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New Technologies For Combatting Sexual Violence In Conflict And Non-conflict Settings

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Question

- *How has digital technology been used to monitor and provide early warning of CRSV? How effective are these approaches?*
- *Identify digital technology-based prevention solutions for sexual violence in non-conflict settings? To what extent can these prevention tools be applied 1174in conflict settings?*

Contents

1. Summary

There are a significant number of new technologies aimed at combatting sexual and gender-based violence (SGBV)—primarily in the form of “emergency mobile apps”, but they are generally geographically and culturally limited, and under-studied. There are fewer applications of new technologies addressing conflict-related sexual violence (CRSV)[1], as regards prevention, monitoring, and early warning systems. Well established issues related to the under-reporting of SGBV also impact the accuracy of digital monitoring tools used in both conflict and non-conflict contexts. The use of digital tools to combat SGBV also raises novel challenges related to new technologies, such as bias and data protection concerns.

This report reviews evidence of the deployment of new technologies to address sexual and gender-based violence (SGBV) both in and outside of conflict settings, and the potential for applications from non-conflict settings to apply to CRSV. Although certain literature is beginning to address the specific limitations of new technologies (e.g. usability in urban environments, cultural and linguistic appropriateness, and other accessibility questions), the limited nature of the literature assessing these new technologies and—more importantly—the design of these new technologies, means that the needs of disabled individuals, LGBTQIA+, and even men and boys, are often not centred or addressed in the design and critique of these new technologies.[2]

The following key findings emerged from the literature:

- In conflict-settings, there are few relevant applications of new technology. Those that exist are generally limited to mobile-health, and/or using digital devices to assist with monitoring surveys;
- The majority of new technologies deployed to address SGBV in non-conflict settings are mobile emergency apps, although applications based in automation/machine learning are increasingly prevalent;
- While there are many promising developments in the area of new technologies aimed at addressing sexual violence, the studies addressing the efficacy of these new technologies are generally limited in scope culturally, temporally, and geographically, meaning their results are often not universalizable;
- Research identifies several challenges facing the effective deployment of new technologies aimed at addressing SGBV common to non-conflict and conflict settings. Many of these issues are germane to the issue of SGBV generally, including: under-reporting, stigma, and fear of reprisal;
- New technologies deployed to address SGBV and CRSV raise novel design challenges, including, but not limited to: privacy and data protection issues, accuracy in reporting, bias as regards machine learning and automation, lack of access (both due to language barriers and access to technology and technical infrastructure), cultural appropriateness of design, and the production of new digital harms; and

[1] Conflict-related sexual violence encompasses a number of offences, and consequentially there is no universally accepted definition. According to the United Nations, CRSV refers to rape, sexual slavery, forced prostitution, forced pregnancy, forced abortion, enforced sterilisation, forced marriage and any other form of sexual violence of comparable gravity perpetrated against women, men, girls or boys that is directly or indirectly linked to a conflict (United Nations Secretary-General, 2022: 5).

[2] Importantly, this report does not address the use of new technologies in investigating CRSV. There exist rich and evolving literature on that subject (see, for example, Koenig & Egan, 2021), but it remains a distinct issue from questions of prevention and monitoring.

- Very little evidence exists as to the deployment/application of new technologies to address CRSV specifically, although increasingly scholars address the possibility with a focus on harm reduction.

The review found that the studies assessing new technologies designed for and deployed in non-conflict settings identify many of the same issues affecting societal understanding of SGBV generally (under-reporting, for example), as well as new issues specific to the digital turn, such as serious and evolving privacy and data protection concerns. As regards the application of new technologies to CRSV specifically, both the applications and literature assessing them are nascent. Nevertheless, scholars are seeking to define frameworks aimed at harm reduction for the proliferation of new technologies in the humanitarian field specific to CRSV.

2. Definitions

Literature addressing the use of digital tools to combat SGBV in conflict and non-conflict settings do not employ uniform terms or definitions. Some seek to address violence against women (VAW), whereas others embrace terms such as sexualised versus sexual violence. This report offers the following essential definitions to further discussion, although terminology both as regards SGBV and new technologies is much richer than presented here.

- **Conflict-related sexual violence**: refers to rape, sexual slavery, forced prostitution, forced pregnancy, forced abortion, enforced sterilisation, forced marriage and any other form of sexual violence of comparable gravity perpetrated against women, men, girls or boys that is directly or indirectly linked to a conflict (United Nations Secretary-General, 2022: 5).
- **Information and Communication Technology (ICT):** the infrastructure and components that enable modern computing.
- **Monitoring and early warning systems**: a process or processes that alert decision-makers to the potential outbreak, escalation, or resurgence of conflict, and/or to monitor the evolution of a conflict.
- **Sexual and gender-based violence (SGBV)**: any non-consensual, unwanted, actual, attempted, or threatened act or behaviour carried out through sexual means or by targeting a person's sex, sexual identity, or gender identity or expression.

Conflict-related sexual violence early warning and monitoring

CSVR occurs in several conflict settings and there are some estimates of the extent of the problem:

- The United Nations reported double the number of reported CRSV cases in the Central African Republic in 2021 than the previous year, a number it acknowledges likely does not encompass the full scale of the problem (United Nations Secretary-General, 2022: 17);
- As of 3 June 2022, the Ukraine Human Rights Monitoring Team of the United Nations High Commission for Human Rights had received 124 allegations of CRSV in Ukraine (United Nations News, 2022); and
- The United Nations confirms that hundreds of women and girls—including Yazidi, Turkmen, and members of other groups— were sold into sexual slavery, with thousands reportedly still in captivity (United Nations Secretary-General, 2022: 23).

Conflict-related sexual violence can have devastating consequences on individuals as well as their communities, potentially impacting both the physical and mental health of both.

Nevertheless, the nature of CRSV, and chiefly its lack of comparative visibility to, for example, conflict-related killings, make it difficult to monitor and report on. This further limits the efficacy of new technologies such as satellite monitoring when applied to CRSV. This difficulty is further compounded by factors including gender inequalities, weak rule of law and institutions, fear of reprisal, and the simple question of lack of access and resources (United Nations Secretary-General, 2022: 9). Difficulties related to monitoring and reporting on CRSV have only been further exacerbated by the pandemic (ibid.), and there remains a lack of empirical, policy-focused research. Nevertheless, both early-warning systems and monitoring systems enable both intervention—and potentially prevention—as well as the effective deployment of resources for CRSV survivors and their communities. Furthermore, monitoring and reporting potentially enables criminal prosecution.

New technologies have been increasingly deployed in early-warning and conflict monitoring, and there is some evidence that innovators are seeking to leverage new technology to prevent and monitor CRSV. This is particularly true for the field of mobile health, where innovators are adapting innovations made through mobile health apps to report and monitor CRSV (Mishori et al., 2017; Naimer et al., 2017).

Digital technology

The proliferation of smartphones, together with increasingly strong connectivity in middle and least developed countries, has the potential to empower users in conflict-prone and conflicted-affected areas of the world. Such technologies may make early-warning systems and reporting more accessible, possibly removing the necessity of an intermediary such as an humanitarian aid worker. New technologies and digitalisation might equally empower actors in the CRSV field to more efficiently respond to emerging crises. It may be that some of the benefits the humanitarian aid sector has seen broadly from new technology—including the proliferation of wearable technologies to mass data extraction and processing by super-platforms to digital cash to 3-D printing—could equally benefit the fight against CRSV. For example, data extraction and monitoring of social media by super-platforms may allow observers to track allegations of CRSV without placing additional reporting burdens on victims, their communities, or humanitarian workers as they seek to respond to emergencies at moments when access to technical and digital infrastructure may be sporadic. Equally, digital cash and 3-D printing might allow the humanitarian sector to more efficiently provide much-needed resources to treat and support victims of CRSV and their communities.

That said, the issues that affect the fight against sexualised violence in everyday life, including under-reporting due to stigma, fear of reprisals, or lack of resources, remain present as regards the use of new digital tools combatting SGBV and CRSV. Moreover, these new systems also present challenges germane to the proliferation of new technology, including questions of privacy and data protection and bias in automated systems.

3. Use of digital technology addressing sexual violence in conflict settings

Scholars have sought to operationalise data and new technologies in a variety of ways to both understand and combat CRSV, such as the Peace Research Institute Oslo (PRIO), which has compiled the Repertoires of Sexual Violence in Armed Conflict (RSVAC) database (updated to

2015) (Dumaine et al., 2021). Generally, such datasets are temporally limited (e.g. not updated in real time) and require manual input by researchers, such as the Sexual Violence in Armed Conflict dataset, which, notably, is fully compatible with the Uppsala Conflict Data Program, a leading provider for data on organised violence and armed conflict (Cohen & Nordås, 2014).

War Child Canada notes that materials play an important role in the monitoring and evaluation process related to GBV and CRSV, and suggests that tablets and mobile phones might be utilised for data collection (War Child Canada, 2020: 81). The organisation also notes that smartphone systems might enable complaints or feedback that can be uploaded to their server either immediately or at a later date (ibid.). Data collected in this manner might include surveys, registration information, and GPS and time-stamp surveys, which all have the benefit of reducing workload, allowing rapid transmission of data, and facilitating easier detection of abuse in the data collection process, and more (War Child Canada, 2020: Annex 1.7.A). Nevertheless, War Child Canada highlights that when undertaking such data collection for monitoring purposes the security of mobile devices, staff, and the data storage options must be considered. The organisation equally highlights that reliance on digital tools for monitoring may lead to unequal access to results, or present risks of theft of the deployed devices.

In other instances, Audio-Computer Assisted Self-Interview (ACASI) has been used to allow users to listen to pre-recorded questions and respond to questions through a touch screen. In one study of adolescent girls in humanitarian settings in the Democratic Republic of the Congo and the border of Sudan-Ethiopia researchers found that participants would identify caregivers or parents as perpetrators of violence against them, whereas answer differed in-person, when participants would instead identify strangers as perpetrators (Falb et al., 2017). Importantly, the researchers in this instance noted that reliance on software may lower the number of participants seeking referrals for further care and support given that participants would have fewer chances to develop rapport with in-person interviewers (Falb et al., 2017).

As regards deployment of new technologies to address CRSV specifically, innovations primarily appear to be geared at addressing medical-forensic documentation of CRSV, and are in the "future proofing" stage (Mishori et al., 2017; Naimer et al., 2017)—notably, both the aforementioned cited studies are being trialled in the Democratic Republic of the Congo. The development of apps seeking to enable users in low resource/conflict affected environments prioritise the creation of evidence of SGBV with an eye towards criminal prosecution, although one such app (MediCapt) does envision a data mapping capability will be built into the app but it highlights that significant additional study of the app is needed (Naimer et al., 2017: 33).

4. Use of digital technology addressing sexual violence in non-conflict settings

Most, if not all, research related to SGBV and technology cites a need for expanded research on GBV and technology. The following sections will present the main categories of new technologies addressing SGBV outside of conflict settings, together with any studies assessing these technologies. Given that criticisms are common to different technologies, these are discussed together at the end of the section.

Mobile Apps

Anti-SGBV mobile apps can be broadly placed in the five following categories:

Table 1: Types of mobile apps addressing SGBV in non-conflict settings

Types of mobile apps addressing SGBV in non-conflict settings	
Emergency assistance app (includes panic buttons and autonomous/multimodal systems)	• Targets emergency situations only. • Temporal immediacy of alert: mostly directly before, during or after an incident. • Easy handling (one alarm button/shake/scream). • Sends an emergency alert to selected contacts, community workers and/or to law enforcement agencies. • Alert may include GPS details and/or voice recording/video recording. • No background-information concerning the incident is transferred. • No information or resources related to SGBV is necessarily provided.
Avoidance apps	• No direct temporal link between the app's use and incident. • Usage of function before (potential) incidents. • Employs an avoidance strategy. • May target forms of SGBV that do not specifically represent harm to a person's physical integrity.
Self-assessment and learning apps	• No direct temporal link between usage of app and incident. • Usage of function before (potential incidents). • Education strategy. • May also target professionals. • May also target forms of SGBV that do not specifically represent a harm to a person's physical integrity.
Reporting and evidence-building app	• No direct temporal link between usage of app and incident, may rely on crowdsourcing and/or machine learning technology. • Usage of function before (potential incidents). • Education strategy. • May also target professionals. • May also target forms of SGBV that do not specifically represent a harm to a person's physical integrity.
Supporting app	• Usage of app only after or consecutive with incidents. • Connects users with organisations. • Informs about and connects with professional resources. • Predominantly targets forms of SGBV that harm the victim's physical integrity. • Often aiming at intimate partner violence/domestic violence.

Source: Author's Own created using data from Eisenhut et al.(2020) and Sinha, Shrivastava, & Paradis (2019).

Importantly, published studies on the use of ICT and apps to address/combat SGBV are often limited to narrow systematic reviews, and are especially limited for lower- and middle-income (LMIC) countries (Philbrick et al., 2021). One systematic review published in 2020 identified over 300 mobile apps in total addressing SGBV (Eisenhut et al., 2020). The authors also found that the largest proportion (46.78%) constituted emergency apps, followed by education, reporting and evidence building, with supporting and avoidance apps being the least represented (Eisenhut et al., 2020: 4). This finding was echoed in a separate 2020 review that also noted few existing apps have a preventative nature (Maxwell et al., 2020: 244). The authors identified a need for further research to critically consider questions related to data security, personal safety, and the effectiveness of apps seeking to address SGBV, noting that the apps themselves "are

not the panacea for violence against women and should not be viewed as a replacement for existing strategies" (Eisenhut et al., 2020: 9).

Emergency apps/Panic buttons

The largest of the abovementioned categories, emergency assistance apps are designed to enhance user safety by first collecting user personal data (primarily contact information for emergency contacts) and allowing users to trigger an SOS alert, or "panic button", which sends an emergency alert to personal contacts, sometimes also contacting emergency dispatch, and sometimes including user geolocation data at the time of the SOS alert (Eisenhut et al., 2020: 4).

Wearables

One research group designed and deployed **an autonomous system powered by artificial intelligence** and the Internet of Things (IoT) intended to automatically report when a woman is at risk of GBV (Miranda et al., 2022). The system (Bindi) relies on edge-computing based in two devices modelled after jewellery (a pendant and bracelet) that measure physiological and auditory data from the user. The devices are connected to an app, and if the neural-based engine for auditory data as well as feeds from the machine learning response in the bracelet detect a risky situation, an alarm is automatically triggered, contacting protection services, with relevant information processed and stored securely in a specific cloud-based computing service.

The project relies on the newly **introduced "Women and Emotion Multimodal Affective Computing (WEMAC)" dataset**, which contains physiological and auditory information from "non-acted emotions elicited in an immersive virtual reality environment" from a group of 47 volunteers. Importantly, the research is relatively new, and the authors highlight "a current need for research on these topics, which [their] work aims to deepen" (Miranda et al., 2022: 4). Other research has sought to improve machine learning in predictive modelling for GBV, noting that modelling as regards predictive GBV has been traditionally been of poorer quality than predictive modelling for other types of crime (González-Prieto et al., 2021). Other wearable rely on **Raspberry Pi Based technology**, comprising a smart ring that uses a Raspberry Pi camera, buzzer, and button to activate services, sending a location and link to captured images to predefined emergency contact numbers of the police when activated (Sogi et al., 2018).

Crowdsourcing/Crowdmapping

Crowdsourcing reporting seeks to tie (attempts at) violence to user (geo)location, culminating in a map that allows users to visualise reported "hotspots". Importantly, such crowdsourcing platforms may assist users in personal safety decisions, but may also be employed by law enforcement bodies assess where and how to deploy law enforcement resources. Equally, crowdsourcing can serve as a form of consciousness-raising (Fileborn 2021; 2022). For these reasons, crowdsourcing apps may serve to inspire a "collective (re)imagination of cities [that is] more inclusive of women and girls" and be a tool that can inform urban planning and policymaking as regards GBV in cities (Kalms, 2018: 159).

The Bogota government, together with SafetiPin, formed a partnership to collect urban safety data through crowdsourcing, making the database available through the Open Data portal, in addition to integrating it into the city's geographic information system (Hawken et al., 2020).

Hawkens et al. (2020) identified that the database, in turn, led to public pressure on decision-makers in urban agencies to make certain improvements in urban architecture, including, for example, by providing better lighting in particular parts of the city.

Other **crowdmapping** apps rely on real-time user data, using Bluetooth technology or wired networks to display a map with the location of every user. Users have the option of triggering the application either by shaking their mobile device vigorously, or through hardware, at which point the user's Maker on the map changes colours and continuous vibrations are triggered in every available user's mobile until they open the notification, redirect these other users to a Google Maps route to the user in distress (Pughazhendhi, Muruganandam, & Sridevi, 2021).

Crowdsourcing apps can provide useful insight into both patterns and mechanisms of SGBV and its spread in a given region. Importantly, anonymity can be crucial in the success of a crowdsourcing app for a few reasons. First, victims may feel a sense of shame, or that the incident is too trivial to report (Sinha 2019). Second, victims may have privacy concerns which may relate to fears of reprisal (Sinha, Shrivastava, & Paradis, 2019). Evaluations of crowdsourcing app HarassMap—which facilitates an online anonymous reporting mechanism—have suggested anonymity in reporting "is a critical feature" for ICTs seeking to address SGBV. The website *Hollaback!*, for example, was created in 2005 and allows users who have either experienced, witnessed, or intervened in street harassment to document the incident via anonymous reporting made available through a website, which also provides users with the opportunity to interact with a Google map by dropping pins identifying the location of the harassment that may complement a written description or photographs (the latter are less popular) (Fileborn, 2021).

HarassMap, an early iteration of crowdsource data being deployed to address GBV, produced a map of verified and unverified reports, relying on volunteers to verify reports and decide whether an unverified report was "reasonable" and should be uploaded to the map with an "unverified" flag. As the seminal study on the app states, this control "relies on the value judgments of volunteers", and carries the dual risks that false or inaccurate reports are uploaded, and that actual reports may not be uploaded because they are deemed unreasonable by a trained volunteer (Young, 2014: 10). Both scenarios present the risk of undermining the project's integrity. As the study's author notes, there is "little that can be done to conclusively demonstrate the accuracy of large quantities of 'good-enough' data collected in real time" (Young, 2014: 11). The study's author equally notes that suppression, stigmatisation, and shame, or even technical access and literacy may affect the data uploaded—or not— to the platform by users, potentially effecting its usefulness. Consequentially, informal institutions and cultural constraints may "pose a greater barrier to the collection of representative data" than the app's design features (Young, 2014: 11).

In the same vein as HarassMap, the *Report It! Stop it!* app was designed to allow Kenyan users—either victims themselves or witnesses—to pin incidents of violence on an interactive map, and, if the user so wished, to add a description of the incident. The data was then gathered to create a comprehensive database on GBV hotspots across Kenya, and not only made public but additionally shared with government authorities, public transport operators, and civil society in Kenya (Dickins & Mwaura, 2020). In developing this application, the designers noted a distinct lack of formative research into the efficacy of mobile or other ICT-based SGBV intervention tools (Dickins & Mwaura, 2020). Similarly, Bijoya in Bangladesh, Harasstracker in Lebanon,

Aksharea/HarassMap and Safeciti in India all seek to provide similar crowdsourced based platforms to map and publicise incidents of GBV (GBV AoR Helpdesk, n.d.:14).

Machine learning and forecasting

In other scenarios, activists have sought to operationalise technology to fill gaps in reporting, both with an eye towards challenging state bias and inaction as regards SGBV, and to provide a monitoring mechanism for femicide. One recent empirical study analysing ten such grassroots projects across a range of six countries in North, Central, and South America suggested that **interactive technologies and machine learning** could play a useful role in information discovery, retrieval, and verification specifically as regards gender-related killings (D'Ignazio et al., 2022). More specifically, the authors highlight that **interactive technologies and machine learning** could help address time and resource constraints facing activists groups as regards crowdsourced case detection and/or partially automated case detection, and that such technologies could also reduce instances of vicarious trauma by limiting human exposure to violent content (D'Ignazio et al., 2022).

Another paper presented findings related to **machine learning and forecasting** SGBV within the court system in Spain. Using the Spanish database INE, the researchers built a database of almost 250,000 data examples between January 2009 and March 2020 in 52 Spanish territories (Rodríguez-Rodríguez et al., 2020). The researchers found acceptable accuracy in predicting reports of GBV, noting that such forecasting could assist in adjusting planning in provincial distribution of resources in Spain, although the group noted a need for further study of their proposed methodology (Rodríguez-Rodríguez et al., 2020).

A separate research group has compiled a **video dataset** of sexual harassment to operationalise a **smart surveillance system** to detect sexual harassment in real-time for law enforcement (M. S. Islam et al., 2021).

Using India's nationally representative, retrospective, cross-sectional data another research group applied machine learning methods (specifically, **iterative thematic analysis**) to identify risk factors for non-marital sexual violence (Raj et al., 2021). Although the authors highlight certain indicators for an individual's risk of experiencing non-marital sexual violence, they additionally note that the reliance on self-reporting may influence results—noting that under-reporting is particularly likely. Together with other reporting biases, the authors note this may affect their data and analysis, and therefore the efficacy of the machine learning in question. Nevertheless, the results broadly correspond with prior epidemiologic and demographic research in the area (Raj et al., 2021: 11).

Dissimilarly, a different study applied **machine learning** to 28,000 arraignment cases involving an offender facing domestic violent charges, and incorporated various asymmetric costs for diverse forecasting errors (Berk, Sorenson & Barnes, 2016). Ultimately, the study applied the machine learning to an out-of-sample forecast of no post-arraignment domestic violence arrests within two years with a success rate of approximately 90% (Berk, Sorenson & Barnes, 2016).

Another study used machine learning to try to accurately predict types of violence (physical/sexual, verbal, and mental) experienced by adolescent girls in public spaces, educational institutions, and the home, ultimately concluding that the **Winnow algorithm** had a sufficient accuracy rate (97%) to help institutions identify victims of violence and provide help

(Mishra & Kulkarni, 2022). Yet another research group has created a **supervised learning-based automated sexual violence report tracking model** that is scalable, which it assesses as able to identify sexual violence reports with a precision of 80.4% and recall of 83.4% (Hassan et al., 2020).

5. Potential ethical and efficacy issues in the application of new technologies in non-conflict and conflict settings

Deploying new technologies to both prevent and map SGBV in non-conflict and conflict settings presents some already understood challenges, and additionally presents novel design challenges. In many ways, conflict dramatically complicates both the ethical and efficacy issues facing organisations seeking to design and deploy new technologies to address CRSV. As highlighted by the United Nations Secretary-General, conflict alone presents an additional challenge for users in achieving connectivity and taking advantage of digital tools that might be available to them (United Nations Secretary-General, 2020: 11). Observers generally identify the following issues related to both ethics and efficacy challenges in non-conflict and conflict settings:

1. Cultural and geographic limitations.
2. Security and privacy issues.
3. Accessibility issues, including the actual usability of the technology, awareness of the technology, and technical accessibility issues.
4. Bias and accuracy issues.

Cultural and geographic limitations

Researchers have also identified significant differences among geographical distribution of the non-conflict apps among the five World Bank regions, with many app downloads being restricted by region (Eisenhut et al., 2020; Philbrick et al., 2021). Indeed, one study ultimately excluded East Asia and the Pacific region because of the comparative paucity of apps available for download (Eisenhut et al., 2020: 3). Surveys on research related to women's safety apps has identified that the majority of research has taken place in the United States (Doria et al., 2021). Moreover, most surveys were comprised of college women, only one study reported the sexual orientation of the participants (the sample was almost entirely heterosexual women), and, where ethno-racial makeup was reported, the studies were comprised of a majority Caucasian/White sample group (Doria et al., 2021).

One potential challenge presented in the deployment of new technologies in either monitoring or preventing CRSV is one of inclusivity and access. It may be that successful deployment of a new technology is premised on a baseline digital literacy that can be assumed in the locus of design, but the same may not be true for the locus of deployment (Sandvik & Lohne, 2020). For example, the United Nations Secretary General's 2020 "Roadmap for Digital Cooperation", also highlights that only 19% of individuals in least developed countries use the Internet, as opposed to 87% in developed countries (United Nations Secretary-General, 2020: 2). This is echoed in a 2021 United Nations report on CRSV, which also noted that marginalised women and girls in

conflict-affected areas and displacement settings are among the hardest to reach, in part because of the gender-based digital divide (United Nations Secretary-General, 2021: 3).

Security and privacy issues

Data protection and privacy issues constitute a significant and omnipresent concern for observers considering the use of new technologies in the humanitarian space, (Rejali & Heiniger, 2020) this is especially true for observers considering the application of new technologies to CRSV (Sandvik & Lohne, 2020). As regards the administration and governance of data related to SGBV, a 2020 systematic review by UN Women highlighted the importance of privacy protection in the collection and storage of data related SGBV (UN Women, 2020). The study noted a need not only to remove names and aggregate data to protect individual privacy but also supress (not report) the data in cases where reporting numbers were particularly low (UN Women, 2020). Data privacy issues may be particularly salient in the design phase when relying on AI systems, as collection of open data may be susceptible to misuse or abuse:

> AI systems can reveal sensitive insights into individuals' whereabouts, social networks, political affiliations, sexual preferences and more, all based on data that people voluntarily post online (such as the text and photos that users post to social media) or incidentally produce from their digital devices (such as GPS or cell-site location data) (Pizzi, Romanoff, & Engelhardt, 2020: 153).

A study of HarassMap suggested dangers related to the platform's data being used to pursue microlevel targeting of women, or to justify other forms of state violence (Grove, 2015).

Nevertheless, studies have identified that using apps provided a great sense of privacy or anonymity than obtaining information from in-person services, and additionally gave users a greater sense of privacy because of the ambiguous/discreet design of the apps in question (Doria et al., 2021). Additionally, the reviewed literature suggested that participants experienced a greater sense of security because the apps helped them avoid judgment/stigma associated with SGBV, which also led to participants having a sense that the apps provided more objective/unbiased help than seeking assistance through friends or family. The surveyed literature additionally identified that information and safety planning strategies provided in apps helped to increase a sense of empowerment among users, although several studies identified a need to improve the knowledge provided in SGBV safety apps, thereby increasing the apps' value as "all-in-one" resources for support information, and emergency planning (Doria et al. 2021).

In the literature surveyed for the Doria et al study, surveillance and privacy nevertheless emerged as a large concern for participants, including surveillance from partners (Doria et al., 2021). Recommendations to help address privacy concerns included: using innocuous names for apps or allowing users to rename apps, password protecting apps, and including an emergency exit on each screen apps (Doria et al., 2021).

In order to circumvent lack of knowledge, observers have suggested crowdsourcing might be better suited by aggregating data from multiple social media platforms (although they highlight that such a practice would raise additional ethical concerns as regards both ownership and privacy rights) (Young, 2014: 11). The study's author additionally flags potential risks to

crowdsourcing platform owners and operators, primarily in the guise of both ethical and data integrity issues (Young, 2014: 12).

When addressing new technologies and CRSV, observers note that digital security issues "may be *as consequential* in compromising the security and well-being of physical bodies"(Sandvik, 2019: 4). On the specific application of wearable technologies to CRSV, critics note that technological possibilities coupled with an emergency context may allow for "intrusive uses" for intimate tracking (Sandvik, 2019: 5-6).

Accessibility issues

Research has noted that apps did not appear to be targeted at specific risk factors and options available to individuals in rural areas (Maxwell et al., 2020: 242). Moreover, very poor and sometimes non-existent network coverage means apps might be essentially unavailable to swathes of users (ibid.). App designers have noted that, depending on the app, storage may be an issue in addition to the app's data use (Dickins & Mwaura, 2020). It may also be that users are not even aware of relevant technologies (Young, 2014: 11; Tozzo et al., 2021: 11), which some research has circumvented through partnerships with communities (Decker et al., 2020).

Studies have also suggested that panic button apps may not be accessible or usable in all emergency situations specifically because they require a potential victim to play an active role in their use (Miranda et al., 2022). Other research has suggested that recipients of emergency alerts—including emergency services—may not be able to intervene and reach the user before a crime takes place, or worse, will not take the alert seriously (Maxwell et al., 2022: 241).

Furthermore, to the extent that applications connect users with professionals, studies note that expert/professional comfort with the technology may also present a barrier to use, and may require additional outreach/education to relevant experts and professionals (Mishori et al., 2017).

Bias and accuracy issues

In particular as regards the use of big data and open data, observers note that use of such datasets

> often lack demographic information that is crucial for epidemiological research, such as age and sex. [Also], this data represents only a limited portion of the population – i.e., excluding marginalised and under-represented groups such as infants, illiterate persons, the elderly, indigenous communities and people with disabilities – while potentially under-representing some developing countries where digital access is not widespread (Gazi & Gazis, 2020: 93-94).

Big data analytics and machine learning models can equally "accelerate" existing inequalities, potentially presenting a misleading or distorted view of facts on the ground in part because such models may be very susceptible to human bias in the design process (Sandvik & Lohne, 2020; Milaninia, 2021). Importantly, when considering new technologies and gender-based crimes, it may be that social norms not only present access issues as regards new technologies, but also that social norms may affect what individuals consider rise to the level of violence (Cochrane, Zeid, & Sharif, 2019).

When discussing possibilities related to reporting, automation, and machine learning, a recent literature from the Belfar Center highlighted that self-censorship by victims, survivors and witnesses may seriously limit the efficacy of automation and machine learning and CRSV (as distinct from the field of political violence, where the authors suggest automation and machine learning holds "great promise" as a monitoring tool) (Nordås & Cohen, 2014: 203).

On accuracy of crowdsourced apps, Maxwell et al. notes that the apps assume that user information entered into the app is accurate (Maxwell et al., 2020: 242). Such assumptions may lead users to believe an area is safe or unsafe, and Maxwell highlights research from other contexts on factors that influence perceived safety and fear of crime that establishes these factors do not always align with vulnerability, meaning that users may avoid places that appear unsafe based on app data (even if those locations are not actually unsafe), and have a false sense of security in other locations not flagged as problematic by the apps.

Applications of new technology to CRSV monitoring face some of the same obstacles as quantitative studies of sexual violence generally, chiefly issues of both data bias and limitations (Krüger & Nordås, 2020). Insofar as the turn to technology in the humanitarian field corresponds with an increase in quantification and evidence-based approaches, Sandvik highlights that this may lead to a reductive form of accountability that forces responses to measure only what is classified/classifiable, or counted/countable (Sandvik, 2019: 7). Equally, as regards use of algorithms to detect vulnerability, Sandvik highlights that "perceptions of gender and vulnerability not only impact directly on program priorities but also shape screening efforts and data generation that legitimise these priorities: this reinforces the notion of women as vulnerable and of men's specific gendered problems as invisible and irrelevant to vulnerability considerations" (Sandvik, 2019: 7-8). Without a critical approach, use of Big Data may have the end effect of compounding pre-existing issues related to the poor documentation of SGBV against males.

Finally, scholars further highlight the ethical and actual dangers associated with the re-framing of sexual violence as an "innovation opportunity" in the humanitarian sector (Sandvik, Jacobsen, & McDonald, 2017; Sandvik, 2019). Instead, there is a need to ensure that experimental applications of digital data and ICTs happen within a pre-agreed normative framework guided by accepted theory as to their ethical and responsible use (Sandvik, 2019: 10).

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