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Adaptability to acute stress among women survivors of intimate partner violence: protocol for a mixed-methods cross-sectional study in a laboratory setting (BRAW study)

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ABSTRACT

Introduction Intimate partner violence (IPV) is the most common and alarming form of violence against women, affecting around 30% of all women around the world. Using an integrative methodology, we approach IPV as a form of chronic exposure to severe stress that alters the stress-response system of exposed women. The aim of this study is to test the hypothesis that sustained exposure to IPV in women confers a vulnerability-to-stress profile characterised by higher neuroendocrine and behavioural responsiveness associated with a selective attentional processing bias towards threat.

Methods and analysis Women between 21 and 50 years old from the area of Barcelona (Spain) will be invited to participate. A sample of 82 women exposed to IPV and 41 women not exposed to IPV will be included and assessed for attentional bias and response to acute stress in a laboratory condition (the Trier Social Stress Task). The study will include quantitative and qualitative measures of cognitive performance, neuroendocrine activity and face-to-face interviews to obtain an integrative description of the stress-response profile of these women. Results are expected to help build resilience strategies with a long-lasting impression on women's healthy functioning.

Ethics and dissemination The study has obtained the approval of the local Ethics Committee ('Comité de Ética de Investigación Parc Taulí de Sabadell'; 2018551 V.1.2 June 2018). Besides the communication of results in peer-reviewed papers and scientific congresses, the project will inform guidelines and recommendations through policy-dialogues and workshops with relevant regional and national representatives for future work and prevention strategies. Participants will be invited to be an active part in the dissemination strategy focussed on raising awareness of coping limitations and abilities that women themselves will be able to identify throughout the study.

Trial registration details The study has been registered at the ClinicalTrails.gov database (Identifier number: NCT03623555; Pre-results).

Strengths and limitations of this study

- The design combines biological and psychosocial data in an integrative model of the health consequences of intimate partner violence.
- A mixed-methods approach allows to incorporate the voices of the survivors in the research process.
- Stress reactivity is measured in the laboratory using the gold standard Trier Social Stress Task.
- The limited sample size will prevent exploring possible modulatory effects of relevant variables (ie, other stressful experiences).

INTRODUCTION

The burden and prevalence of violence against women and girls worldwide has helped raise this issue as a global public health problem.[1] While women are exposed to several types of gender-based violence, almost one in three ever-partnered women worldwide (30%) have experienced intimate partner violence (IPV).[2] This alarming reality applies to the territory of the European Union (EU), where a recent EU-wide survey has estimated the prevalence of IPV to be 22%.[3] It also reflects on the IPV estimates in Spain: 13% of women report suffering physical or sexual violence, and over 26.4% have suffered psychological and economic IPV.[4]

Consistent evidence confirms that survivors of IPV, compared with women who have not suffered IPV, more frequently present chronic diseases such as diabetes, chronic pain, asthma or cardiovascular disease.[5 6] Furthermore, mental health-related consequences are largely common among IPV survivors.[7] It has been estimated that up to 28% of the cases of depression can be attributed to lifetime exposure to IPV.[8] Only in the USA this translates into 1 million cases of depression per year that could be completely averted if no women had been exposed to IPV. In this regard, the possibility to suffer traumatic

brain injury has to be considered as this is frequently associated with mental health problems, mostly depression.[9] Also relevant to the present study, women survivors of IPV are more likely to report a history of childhood trauma, which per se has long-term consequences in mental health.[10 11] In Europe, almost one-third of the women exposed to sexual IPV report having experienced sexual victimisation during childhood.[3] A recent multi-country study has reported ORs ranging from 1.41 to 3.8 in six out of seven study sites.[12]

This background clearly supports a relationship between IPV and disease. But the biological correlates of such association are still unclear. The most widely acknowledged theoretical approach proposes a model of chronic stress. Indeed, the victims of IPV are repetitively exposed to physical, emotional and sexual violence in the context of an intimate relationship that may last for years.[13] Each single exposure to IPV is expected to trigger the typical neurobiological response to stressful stimuli, which includes a wide range of neural and peripheral stress biological responses, including the activation of the sympathetic-adrenomedullary and hypothalamic-pituitary-adrenal (HPA) axes,[14] and the subsequent release of catecholamines and cortisol, respectively. When this stress response presents frequently or persists continuously for an extended period of time, the mechanisms that were initially activated to cope with acute stress extend over time and can eventually lead to pathophysiology and psychiatric diseases.[15] However, the impact of chronic stress on basal cortisol secretion appears to be dependent on several critical factors, including the time since stress onset, the type of challenge and the possibility of control.[16]

Stress-related biological dysregulations specific to IPV survivors have been addressed for the first time in a recent systematic review.[17] Authors reveal that this population present flattened diurnal cortisol rhythm and an overall higher diurnal secretion—a pattern expected after exposure to chronic stress. The extent to which these changes persist once exposure to the situation has finished is unclear. Interestingly, in IPV survivors that developed post-traumatic stress disorder, but not in those without overt psychopathology, reduced baseline cortisol levels and enhanced suppression by dexamethasone has been reported.[18] In sum, previous literature consistently supports that the neurobiological mechanisms involved in the stress-response system are altered following IPV. Importantly, these alterations can be placed in the core of the neurobiological pathogenesis of the associated health disorders.[16]

Why our study?

Despite the critical importance of the stress-response system, most research on IPV has only evaluated basal activity of the HPA and other biological systems. This has left unanswered the question of whether women previously exposed to IPV present behavioural difficulties when coping with new emotional situations (ie, anxiety, emotional arousal) and whether this is reflected in an altered HPA responsiveness. The activation of the stress system in response to novel stressful situations is a central matter as it reflects the person's capacity to respond to the changing demands that commonly occur at work and at home. For example, a job interview could be a stressful circumstance that affected women may have to face after recovering from IPV. The performance during the interview (ie, getting or losing the job opportunity) will largely depend on the current person's neuroendocrine and behavioural vulnerability to emotionally stressful situations or, on the contrary, on the successful, resilient strategies women may present to cope with acute stress.

A history of chronic stress can alter responsiveness to further acute stressors in a way not predicted by basal HPA activity. These alterations can be either sensitisation or blunting.[19] In this regard, experimental findings indicate that both acute and chronic exposure of adult rats to severe stress induced HPA cross-sensitisation; that is, enhanced response to new acute stressors.[20 21] Human studies focussed on the consequences of exposure to chronic stress also adopt this perspective. Evidence suggests that the chronic stress exposure implicated in caregiving is associated with dysfunctional psychosocial behaviour related to maladaptive coping strategies when facing novel stressful circumstances. A key phenomenon in this respect is selective attentional processing,[22] which refers to an attentional bias early on the process of the cognitive approach to any given situation that predisposes a person to an enhanced vigilance for threat. This bias towards threat has been linked to being a victim of interpersonal violence,[23] and is associated with higher HPA axis activity.[24] Quite surprisingly, no study has yet evaluated selective attentional bias in association to acute stress responsiveness among women exposed to IPV.

In the present proposal we aim at identifying potential alterations in the adaptive response to acute stress among IPV-exposed women using valid measures of neuroendocrine and behavioural response to acute stress. We propose that these alterations persist in the long term even when the exposure to IPV has ceased. Given the innovative nature of this project, we will register the perceptions of the participants regarding their experience of acute stress. This qualitative information will allow the identification of variables that may be overlooked during the design of the study. Also, we will assess the long-termed marks of chronic stress on the global basal levels of cortisol in IPV survivors using hair-cortisol analysis, following previous studies on other stress-related situations.[25 26]

Objectives of the study

The main (general) objective of our study is to compare the response to acute stress in a group of women with a history of IPV as opposed to women without such history from the same community. The specific objectives are:

1. To assess the neuroendocrine (HPA axis) and behavioural response to acute stress.

2. To study whether IPV women show selective attentional processing bias towards threat.
3. To identify the resilience strategies used by women in terms of psychosocial schemes (ie, quantitative and qualitative information) and neuroendocrine regulation to cope with acute stress and their relationship with health status.
4. To examine global basal cortisol alterations in the group of IPV-exposed women using hair-cortisol analyses.

The main hypothesis of our study is that women exposed to IPV, in contrast to a group of women without a history of IPV, will present a vulnerability-to-stress profile. The specific sub-hypotheses of the study are:

1. The group of women exposed to IPV will present higher neuroendocrine and behavioural responsiveness to stress than the non-exposed group, as measured by self-reported behavioural scales and salivary cortisol, respectively.
2. A selective attentional processing bias towards threat will be associated with a higher response to acute stress in the group of women exposed to IPV, as opposed to the group of non-exposed women.
3. The performance and resilience strategies during an acute stress task will be self-perceived as poorer/weaker among the group of women exposed to IPV in contrast with the self-perceptions of the group of non-exposed women, as assessed using semi-structured interviews and quantitative scales. Weaker resilience strategies will be related to poorer health status.
4. Women exposed to IPV will present higher levels of hair cortisol indicating global basal cortisol alterations.

STUDY CONTEXT

Participants will be women from the general population who will be recruited through advertisements in the community and in social media. The interviews will take place in the facilities of Parc Taulí Foundation, the research branch of the Parc Taulí Healthcare Corporation (Corporació Sanitària Parc Taulí, CSPT). Participants will not receive monetary compensation for their participation in the research.

CSPT is a public healthcare legal entity that manages the third-level Parc Taulí Hospital along with primary healthcare centres, diagnostic and emergency units, and several transversal services including sexual and reproductive health programmes. It is the single healthcare provider for the area of the Catalan Eastern Occidental Vallès, which counts a total population of close to 500 000 people. Parc Taulí Foundation (Fundació Parc Taulí, FPT) provides support to CSPT in areas of research, teaching and innovation, and has been recognised as a University Institute affiliated to the Universitat Autònoma de Barcelona. FPT has a strong background in the promotion of healthy habits and social awareness in the community, and for the last decade has dedicated special efforts to enhance this line of work in the area of mental health.

Because social media will be an important tool for recruitment, participants in the study are expected to belong to areas in Catalonia that will exceed the catch zone of the reference Centre. In particular, we expect participants based in the area of Barcelona, which covers a population of approximately 1 620 000 inhabitants.

METHODS AND ANALYSIS

Study design and participants

We will use a mixed-methods, cross-sectional design in compliance with the Good Reporting of a mixed methods study (GRAMMS) framework.[27] The key element in the study is the inclusion of the Trier Social Stress Task (TSST), which provides a laboratory setting to measure the neuroendocrine and behavioural responses to acute stress. Quantitative data will be generated from various sources, including biological samples (hair, saliva) and clinical and behavioural scales that are described in detail in the procedures section below. Qualitative data will be generated from semi-structured interviews that will be used to register the participants' impressions regarding their experience during the TSST, with a focus on identifying emerging themes. The integration of these sources of data is the main justification for proposing a mixed-methods approach. While the sample size for the quantitative analysis has been calculated during the design phase of the study, the total number of semi-structured interviews may vary. Interviews will continue until data saturation has been reached in the analyses (ie, no new emerging themes are identified from new interviews, expected 30 interviews[28]). The methods for each stage of the study are presented in more detail in the following sections.

Criteria for the inclusion of women in the study will be mainly guided by their previous exposure to IPV, which will define two groups of participants: an IPV-exposed group with an estimated sample size of 82 women, and a non-exposed IPV group with an estimated sample size of 41 women (see sample size calculation for further details). The definition of exposure to IPV will follow the WHO guidelines: 'IPV refers to any behaviour within an intimate relationship that causes physical, psychological and sexual harm to those in the relationship'[29] and will include physical violence, sexual violence, emotional/psychological abuse and controlling behaviours. These forms of violence will also follow WHO's definitions[30] including but not limited to: (1) Acts of physical violence: the woman has been pushed, beaten up, choked or burnt by an intimate partner; (2) sexual violence: any form of sexual coercion by the intimate partner; (3) emotional/psychological abuse: the woman has been humiliated, intimidated, threatened by her intimate partner; and (4) controlling behaviours: the woman has been isolated, monitored for her actions by her intimate partner, and restricted her access to financial resources, employment, education or medical care. In order to warrant chronic exposure to stress as proposed in the rationale of the

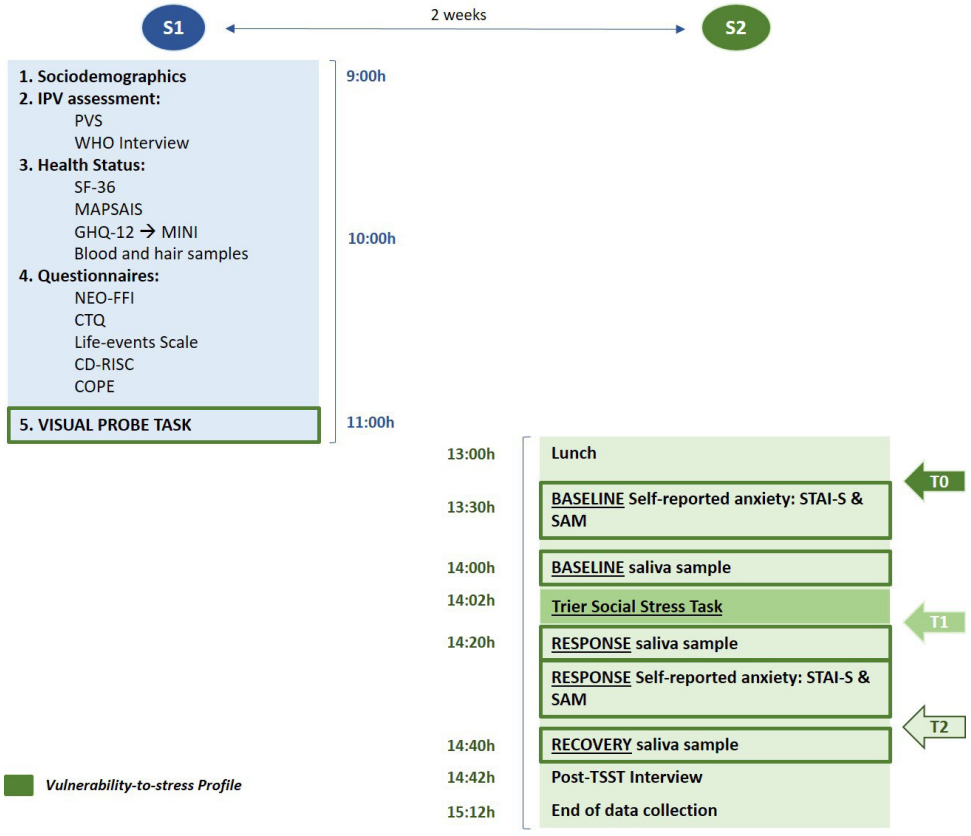

Figure 1 Procedures of the study. Session 2 (S2) will be scheduled 2 weeks after session 1 (S1) and will take place in the afternoon. CD-RISC,Connor-Davidson Resilience Scale; COPE, COPE Inventory; CTQ, Childhood Trauma Questionnaire; GHQ-12, General Health Questionnaire; h, hours; MAPSAIS, Miller AbusePhysical Symptom and Injury Scale; MINI, Mini-International NeuropsychiatricInterview; NEO-FFI, NEO Five-Factor Inventory; PVS, Partner Violence Screen;SAM, Self-Assessment Manikin; SF-36, Short Form 36 Health Survey; STAI,State-Trait Anxiety Inventory; TSST, Trier Social Stress Task; WHO Interview, WHO Violence Against Women Instrument.

study, the minimum time of duration of the violent relationship will be set at 1 year.[16] Also, to study the long-term effects of IPV once the exposure has ceased, only women who have already ended the violent relationship for at least 1 year will be included.

Exclusion criteria will be as following: age below 21 (to allow a margin of accumulated relationship experience during adulthood) and over 50 (excluding menopause), having any pituitary and/or adrenal gland disorder, currently using steroid-based medications, being currently pregnant, lactating or menopausal and having a severe illness that may affect cognitive performance and/or consciousness. No participant will be excluded on the basis of disability, ethnicity, religion or sexual orientation.

Procedures

Women interested in participating will actively contact us by the email address that will be detailed in the advertisement. At first contact, a researcher will assess eligibility according to inclusion/exclusion criteria. If all criteria are met, a first face-to-face session will be scheduled for an in-depth interview, followed by a second session 2 weeks later to complete the assessment of response to acute stress exposure. A visual depiction of the procedures is presented in figure 1, and a detailed description of the measures along with the reference for the Spanish translations of the scales is available as online supplemental materials.

Session 1

All participants will obtain a full description of the study's aims and procedures and all questions will be answered. Only those women willing to participate who sign an informed consent will be included in the study. Sociodemographic data will be collected through the use of a standardised self-report questionnaire. History of IPV will be extensively described combining standard measures of screening (Partner Violence Screen[31]) and an in-depth structured interview among women identified as survivors that include onset and frequency of IPV among other details (WHO Violence Against Women Instrument[29]). Exposure to other forms of interpersonal violence will also be collected at this point using the Childhood Trauma Questionnaire (CTQ,[32]) and the Life-events Scale.[33] A description of coping styles and resilient behaviour will be assessed using the Coping Orientation to Problems Experienced Inventory[34] and the Connor-Davidson Resilience Scale.[35]

A comprehensive health profile will also be assessed during the initial interview that will provide information

on physical and mental health status and history of clinical treatment. The Miller Abuse Physical Symptom and Injury Scale[36] and Short Form 36 Scale for self-perceived health status[37] scales will be used for the assessment of physical symptoms and perception of general health. As part of the comprehensive health profile assessment, a full laboratory test will be included to obtain a description of biochemistry markers. For this objective, peripheral blood samples will be collected by a nurse in 15 mL of capacity tubes. The General Health Questionnaire (12 items version, GHQ-12)[38] will be used for screening of mental health status and the Mini International Neuropsychiatric Interview[39] for in-depth assessment when GHQ-12 suggests mental health disorders. Personality traits will be assessed using the Neuroticism-Extraversion Openness Inventory (Five Factor version, NEO-FFI[40]).

Finally, a hair sample of more than 3 cm length with an approximate diameter of 30 single hairs will be taken from the upper part of the scalp. This technique provides a measure of the integrated global basal cortisol over the growth period of a specific hair segment, typically 1 cm/month.[41] As glucocorticoid levels cannot be experimentally manipulated in humans, we have biologically validated this variable measuring hair corticosterone in rats.[42] Moreover, we have also technically validated in our laboratory the measurement of hair cortisol in humans using the well-characterised Salivary Cortisol Elisa Kit (Salimetrics, LCC, Pennsylvania, USA). Reliability of the measure taken at different times is good, with correlations of 0.68 to 0.79.[41]

At this point of the assessment, we will examine selective attentional processing by means of the Visual Probe Task (VPT).[43 44] Briefly, participants will be presented simultaneously with a pair of stimuli, one emotionally salient and one neutral for 500 ms time, followed by a probe that replaces one of the two stimuli. Participants will be required to respond as accurately and as quickly as possible to the probe. Reaction times will be recorded and contrasted. A decreased reaction time to a probe replacing emotional stimuli compared with the neutral stimuli will provide a measure of bias to be vigilant for threatening information. Assessment of the VPT will be accompanied by a brief complementary cognitive examination that will include semantic memory,[45] IQ[46] and executive functioning.[47 48]

Session 2

After 2 weeks, a second appointment will be scheduled focussed on the assessment of the response to acute stress. In order to control for potential differences in circadian rhythm associated with endocrine activity, all participants will have a light lunch in the cafeteria of the centre 1 hour before the start of the laboratory phase. To control for inter-individual differences in cortisol levels, heavy physical activity 2 hours before lunch, and coffee consumption the same day are not allowed.[49 50]

Acute psychosocial stress response will be assessed using the TSST.[51] This is the gold standard in biopsychological stress research, and can be briefly described as a mock job interview. The participants are instructed to imagine that having applied for their 'dream job', they are now invited to a job interview. Participants are aware that no real job is at issue. The TSST consists of three successive phases: (1) a preparation period (3 min), (2) a free speech task in which the participants have to argue why they are the best candidate for the job (5 min) and (3) a mental arithmetic task in which participants have to sequentially subtract an odd two-digit number from an odd four-digit number (eg, 17 from 2023; 5 min). The two tasks are performed while standing in an upright position in front of a selection committee consisting of two members, one male and one female, dressed in white lab coats, acting in a reserved manner and providing no facial or verbal feedback.[52] The interview is recorded in a video camera, a procedure that has been demonstrated effective in triggering further threat.[53] The researchers in charge of the TSST are blinded to the condition (IPV-exposed or not exposed) of the participants.

The primary measure of the stress response will be the activation of the HPA axis by assessing the release of cortisol immediately before the TSST (T0), immediately after (20 min after the start of TSST, T1), and at recovery (40 min after the start of TSST, T2). Saliva samples will be obtained by means of Salivette Cortisol collection devices (Sarstedt AG & Co, Germany) and will be stored at −20°C on the same day of collection. Salivary cortisol levels will be determined by means of a competitive radio-immunoassay (RIA) technique developed in our laboratory that uses anti-cortisol antibody (121116) and Iodinated cortisol (121126) from MP-Biomedicals (Valiant Co, Ltd, USA). We have validated this RIA against the Salivary Cortisol Elisa Kit (Salimetrics, LCC, Pennsylvania, USA), showing a high correlation of r=0.95. The reliability of the salivary cortisol TSST response is moderated, with Spearman correlations over the days between 0.38 to 0.60.[54]

The behavioural response to acute stress will be the level of anxiety and perceived stress. To fulfil this aim, the individuals' responses to two different scales will be registered. The first of these scales will be the state examination of the State-Trait Anxiety Inventory (STAI,[55]), which will allow to examine the self-perceived level of state anxiety at baseline (T0) and after the task (T1). Cronbach's alpha reliability of the Spanish adaptation of this measure is high: 0.90 for the Trait Inventory and 0.94 for State Inventory. The second scale will be the Self-Assessment Manikin (SAM,[56]), which is a picture-oriented scale to register an emotional response in its three key features: valence/pleasure of the response, arousal and dominance/control. This is a non-verbal scale specifically designed to be applied in transcultural settings.

The final half hour of the second appointment will be dedicated to a face-to-face interview aiming to systematically register subjective experience-based issues related to stress and coping strategies that may have not been included in the quantitative assessment. The interviewer will have no previous contact with the women up to this

moment. Participants will be invited to a semi-structured interview regarding their feelings, perceptions and attitudes during exposure to the acute stress (TSST), generating a personal narrative of the experience by women themselves.[57] Conversations will be recorded and the transcripts will be used for analysis.

Sample size calculation

Sample size has been calculated using a priori power analysis conducted in G*Power V.3.1.9.2 for Windows,[58] with a focus on the neuroendocrine response to acute stress that will be assessed by means of the changes in the levels of salivary cortisol during TSST at T0, T1 and T2. It has been estimated that the TSST reliably activates the HPA axis and triggers a twofold to threefold increase in cortisol in about 70% to 80% of participants.[59] Assuming a conservative effect size of 0.2 based on this reference, and the correlation between measures of 0.38 mentioned above,[54] if we want to detect differences among the two groups with a power of 0.95 and an alpha of 0.05, we will need a sample size of 41/group to detect a significant effect (repeated measures analysis of variances (ANOVAs) for the predictor analysis: Test Family: F tests, Statistical test: ANOVA, Repeated measures, within-between interaction, Type of power analysis: A priori, two groups, three measurements). Because violence during childhood can also affect the stress system of women,[60] the sample size of the group exposed to IPV will be doubled to include an even number of women with and without a history of childhood violence, as assessed by the CTQ. Therefore, the complete sample will include: (1) the group of women exposed to IPV composed of 82 women, 41 of them with history of childhood abuse and 41 of them without such history, and (2) the group of women not exposed to IPV, composed of 41 women. The total sample size will equal 123 women. Data collection will continue until the minimum sample is reached.

Participants and public involvement

The study has been designed with a focus on exposure to IPV as a main risk factor for a number of health-related issues, particularly mental health disorders. During the design stage the research team was particularly concerned that the exposure to acute stress was clearly justified, and the information obtained through this laboratory condition could not be collected in other forms. It was also highly important that the experimental condition would resemble a situation that any person could be presented with in real life. The team consulted local experts in the field of violence against women before deciding on the use of the TSST.

During the recruitment period, different local governmental and non-governmental organisations will be involved as consultants and sources of identification of potential participants. They will also be contacted to discuss the final results and potential recommendations.

The final stage of the study will include a workshop session where the participants will be placed in the centre of the experience and will be invited to contribute to possible solutions. This session will have two parts with different purposes. The first will be an open session aiming at disseminating the results of the study, including specific interventions to raise awareness about the consequences of IPV. This first part will target all the participants as well as other stakeholders and social agents that may benefit from this information. The second session will be a closed participatory session targeting the participants with history of IPV aimed at identifying strategies to build resilience and discussing prevention strategies. The session will end with the co-creation of an inventory of prevention strategies (from survivors and for survivors) and ideas to communicate them.

Data management plan and measures

All participants will be assigned a code at the moment of inclusion in the study, and the identification information will be saved separately to warrant confidentiality. Original data will be transferred to databases that will be archived in FPT applying the standard processes of the centre. These same standard processes will be used to secure data quality throughout the study.

First, a detailed descriptive analysis will be run that will include the information from: (1) the initial interview, (2) hair-cortisol analysis, (3) the results of the VPT task, (4) the neuroendocrine response trajectories during the TSST, and (5) the self-reported levels of behavioural responses during the TSST. This information will be presented in the form of contingency tables. Group-comparison analysis will be run between the groups of IPV-exposed women (with and without history of childhood maltreatment) and non-exposed women. Tests will be selected according to the nature of the variables and their sample distributions.

The primary outcome variable in the study is the neuroendocrine response to acute stress, measured on the basis of salivary cortisol at T0, T1 and T2. The secondary outcome variables are the behavioural responses to acute stress as measured by self-reported behavioural scales: perceived levels of anxiety at T0 and T1 (STAI), perceived levels of valence/pleasure, arousal and control at T0 and T1 (SAM). Hence, these will be the dependent variables in all analyses (online supplemental table 1). The hypothesis being tested at this stage will be that the three groups differ in the measures of response to stress both at the neuroendocrine (salivary cortisol) and behavioural (self-reported behavioural scales) levels. To test this hypothesis, we will use a generalised lineal model, specifically a repeated measures design,[61] using group and time as the explanatory variables (online supplemental table 2).

The following stage will test the hypothesis that bias towards threat as measured by the VPT task is associated with the response to acute stress in the group of women with IPV. To test this hypothesis, an independent analysis will be run with VPT, group and time as explanatory variables. Two independent analysis will be run for salivary cortisol and for behavioural outcomes.

Other variables of potential interest will be included as covariates in the models: age, level of education, exposure to other relevant life events, copying styles, resilient behaviour, general health status (physical symptoms, global cortisol hair concentration, self-perception), mental health status, personality traits, and cognition (semantic memory, IQ, executive function) (online supplemental table 3). Data will be analysed using SPSS software (IBM SPSS Statistics for Windows, V.23.0. Armonk; New York: IBM Corp).

Regarding the semi-structured interviews that follow the TSST, the research team will develop the general guidelines before the start of the study. All interviews will be recorded, and the transcriptions of these recordings will be conducted by trained professionals. Content analysis will be used to extract the fundamental aspects of the discourse on the experience of women and their resilience strategies.[62] The aim will be to search data saturation, this is, when new interviews do not provide new findings on the results. Transcriptions will be analysed using software for qualitative analysis, Atlas.ti (Atlas.ti 8 Windows, Scientific Software Development GmbH). Following on these data, a second tier for analysis will focus on profile differentiation in order to capture the different narratives and profiles that may arise across participants, and related to other variables (childhood abuse, socio-economic position, education). This will lead to highlight the common traits within each profile as well as strengths and weaknesses. Finally, the integration of quantitative and qualitative data will take place through a mixed-methods analysis that will be run to explore relevant aspects identified in the post-TSST interviews and that may have not been fully considered in the original design.[63] The selection of the specific variables at this point will be determined by results of the previous stages. Integration of the different sources of data will also be performed during the interpretation of the results using data presented in theme-by-statistics joint display.[64]

Ethics and dissemination

This study has been approved by the Ethics Committee of reference ('Comité de Ética de Investigación Parc Taulí de Sabadell'). Written informed consent as approved by the Ethics Committee will be obtained after a full description of the study's aims and design. Participants will be informed of the confidentiality of their comments and of the contact information of the principal investigators to exercise their rights of access, modification, opposition and cancellation of data, and withdrawal from the study without any repercussions, following the European Data Protection legislation (2016/679; Ley Orgánica de Protección de Datos de Carácter Personal, 15/1999 del 13 de Diciembre, LOPD). Registry and use of information resulting from this study will follow the Declaration of Helsinki agreements. All biological samples will be collected and stored according to the corresponding legislation (Llei 14/2007 de Recerca Biomèdica). The study will follow WHO's recommendations for research on violence against women.[65] Participants will be compensated for their transportation expenses, but no other compensation will be included in the study. They will be asked about their experience with the study immediately after completion of the interviews, and this information will be collected and used to provide feedback on evaluation of the study. Finally, all participants will be provided with information regarding counselling services and other resources as appropriate.

The dissemination of the results of our project will start at the level of the participants during the final workshop, which is expected to act as a first step for developing prevention tools and information resources that are essentially built by women themselves. We will carry out policy-dialogues and workshops with relevant regional and national representatives aimed at enhancing the current policies and roadmaps regarding the training and management in the educational and healthcare areas. Spain counts with relevant programmes in the field of violence against women,[66] and we expect to provide these initiatives with evidence-based data that can help build innovative solutions. At the level of the dissemination of results in the scientific community, the strategy includes the publication of the results in international peer-reviewed scientific journals and the presentation in national and international congresses. Also, the project is expected to strengthen the way healthcare providers respond to women who have experienced violence. A series of courses will be developed based on the results of this project and others with similar objectives to inform the work of psychologists, psychiatrists, social workers, nurses and any professional association that might be willing to receive the training. The complete set of results from the study will be used to develop guidelines and recommendations for actions that will be distributed among professionals.

DISCUSSION

The prevention of violence against women in general, and of IPV in particular, has risen as a priority on the international public health agenda, and research is playing a key role in the detection of protective factors and the development of effective interventions.[67] Are there cognitive implications of exposure to gender-based violence? Which systems underlie these effects, what causes them? Can they be reversed? These are questions that exceed the laboratory settings and impact 'the real world'. Our proposal aims at targeting these traits, which not only impair women's daily functioning but also feed a cycle of attitudes, norms and beliefs that justify dominant notions of masculinity and stigmatise survivors.[68 69] Hence, the inclusion of a mixed-methods approach that integrates subjective reports with neurobiological data is a key aspect of this protocol.

Regarding methodological issues, the TSST is a powerful tool to identify dysfunctional patterns of coping that may help explain some critical aspects of the behavioural

responses of IPV-exposed women. However, we have included the TSST only after extensively discussing the possible distress that may be caused to women, and the benefits of including the measure in the study. Our decisions throughout the project have been guided by the WHO Practical Guide for Researchers and Activists.[70] This document summarises all aspects of research in this field and provides with useful recommendations to assure the project achieves the objective of serving the target women. The safety of respondents and the research team is our priority and it is our advice that it be that of any other study working with this population. The identification of any problem in this respect must result in the immediate interruption of the assessment. The research team must be trained, and the assessment must be conducted in a location different to that where women receive health and social assistance.

The main limitation in our study is that the limited sample size will prevent exploring putative modulatory effects of relevant variables such as other lifetime stressful experiences. Also, we will not be able to test our hypothesis among women over 50 years of age due to restrictions in the inclusion/exclusion criteria. We would like to acknowledge the need for further information and research regarding IPV in the population of women aged 50 years and older, as has been highlighted by others before us.[2] The mixed-methods approach proposed in our project is expected to be challenging because the qualitative perspective tends to emphasise an inductive method that highlights subjective information while the quantitative perspective is based on a deductive method largely based on objectivity and generalisation. In turn, our study has the potential to provide evidence to serve a deeper understanding of IPV and the vulnerability and resilience processes that IPV-exposed women present. This information will allow professionals and institutions to better understand and address this reality. Ultimately, it is expected that the results of this research will serve as the foundation to build evidence-based tools for the prevention of re-victimisation among women exposed to IPV and of IPV in at-risk groups.

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