# Digitizing Intervention:
# Analyzing Technology's Role in Domestic Violence Prevention

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## Abstract

Digital interventions have emerged as a promising strategy for supporting victims and preventing intimate partner violence (IPV). A systematic review of 20 peer-reviewed, open-access studies revealed that technology holds significant potential to modernize IPV prevention by enhancing the speed, efficiency, and coordination of responses, while simultaneously improving victim safety and promoting offender accountability. To optimize the effectiveness of these applications, they must be localized and tailored to specific contexts, ensuring greater accessibility for a diverse range of users. User feedback from a broad spectrum of stakeholders, particularly traditionally underrepresented groups, is essential for designing digital tools that are sensitive and responsive to varying needs. Systematic reviews of global information and communication technologies (ICT) interventions placed great emphasis on user-centered designs, enhanced confidentiality amongst users, and integration with existing services to ensure long-term sustainability and recovery. Ultimately, effective IPV interventions were identified as context-specific, user-friendly, flexible, customizable, and trauma-informed.

## Introduction

Domestic violence manifests under various names yet remains a silent epidemic that undermines the very fabric of society. Of the many terms and types of domestic violence, intimate partner violence (IPV) is one of the most pressing issues. The United Nations describes this type of violence as "behaviour by an intimate partner or ex-partner that causes physical, sexual or psychological harm, including physical aggression, sexual coercion, psychological abuse and controlling behaviours" (World Health Organization, 2024). This form of violence transcends cultural, status, racial, geographical, and even gender boundaries, affecting individuals regardless of their background or status. While women are disproportionately affected, with 41% of women in the United States reporting experiencing stalking, sexual violence, or physical violence and 61 million enduring psychological violence, it is important to recognize that IPV remains a universal problem impacting other genders, as well. Statistically, 1 in 10 men experienced some form of IPV in their lifetime and 53 million men experienced psychological violence (CDC, 2024). Despite this, the effects of IPV on men are underexplored, as women are often viewed as conventional victims of such abuse (Tarzia et al., 2023).

Traditionally, IPV has been studied through a sociological and psychological lens aimed at understanding the lived experiences of victims. However, as IPV continues to evolve and persist, so must the approaches to prevention and intervention. One area that remains underexplored and relatively new, yet holds potential, is the role of Information and Communication Technology (ICT) in both mitigating and reducing IPV. Traditional intervention methods, including law enforcement and self-defense tools, have been critical; these systems are often overwhelming, outdated, or ineffective in adequately addressing the needs of victims

(Case, 2023; Sumra et al., 2023). The insufficiency of traditional responses necessitates a shift toward integrating ICT-based solutions to improve the well-being of IPV victims.

The proliferation of technology, particularly the internet, represents a paradox within the context of IPV. By 2021, 4.9 billion people, over 63% of the global population, had internet access, marking an 800 million increase since 2019 (United Nations, 2021). This figure is expected to grow, linking the global community in a way not previously imagined. As mobile phones and computers become pervasive, technology increasingly shapes the dynamics of relationships, often in contradictory ways. On one hand, ICT can empower abusers to manipulate, control, and monitor their partners, introducing a new form of abuse: digital abuse. On the other hand, it presents unprecedented opportunities to address IPV, offering victims immediate and anonymous access to support services, virtual check-ins, educational resources, crisis hotlines, and real-time reporting. Features such as incognito mode, private browsing, and the option to delete browser history offer additional protection and security when victims engage in sensitive activities, such as seeking help for an abusive relationship or searching for IPV support services. Further, the wealth of online information can empower victims to facilitate early intervention, recognize patterns and early signs of abuse, and access support services before the situation escalates.

However, the same technologies that empower victims can also be exploited by abusers to track, monitor, and manipulate their partners (Brookfield et al., 2024). Digital surveillance and cyberstalking are forms of abuse that are becoming increasingly common in the context of IPV (Rogers et al., 2023). Research conducted by faculty and students from Cornell Tech, Cornell Computing and Information Science, and New York University revealed that abusers often use spyware, marketed through major platforms such as Google and Apple, to monitor their partners'

activities (Cornell University, n.d.). These forms of abuse, unlike traditional physical violence, leave no visible marks, making them more difficult to detect and hold accountable. The digital divide further complicates the use of technology in IPV prevention. While 63% of the global population has internet access, the remaining 37% face significant barriers to benefiting from digital interventions, particularly as many lack the necessary digital literacy to navigate resources or utilize ICT-based support systems effectively. The widespread use of technology can inadvertently increase the risk of technological abuse, with abusers exploiting the very tools intended for protection to control or track victim movements in ways that are difficult to detect and prevent (United Nations Office on Drugs and Crime, 2015).

### The Present Study

This paper aims to examine the role of ICT in addressing intimate partner violence, analyzing both its potential benefits and limitations. Through a critical review of current research, this paper seeks to identify the key features necessary for developing effective ICT-based intervention applications. While ICT holds significant promise as a transformative tool in IPV prevention, its design and implementation must be carefully selected to ensure accessibility, privacy, security, sensitivity, and relevance, empowering victims rather than intensifying the status quo. The three following central research questions guide this exploration: What are the major characteristic features of existing domestic violence apps worldwide? Are there notable differences between domestic violence apps developed in the United States and those developed internationally? What is the role of technology in preventing domestic violence?

## Methodology

A systematic and structured process was employed to identify scholarly sources examining the role of technology, particularly mobile applications, in preventing domestic violence. The primary database utilized was the John Jay College of Criminal Justice's Lloyd Sealey Library, which facilitated access to reputable research sources, including Google Scholar, OneSearch, EBSCO, Academic Search Complete, and Criminal Justice Abstracts. A targeted set of keywords, such as "domestic violence," "mobile app," "mobile apps for domestic violence prevention," "intimate partner violence prevention," "interpersonal violence or intimate partner violence or IPV or domestic violence," and "technology," was used to capture a comprehensive range of scholarly works addressing technological interventions in IPV, with an emphasis on prevention, intervention, and support. Boolean operators were used to refine the search and ensure the results were pertinent to the research objective. From the search results, 20 peer-reviewed, open-access articles were selected, focusing on the need for accessible and informed digital tools to support long-term recovery. The selection process emphasized scholarly articles relevant to the intersection of technology and domestic violence prevention and provided diverse perspectives, including empirical studies and systematic reviews of applications. Efforts were made to ensure the representation of various types of technological interventions and diverse forms of violence, as well as the inclusion of international perspectives to enrich the analysis.

The literature analysis involved a systematic and methodical process, beginning with a thorough review of each selected source to extract and document its key findings. These findings were then carefully summarized to distill relevant information aligned with the research objective. These sources were categorized into domestic and international applications, as detailed in Table 1 and Table 2, respectively. The selected literature was then critically synthesized, categorized, and grouped based on thematic relevance, allowing for the

identification of recurring patterns, concepts, and key gaps within the existing body of literature. Four key themes were identified: the modernization of intervention, the localization and cultural adaptation of digital tools, the role of user feedback in shaping interventions, and the findings of systematic reviews on application effectiveness, all discussed below.

## Analysis of Literature

### Modernizing Intervention

The outdated nature of police protocols in addressing domestic violence cases often hampers timely and effective support for victims. The evolution of intervention illustrates the potential of technology to offer scalable, data-driven solutions to address domestic violence while prioritizing victim safety and offender accountability. For instance, the reliance on handwritten Domestic Incident Reports (DIR) by the Nassau County Police Department illustrates a systematic inefficiency that delays critical interventions (Case et al., 2023). These delays impeded immediate support and compromised the potential for long-term resolution of domestic violence incidents. The need for reform in police response protocols is evident, and the integration of digital tools represents a promising avenue for modernization. Digital tools can streamline reporting, increase data accessibility, and reduce response times, thereby aligning police practices with the urgent needs of survivors. By digitizing processes, like DIRs, law enforcement can ensure that information is shared more effectively among relevant agencies, enabling coordinated and survivor-centered interventions.

The Safe Shelter Collaborative tool demonstrates the similar potential of technology in addressing the urgent needs of survivors, particularly housing. By using real-time data to connect survivors with available shelters, the tool addresses the critical issue of delayed placement,

which can leave victims vulnerable to further harm (Danis, F.S. et al., 2019). Its efficiency lies in its ability to bridge communication gaps between agencies, reducing the time survivors spend waiting for safe housing. The success of the Safe Shelter Collaborative tool highlights a scalable approach to integrating technology into broader systems of care for domestic violence survivors. On an international scale, Peru's use of a Voicebot-powered application during the COVID-19 pandemic demonstrates the potential for technological innovation to improve family violence scenarios (Novoa-Gallardo, et al., 2024). This app achieved notable successes, including significantly faster detection and response times, more cases identified, and higher levels of user satisfaction compared to traditional methods. By leveraging voice technology, the app not only streamlined reporting but also reduced barriers for users, particularly in areas with limited literacy. Modernizing interventions offers a path toward more responsive, efficient, and equitable systems for addressing IPV across diverse contexts.

GPS technology has emerged as an essential tool to protect victims and hold offenders accountable for domestic violence. Spain's 2009 pilot program deployed 3,000 GPS bracelets to track offenders, providing a foundational model for broader implementation. France, Scotland, Puerto Rico, and Peru have followed similar initiatives, introducing GPS technology to monitor offenders and alert victims and justice authorities when offenders come into close contact with victims (Burt, 2013). This technology reduces the unpredictability of interactions with offenders, providing victims with a sense of autonomy over their movements and minimizing vulnerability. Sinha, Shrivastava, and Paradis (2019) emphasize the effectiveness of various mobile applications, designed to similarly empower victims, largely women, and improve their safety. Crowdsourcing reporting apps, such as HarassMap and Hollaback!, allow users to anonymously report instances of violence. These reports generate real-time data, identifying "hotspots" where

violence frequently occurs, providing valuable data for law enforcement, and raising community awareness. These apps empower women by offering a platform for reporting harassment without fear of identification, helping to hold perpetrators accountable, and informing safety decisions.

**Localization and Cultural Adaptation of Applications**

Intimate partner violence prevention necessitates a nuanced, culturally sensitive approach that accounts for diverse regional and socio-cultural factors. While mobile applications like myPlan, initially developed for high-income countries, are designed with Western frameworks of IPV prevention, efforts are being made to localize these tools for use in lower-and-middle-income countries (LMICs), which face distinct challenges. For instance, myPlan was adapted for use in Kenya, where resource limitations and reduced access to services present unique hurdles for IPV survivors (Decker et al., 2020). In LMICs, women often experience heightened vulnerability to IPV due to fewer support systems, cultural taboos, and economic disparities, which exacerbate isolation and limited access to resources. The localization of myPlan in Kenya included a participatory process in which IPV survivors and local stakeholders were integral to tailoring the content to reflect the realities of Kenyan women, ensuring the app was relevant to their specific needs. This approach not only provides the cultural fit of the mobile application but likewise increases the likelihood of its acceptance and eventual use in local communities.

Similarly, in Malaysia, RelayVio has been developed to address the pressing need for tailored support for IPV victims. The prevalence of domestic violence in Malaysia underscores the critical need for effective interventions, specifically in a context where many face difficulties accessing resources tailored to their needs (Norowi et al., 2021). While global mobile applications exist to support IPV victims, they often overlook the particular challenges faced by women in specific regional contexts, like Malaysia, where legal, cultural, and infrastructural

factors may differ significantly from those in Western settings. RelayVio was designed to fill this gap by offering a platform that allows users to document abuse in various forms, including notes, images, and time-stamped records, which are crucial to legal purposes. This feature ensures that the app is not only a tool for immediate assistance but also a resource for long-term legal processes, where documentation plays a key role in securing justice for victims. Additionally, RelayVio integrates emergency resources, providing direct access to the Malaysian domestic violence hotline (Talian Nur) and the emergency number (999). By incorporating these localized legal and resource frameworks, RelayVio positions itself as a practical, contextually relevant tool for victims, addressing a critical gap in Malaysia's domestic violence support infrastructure.

The "CIPE® Violência" application, grounded in the International Classification for Nursing Practice (ICNP®) Terminology Subset, validated in Brazil, offers a culturally attuned framework for addressing domestic violence, particularly against children (Silva et al., 2021). Built using the Theory of Nursing Praxis Intervention in Collective Health (TIPESC), this application goes beyond clinical intervention by incorporating sociological insights into gender and generational dynamics. This theoretical foundation allows CIPE® Violência to address domestic violence as a complex, multifaceted issue deeply intertwined with cultural, social, and familial factors in Brazilian society. Its design is particularly significant in clinical and nursing settings in Brazil, where healthcare professionals are often at the forefront of identifying and addressing domestic violence. By equipping nurses with tools for documentation, assessment, and intervention, the app not only enhances the quality of care but also fosters a broader understanding of domestic violence as a public health issue rooted in systematic inequalities. Importantly, the app reflects Brazil's unique healthcare and cultural realities, bridging the gap between theory and practice.

In parallel, the U.S.-based Thrive application also exemplifies the importance of tailoring IPV interventions to the diverse experiences of survivors, particularly mothers who face compounding stressors related to childcare, familial responsibilities, and communication challenges (Ragavan et al., 2020). While Thrive is not explicitly tied to a single sociocultural framework, it reflects a similar recognition of the need for culturally sensitive tools. The app acknowledges that survivors' needs are not singular and that factors such as caregiving responsibilities, cultural expectations, and language barriers significantly shape their experiences of abuse and recovery. By incorporating trauma-informed resources and planning to expand support for non-English speaking survivors, Thrive demonstrates a commitment to inclusivity and accessibility, ensuring its resources resonate with diverse populations. This adaptability highlights a growing recognition within IPV intervention design of the need to address structural and cultural barriers that prevent survivors from accessing help. There is a pressing need for IPV prevention strategies to move beyond a one-size-fits-all solution and recognize the impotence of context in shaping the effectiveness of technological interventions. As mobile applications continue to play an increasingly prominent role in IPV prevention, further investment in localization and adaptability will be essential for reaching marginalized and underrepresented populations worldwide (Bacchus et al., 2019).

**User Needs and Perspectives**

User feedback emerges as a critical source of insight for developing interventions and technologies informed by users' lived experiences. Drawing from diverse populations, including adolescents, immigrant survivors, and male participants, such interventions can bridge existing gaps in support systems and foster meaningful engagement. Synthesizing findings from lived experiences, the relevance, usability, and impact of interventions are analyzed.

Adolescents, for instance, provide a unique perspective on the role of technology in preventing and intervening in teen dating violence (TDV). In their analysis of adolescent perceptions of the myPlan app, Debnam & Kumodzi (2021) identified key challenges, including the app's failure to recognize emotional and psychological abuse—such as gaslighting or manipulation—as forms of violence. This underscores a broader societal issue of misperceptions about what constitutes abuse, suggesting a need for more inclusive approaches. Adolescents further highlighted a lack of resources for male victims, emphasizing the importance of moving beyond traditional, gendered understandings of abuse to address the complexities of unhealthy relationships. Further, the study revealed that young users expressed mistrust toward authorities and advocated for alternative reporting mechanisms that respected their autonomy. This mistrust reflects a wider sentiment among young people, emphasizing the need for digital interventions to empower users rather than dictate prescribed actions.

Focus groups with young Australian women, as examined by Tarzia et al. (2017), revealed that technology's inherent anonymity offers users a safer and less intimidating option compared to traditional IPV resources, which are perceived to be inaccessible or judgemental. Participant feedback emphasized that apps and websites should be more than informational repositories. They should provide actionable advice, practical steps, and direct links to services. The tone of these interventions was a critical discussion point, with users suggesting that tools must strike a balance between professionalism and sensitivity to ensure users feel supported rather than overwhelmed. However, privacy concerns arose, as participants feared that abusive partners could access their browsing history, underlining the need for robust security features. Endorsements from public figures were viewed as a potential strategy for reducing stigma and

normalizing seeking help, aligning with the broader cultural shift needed to encourage open dialogues around IPV.

Interviews with men attending behavior change programs, analyzed by Tarzia et al. (2023), further contribute to the design of effective digital interventions for traditional perpetrators of violence. Their feedback highlighted the importance of adopting non-confrontational strategies for intervention, viewed as more effective in promoting since men are more receptive to interventions that address emotional states without immediately labeling behaviors as violent. In other words, interventions must consider the psychological barriers that often prevent men from seeking help, including shame and defensiveness. Male participants further expressed a strong desire for interventions that promote self-awareness, with many suggesting self-assessment features to help them view their behaviors as part of an ongoing process rather than isolated incidents. In addition, participants stressed the importance of offering hope for change, advocating for interventions that focus on positive transformation rather than solely on the consequences of violence. Finally, the need for simplicity and accessibility was emphasized, with men preferring straightforward, easy-to-navigate tools that could benefit users from different backgrounds.

Immigrant women experience unique and compounding challenges that complicate accessing digital IPV interventions, including immigration status, transportation issues, and social isolation that hinder their access to in-person services. Sabri et al. (2023) provided a nuanced understanding of these barriers through a mixed-methods study, collecting data through five focus groups and 46 in-depth interviews with immigrant survivors from various countries, as well as key informant interviews with 17 service providers. The study found that dependence on abusers for technology access was a significant barrier, with abusers creating fears of retaliation

if intervention participation was discovered. Privacy and confidentiality concerns were central, with survivors fearing exposure to abusers. Secure, anonymous platforms and encryption were recommended, along with trust-building between participants and researchers. Safety protocols, such as reminders to delete digital proof of participation, were crucial to minimize risks. Language barriers, including low literacy and limited English proficiency, made digital content hard to understand. Participants suggested using simplified, culturally appropriate language and translations that reflected their native languages and contexts. In terms of communication, most survivors preferred smartphones for their convenience and security, with WhatsApp being the most favored app due to its global reach and privacy features. A multi-modal approach (phone, text, web) to intervention delivery was recommended to accommodate different needs and ensure safety.

El Morr & Layal (2020) conducted a systematic review of 25 studies examining ICT-based interventions for IPV, revealing critical issues regarding usability, diversity, and the ethical implications of such technologies. The majority of participants reported feeling that ICT-based surveys were safer and more confidential than face-to-face interviews for disclosing instances of IPV, with over 78% of participants reporting improvements in decision-making skills through ICT interventions, which led to lower decisional conflicts. Despite generally high user satisfaction, a significant lack of diversity in study populations was noted, with the majority of user feedback conducted in North America. As a result, the applicability of user feedback is limited.

These findings collectively point to the transformative potential of user-centered design in IPV interventions. By incorporating user feedback at every stage of design, development, and implementation, technology can address the immediate needs of survivors and support services

along with the systematic barriers that perpetuate IPV. This approach ensures that applications are not only functional, but meaningful, empowering, and long-term.

**Feedback From Application Reviews**

The integration of technological interventions in combating domestic violence has gained momentum in recent years, particularly as the role of technology in improving access to support services has been normalized. A number of reviews have analyzed existing interventions in this domain, revealing critical insights, strengths, design, and limitations. Collectively, these reviews reflect a substantial effort to evaluate and optimize impact. Reviews of these apps often focus on their features, usability, safety, and relevance for survivors. These features are particularly valued because they reduce survivor's reliance on traditional paper methods, offering a safer, faster, and more discreet alternative (Sumra et al., 2023; Eisenhut et al., 2020).

Mobile health (mHealth) and online psychotherapy applications have been identified as vital technology-based interventions, particularly amid crises such as COVID-19. These apps often provide immediate yet short-term solutions (Su et al., 2022). While immediate resources may prove beneficial to users, the absence of ongoing, holistic support prevents recovery. Despite these apps' utility during emergencies, their long-term impact on victims' mental health remains under-researched, suggesting that they may not be sufficient to support ongoing healing and empowerment for survivors of DV.

Eisenhut et al. (2020) reviewed 171 mobile apps addressing violence against women (VAW), revealing that nearly (47%) of the apps reviewed were designed primarily as emergency response tools, with panic buttons, direct calls to authorities, and location-sharing features. This focus on emergency interventions aligns with the observations of Su et al. (2022), who likewise note that the majority of technology-based interventions are heavily centered on emergency

responses to isolated incidents, rather than long-term preventative solutions, which are essential for effectively addressing the more profound, systemic nature of domestic violence, which requires preventive and recovery-oriented interventions. The need to integrate these apps with community-level support services is repeatedly emphasized to ensure comprehensive assistance for survivors.

Sumra et al. (2023) expanded upon these findings by analyzing 20 apps that offer emergency and avoidance tools. Their review found that emergency assistance apps were the most prevalent, comprising 45% of the apps analyzed, followed by avoidance apps, informative apps, legal information apps, and self-assessment apps. Notably, the most frequently downloaded apps were those offering real-time support, highlighting the significant demand for immediate, life-saving tools. However, the review uncovered recurrent challenges, including mandatory user registration and accessibility barriers, which hinder the effectiveness of these tools for vulnerable populations, including rural women with limited access to technology. These barriers highlight a critical flaw in app design: a disproportionate emphasis on short-term crisis intervention, without adequate attention to long-term support structures or the needs of marginalized groups.

Ford et al. (2022), in their review of 86 personal safety apps in the United Kingdom, added another layer to the growing literature. Their findings align with Eisenhut et al. (2020) and Sumra et al. (2023), particularly in identifying technical and ethical limitations. Despite many analyzed apps being free and highly rated, users reported issues such as crashes, unresponsiveness, and privacy concerns. These technical flaws often frustrate survivors, particularly in high-risk situations where reliable emergency response features are essential. Echoing Eisenhut et al., Ford advocates for the integration of mobile apps with community-based

services, including legal aid, counseling, and shelter services, to ensure apps do not function in isolation but are part of a broader, multi-faceted approach to survivor support.

Draughon Moret et al. (2022) add an additional layer of complexity by analyzing the discoverability and usability of 132 IPV and sexual violence (SV) apps across app stores. Their review revealed that app store algorithms often lead to irrelevant or retraumatizing suggestions for users, further complicating the process of finding effective interventions. This isn't simply a critical gap in app design, but a critical gap in the broader intervention ecosystem. Using the Mobile Application Rating Scale (MARS), Draughon Moret et al. (2022) found that most apps were educational or resource-sharing tools with limited behavior-changing potential. The lack of functionality aimed at behavioral change complicates the effectiveness of these tools, especially as users require more than just information—they need actionable steps and integrated services.

Collectively, these five studies reveal a mixed picture of the current landscape of technological interventions for DV and IPV. While the number of apps has grown significantly, the design of these apps often fails to account for long-term user needs, technical reliability, and integration with broader social and mental health services. Despite these limitations, there is growing optimism for the future of such technology-based interventions. Researchers highlight the growing acknowledgment of such gaps, urging developers to prioritize user-centered designs, community-level integration, and absolute confidentially, particularly in high-risk situations (Su et al., 2022; Draughon Moret et al., 2022; Ford et al, 2022; Eisenhut et al., 2020). Moreover, while apps should not function as standalone solutions, their potential to complement existing services makes them a promising avenue for innovation.

**Discussion and Findings**

As a research assistant for the NSF PFI-RP project titled "Preventing Intimate Partner Violence Using Digital Technology: A Transdisciplinary Approach," I gained a deeper appreciation for the complexities involved in designing digital interventions for sensitive issues. My role involved working closely with the team of iLink Systems to brainstorm and conceptualize ideas for a digital application, titled 4EVA. Observing the design process firsthand underscored the importance of a meticulous and user-centered approach, particularly when developing tools that will directly impact people's lives. Seemingly minor decisions, such as the design of the logo or the flow of the user interface, demanded extensive deliberation and refinement, requiring over a dozen iterations, multiple wireframes, and continuous feedback loops. This process revealed the level of empathy required to create an intervention capable of addressing real-world challenges. Every detail, no matter how small, carried weight, as it had the potential to influence user trust, safety, and willingness to engage with the app. Even minor missteps could undermine the app's effectiveness or alienate its intended users.

Alongside contributing to its design process, I undertook a comprehensive review and analysis of 31 digital applications addressing domestic violence and IPV, both domestic and international, as shown in Table 3. Using a structured Google Forms questionnaire, I evaluated these apps to identify their strengths, limitations, and areas for improvement. The applications were categorized based on their core functionalities—such as education, risk assessment, and access to services—following an approach similar to those described by Eisenhut et al. (2020) and Sumra et al. (2023). However, unlike previous studies, there was significant overlap between categories in this analysis, reflecting the multifunctional nature of many existing applications. The analysis of these digital applications provided valuable insights and informed key design decisions for the 4EVA app.

While digital interventions offer significant potential, they are not without limitations. Through my review of the 31 digital applications addressing domestic violence, it became clear that no single app could fully accommodate the diverse and unpredictable needs of IPV survivors. Applications, by nature, are bounded by their programming, and their rigidity limits their ability to respond to the fluid, complex, and deeply personal experiences of victims. This reinforces the idea echoed in the literature: digital tools cannot be a stand-alone solution. Victims require tailored responses, emotional connection, and the flexibility to adapt to their unique situation—qualities that digital technologies, even the most advanced and informed ones, currently struggle to provide.

Artificial intelligence (AI) presents an opportunity to address some of these gaps by offering a level of personalization that static programming cannot achieve. Specifically, AI can analyze user behavior, preferences, and feedback to adapt content and recommendations in real-time. However, the introduction of AI comes with its own set of risks, including ethical concerns, data privacy issues, and biased algorithms. Victims of IPV are particularly vulnerable to breaches of confidentiality, and even small oversights in data protection can lead to devastating consequences and the escalation of violence. To mitigate these risks, developers must prioritize secure design and conduct rigorous testing with diverse user groups before implementation. IPV survivors represent a wide range of demographics, including differences in culture, socioeconomic status, language, and access to technology. Feedback from diverse stakeholders ensures that tools are relevant and sensitive to the lived realities of users. Diverse feedback likewise aids in identifying blind spots in the design process, such as cultural nuances or accessibility issues, that may otherwise go unnoticed.

Broadening the scope of digital interventions, rather than focusing exclusively on victims, is critical. Domestic violence is a complex social issue that requires multi-faceted solutions, which means that digital tools must be designed to meet the diverse needs of various stakeholders, including survivors, perpetrators, healthcare workers, and law enforcement officials. Focusing exclusively on victims overlooks the potential for intervention at multiple points in the IPV cycle. For instance, law enforcement agencies may benefit from tools that streamline reporting and enhance officers' ability to respond sensitively to IPV incidents. These tools can guide the management of situations with a trauma-informed approach, thereby reducing the risk of re-traumatizing victims. Similarly, healthcare-focused apps can assist professionals in identifying signs of abuse and de-escalating cases appropriately and early on. Equally important are digital interventions targeting perpetrators, who are crucial for breaking the cycle of violence. Behavioral change programs, delivered digitally, could provide perpetrators with education, resources, and ongoing support to challenge harmful behaviors and promote healthier relationship dynamics. Such interventions address the root causes of abuse rather than simply responding to its consequences, as do traditional methods.

Developing effective IPV interventions requires collaboration across multiple disciplines, including social sciences, technology, public health, and law enforcement. Each of these fields brings a unique set of insights and skills necessary to develop digital tools that are not only technically functional but also ethically sound and responsive to user needs. However, challenges arise in cross-disciplinary efforts when competing priorities emerge. Technologists often prioritize efficiency and rapid development, while social scientists advocate caution and ethical rigor. Successful collaborations require a delicate balance where technological expertise is used to translate social science insights into functional tools that serve user needs. It is not enough for

apps to be abundant in number; their true value lies in ensuring that users derive tangible benefits. Ultimately, the effectiveness of digital interventions depends on a transdisciplinary approach that prioritizes collaboration and the responsible use of technology to empower all stakeholders involved.

## Conclusion

The WHO's definition of IPV—a "behaviour by an intimate partner or ex-partner that causes physical, sexual or psychological harm, including physical aggression, sexual coercion, psychological abuse and controlling behaviours"— provides a universal framework for understanding the dynamics of IPV (World Health Organization, 2024). This definition encompasses a broad spectrum of abusive behaviors, some of which may be difficult to identify and address. However, this understanding, while universal in its scope, aligns closely with Western frameworks, where IPV is addressed within the context of legal intervention, with the assumption that victims have the autonomy to seek help and access support systems. Further, IPV is understood primarily as an individual experience rooted in personal relationships. The Westernization of this social issue overlooks the deeply ingrained cultural norms and practices that perpetuate IPV in other parts of the world. Focusing on South Asia, the context of IPV becomes even more complex as it is a reflection of broader societal structures, including patriarchy, family dynamics, and social stigma. The family unit holds significant cultural value in South Asia, and violence within the home is frequently normalized or ignored as part of familial authority.

While legislation has been introduced across South Asia to address IPV, cultural barriers, geography, and inconsistent enforcement mechanisms remain significant obstacles. For instance, in Bangladesh, the Domestic Violence (Prevention and Protection) Act of 2010 categorizes IPV

as a "cognizable, bailable, and compoundable" offense, not criminalizing IPV comprehensively. This creates a situation where the act of violence may be recognized but not treated with the severity necessary for meaningful intervention. As a result, 26% of individuals report experiencing physical and/or sexual intimate partner violence in the last 12 months, according to UN Women, reflecting the limited impact of existing policies.

In Pakistan, while there are legislative actions like the Domestic Violence (Prevention and Protection) Acts in provinces such as Sindh (2013) and Punjab (2016), there are notable provincial disparities in how IPV is addressed. These laws criminalize domestic violence and provide mechanisms like restraining orders and monetary support for survivors. Support services include crisis centers, Dar-ul-Aman shelters, and Violence Against Women (Centers, (VAWC), which offer integrated services. Public awareness campaigns and healthcare protocols have been introduced to enhance IPV response, but efforts often fail to reach rural populations, where traditional gender norms are more deeply entrenched. 14.5% of Pakistanis have experienced physical and/or sexual intimate partner violence in the last 12 months (UN Women, 2024).

Similarly, Nepal has also put in place legal measures, like the Domestic Violence (Offence and Punishment) Act (2009) and the Gender Equality Act (2006), which criminalize IPV and offer legal recourse for survivors. The Interim Constitution of Nepal (2007 guarantees gender equality, further strengthening protections against violence. Support programs like the Access to Justice Program (2008) offer shelter and legal assistance, while the National Plan of Action for the Year Against Gender-Based Violence (2010) outlines strategies to combat IPV. Court regulations further help ensure privacy during legal proceedings for IPV cases and guidelines for health professionals aim to improve the identification and management of IPV

cases within healthcare settings. However, the reported incidence of IPV in the last 12 months stands at 11.2% (UN Women, 2024).

India has developed a range of legislative, policy, and institutional frameworks to combat IPV, notably the Protection of Women from Domestic Violence Act (2005), which serves as the primary legal framework for providing protection and remedies for survivors of IPV. Family courts facilitate the resolution of family-related disputes, including cases of DV. Additionally, the National Policy on the Empowerment of Women (2001) outlines strategies to address gender-based violence as part of broader empowerment efforts. Other key measures include the Mahila Panchayats, which act as local community-based bodies, and the Bell Bajao Campaign, an awareness-raising initiative targeting domestic violence. The Crime Against Women Cells and family counseling centers offer social services and support to victims, while the National Family Health Survey provides valuable data for policymaking. Additionally, the Aajeevika Mission helps support women affected by IPV through education, employment, and housing assistance. Despite such institutions, the prevalence of IPV in India remains the highest amongst the four nations, at 24%, as reported by UN Women.

The high prevalence of IPV in South Asia, despite legal frameworks and support systems, speaks to the limitations of a Western-centric approach to IPV prevention. These statistics point to the necessity of incorporating community-based interventions, public awareness campaigns, and culturally sensitive support systems accessible to both urban and rural populations. A critical examination of technology's role in IPV prevention must be viewed through this lens. However, the relatively high percentages of IPV reported in these countries suggest that current technological interventions are not yet sufficient to curb the prevalence of abuse.

The growing body of literature on digital interventions underscores the potential of mobile applications and digital tools to provide victims with critical resources, safety planning, and immediate support (Decker et al., 2020); Ragavan et al., 2020). Apps, such as myPlan and Thrive have demonstrated success, particularly in low-and-middle-income countries (LMICs), by offering personalized safety strategies and trauma-informed resources (Declet et al., 2020; Ragavan et al., 2020). However, as Sinha et al. (2019) note, the effectiveness of such interventions hinges on overcoming barriers like privacy concerns, economic accessibility, and digital literacy, which remain prominent in rural and underserved areas. Digital tools must be designed with care to prevent unintended risks, particularly for IPV survivors in conservative cultural settings (Bacchus et al., 2019).

Interventions tailored to specific cultural contexts are more likely to be accepted and utilized by IPV survivors when they align with local values, avoiding stigmatization and offering support that aligns with user values and lived experiences (Sabri et al., 2023). Given the diversity of potential users, apps should be simple, intuitive, and accessible, especially for survivors with low digital literacy, disabilities, and visual impairments. A user-friendly interface with minimal steps to access critical features, such as emergency contacts or SOS buttons, is crucial (Tarzia et al., 2017; Ford et al., 2022). Further, mobile applications must be flexible enough to operate across diverse contexts, adapting to varying internet connectivity and device types and providing offline functionality. Customization of safety strategies and tailored advice within these apps can empower victims to take control of their safety in a way that aligns with their individual circumstances. The inclusion of professional mental health support via mHealth should be a critical strategy, as the psychological impacts of IPV are often less visible but equally damaging.

By integrating these characteristics into the design of digital interventions, technology holds the power to do more than assist—it can revolutionize the approach to combating intimate partner violence. The application of technology to disrupt cycles of violence is no longer a vision but an achievable and impactful reality. This progress marks a pivotal shift in social science, ensuring technology becomes a powerful ally.

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