



New technology proposals for tackling intimate partner violence: Challenges and opportunities

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ABSTRACT

Intimate partner violence remains a critical social phenomenon in today's societies. Among the different effective resources and tools to address it, technology seems to offer an innovative procedure to reduce its impact. This article is based on the potential contribution of technology to protect female victims, offering a qualitative analysis of the testimonies of experts who contributed to an ongoing project to design a device capable of providing automatic and immediate warning when women are in at-risk situations. The analysis of the discourses of the experts interviewed provided valuable information to explore the possibilities, limitations and unforeseen effects offered by technology in general, and this new device in particular, for tackling intimate partner violence.

1. Introduction

Intimate partner violence (IPV) constitutes an omnipresent problem in today's societies, and Spain is no exception in needing to urgently address this phenomenon. Despite its long history, IPV was not recognized as a social problem in Spain until the first decade of this century, when the Law 1/2004 was approved in order to define this type of crime and create different mechanisms to confront it.¹ Although in the last decades, comprehensive protection of women has improved, this has proven insufficient to eradicate the phenomenon and to achieve universal social rejection. Recent data and reports on this topic reveal that this type of violence continues to produce a high number of fatalities and it is represented in different types of violence, such as physical, psychological, emotional, economic and sexual [1]. The Spanish *Instituto de las Mujeres* (Women's Institute)² revealed, for example, that 45 fatalities occurred in 2020. Also, the *Macroencuesta de Violencia contra la Mujer* (Macro-survey on gender violence against women³) reported in 2019 that 11.4% of women had experienced physical violence and 8.9%

suffered sexual violence in their intimate partner relationships. At the same time, the *Consejo General del Poder Judicial* (General Council of the Judicial Power) [4] revealed that during 2016, 2017 and 2018, 30.5% of the women murdered in Spain had previously submitted a lawsuit against their perpetrators, a figure that offers two readings: it seems that many women do not report situations of violence prior to their murder and, at the same time, the lawsuits, very frequently, appear to be insufficiently effective to stop the perpetrators.

Technology can play a very relevant role in tackling IPV, as was stated by the United Nations. Sustainable Development Goals (SDGs) [5], specifically in objective 5, that proposes to "enhance the use of enabling technology, in particular ICT technology, to promote the empowerment of women". To accomplish this target, ICT technologies must be designed with a gender perspective, so as to serve as an instrument of empowerment increasing the participation of victims of IPV in the process to achieve a more satisfactory welfare. In this sense, different studies have pointed out how technology may become a resource that provides rights to those who are abused and are identified

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¹ In Spain, contrary to other countries, IPV was defined according to the law as gender based violence, indicating with this concept violence which is exclusively framed in partner relations. Based on the Conditions established in the Istanbul Convention (2011), Spain is committed to broaden the concept of gender based violence to other types of violence against women.

² The Women's Institute is the governmental institution (attached to the Ministry of Equality) that was created with the aim to promote and develop gender equality. The Institute promotes and manages statistical data on the situation of Spanish women [2].

³ The 2019 Macro-survey on gender violence against women was based on a sample of 9568 women representative of the female population residing in Spain aged 16 or over [3].

as vulnerable [6,7].

The analysis offered in this article is part of a project entitled EMPATÍA,⁴ which aims to improve the protection of women through innovative technologies, providing an automatic, immediate and remote warning of at-risk situations. More specifically, the analysis focuses on a wearable solution, currently in development, that uses physiological sensory data, audio analysis and machine-learning algorithms to detect intense emotional states (such as panic, fear or stress) caused by IPV situations [8]. The project has involved women in the design process of the device, with the aim of counterbalancing the overwhelming male representation in the configuration of current technology [9,10], and has also taken into account the interpretation of emotions from a gender perspective. The main objective is, therefore, to examine the relationship that exists between technological development and its application to social reality in the specific case of IPV. Within this framework this article specifically analyzes the potential of this new resource, considering the features that the device should have and its possible social effects.

2. The potential of technology to tackle intimate partner violence

Technological devices designed to defend victims of IPV, and of GBV in a broader scope, have recently been implemented in western contemporary societies. This technology is consistent with the expanding importance of information and the process of individualization that have affected social dynamics in recent years [11–13].

The relationship between women and technology has often been observed as problematic and difficult. Technology has traditionally been designed and developed by men, without paying specific attention to women, with the exception being devices geared toward perpetuating their role as caregivers or housewives [14,15]. The purpose of the technological devices, such as the one examined in this paper, is based on enabling women to receive support and provide control over their lives in order to facilitate more security and normality in their daily life [16]. However, the current technological devices designed to tackle IPV tend to be pragmatic and short-range [17], since they do not incorporate the structural bipolar social problem that involves perpetrators and victims.

The technological devices applied to IPV also translate into metaphors and allegories, such as those collected by Haraway [18] when referring to the cyborg, an illustration of the possibility of transcending traditional problems with new resources. Technology, from this point of view, facilitates the empowerment and liberation of women from patriarchal structural domination. In general terms, these types of devices, as pointed out by Arenas García [19], are usually effective, reduce aggressions and are positively valued by the victims, who frequently agree to use them due to the feeling of security and support they provide.

These devices, such as the one that constitutes the main focus of this article, are basically fed with information obtained from the victim although, on some occasions, also includes information from the perpetrator. Thus, personalization and adaptability, two qualities that characterize the information society [20], enable the detection of at-risk situations when the victim's physiological markers identify them. The design of the device presented in this paper employs more sophisticated indicators than traditional ones, expanding the options offered by panic buttons [21]. This innovation involves the introduction of objective features to detect the threat provoked by the actions of the perpetrator over the victim, identifying victim's physiological responses independently of the level of violence of the actions [17]. This trait will be

⁴ The acronym Empatía stands for 'protEcción integral de las víctimas de violencia de género Mediante comPutación AfecTiva multimodal' (Comprehensive protection of victims of gender-based violence through multimodal affective computing).

programmed with the information provided by an 'emotional database', generated *ad hoc* with a 3D audiovisual experiment to test women's reactions in virtual situations of potential risk and it will be adapted to each user's case measuring the responses of each individual. Furthermore, the device also facilitates the geo-localization of the victim, gathering evidence of the alleged offence and transferring the warning to a 'guard circle', who can act immediately to protect the user.

The technological devices examined in this paper are conceived as technical elements with highly accurate sensors capable of identifying states of risk based on the changes of different vital signs, developing and improving the solutions offered by other devices, such as ATENPRO⁵ and COMETA,⁶ which have been questioned because of their limited efficacy and the unforeseen effects they have on the victims. However, current technological devices in the field of IPV also have limitations in their use and design, such as battery life, insufficient signal coverage or false alarms when the physiological parameters incorrectly indicate a situation of violence [19]. In addition, new devices designed to tackle IPV gave rise to a certain degree of skepticism regarding the real impact that they can achieve. This is due to the fact that enormously complex and heterogeneous feelings, situations and behaviors, such as those that make up the daily reality for victims of gender-based violence, need to be reduced to measures and parameters that are of a general and standardized nature. These problems can lead to a loss of confidence in the devices by the users or the institutions and agencies which incorporate them in their protocols.

These limitations in conjunction with the slow process of social acceptance of new technology, as the immaterial culture evolves more slowly than the material one [22], are part of the feedback process in which the material culture and social demands are modified by the invention of new technology. In this sense, as observed by Castells [23, p. 470] "the relevance of a certain technology and its social acceptance are not a product of the technology itself, but rather of the appropriation of the technology by individuals and groups to satisfy their needs and that of their cultures". Along the same lines, Wajcman [24,25] pointed out that the outcome of technology is neither patriarchal nor liberating for the woman *per se*, but depends on the use it is given and the existing social context. Hence, this author states that the invention of technology does not automatically imply the transformation of the structural factors that produce current social challenges, as they are immersed in broader structural social relations.

The social change provoked by technology allows both to analyze the social needs and the technological possibilities of satisfying them in the past and present, and to examine their trajectory, project them into the future and thus anticipate what is to come. In this way, technology applied to IPV proposes a series of optimistic solutions but, at the same time, it raises the questions of whether these devices could trigger new problems, such as the social identification of the victims and the feeling of control that these devices could produce. Therefore, the future path of this technology depends, to a large extent, on the proper design of the devices along with the capacity to critically analyze their use and the resulting impact on the users.

3. Methodology

To examine the device designed by the EMPATIA project and the

⁵ The telephone service for victims of gender-based violence (ATENPRO) provides a mobile device to the victims to allow them to contact the Centre with specialized staff at any time. (<https://www.msccs.gob.es/va/ssi/violenciaGenero/Recursos/ATENPRO/home.htm>).

⁶ COMETA is a monitoring protection center of gender-based violence. The system provides updated and permanent information on incidents that affect non-compliance with the measures or sentences imposed, as well as possible incidences (<http://www.violenciagenero.igualdad.gob.es/informacionUtil/recursos/dispositivosControlTelematico/home.htm>).

cultural appropriation of such technology, a qualitative methodology was applied based on semi-structured in-depth interviews of professionals from different fields with experience (an average of 15 years) in aiding victims of IPV. Furthermore, a flexible script was designed to guide the dialogue, while simultaneously facilitating a fluid discourse to ensure the conversational initiative came from the interviewees [26,27].

The empirical work was undertaken between March and August 2019, carrying out 14 group interviews and 20 individual ones, with a total of 59 participants, mostly women (56). The interviews were undertaken in the geographical area of Madrid, the setting of the project. The individuals interviewed were key informants related to the process of IPV who belonged to 18 teams from Help Centers for Female Victims of Gender-based Violence (*Puntos de Atención a Mujeres Víctimas de Violencia de Género*), members of six civil society organizations who work with these victims and workers from the *Unit of Family and Women of the National Police*. In the analysis offered in this article the interviews are cited by the order in which they were performed and the profession of the interviewee. Prior to the interviews, and following the current legislation, a strict process of individual consent and data protection was carried out.

Analysis of the qualitative information was performed with the ATLAS.ti software applying 43 different codes. First, a random selection of interviews was codified by all the members of the project in order to discuss and agree the categories [28]. Second, a codification in pairs was performed to enhance the benefits that this process entails in terms of objectivity, coherence and reliability [28–30].

For this article, the following codes have been cross-tabulated and analyzed:

- Code 1.6: Potential aspects of future technology applied to protection of victims. [Exp-Futuro]
- Code 6: Existing devices used to combat gender-based violence. [DIS-Dispositivos]
 - 6.1: Existing devices applied to controlling the aggressor (generally the COMETA device). [DIS-Agresor]
 - 6.2: Existing devices that function as protection tool for victims (generally the ATENPRO device). [DIS- Protección VVG]
 - 6.3: Feeling or perception of safety/empowerment of victims of gender-based violence through the technology. [DIS-Empoderamiento VVG]
 - 6.4: Aspects of the use of protection devices to combat gender-based violence (acceptance/rejection, difficulties, etc.). [DIS- Uso VVG]

- Code 7: Design of new device [Bindi- Diseño dispositivo]
 - 7.1: Body location: potential locations for the future protection device. [Bindi- Localización]
 - 7.2: Aspects related to design, appearance and ergonomics: what the device should be like physically, what shape it should have, its potential comfort, etc. [Bindi- Estética]
 - 7.3: Questions related to device use and activation (activation by the victim, automatic activation, connection to cellular phone, etc.) [Bindi- Usabilidad]
 - 7.4: Potential for acceptance/rejection of future device [Bindi-AcepRechazo]

The following diagram in Fig. 1 summarizes the connection among the different codes (see Fig. 2).

A word cloud based on the discourses of the interviewed experts reflects those terms that, due to their frequency, represent the most significant ideas expressed in all the interviews. In this way, the word that occupies the center of the cloud and, therefore, is the term most mentioned is device (*dispositivo*). At a second level in terms of the number of times it has been cited, we find words that refer to the design of the device: bracelet (*pulsera*), telephone (*teléfono*), ATENPRO, protection (*protección*) and, also, two elements associated with this technology or their use: police (*policía*), problem (*problema*), violence (*violencia*), fear (*miedo*). On a third level there are other concepts that are very evocative of the speech of the interviewees, words that on the one hand refer to characteristics that a potential device should have: small (*pequeño*), earring (*pendiente*), discreet (*discreto*), watch (*reloj*) and those that, on the other hand, show the interviewees directing their discourses towards the experiences of IPV victims: trust (*confiar*), anxiety (*ansiedad*), nervousness (*nerviosa*), health (*salud*), sexual, victims (*víctimas*), perpetrators (*agresores*), risk (*riesgo*), danger (*peligro*), communication (*comunicación*) or lawsuit (*denuncia*).

4. Examining the EMPATIA device through the voice of the experts

4.1. Technology and patriarchy

A mandatory question that arises when discussing aspects related to the aim of technology in the area of protection, concerns the nature of the devices themselves and who they should target. The conversations about the potential effectiveness of technological devices included reflections about the concept of this technology itself and the fact that the

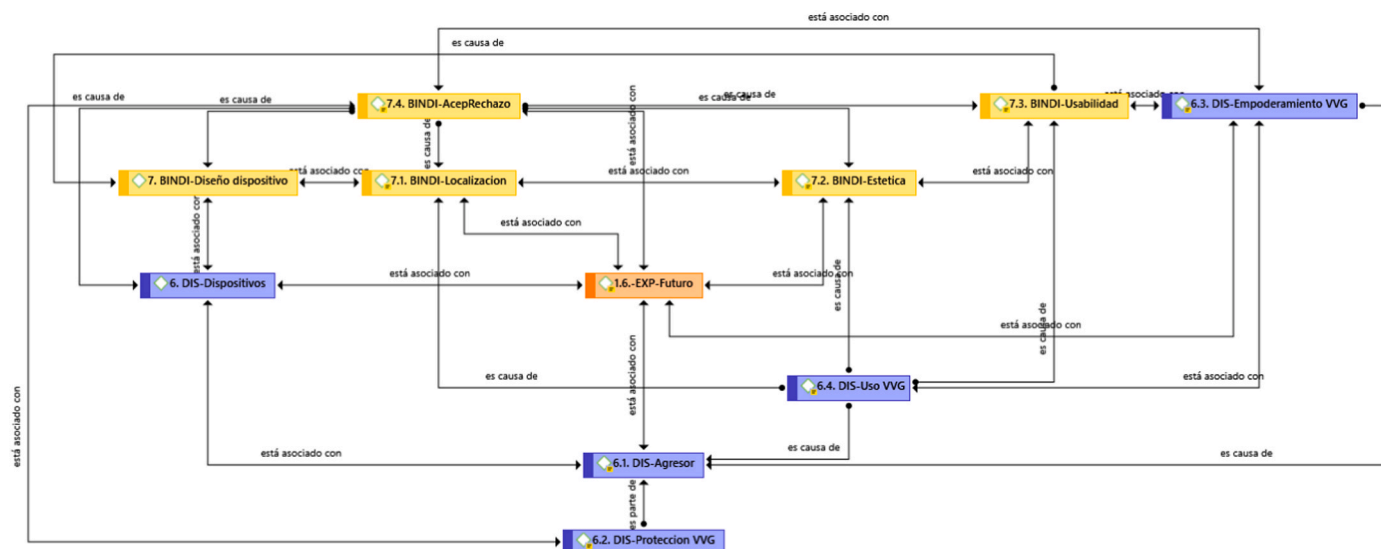


Fig. 1. Connections among the codes examined.

Well, look, really bad coverage, and low battery is what they are telling you lately, and they are right. Or maybe it could even be right in your house where you don't have coverage, which happens a lot with ATENPRO. (I 33, social worker)

... I think that if they made it simple and light, that is, improving on the aspects that we already have with, for example, ATENPRO, which is a device, that's what the women say, is an old, big device, it's obsolete...It's true, it's really bulky. (I 28, psychologist)

The idea shared by a large part of the interviewees can be summarized as follows: the devices should adapt to the daily lives of the women who wear them, and their use should not be burdensome to them. The proposal of shaping the device as a mobile phone was questioned based on the experience that already exists in this respect with the ATENPRO device. The interviewees considered this technology to be excessively bulky to be always carried around and can also be intentionally destroyed by the abuser. On many occasions, the perpetrators vent their anger by attacking the mobile phone of the victims as they represent the victim's relationship with the outside world. Moreover, devices similar to mobile phones are instruments that, in situations of IPV, can lose their effectiveness if they are not within the women's reach when they are at home.

But it would have to be camouflaged, of course. A mobile phone, for example, and all the electronic devices that are related to phones, the abusers go after them. We can't forget about environmental violence. So if it's a mobile phone or within a mobile phone, they can sometimes throw it away, they can manipulate it ... I mean, they take their anger out on the mobile phone, because it's a tool for communicating with the outside world, which means that sometimes it is susceptible to getting broken, or manipulated, or always being checked. (I 26, legal advisor)

Despite these drawbacks of mobile phones as a protection tool, some discourses propose a new protective device which can be incorporated in the phone. According to some experts, the constant presence of this object in everyday life, particularly its familiarity, closeness and accessibility, must be taken into consideration. In this respect, some interviewees pointed out how already existing technology enables a mobile phone to be transformed into a device able to alert of aggressions and monitor the emotions of the victims of IPV.

And another thing, all of us always have a phone with us. I don't know if it would be possible that the bracelet sends everything to the telephone and the telephone could automatically record it and you could get all the information. Maybe that could also be interesting, because in the end, it's very unusual for a person to leave home without their phone. (I 17, legal advisor)

I am insisting about the mobile phone because all of us carry them today. And there are mobile phones that are simply like that, you put them on your wrist, and they take your pulse and get your measurements and they tell you "breathe". And it's super lightweight, because, if you also need to call, you need a phone ... (I 28, psychologist)

Hence, the goal is for these newly designed devices to be small, discreet and adapted to the user's special characteristics. Indeed, the devices most often imagined by the interviewees adopt the shape of simple accessories or adornments that women can wear on a daily basis and which do not reveal their purpose.

Well, maybe they could improve on its advantages and it could be something that is easy for women to wear...a ring...it's very easy...an earring. (I 28, psychologist)

And which isn't burdensome, isn't heavy and it does not mean ... if it can be a necklace or a bracelet, which you wear on your body, then you'd do it: you put it on, and that's it! (I 11, social worker)

And I think it would have to be something that could be adapted to something that the person already has, it would almost have to be something individual, because sometimes they don't want others to see it and know what it is. (I 22, journalist)

the Fitbit bracelets, I see that as something that would be, wow, great, that could be the best device and the covers could be interchangeable ... (I 30, social worker)

As was pointed out previously, the experts remark that the device should not identify the victims. In this sense it is important to consider that IPV, as a structural problem, does not depend on individual issues but on prevailing power and dominant relationships, by which stigmatization of the victims of this type of violence, indirectly blaming them for their situation, still persists in the collective imagination, which contributes to their re-victimization.

I believe that it's important that you don't see it at a first glance. They need to not feel stigmatized ... (I 17, legal advisor)

... a ring, a watch, a necklace, an earring, a shirt in which the device is embedded into the collar ... That would be great! I think anything that didn't make them feel like they are being looked at. (I 18, legal advisor)

Besides, something they don't know you have and it would have to be something very discreet that could be camouflaged, such as a piece of jewelry, a bracelet with a very special design, because we are clearly not talking about fashion, but something that is not very flashy, because that might give away that the women are wearing them and the aggressors would realize it. (I 14, psychologist)

The possibility of hiding the device led to some differences in the interviewees' discourses, as some experts considered that it is precisely its visibility which could help to control the perpetrator's behavior by making them aware that they are constantly being monitored by different agencies.

Well, having an alarm sound, no, but should they see it? Maybe that wouldn't be a bad thing...because it would be good that they saw it as a means to alert, because if the man knows that it exists, if something happens, the police can be called or it can be activated. (I 9, social worker)

Some interviewees suggested using innovative technology to incorporate sensors in the body of the users themselves, which, besides properly monitoring physiological reactions, would provide discretion and comfort. Certainly, existing devices for protecting women against other types of gender-based violence, such as rape, are also incorporating this approach through wearable solutions, such as nail polish or special underwear [6].

It could be something internal that is in contact with your skin and that remains invisible. (...) And a patch you put here? [She points to her arm] (...) A patch like those you use to stop smoking, or something like that, or for people that have Alzheimer's. (...) Or a chip [laughter]. (I 17, social worker)

If it could be something that you can't see, because if it were an implant or tattoo (...). (I 20, social worker and psychologist)

In summary, the features proposed for this device are intended to overcome the limitations of existing devices, and although there is a debate about the suitability of a device that can be detected by the perpetrator, there is consensus about the need to create a discreet device that can be used without it being a social stigma.

4.3. Beyond the alert function: Autonomous devices or devices under women's control?

Despite general agreement on the importance of technology to protect women, the experts interviewed also reflected on the incapacity of

the current protection mechanisms to assure the personal safety of women in a high-risk situation because they are not able to impede the action of a perpetrator. Different measures have been implemented with this aim but, currently, there is no effective way to guarantee their safety, since the perpetrators can bypass restraining orders and dismantle the established measures of control.

... the women don't have bodyguards nor are they protected by a steel wall. That is, if the abusive partner wants to, he can get around the protection measures ... (I 3, psychologist)

We simply would need a mechanism that is truly 100% effective and that would save a life, because if a man wants to kill his partner or his wife, he doesn't have anything stopping him. I mean, if he wants to do it, he is going to do it ... (I 14, psychologist)

This fact opens up a debate on the possibilities offered by technology to protect victims of IPV. The idea, which is receiving increasing attention in the academic research (for example García Vitoria [31]), lies in devices that not only serve as warning mechanisms linked exclusively to the victim's reactions, but which are able to offer the possibility of using elements for immediate protection. Some of the ideas proposed are related to self-defense mechanisms, where the objective is to generate a period of time during which the victim could protect herself until the help requested arrives using, for example, paralyzing sounds or temporary blinding defense sprays. The Athena device is a good illustration of this. The device was on the market for some years, with the aim of protecting women. This technology sent the location to a reception center and it came equipped with an alert button and a sound alarm to immediately warn about the situation. The proposals mentioned by the experts are not intended to inflict severe harm on the perpetrators, but rather they target a greater degree of defense for the victims, providing them with increased reaction time.

Something that could give off an electrical discharge with the abuser getting a shock. (I 34, psychologist)

In this sense, certain voices propose electronic means able to increase levels of protection in an independent way, that is, sensors in the car, home, or in other environments that detect danger before the victims do. In this way, they would fulfill the two-fold function of getting ahead of the emergency, providing wider margins of protection and, at the same time, relieving some of the stress usually experienced by the victims as they are the only ones responsible for their own protection. Accordingly, the interviewees declared themselves in favor of the device proposed by EMPATIA, as they commented positively on the technological innovation and its effectiveness in protecting women, reducing their responsibility in conscious decision-making about their own safety during emotionally charged moments.

A device that could detect, locate if he is more than 300 or 200 m away... that would be really good. (...) the women who at least have a clear and decided determination, who want to get out of this situation, and be themselves, anything that adds to that, will help them get out of it. That is, anything that's a resource to help them in their process of getting out and taking charge, as you said. (I 28, social worker)

This system that you have envisaged, the truth is that, if it is capable of anticipating those emotions, giving off an early warning, and it isn't the victim consciously or unconsciously doing it, the system can alert, and we don't get into having to decide "should I set off the alert or not ...", so that everyone can be warned, right? If not, simply, by measuring your fear objectively, that gets your attention, at least in the network established to receive the alert, not the police yet ... But it is an interesting safety system. (I 15, social worker)

This last point sparked controversy in their discourses raising dilemmas similar to those connected to the rising prominence of AI in many other fields: should the devices be autonomous and self-activate or

should they be subject to what their users decide in any circumstance? Hence, the interviewees questioned whether the technology should be able to act without any control from the women themselves. In this regard, some interviewees defend autonomous activation of the technological devices because it frees up women from having to take the decision-making step about her protection in moments of risk, danger, and maximum tension, when they are unable to evaluate different options.

... I mean, it seems fantastic to me that there is something that decides for the woman. (I 1, social worker)

From another perspective, however, the lack of control the women have over the (re)actions and the delegation of decisions to the technology is called into question.

The danger, now that I just heard what you said, is that it takes away her personal criteria, I mean what you said about artificial intelligence. (...) there are victims who say they don't want to feel like they are being controlled in any way. (I 13, psychologist)

I think if there could be a device, one single device, that would monitor her (...) And then, having many alerts also makes them feel very controlled in their lives, in their daily routine. And more than anything, if it is something that they don't have to touch, you are taking away the responsibility of "I want to activate the device now or not", because I decide that this isn't the moment or because... That is, you are taking away decision-making possibilities if it activates by itself. (I 24, social worker)

... she has to take the decision herself, right? Then leaving the responsibility to the detector that senses I don't know what and connects with the police, is like, well, "I didn't do anything" and that is important too, right? That the woman is aware that she is in a situation of risk and she needs to go to the police or finish the relationship or whatever. (I 23, psychologist)

The rejection of the autonomy of the technology is linked to certain institutional reactions which question the behavior of victims who turn off the currently existing protection procedures, above all, when the alert is understood to be unnecessary. In this sense, several of those interviewed referred to currently existing protocols for protection of victims of IPV and their corresponding methods for assessing risk situations. They mentioned, in this regard, that established protocols are often inefficient when detecting situations of risk. In this sense, some interviewees highlight the importance of including the use of technological devices, such as the one presented in this paper, in a broader social and psychological intervention protocol to ensure ample frameworks of attention considering the differences in the perception of risk that exist among women who are victims of IPV.

You have to be careful about this subject of decision-making that you are talking about. I mean, at the moment there is a physiological variable and the decision-making process, I mean, that this decision making is going to translate into "Right! The device activated by itself...and I put the father of my children in jail." (I 13, psychologist)

Managing these devices, at times, I mean it's necessary, I think that there should be a little more information, more empathy. That the response should not be excessive, right? Especially talking about law enforcement or security forces, it's a bit excessive and even a little recriminating. There continues to be a feeling of "if I call and it's a false alarm" or if "I call and it sounds an alarm"... This has to be tackled in some way, because it is an issue that is very relevant. (I 29, social worker)

I think what needs to be understood is if I give you a device, it forms part of an intervention process in which you are going to be monitored, we will see how it's used, if its working or not ... (I 11, psychologist)

So, in some way, I think there would have to be very personalized training for what we are saying about the perception of risk, it isn't the same for one woman as it is for another. (I 25, social worker)

However, the interviewees agreed that technology should not have a continuous and permanent leading role, but rather act as a facilitator in the first stages of the process to enable women to take the reins and regain gradual control of their own lives.

Besides that, I also think that the devices should be temporary, just like tele-assistance is at this moment. They have to be temporary because you don't want the situation to perpetuate. You want the women to have the tools, and sure, there will be cases where it can't be ... and they will have to wear a protection device permanently, but in the majority of cases, they won't! (I 17, social worker)

... it is true that we are talking about the woman's comprehensive recovery, the idea is for them to live independently, so to speak, but, of course, without fear, because in the end they have done nothing wrong. Depending on the stage that they are in, it could provide them with a sense of safety –which is usually one of the first stages– or then, it might even start to bother them, "I don't feel like wearing this". (...) Above all, what they tell you at the beginning of the psychological sessions is: "I am wearing such and such device and now I feel more calm", right? However, our objective in therapy and the psychology sessions doesn't depend on any device. So, it would be to feel safe. (I 27, psychologist).

The following table (Table 1) summarizes the main analytical findings

5. Conclusions

The impact of technology on IPV has recently received increased attention and interest from the academic community [6,16,32]. The technology aimed at protecting women who are victims of IPV is a product that reflects the development of the information society. In the case of the EMPATIA project's device, it uses information about the physiological state of the users to activate alarms, communicating the situation and location autonomously. In addition, this device is meant to be adapted to the different physiological responses of each of the recipients.

However, this technology faces many of the uncertainties and skepticisms that arise from its application to human activity, which is fundamentally directed towards the failure in the detection of at-risk situations and the loss of control over the decisions when the actions are delegated to machines. Hence, the assessment of this technology resembles the current fears and hopes held over the development of posthumanism as, while it might help to improve human activities, it may also provoke a scenario of dependency on technology or even control over human actions.

Technological progress is closely linked to the social imaginary and cultural dominant values. Hence, the design of technological devices, such as that discussed here, is only accepted when their incorporation generates results that are perceived as valuable and they meet existing social needs. Consequently, culture appropriates the technology available, although the latter also has the potential to change social dynamics, attitudes and behavior in a process of reciprocal feedback. The effective protection of female victims of IPV with the use of technology may be useful to protect women in the short term but there is a need to link the use of the device to a broader social intervention.

This device has been designed from the point of view of, mainly women, experts in the field and also from their female users. First, the device was designed taking into account experts voices on IPV, whose discourses were extremely valuable in identifying some limitations and potentialities of this kind of device. Specifically, functionality, battery life, range, comfort and discretion were identified as the most relevant challenges to address. Second, women contributed to the creation of an

Table 1

Main findings.

Topic	Interviewee's consideration
Women as recipients of IPV technological devices Design proposals	Need to incorporate them in the design process Reliable (in terms of battery and coverage) Discreet (preferably something wearable) Controversy regarding the role of the mobile phone
Device autonomy	In the short term: consensus on the benefits provided by the autonomy of the device (at the beginning of the process). In the long term: controversies: - It relieves women of the responsibility of taking a decision at critical moments - Women's decisions must always prevail

emotional database built exclusively on women's reactions. This database contains the information that feeds the device to enable it to work autonomously.

The effort to generate a non-patriarchal technology also encompasses the debate on who should be the recipient of the device, as interviewees repeatedly question the responsibility being placed on the victims instead of on the perpetrators. The experts agreed that the device may certainly be useful in the first stages of women's protection from IPV although technology is not intended to be a permanent solution. Technology would, in that sense, be a prosthetic, a medium to achieve safety but avoiding dependency on the resource.

The EMPATIA device is a work in progress. It should be evaluated in the near future in order to establish new research areas or detect other issues that need to be improved. Once the functionalities of this device, such as the detection of psychological markers and the autonomous response, has been completely tested, other improvements related to the design or functioning of the technology in IPV protection can be considered.

Credit author statement

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