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Digitally supported public health interventions through the lens of structural injustice: The case of mobile apps responding to violence against women and girls

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Abstract

Mobile applications (apps) have gained significant popularity as a new intervention strategy responding to violence against women and girls. Despite their growing relevance, an assessment from the perspective of public health ethics is still lacking. Here, we base our discussion on the understanding of violence against women and girls as a multidimensional, global public health issue on structural, societal and individual levels and situate it within the theoretical framework of structural injustice, including epistemic injustice. Based on a systematic app review we previously conducted, we evaluate the content and functions of apps through the lens of structural injustice. We argue that technological solutions such as apps may be a useful tool in the fight against violence against women and girls but have to be situated within the broader frame of public health that considers the structural dimensions of such violence. Ultimately, the concerns raised by structural injustice are—alongside key concerns of safety, data privacy, importance of human supportive contact, and so forth—crucial dimensions in the ethical assessment of such apps. However, research on the role and relevance of apps as strategies to address the structural and epistemic dimensions of violence remains scarce. This article aims to provide a foundation for further discussion in this area and could be applicable to other areas in public health policy and practice.

KEYWORDS
epistemic injustice, gender inequality, mobile applications, mobile health, structural injustice, violence against women and girls

Ela Sauerborn and Katharina Eisenhut should be considered joint first author.

1 | INTRODUCTION

Violence against women and girls is a complex global public health issue that requires effective and sustainable intervention strategies at structural, societal, and individual levels.[1] Based on the large numbers of downloads and recent research,[2] mobile technologies, such as mobile applications (apps), seem to be gaining popularity as an intervention strategy responding to such forms of violence.

A central claim of this article is that the content and functions of such apps should also be evaluated through the lens of structural injustice including considerations of epistemic injustice. We first establish and highlight the importance of violence against women and girls as an issue of global public health and briefly assess its intricate multidimensional nature on structural, societal and individual levels. We then situate our discussion and respective intervention strategies within the context of structural injustice, including epistemic injustice, with reference to Iris Marion Young's[3] and Miranda Fricker's[4] works, highlighting an inextricable link between violence against women and girls and structural injustice.

As apps have been increasingly promoted as an intervention strategy by for example, the UN Commission on the Status of Women,[5] we critically assess whether, and to what extent, the structural and epistemic dimensions of violence against women and girls are reflected in the content and function of such apps. We argue that technological solutions such as apps may be a welcome asset in the fight against violence against women and girls but have to be situated within the broader frame of public health that acknowledges and considers the structural dimensions of such violence. Ultimately, the concerns raised by structural injustice are—alongside key concerns of safety, data privacy, importance of human supportive contact, and so forth—crucial dimensions in the currently vastly underexplored ethical assessment of such apps.[6]

2 | VIOLENCE AGAINST WOMEN AND GIRLS AS A CONCERN OF GLOBAL PUBLIC HEALTH AND STRUCTURAL INJUSTICE

Physical safety and integrity are essential to human well-being and key determinants of physical and mental health. Violence against women and girls affects these core aspects of human flourishing on a global scale as one third of the female population worldwide faces violence during their lifetime.[7] In the following, we use the term violence against women and girls in line with the UN's phrasing of the Sustainable Development goals,[8] but focus in particular on rape, sexual assault, and forms of sexual harassment.

Understanding violence against women and girls as a symptom of broader, structurally entrenched gender-based inequalities, including gender norms and attitudes, and gendered institutional and social processes, allows us to reconceive behaviours and actions that might lie at the very core of such violence.[9] Empirical research suggests that said structural factors are highly predictive with respect to rates of perpetration and victimization of violence.[10] The importance of 'addressing the structural and underlying causes of violence against women and girls' was highlighted in the conclusion of the UN Commission on the Status of Women's 57th session.[11] This means that while acts of violence can be isolated events and are mostly carried out by (groups of) individuals, they are often dependent on the structural context in which they are carried out. Violence against women and girls is therefore to be viewed as intrinsically linked to, and rooted in, the structural dimensions that underlie and perpetuate these forms of violence.[12]

As philosopher Iris Marion Young has argued, oppression manifests itself in all societies, and need not be perpetuated by a specific individual, or identifiable group that dominates or oppresses.[13] Oppression, she suggests, refers to 'structural phenomena that immobilize or diminish a group'.[14] Such structural oppression leads to structural injustice by allowing some to flourish, while others are constrained. In that respect, violence against women and girls ought

[1]World Health Organization. (2018). *Responding to intimate partner violence and sexual violence against women—WHO clinical and policy guidelines*. https://apps.who.int/iris/bitstream/handle/10665/85240/9789241548595_eng.pdf;jsessionid=4064364DF9C87D5513A1959FDF3E9115?sequence=1; World Health Organization. (2010). *Preventing intimate partner violence and sexual violence against women: Taking action and generating evidence*. https://apps.who.int/iris/bitstream/handle/10665/44350/9789241564007_eng.pdf?sequence=1

[2]Maxwell, L., Sanders, A., Skues, J., & Wise, L. (2020). A content analysis of personal safety apps: Are they keeping us safe or making us more vulnerable? *Violence Against Women*, *26*(2), 233–248; White, D., & McMillan, L. (2020). Innovating the problem away? A critical study of anti-rape technologies. *Violence Against Women*, *26*(10), 1120–1140; Eisenhut, K., Sauerborn, E., García-Moreno, C., & Wild, V. (2020). Mobile applications addressing violence against women: A systematic review. *BMJ Global Health*, *5*(4), e001954.

[3]Young, I. M. (2010). *Responsibility for justice*. Oxford University Press.

[4]Fricker, M. (2007). *Epistemic injustice*. Oxford University Press.

[5]United Nations. (2013). *The UN convention on the elimination of all forms of discrimination against women*. https://www.ohchr.org/Documents/ProfessionalInterest/cedaw.pdf

[6]Emezue, C. (2020). Digital or digitally delivered responses to domestic and intimate partner violence during COVID-19. *JMIR Public Health and Surveillance*, *6*(3), e19831; Jewkes, R., & Dartnall, E. (2019). More research is needed on digital technologies in violence against women. *The Lancet. Public Health*, *4*(6), e270–e271.

[7]World Health Organization. (2013). *Global and regional estimates of violence against women*. https://www.who.int/publications/i/item/9789241564625

[8]United Nations General Assembly. (2014). *Report of the open working group of the General Assembly on sustainable development goals*. https://www.iom.int/sites/default/files/UN_Documents/69th_Session/A_68_970.pdf

[9]Heise, L. L., & Kotsadam, A. (2015). Cross-national and multilevel correlates of partner violence: An analysis of data from population-based surveys. *The Lancet. Global Health*, *3*(6), e332–e340.

[10]Sardinha, L., & Nájera Catalán, H. E. (2018). Attitudes towards domestic violence in 49 low- and middle-income countries: A gendered analysis of prevalence and country-level correlates. *PLoS ONE*, *13*(10), e0206101; Gracia, E. (2014). Intimate partner violence against women and victim-blaming attitudes among Europeans. *Bulletin of the World Health Organization*, *92*(5), 380–381; Archer, J. (2006). Cross-cultural differences in physical aggression between partners: A social-role analysis. *Personality and Social Psychology Review*, *10*(2), 133–153; Sugarman, D. B., & Frankel, S. L. (1996). Patriarchal ideology and wife-assault: A meta-analytic review. *Journal of Family Violence*, *11*, 13–40.

[11]United Nations, op. cit. note 5.

[12]Dixon, L., & Graham-Kevan, N. (2011). Understanding the nature and etiology of intimate partner violence and implications for practice and policy. *Clinical Psychology Review*, *31*(7), 1145–1155.

[13]Young, I. M. (2011). *Justice and the politics of difference*. Princeton University Press, pp. 39–65.

[14]op. cit. note 13, p. 42.

to be understood as a manifestation of a broader context of structural injustice and oppression.

This interplay between individual, societal, and structural factors is further reflected in the etiological framework of the 'socio-ecological or ecological model'.[15] This model considers how risk factors across four ecological levels (i.e. individual, relationship, community, and societal) put individuals at increased risks for experiencing and/or perpetrating violence. The model is extensively used, notably by the WHO and the CDC,[16] to delineate the multiple levels at which social factors operate to influence levels of risk of violence.

Young's paradigm of structural injustice also echoes the 'socio-ecological model' of violence against women and girls, according to which—for example—factors, such as the concept of gender inequality, lead to unequal access to and distribution of resources, for example, education, employment, and healthcare. Biased access and distribution of resources, in turn, often lead to increased vulnerability to and risk of violence. Gender inequalities represent additional constraints on women's lives, economic potential, resource allocation, and social roles.[17] In particular, socially sanctioned gender roles and unequal power relations often legitimize the use of violence against women and girls. This correlation between structural injustice instantiated by structural gender inequality and violence against women and girls has been studied empirically and theoretically, as the prevalence of intimate partner violence, a common manifestation of violence against women and girls, was found to be substantially higher in contexts with greater prevailing structural gender inequality.[18] Similarly, feminist theories postulate that violence is used as a tactic to exert control and dominance over women, forming a self-enforcing dyad of violence and oppression.[19]

Viewing violence against women and girls a phenomena intrinsically grounded in and stemming from gender oppression and structural injustice allows us to cast a larger net with regards to causes and responsibilities. A focus on social structures and processes allows us to consider how individuals (as potential and actual survivors or potential and actual perpetrators) are placed, in relation to others around them, as well as in relation to institutions that affect their lives, actions, and decisions. This applies even where institutions and social processes are established specifically to respond to this type of violence. It is well documented that institutions (e.g. health care and social and legal institutions) designed to deliver justice for (potential) survivors, not only often fail to do so, but in part further reinforce the trauma and stress of (potential) survivors.[20] This then presents an additional facet to the ways in which social structures, including institutions responsible for delivering criminal and social justice, further perpetuate oppression and inequality.

As part of the concerns raised by structural injustice, targets and survivors of such violence face issues of epistemic injustice. The concept of epistemic injustice, as understood by Miranda Fricker, refers to the injustice done to someone 'in their capacity as a knower'.[21] Violence against women and girls is a particularly stark illustration of the ways in which such injustice operates. Survivors are often not believed (testimonial injustice) or are preemptively silenced by the fear of being disbelieved or other social repercussions.[22] Additionally, survivors of such violence might not have the epistemic tools to recognize or verbalize such violence (hermeneutical injustice), because they or their surroundings do not have the means, and often do not have the power, to express the harm of such violence, or make claims from the criminal justice system.[23] These epistemic gaps and injustices are themselves further mediated through social structures, and relative positions of privilege.

3 | INTRODUCING A NEW INTERVENTION STRATEGY: MOBILE APPS RESPONDING TO VIOLENCE AGAINST WOMEN AND GIRLS

We previously conducted a systematic app review to identify and categorize apps addressing violence against women and girls according to their functions[24] by a structured qualitative content analysis.[25] In accordance with the researchers' language proficiency, languages of our online search and content analysis were limited to English, German, Spanish, and French. In total, we analysed 171 apps and identified five categories of main functions (Table 1).

As argued earlier, violence against women and girls has an individual and immediate component, as well as a structural and systemic component. In the following we briefly describe in what way apps might contribute to individual and immediate support, and in what way they aim to improve the structural dimensions of violence against women and girls.

[15]Heise, L. L. (1998). Violence against women: An integrated, ecological framework. *Violence Against Women*, *4*(3), 262–290.

[16]World Health Organization. (2019). *RESPECT women: Preventing violence against women*. https://apps.who.int/iris/bitstream/handle/10665/312261/WHO-RHR-18.19-eng.pdf?ua=1; Centers for Disease Control and Prevention. (2020). *The socio-ecological model: A framework for prevention*. https://www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html

[17]Willie, T. C., & Kershaw, T. S. (2019). An ecological analysis of gender inequality and intimate partner violence in the United States. *Preventive Medicine*, *118*, 257–263.

[18]Sardinha & Nájera Catalán, op. cit. note 10; Gracia, op. cit. note 10, p. 380; Archer, op. cit. note 10; Sugarman & Frankel, op. cit. note 10.

[19]Bell, K. M., & Naugle, A. E. (2008). Intimate partner violence theoretical considerations: Moving towards a contextual framework. *Clinical Psychology Review*, *28*(7), 1096–1107.

[20]Evans, D. P., Hall, C., DeSousa, N., Wilkins, J. D., Chiang, E., & Vertamatti, M. (2020). "Women fear the law more than abusers": A study of public trust in health and legal response to violence against women in Santo André, São Paulo State, Brazil. *Cadernos de saude publica*, *36*(10), e00114019.

[21]Fricker, op. cit. note 4, p. 1.

[22]Fanslow, J. L., & Robinson, E. M. (2010). Help-seeking behaviors and reasons for help seeking reported by a representative sample of women victims of intimate partner violence in New Zealand. *Journal of Interpersonal Violence*, *25*(5), 929–951.

[23]Kiss, L., d'Oliveira, A. F., Zimmerman, C., Heise, L., Schraiber, L. B., & Watts, C. (2012). Brazilian policy responses to violence against women: Government strategy and the help-seeking behaviors of women who experience violence. *Health and Human Rights*, *14*(1), E64–E77.

[24]Eisenhut et al., op. cit. note 2.

[25]Mayring, P. (2010). *Handbuch qualitative Forschung in der Psychologie*. VS Verlag für Sozialwissenschaften.

TABLE 1 App categories and main function description

App categories	Main function description
Emergency apps	Send an immediate emergency message and/or call to preselected contacts and/or local authorities after being activated by the user in emergency situations of violence against women and girls (VAWG)
Avoiding apps	Offer users strategies to avert and prevent possible incidents of VAWG, for example, by an all-female cab service
Supporting apps	Mediate or directly offer legal, medical, and psychological help, facilitate a connection between survivors and support groups
Reporting and evidence-building apps	Allow users to report incidents of VAWG via their mobile phone, encourage to anonymously report their stories and experiences of violence, and to share them with other app users
Educating apps	Provide information on the unacceptability and, if the case, unlawfulness of VAWG as well as on the advantages of egalitarian gender roles for individuals, relationships, and for society

4 | MOBILE APPS RESPONDING TO VIOLENCE AGAINST WOMEN AND GIRLS THROUGH THE LENS OF STRUCTURAL INJUSTICE

Successfully addressing, preventing, and reducing violence against women and girls requires understanding the ways in which structural factors are inextricably linked to such violence. As one intervention strategy, the increasing number of downloads indicates that mobile apps have become a prominent technological tool in addressing violence against women and girls.[26] Indeed, in areas with high prevalence, the promotion of the development and implementation of apps appears to follow a positive trend.[27] Such technology bears great potential by offering new opportunities for action and defence, such as a new level of agency in relation to bodily safety and integrity.

It is notable that 'emergency', and 'avoiding' apps, as apps that focus on specific incidences of inter-individual violence, make up the largest groups of mobile applications included in our review. Our review showed that the number of downloads of these types of apps is proportionally higher in regions with higher to highest rates of violence.[28] We argue that the dominance of one-time solution apps targeting specific, decontextualized incidents of violence presents not only benefits for the individual user but also a potentially problematic trend in these apps' deployment as effective forms of intervention. Given the diversity and reach of the apps reviewed, we suggest that a more nuanced approach is warranted. We also demonstrate that it is possible to differentiate types of apps and their roles in a way that considers whether they should go beyond providing targeted one-time solutions.

Prevention as a public health strategy should be a long-term, contextual, and forward-looking strategy,[29] particularly where health and safety concerns have deep-rooted structural features. As delineated above, the disadvantaged position of potential targets and survivors is deeply entrenched in multi-layered structural processes that have persisted and are predominantly long-lived. The 'educating', 'supporting', 'reporting and evidence-building' applications we identified address the structural and epistemic injustices in various ways and to different degrees and therefore show the potential to contribute not only to the short-term prevention of a single event, but to the long-term prevention of violence against women and girls on a larger scale.

'Educating' apps inform users about violence, its unacceptability, and the availability of services. Apps from this category also address the importance of egalitarian gender norms for individuals and societies, and therefore take the social, cultural, and institutional contexts of violence against women and girls into account. These apps conceptualize this type of violence not merely as isolated events of individual harm, but instead as the culmination of underlying social structures, which are addressed by giving users access to information on the relevant social processes and structures.

Similarly, 'supporting' apps, though not providing users with specific information on the structural dimension of violence, connect users with providers that often do so, such as legal, medical, and psychological services as well as support groups. Naturally, such services first and foremost seek to help an individual in need, but they often also offer a space in which information on and experiences with violence can be shared, spoken about, and framed within a broader context. In this manner, apps can facilitate access to institutional frameworks that understand violence as structurally embedded, and within which survivors are given the chance and epistemic tools to share their story and connect with others.

'Reporting and evidence building' apps encourage users to actively narrate their experiences and to connect with stories of fellow survivors, building a common epistemic space for those who have encountered violence. Users are acknowledged as epistemic subjects, are encouraged to make use of their epistemic capability and can share and potentially enhance their knowledge within the user community. By giving users the opportunity to make their voices heard, even if only digitally by the means of a mobile application, these apps appear to address aspects of epistemic injustice. Thus,

[26]Eisenhut et. al., op. cit. note 2.
[27]Ibid.
[28]Ibid.
[29]World Health Organization, op. cit. note 7.

these types of apps may contribute to a better understanding of patterns and clusters of violence, and can emphasize the need to react, not only on an individual, but also on a structural level (e.g. communities, governments, policy). Potentially, these apps could also help individuals feel less lonely about their experiences, to learn about ways of coping and of finding support and advice. Certainly, this needs further investigation in sensitive, qualitative research settings.

Nevertheless, the identified shortcomings in the current ecosystems of apps highlight the need to situate technology within a broader framework of structural and systemic concerns. Access and use of apps present a digital divide that mirror a gender divide, class divide, and urban/rural divide.[30] Rates of access and use can be heavily dependent on e-literacy or socio-economic privilege and in many cases such disadvantages are also specifically gendered.[31] Even if apps are developed in ways that consider and reflect structural dimensions of violence, their effect will be questionable if they cannot be accessed by all. This bears the risk of accentuating and reinforcing structural and epistemic injustice by promoting digital intervention strategies that can only be accessed by users with certain privileges. Additionally, most apps—regardless of their category—target exclusively those at risk of violence, namely women and girls and do not address the need for educating men and boys about violence, or the need to engage them in the broader societal discourse on violence.

It appears that only a small proportion of the apps included in our review incorporate structural dimensions of violence against women into their content and aims. However, the mere fact that an app does not explicitly mention structural dimensions of violence against women and girls in its content and aims, does not preclude such apps from having a structural impact. Rather, short-term solution apps like emergency and avoidance apps could support structural *justice* with regards to violence against women beyond the app content by means of targeted collaborations. An emergency app, for example, could form targeted collaborations with local police and policy institutions, as well as with existing support groups. By gathering GPS details of emergency calls placed by app users for instance, infrastructural and institutional shortcomings with regard to street lighting, public transport, and so forth, in specific areas could be further highlighted and addressed. Contexts or situations in which women and girls are in disproportionately vulnerable positions could be identified and approached more systematically and rigorously in intervention strategies. Thus, a one-time solution app could still contribute to broader, preventative, and long-term structural considerations through other means beyond the app content itself. However, according to our assessment, the majority of apps do not seem to be explicitly or visibly integrated into a broader framework of existing, non-digital public health interventions against violence against women and girls.

For apps to live up to their potential as tools against structural and epistemic injustice, we further argue that collaborations with already existing social institutions and support structures are required. However, establishing such partnerships is not the sole responsibility of the mobile health (*mHealth*) sector, but also of existing endeavours, such as local initiatives, health institutions or the judiciary and political sector. Changing structural processes and fostering awareness can be achieved 'only if many actors from diverse positions within the social structures work together [...] to try to produce other outcomes'.[32] Finally, such an integrative approach ought to actively include *all* public actors, as well as all individual actors, that is, men and women, in the fight against this global public health issue.

5 | CONCLUSION AND LOOKING AHEAD

In this article, we evaluate the development and deployment of mobile apps as a tool for addressing violence against women and girls. We argue that in order for any intervention strategy to be effective and sustainable, factors that go beyond the inter-individual level need to be taken into account.

Research on the role and relevance of apps as strategies to address the structural and epistemic dimensions of violence remains scarce. This work shall provide a foundation for further discussion in this area and could be applicable to other areas in public health policy and practice.

A core argument of this article is that an integrative approach is warranted, which includes targeted collaborations between the deployment and use of apps and existing institutions such as the police, health care institutions, civil society as well as advocacy and support groups. This is especially important where institutions, in part, contribute to upholding the high prevalence of violence against women and girls through negligence with respect to the treatment and protection of survivors and/or with respect to the prosecution of predators.

Building on our work, further research is needed to investigate whether and to what extent structural dimensions of violence against women and girls can and should be *effectively* taken into account by apps. For this, interviews with potential future users and current active users and stakeholders of such apps could provide deeper insights than our exploratory app review.

It is essential to include women as future users in the concrete development and design of such apps, to ensure that epistemic injustice and the needs of potential users are considered not only in the use of apps but also in app development.[33] Furthermore, systematic intervention studies for further evaluation will be essential. These studies should include potential adverse effects of apps, as well as

[30]Heise, L. L. (2011). What works to prevent partner violence? An evidence overview. http://strive.lshtm.ac.uk/system/files/attachments/What%20works%20to%20prevent%20partner%20violence.pdf; Aranda-Jan, C. B., Mohutsiwa-Dibe, N., & Loukanova, S. (2014). Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa. *BMC Public Health*, *14*(1), 188; Joshi, A., Malhotra, B., Amadi, C., Loomba, M., Misra, A., Sharma, S., Arora, A., & Amatya, J. (2020). Gender and the digital divide across urban slums of New Delhi, India: Cross-sectional study. *Journal of Medical Internet Research*, *22*(6), e14714.

[31]Joshi et al., ibid.

[32]Young, op. cit. 3, p. 111.

[33]Ernst, W., & Horwath, I. (Eds.). (2014). *Gender in science and technology: Interdisciplinary approaches*. Transcript Verlag. http://www.jstor.org/stable/j.ctv1xxsrx

access to this technology, cultural compatibility and acceptability. When assessing potential adverse effects, it must be ensured that (potential) users are not inadvertently put at more risk by said apps. Thus, issues of safety and privacy breaches, especially regarding the, in lower- and middle-income countries relatively prevalent, phenomenon of phone sharing need to be carefully considered. Data security should further be assessed regarding app providers, particularly if apps are linked to social media platforms, as potential misuse of sensitive data can reinforce existing concerns of structural injustice. Moreover, issues such as loss of personal contact in intervention settings (such as social workers providing local counselling) resulting from a shift to digital technology, potential misinterpretation of the information provided due to the lack of non-verbal cues, as well as issues of language and literacy and access to mobile phones, may arise as apps gain increasing importance as an intervention strategy.

The novel intervention strategy of mobile applications certainly does not represent a panacea against violence against women and girls. Rather, these apps offer an inexpensive and low-threshold opportunity for support. It is important to note that apps should not function as a singular intervention strategy. Instead, the potential of apps to help in the fight against violence against women and girls can and should be amplified by the means of culturally and structurally sensitive, targeted collaborations with already existing institutions.

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CONFLICT OF INTEREST

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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