Repairing *the* Harm *of* Digital Design Using *a* Trauma-informed Approach

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With increased awareness and mindful decisions, digital designers can repair the harm caused by digital design and improve the online experience of individuals who have been previously marginalized. This repair of poor design decisions, well-intentioned or out of ignorance, is necessary in a world where technology, exclusion, and trauma are pervasive. This article provides examples of digital harm that designers must acknowledge, understand, and avoid recreating. The concept of trauma-informed design is explained along with two practical approaches for designers to use to become more trauma-informed, and repair harm when creating websites, apps, and other digital experiences.

Keywords

trauma-informed design
user experience design
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Repairing the Harm of Digital Design Using a Trauma-informed Approach

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Content note This paper contains references to intimate partner violence and other harms to individuals. We use the term 'people who have experienced trauma' and the word 'survivor', and switch between the two, as there is no consistently preferred language among the large group of people affected by trauma.

INTRODUCTION: DESIGN HARM

Designers can no longer ignore the ubiquitous trauma in our world and the role they play in it. Those designing websites, apps, and other digital products must recognize that people are experiencing harm due to the exclusion caused by poor design decisions. A trauma-informed approach can confront and repair some of these harmful design choices. By altering our design practices to become more trauma-informed, we take steps toward repairing-designing, which we see as responding to past eco-social harm to avoid future replications. This section discusses design harms and provides digital design examples that may result in trauma.

Harm is damage to someone or something by causing it to be "hurt, broken, made less valuable or successful" (Britannica Dictionary, 2023a). While design harm may come in many forms, in digital design harm often appears as the exclusion of people who are not part of a majority group, and as lack of attention to the safety and care of these populations. Design that excludes can either exacerbate trauma already experienced or introduce new harm by preventing individuals from doing what they hope to do—e.g., to seek help to do an important task.

The technology industry prioritizes people from dominant groups "unless careful and explicit priority is given to support a marginalized group" (PenzeyMoog, 2021, p. 4). Design teams narrowly focus on serving 80 percent of individuals, assuming that the problems of these majority groups are the essential ones to solve (Holmes, 2020; Noel & Paiva, 2021). In modern design, humans are imagined "as white, cis-male, Anglo-Saxon, Christian, heterosexual, affluent,

and of able body and mind" (Tunstall, 2023). Designers may neglect what they consider 'edge cases' or situations that are perceived to occur outside the dominant majority (Holmes, 2020, p. 96) and affect "an insignificant number of users" (Meyer & Wachter-Boettcher, 2016). Designers play a powerful societal role—their choices can be harmful or helpful.

Edge cases indicate who designers will help and who they will marginalize (Meyer & Wachter-Boettcher, 2016). Those who "design the touch points of society determine who can participate and who's left out" (Holmes, 2020, p. 6).

Examples of Digital Harm through Exclusion

These examples illustrate the harm of designers focusing on the perceived majority:

- Disabled individuals are more likely to be identified as a higher security risk and endure extra screenings at airport security because of security technology that assumes normative body shapes, possibly excluding prostheses and medical devices (Costanza-Chock, 2020).
- Facial recognition technology, such as that used by Microsoft and IBM in consumer and law enforcement products, recognizes light-skinned people but not dark-skinned people, particularly dark-skinned females (Buolamwini & Gebru, 2018).
- Nonbinary people experience harm due to only male and female gender options in user interfaces—for example, exclusion in online forms (Meyer & Wachter-Boettcher, 2016) and extra scrutiny in U.S. airports at security scanners with binary gender options (Costanza-Chock, 2020).
- Disabled people experience many barriers to use the Internet—the number of worldwide websites that are legally accessible remains under 3 percent (WebAIM, 2022).
- Safety concerns and/or social norms reduce physical mobility, access, and use of many apps for women living in the Global South in countries like India, Pakistan, Bangladesh, and Nigeria (Sambasivan et al., 2017).

Ironically, there are many websites *created specifically to help* marginalized populations that are exclusionary and problematic. A few examples include:

- A nonprofit website intended to help low-income people find free and low-cost healthcare with basic usability flaws that make it hard to use on mobile. When accessed on a mobile phone, the PDFs with resources appear as blank pages, and phone numbers are not one-touch click-to-call (Florida Health Justice, 2021).
- Access to a U.S. state government's low-income energy assistance program website that requires a laptop because the text on the mobile format doesn't fit the screen, PDFs are illegible, and the interactive map doesn't work (North Carolina Department of Health and Human Services, 2023).

- A nonprofit website supporting interpersonal violence victims in crisis that used gendered language, contained post-graduate level text, and didn't have one-touch click-to-call phone numbers (Eggleston, 2017).
- An anti-sexual violence website with a long list of types of sexual assault, which quickly overwhelmed a person who had been recently harmed (Meyer & Wachter-Boettcher, 2016).

Many individuals across the globe could describe personal experiences of digital harm by exclusion. In digital design, ignoring people and their context may "reinforce a user's feeling that a community or a service was not designed for them, that their life is not one that matters" (Meyer & Wachter-Boettcher, 2016, p. 4). Social exclusion has harmful consequences, such as feelings of anxiety, anger, lack of control, and inadequacy (Holmes, 2020). Social exclusion, either chronic or from discrete events, is now being treated by some psychologists as a form of trauma, as it can have long-term and repetitive negative effects on individuals (Parks & Tasca, 2021).

As technology use continues to rise globally, digital design affects more people than ever. In many areas of our lives, "interactions that were once human-to-human are now facilitated by machines" (Holmes, 2020, p. 35). There are too many affected people to argue that these are 'edge cases'. Increasingly, the delivery of social services by governments, nonprofits, and the private sector happens online, so it is critical to ensure that digital design is not retraumatizing or a barrier to getting help.

DEFINING TRAUMA AND ITS IMPACT ON THOSE WE SERVE

Trauma is a common human experience and a societal problem that requires a communal response (Substance Abuse and Mental Health Services Administration, 2014; Herman, 2023). Trauma results from an event or series of events that individuals experience as "physically or emotionally harmful or life-threatening" (Substance Abuse and Mental Health Services Administration, 2014, p. 7). Some scholars define trauma more broadly and move away from a Euro-centric, individualistic, and event-based definition, noting that system-based traumatic experiences such as racism and colonialism are sustained and long-lasting (Andermahr, 2015; Craps, 2013; Ford & Courtois, 2020; Visser, 2015).

Traditional ideas of experiences that cause trauma include physical violence, sexual abuse, natural disasters, life-threatening child neglect, and war (Substance Abuse and Mental Health Services Administration, 2014), as well as the loss of a loved one, divorce, and witnessing another's trauma (Felitti et al., 1998; Nijenhuis et al., 2002). Newer definitions of trauma include institutional racism, cultural and historical trauma, and refugee experiences, among other systemic issues (Ringel & Brandell, 2019). In this article, we adopt the broader

definition of trauma that includes the result of events, systems, and situations experienced as harmful by people—including online digital experiences.

The impacts of trauma may vary and can include depression, anxiety conditions, addiction, cognitive impairment, post-traumatic stress disorder (PTSD), and disordered eating (Bloom, 2013; Ford & Courtois, 2020; van der Kolk, 2014). For example, PTSD changes "cognitive processes such as memory, attention, planning, and problem-solving" (Hayes et al., 2012, p. 1). An individual's "careful, complex, and rational thought" often disappears during stress (Bloom, 2013, p. 9). Many people go through what may be called traumatic experiences, but their reactions and symptoms resolve themselves in the short term (Substance Abuse and Mental Health Services Administration, 2014). However, it is important to care for those who experience symptoms more severely or for longer periods.

Individuals and groups who experience marginalization, e.g., people who are indigenous, black, brown, LGBTQ+, disabled, women, of a religious minority, etc., are more likely to experience trauma (Substance Abuse and Mental Health Services Administration, 2014). The prevalence of trauma may not be consistently recognized, given that it can be publicly invisible (Substance Abuse and Mental Health Services Administration, 2014). Trauma affects many of the people we serve, and therefore, experiencing traumatic events is not an 'edge case'.

The concept of 'knowing your user' is fundamental in digital design. Leaders in the digital design field frequently write about how to learn about individuals using a website, app, software, or system (Ferreira, 2016; Hall, 2013; Holmes, 2020; Krug, 2013; Norman, 2005; Redish, 2007; Stickdorn & Schneider, 2011; Weinschenk, 2011). Learning about users and their context, needs, behaviors, and motivations is essential to developing a mental model of their worldview (Hall, 2013). 'Knowing your user' means understanding the different experiences that users have. At times, the powerful and non-diverse technology industry holds a narrow view of who its users are and what they experience (Holmes, 2020; Meyer & Wachter-Boettcher, 2016).

The concept of 'edge cases' is exclusionary and harmful, and should be discontinued to repair past harms and prevent future harm. Groups in power seem unaware that being disabled is not an 'edge case', having darker skin is not an 'edge case', and experiencing trauma is not an 'edge case' either. Serving the needs of the perceived majority is insufficient, in the same way disability advocates rightly demand their needs not be dismissed (Fleischer & Zames, 2012; Garland-Thomson, 2005; Girma, 2019; Heumann & Joiner, 2021; Titchkosky, 2011) and feminists insist that the experiences of women of color must be considered in the push for women's rights (Collins, 1986; Crenshaw, 1991; hooks, 2015). Designers must design with care for the wide range of audiences they serve, and assume that trauma may be affecting at least some of them.

TRAUMA-INFORMED PRINCIPLES AND THEIR USE

Fortunately, designers can look to other fields for a more inclusive and caring approach. Behavioral health practitioners have developed a trauma-informed approach for working with those who have experienced trauma (Fallot & Harris, 2009; Harris & Fallot, 2001; Substance Abuse and Mental Health Services Administration, 2014). While trauma-informed approaches do not treat or diagnose it directly, they *recognize* its impacts and adjust policies, interactions, and behaviors to account for trauma and avoid retraumatization (Substance Abuse and Mental Health Services Administration, 2014). The goal is to understand the person and their living context entirely (Harris & Fallot, 2001). The concern about potential retraumatization is a barrier for some people seeking help online (Kelly et al., 2021), and therefore, trauma-informed approaches could address their needs. The following are the SAMHSA trauma-informed principles:

Table 1: SAMHSA's 6 key principles of a trauma-informed approach

1. Safety
2. Trustworthiness and Transparency
3. Peer Support
4. Collaboration and Mutuality
5. Empowerment, Voice, and Choice
6. Cultural, Historical, and Gender Issues

Source: Substance Abuse and Mental Health Services Administration, 2014.

SAMHSA's 'Concept of Trauma and Guidance for a Trauma-Informed Approach' document offered the above principles and ten domains for implementation, including the physical environment, policy, training, and even financing—but not technology (Substance Abuse and Mental Health Services Administration, 2014, p. 12).

The design of technology is an essential area for implementing trauma-informed principles. If we ignore trauma in the creation and output of technology or any system, we risk re-traumatizing people at worst and being unhelpful at best (Harris & Fallot, 2001). Technology professionals, including designers, have a role in making choices to move toward repair and care, while avoiding harm and exclusion.

Other disciplines already apply trauma-informed principles in their work, recognizing that trauma is pervasive in society and affects individuals in many areas of their lives. Trauma-informed principles have been applied in settings such as mental health care organizations (Harris & Fallot, 2001; Substance Abuse and Mental Health Services Administration, 2014); nursing (Kassam-Adams et al., 2015); architecture/housing (Bollo & Donofrio, 2022;

Farrell & Committee on Temporary Shelter, 2018; Gill, 2019; Owen & Crane, 2022); workplace (Roy, 2021); law enforcement (Substance Abuse and Mental Health Services Administration, 2023); prisons (Jewkes et al., 2019); yoga (Cook-Cottone et al., 2017); and schools (Taylor, 2021; Wiest-Stevenson & Lee, 2016). Applying trauma-informed approaches can be complex as they can seem at odds with the aims of the structures to which they are applied. Even when some of these contexts seem misaligned to the principles (e.g., applying the principle of empowerment in a prison setting), their application to reduce the harm of these systems and to promote restorative outcomes in these contexts is laudable.

Applying trauma-informed principles to digital design as a methodology has recently become more commonly discussed online among design practitioners. For example, SAMHSA's trauma-informed principles have been applied to websites serving people seeking support for domestic or interpersonal violence (Eggleston, 2017), and university students (Kelly et al., 2021). Designers have explained how they take a trauma-informed approach to the design research process (Dietkus, 2021; Fathallah, 2022; Slate, n.d.; Wechsler, 2021; Winfield, 2022). Human-computer interaction researchers have also applied trauma-informed ideas to social media design (Scott et al., 2023).

A BRIEF REVIEW OF TRAUMA-INFORMED DESIGN

Guidelines for universal design in health care following trauma-informed principles have been developed to create better products and build environments (Bassuk et al., 2017).

User experience heuristics, also called website heuristics, are principles based on research to improve the design of a user interface (Nielsen, 1994). Trauma-informed website heuristics were developed by communication design researchers and used in the iterative creation of a web portal to meet the essential needs of students at a large U.S. university (Kelly et al., 2021). These heuristics derive from definitions and principles of trauma-informed care from The Institute on Trauma and Trauma-Informed Care (ITTC) at the University of Buffalo School of Social Work (Kelly et al., 2021): ITTC offers information on trauma-informed concepts from both Harris and Fallot and SAMHSA (Institute on Trauma and Trauma-Informed Care, 2021). Instead of an interactive evaluation of the website, such as usability testing, an adapted heuristic evaluation method avoided "retraumatizing the very people who would be users of the site" (Kelly et al., 2021, p. 173). The researchers used a 7-point Likert scale from 'no problem' to 'severe problem' to rate aspects of the website design on how it supported the trauma-informed website heuristics such as safety, choice, and trustworthiness (Kelly et al., 2021). This method sparked important conversations about the design, and led them to carefully consider various design elements that affected the final

design, such as removing an emergency button and changing the language to introduce a request form (Kelly et al., 2021).

Researchers in human-computer interaction have created a "trauma-informed computing" framework (Chen et al., 2022) based on SAMHSA's principles. For example, research and user interface design can become more trauma-informed by evaluating how they "may traumatize or retraumatize its users" (Chen et al., 2022, p. 10). Design practitioners can be mindful of any emotional distress of research participants and be ready to respond (Hirsch, 2020). Researchers and organizations can achieve better and healthier research outcomes by applying a trauma-informed framework to the design research process (Bernius & Dietkus, 2022). Artificial intelligence and machine learning systems can be more trauma-informed and increase end user's trust by explaining why a particular recommendation feature that suggests new services or products is offered (Chen et al., 2022). There is little verified research about technology with trauma survivors. In the future, involving survivors in research with care is one suggested way to gain their essential perspective (Chen et al., 2022; Kelly et al., 2021).

HOW TO BEGIN REPAIRING HARM

To repair something is to correct and improve it (Britannica Dictionary, 2023b). Creating a positive online experience is a significant first step to repairing past harms created or exacerbated by exclusionary design output, and preventing further harm from occurring. In our current society, many interactions between individuals and organizations serving them are now mediated through technology (Holmes, 2020). Being trauma-informed means having an awareness of trauma survivors and avoiding marginalizing people through design.

Trauma-informed approaches can begin to repair the harm happening in digital design. Website creators can follow the four "R" assumptions:

> A program, organization, or system that is trauma-informed *realizes* the widespread impact of trauma and understands potential paths for recovery; *recognizes* the signs and symptoms of trauma in clients, families, staff, and others involved with the system; and *responds* by fully integrating knowledge about trauma into policies, procedures, and practices, and seeks to actively *resist re-traumatization*. (Substance Abuse and Mental Health Services Administration, 2014, p. 9)

This approach can help foster healing, repair past harm, and prevent further harm by not recreating the structural dynamics of exclusion. Based on our experiences of designing for those who have experienced trauma, and after considering the academic literature mentioned above, we offer two ways through which designers can begin the work of becoming trauma-informed, thus beginning the process of repair:

Apply User Experience (UX) Heuristics as a Foundation

User experience (UX) is "the user's perceptions and responses that result from the use and/or anticipated use of a system, product or service"; this includes the user's "emotions, beliefs, preference, perceptions, comfort, behaviors, and accomplishments that occur before, during, and after use" (International Organization for Standardization, 2018). The UX heuristics developed by Nielsen (1994) are listed below, along with a discussion of why they are important to individuals who have survived trauma:

Table 2: UX heuristics and their importance to those who have experienced trauma

Principle	Importance for survivors using websites, apps, online forms, and other digital systems
1. Visibility of system status	Keeping individuals well-informed about what is happening in digital design can help increase trust and empowerment/enablement.
2. Match between the system and the real world	Using language that is understandable and familiar to people who have been through trauma makes it more likely they will be able to reach their goal of using digital design.
3. User control and freedom	Providing options to undo errors and offering choices to people avoid reinforcing feelings of powerlessness that individuals may have felt in their traumatic experiences.
4. Consistency and standards	Following common digital design standards and being consistent across the website helps with predictability and learnability, which can reduce cognitive load.
5. Error prevention	Careful digital design, such as defaulting to privacy and avoiding implied consent, can help prevent errors and problems for those who have experienced trauma.
6. Recognition rather than recall	Reducing cognitive load is an important goal for individuals in immediate crisis and survivors of trauma who may experience short or long-term trauma symptoms.
7. Flexibility and efficiency of use	Giving choices to individuals about how to use digital design allows for more empowerment/enablement and feels more collaborative.
8. Aesthetic and minimalist design	Centering visual design and content on the needs of the user. Context and culturally relevant aesthetics are important to build trust and appeal (e.g., minimalism which may seem standard in one context may not work for another audience).
9. Help users recognize, diagnose, and recover from errors	Supporting people when they encounter problems is essential, as digital designs should not reinforce feeling trapped and powerless. Providing options such as a live chat or phone call for immediate assistance is ideal.
10. Help and documentation	Enabling individuals to help themselves and use digital design successfully is essential. Videos and plain language documentation may help survivors get the help they seek.

Sources: Principles: Nielsen, 1994; Importance for survivors: Authors' own elaboration.

For a website to be trauma-informed, it needs to follow the established UX heuristics from the field of human-computer interaction. For example, many of the problems found on social services websites are basic issues that are easily identified through evaluation with heuristics. For instance, a domestic

violence agency in the US did not have a search function on its website; adding a search function added flexibility and efficiency to empower those trying to find information online. The same website also used gendered language that did not match the real world, since people of all genders might need help with interpersonal violence situations (Eggleston, 2017). These issues could cause anybody frustration. However, they may have a more severe impact on those who have experienced trauma and suffer from its symptoms.

UX heuristics offer a research-backed foundation for trauma-informed digital design that works for a wider range of people. Ignoring UX heuristics, intentionally or not, while trying to be trauma-informed in digital design seems contradictory, similar to the concerns about attempts to create trauma-informed prisons without changing fundamental aspects of hostile environments (Jewkes et al., 2019). For any designer, following UX heuristics is a foundational step toward making the website more trauma-informed, repairing past harm, and avoiding future harm.

Adopt a Trauma-informed Framework

Once a foundation with user experience heuristics has been laid for a positive digital design experience, it is easier and more effective to apply a trauma-informed approach. Before adopting any framework, digital designers would want to know the basics of trauma, its impacts on users, and the needs of those who have been through trauma. Scott et al. (2023) provide great detail on types of trauma to help those working in technology. Free and low-cost resources exist online to learn about trauma through organizations such as SAMHSA (Substance Abuse and Mental Health Services Administration, 2014); The Institute on Trauma and Trauma-Informed Care (2023) established in 2012 at the University of Buffalo; and the National Child Traumatic Stress Network (2023), created by the United States Congress in the year 2000. After learning more about the socio-ecological model of trauma, designers can better understand why a trauma-informed framework should be used in the design process and design outputs to avoid harm.

We view the combination of UX heuristics and a trauma-informed approach as a pyramid:

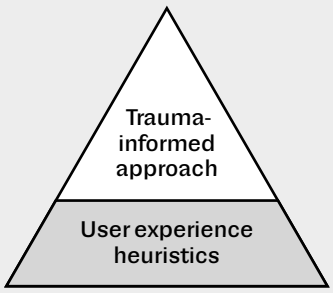

Figure 4: Trauma-informed design pyramid. Source: Authors' own elaboration.

For the trauma-informed approach layer, designers can adopt one of the well-known trauma-informed frameworks established by the social work field. Because these frameworks were created before technology became pervasive, they do not fully cover all the areas of design that must be considered to support those who have experienced trauma. However, they offer designers direction based on trauma theory, verified research, and the experience of numerous trauma experts.

The aforementioned SAMHSA trauma-informed framework containing six principles (safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; cultural, historical, and gender issues) is a widely known framework that offers the central ideas of many approaches (Substance Abuse and Mental Health Services Administration, 2014). The SAMHSA framework has been applied by website designers (Eggleston, 2017) and human-computer interaction researchers working to improve social media (Scott et al., 2023).

Another widely used framework has been developed by The Institute on Trauma and Trauma-Informed Care (ITTIC): its origins derive from the work of Bloom (2000) and Harris and Fallot (2001), among others. The principles in the ITTIC framework are: safety, choice, collaboration, trustworthiness, and empowerment (Institute on Trauma and Trauma-Informed Care, 2015). This framework was used by designers at Michigan State when developing a website for university students (Kelly et al., 2021). It is important to note that neither the SAMHSA nor the ITTIC framework have the principles ordered in a set sequence: they are flexible, interdependent, and build upon each other (Institute on Trauma and Trauma-Informed Care, 2015; Substance Abuse and Mental Health Services Administration, 2014). Both frameworks aim for social justice by addressing cultural, historical, and gender issues that designers cannot ignore (Institute on Trauma and Trauma-Informed Care, 2015; Substance Abuse and Mental Health Services Administration, 2014). As there is much overlap between these frameworks, the designer's choice on which framework to apply is less critical.

These trauma-informed frameworks and their associated principles can be applied in the design research process and in the design output—a website, software application, augmented reality, virtual reality, and whatever technology will come next. Once a website, app, system, or another digital tool aligns with most user experience heuristics, we can look at additional needs to address trauma, and specific cultural groups or contexts that may require extra care. For example, there is often a quick exit button feature on a website that specifically serves individuals who may be in dangerous interpersonal violence situations, allowing them to leave quickly in case their safety becomes at risk.

In another example, designers of online form experiences can first ensure they follow UX heuristics and other best practices we already know for form design, both on laptop/desktop and mobile. Next, they can consider making the form more trauma-informed by contemplating SAMHSA's trauma-informed principles and asking critical questions such as:

- Does this form foster trust by explaining where this data goes and how it is used?
- Who owns the form, and how can a user know how to reach them?
- Are the questions being answered willingly or am I forcing disclosure of information people may not want to give for their safety or privacy?
- Does the form keep in mind the many identities of the user, considering their culture, context, and needs?

Additionally, digital designers working on financial websites and apps can consider how safety, trust, and culture could affect their audiences. Those conducting design research in any industry can also consider their practices while conducting research with participants, ensuring they offer choices and act in trustworthy ways.

The use of UX heuristics and subsequent layering of a trauma-informed approach can be applied to any type of technology interaction designed for the consumer—such as websites, apps, and virtual or augmented reality experiences. Digital designs can be evaluated against both the UX heuristics and trauma-informed principles. We encourage others to build on, adjust, and expand both the UX heuristics and trauma-informed principles to meet the needs of people who have been excluded by harmful digital design.

Similar to the issues mentioned earlier when trying to design trauma-informed prisons (Jewkes et al., 2019), digital designers will likely face challenges where technology may cause harm, so adopting a trauma-informed approach will be complex. However, this complexity should not stop us from working to ensure technology is not harmful, moving toward repair, and preventing future harm.

CONCLUSION

A trauma-informed approach may seem daunting due to the unfamiliar language of the social work field from which it originates. It may be more recognizable and approachable for designers upon closer examination. For example, designers regularly have conversations about building trust in digital products. The two approaches suggested in this article should offer a familiar stepping-off point for digital designers to begin the work of becoming trauma-informed.

Further research is needed to deepen trauma-informed approaches to design. We need more research directly with trauma survivors to get their explicit input on technology. We must co-design with those who have experienced trauma

to understand *their* tech experiences, and to learn what repair and trauma-informed care feels like to *them*, which we suspect is likely to vary by culture and type of trauma(s) experienced.

Research on various technologies such as software, virtual reality, augmented reality, smart home, smart wearables, and artificial intelligence is needed. How might these mediums affect those who have experienced trauma? Would the needs of trauma survivors differ through various types of technologies? More thoughtful discussion from a diverse audience of digital designers is needed to consider how designers can apply trauma-informed approaches.

Interdisciplinary partnerships between designers and other fields can explore and potentially expand these trauma-informed approaches. Exploration is needed at the intersection of trauma-informed principles with principles common in technology. In addition to the UX heuristics (Nielsen, 1994), other sets of principles merit comparisons to the trauma-informed approach, such as inclusive design, accessibility, data ethics, and universal design principles. Trauma-informed frameworks do not address the concepts of privacy and data ownership. Examining overlaps between these groups of principles will clarify what makes a trauma-informed approach unique in digital design.

Becoming trauma-informed is a long process. It can take years for individuals and organizations to develop the maturity required for a consistent baseline of awareness, care, and mitigation strategies (Missouri Department of Mental Health and Partners, 2014). Becoming trauma-informed is an ever-changing goal, as our understanding of trauma, its impact, and potential harm mitigation strategies in digital design increase each year. In that sense, all types of digital design are in a continual prototype to become trauma-informed, to repair past harm, and prevent further harm.

Digital designers should be responsible for repairing past harms and avoiding future damage in their work. A trauma-informed approach in digital design can play an important role in designing for repair. It is also a commitment to continuous learning, repairing past harms, and avoiding future harm by challenging structural inequalities and marginalization. **D**

Authors' note on positionality

Our lived and professional experiences inform the perspectives evident in the article. Raised in Southern U.S. and influenced by Western perspectives on trauma, the primary author is a mixed-methods researcher and human-centered designer with experience designing for adult populations who have experienced human trafficking, substance abuse disorders, serious mental illness, and/or physical disabilities.

The secondary author is an Assistant Professor in the Department of Media Arts, Design and Technology at North Carolina State University. She teaches courses on contemporary issues in art and design, design for social innovation, and design studies. Her research uses design methods to support youth participation and agency, social innovation, STEM education,

and patient-centered public health. She is currently creating a social-justice-centered design curriculum for youth that combines game design with Afrofuturism.

REFERENCES

ANDERMAHR, S. (2015). "Decolonizing Trauma Studies: Trauma and Postcolonialism"—Introduction. *Humanities, 4*(4), Article 4. https://doi.org/10.3390/h4040500

BASSUK, E. L., LATTA, R. E., SEMBER, R., RAJA, S., & RICHARD, M. (2017). Universal Design for Underserved Populations: Person-Centered, Recovery-Oriented and Trauma Informed. *Journal of Health Care for the Poor and Underserved, 28*(3), 896–914. https://doi.org/10.1353/hpu.2017.0087

BERNIUS, M., & DIETKUS, R. (2022). Cultivating Resiliencies for All: The Necessity of Trauma Responsive Research Practices. *Ethnographic Praxis in Industry Conference Proceedings, 2022*(1), 9–34. https://doi.org/10.1111/epic.12098

BLOOM, S. L. (2000). Creating Sanctuary: Healing from Systematic Abuses of Power. *Therapeutic Communities: The International Journal for Therapeutic and Supportive Organizations, 21*(2), 67–91.

BLOOM, S. L. (2013). *Creating Sanctuary: Toward the Evolution of Sane Societies* (Rev. ed.). Routledge.

BOLLO, C., & DONOFRIO, A. (2022). Trauma-informed Design for Permanent Supportive Housing: Four Case Studies from Seattle and Denver. *Housing and Society, 49*(3), 229–250. https://doi.org/10.1080/08882746.2021.1989570

BRITANNICA DICTIONARY. (2023a). *Harm Definition & Meaning*. https://www.britannica.com/dictionary/harm

BRITANNICA DICTIONARY. (2023b). *Repair Definition & Meaning*. https://www.britannica.com/dictionary/repair

BUOLAMWINI, J., & GEBRU, T. (2018). Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification. *Proceedings of the 1st Conference on Fairness, Accountability and Transparency*, 77–91. https://proceedings.mlr.press/v81/buolamwini18a.html

CHEN, J. X., MCDONALD, A., ZOU, Y., TSENG, E., ROUNDY, K. A., TAMERSOY, A., SCHAUB, F., RISTENPART, T., & DELL, N. (2022). Trauma-Informed Computing: Towards Safer Technology Experiences for All. *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*, 1–20. https://doi.org/10.1145/3491102.3517475

COLLINS, P. H. (1986). Learning from the Outsider Within: The Sociological Significance of Black Feminist Thought*. *Social Problems, 33*(6), s14–s32. https://doi.org/10.2307/800672

COOK-COTTONE, C., LAVIGNE, M., GUYKER, W., TRAVERS, L., LEMISH, E., & ELENSON, P. (2017). Trauma-Informed Yoga: An Embodied, Cognitive-Relational Framework. *International Journal of Complementary & Alternative Medicine*. https://doi.org/10.15406/ijcam.2017.09.00284

COSTANZA-CHOCK, S. (2020). *Design Justice: Community-Led Practices to Build the Worlds We Need*. MIT Press.

CRAPS, S. (2013). *Postcolonial Witnessing: Trauma Out of Bounds*. Palgrave Macmillan.

CRENSHAW, K. (1991). Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color. *Stanford Law Review, 43*(6), 1241–1299. https://doi.org/10.2307/1229039

DIETKUS, R. (2021). The Call for Trauma-Informed Design Research and Practice. *Design Management Review, 33*(2), 26–31. https://doi.org/10.1111/drev.12295

EGGLESTON. (2017, April 27). *Is Your Website Trauma-Informed?* https://www.melissaegg.com/blog/is-your-website-trauma-informed

FALLOT, R. D., & HARRIS, M. (2009). *Creating Cultures of Trauma-Informed Care (CCTIC): A Self-Assessment and Planning Protocol*. Trauma Informed Oregon. https://traumainformedoregon.org/tic-resources/creating-cultures-trauma-informed-care-cctic-self-assessment-planning-protocol/

FARRELL, J., & COMMITTEE ON TEMPORARY SHELTER. (2018). *Trauma-informed Design: How the Physical Environment Supports Recovery from Homelessness*.

FATHALLAH, S. (2022, September 9). *Trauma Responsiveness in Participatory Research*. https://www.thinkofus.org/news/trauma-responsiveness-in-participatory-research

FELITTI, V. J., ANDA, R. F., NORDENBERG, D., WILLIAMSON, D. F., SPITZ, A. M., EDWARDS, V., KOSS, M. P., & MARKS, J. S. (1998). Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine, 14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

FERREIRA, A. (2016). *Universal UX Design: Building Multicultural User Experience*. Morgan Kaufmann.

FLEISCHER, D., & ZAMES, F. (2012). *The Disability Rights Movement: From Charity to Confrontation*. Temple University Press.

FLORIDA HEALTH JUSTICE. (2021, December). *Miami Free and Low-Cost Health Care*. https://www.floridahealthjustice.org/miami-dade-county-free-and-low-cost-health-care.html

FORD, J. D., & COURTOIS, C. A. (2020). Defining and Understanding Complex Trauma and Complex Traumatic Stress Disorders. In C. A. Courtois & J. D. Ford (Eds.), *Treating Complex Traumatic Stress Disorders in Adults: Scientific Foundations and Therapeutic Models* (2nd ed., pp. 3-34). The Guilford Press.

GARLAND-THOMSON, R. (2005). Feminist Disability Studies. *Signs: Journal of Women in Culture and Society, 30*(2), 1557–1587. https://doi.org/10.1086/423352

GILL, N. (2019, December 9). The Importance Of Trauma-Informed Design. *Forbes*. https://www.forbes.com/sites/forbesnonprofitcouncil/2019/12/09/the-importance-of-trauma-informed-design/

GIRMA, H. (2019). *Haben: The Deafblind Woman Who Conquered Harvard Law*. Grand Central.

HALL, E. (2013). *Just Enough Research*. A Book Apart.

HARRIS, M., & FALLOT, R. (2001). Using Trauma Theory to Design Service Systems. *New Directions for Mental Health Services*, (103). https://psycnet.apa.org/fulltext/2001-00826-000.pdf

HAYES, J., VANELZAKKER, M., & SHIN, L. (2012). Emotion and Cognition Interactions in PTSD: A Review of Neurocognitive and Neuroimaging Studies. *Frontiers in Integrative Neuroscience, 6*. https://doi.org/10.3389/fnint.2012.00089

HERMAN, J. L. (2023). *Truth and Repair: How Trauma Survivors Envision Justice*. Hachette.

HEUMANN, J., & JOINER, K. (2021). *Being Heumann: The Unrepentant Memoir of a Disability Rights Activist*. Beacon Press.

HIRSCH, T. (2020). Practicing Without a License: Design Research as Psychotherapy. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–11. https://doi.org/10.1145/3313831.3376750

HOLMES, K. (2020). *Mismatch: How Inclusion Shapes Design*. MIT Press.

HOOKS, BELL. (2015). *Feminist Theory: From Margin to Center* (3rd ed.). Routledge.

INSTITUTE ON TRAUMA AND TRAUMA-INFORMED CARE. (2015). What is Trauma-Informed Care? University of Buffalo Center for Social Research. https://socialwork.buffalo.edu/social-research/institutes-centers/institute-on-trauma-and-trauma-informed-care/what-is-trauma-informed-care.html

INSTITUTE ON TRAUMA AND TRAUMA-INFORMED CARE. (2021). *Trauma-Informed Organizational Change Manual*. University at Buffalo School of Social Work. https://socialwork.buffalo.edu/social-research/institutes-centers/institute-on-trauma-and-trauma-informed-care/Trauma-Informed-Organizational-Change-Manual0.html

INSTITUTE ON TRAUMA AND TRAUMA-INFORMED CARE. (2023, February 10). *The Institute on Trauma and Trauma-Informed Care*. University of Buffalo Center for Social Research. https://socialwork.buffalo.edu/social-research/institutes-centers/institute-on-trauma-and-trauma-informed-care.html

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. (2018). *Ergonomics of Human-system Interaction—Part 11: Usability: Definitions and concepts (ISO 9241-11:2018, 3.2.3)*. https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-2:v1:en

JEWKES, Y., JORDAN, M., WRIGHT, S., & BENDELOW, G. (2019). Designing 'Healthy' Prisons for Women: Incorporating Trauma-Informed Care and Practice (TICP) into Prison Planning and Design. *International Journal of Environmental Research and Public Health, 16*(20), Article 20. https://doi.org/10.3390/ijerph16203818

KASSAM-ADAMS, N., RZUCIDLO, S., CAMPBELL, M., GOOD, G., BONIFACIO, E., SLOUF, K., SCHNEIDER, S., MCKENNA, C., HANSON, C. A., & GRATHER, D. (2015). Nurses' Views and Current Practice of Trauma-Informed Pediatric Nursing Care. *Journal of Pediatric Nursing: Nursing Care of Children and Families, 30*(3), 478–484. https://doi.org/10.1016/j.pedn.2014.11.008

KELLY, S., LAUREN, B., & NGUYEN, K. (2021). Trauma-informed Web Heuristics for Communication Designers. *Proceedings of the 39th ACM International Conference on Design of Communication*, 172–176. https://doi.org/10.1145/3472714.3473638

KRUG, S. (2013). *Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability* (3rd ed.). Pearson.

MEYER, E. A., & WACHTER-BOETTCHER, S. (2016). *Design for Real Life*. A Book Apart.

MISSOURI DEPARTMENT OF MENTAL HEALTH AND PARTNERS. (2014). *The Missouri Model: A Developmental Framework for Trauma-Informed Approaches*. https://dmh.mo.gov/media/pdf/missouri-model-developmental-framework-trauma-informed-approaches

NIELSEN, J. (1994). Enhancing the Explanatory Power of Usability Heuristics. *Conference Companion on Human Factors in Computing Systems*, 210. https://doi.org/10.1145/259963.260333

NIJENHUIS, E. R. S., VAN DER HART, O., & KRUGER, K. (2002). The Psychometric Characteristics of the Traumatic Experiences Checklist (TEC): First Findings among Psychiatric Outpatients. *Clinical Psychology & Psychotherapy, 9*(3), 200–210. https://doi.org/10.1002/cpp.332

NOEL, L.-A., & PAIVA, M. (2021). Learning to Recognize Exclusion. *Journal of Usability Studies, 16*(2), 63–72. https://dl.acm.org/doi/pdf/10.5555/3532753.3532754

NORMAN, D. A. (2005). Human-centered Design Considered Harmful. *Interactions, 12*(4), 14–19. https://doi.org/10.1145/1070960.1070976

NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES. (2023). *Low Income Energy Assistance*. https://www.ncdhhs.gov/divisions/social-services/energy-assistance/low-income-energy-assistance-lieap

OWEN, C., & CRANE, J. (2022). Trauma-Informed Design of Supported Housing: A Scoping Review through the Lens of Neuroscience. *International Journal of Environmental Research and Public Health, 19*(21), Article 21. https://doi.org/10.3390/ijerph192114279

PARKS, C. D., & TASCA, G. A. (Eds.). (2021). *The Psychology of Groups: The Intersection of Social Psychology and Psychotherapy Research*. American Psychological Association.

PENZEYMOOG, E. (2021). *Design for Safety*. Book Apart.

REDISH, J. (2007). *Letting Go of the Words: Writing Web Content that Works*. Morgan Kaufmann.

RINGEL, S., & BRANDELL, J. (Eds.). (2019). *Trauma: Contemporary Directions in Theory, Practice, and Research* (2nd ed.). Columbia University Press. https://doi.org/10.4135/9781452230597

ROY, R. (2021). Need of the Hour: Inculcating Trauma-Informed Design Principles for our Workers, Work, Workplace, and the World. *Performance Improvement, 60*(3), 27–29. https://doi.org/10.1002/pfi.21962

SAMBASIVAN, N., CHECKLEY, G., AHMED, N., & BATOOL, A. (2017). Gender Equity in Technologies: Considerations for Design in the Global South. *Interactions, 25*(1), 58–61. https://doi.org/10.1145/3155050

SCOTT, C. F., MARCU, G., ANDERSON, R. E., NEWMAN, M. W., & SCHOENEBECK, S. (2023). Trauma-Informed Social Media: Towards Solutions for Reducing and Healing Online Harm. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–20. https://doi.org/10.1145/3544548.3581512

SLATE, T. (n.d.). *Trauma Informed Design*. User Experience Professionals Association. https://uxpa.org/product/trauma-informed-design/

STICKDORN, M., & SCHNEIDER, J. (2011). *This is Service Design Thinking: Basics, Tools, Cases*. Wiley.

SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION. (2014). *SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach*. SAMHSA.

SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION. (2023). *Practical Guide for Implementing a Trauma-Informed Approach*. SAMHSA.

TAYLOR, S. S. (2021). Trauma-Informed Care in Schools: A Necessity in the Time of COVID-19. *Beyond Behavior, 30*(3), 124–134. https://doi.org/10.1177/10742956211020841

THE NATIONAL CHILD TRAUMATIC STRESS NETWORK. (2023). *Resources*. The National Child Traumatic Stress Network. https://www.nctsn.org/resources

TITCHKOSKY, T. (2011). *The Question of Access: Disability, Space, Meaning*. University of Toronto Press.

TUNSTALL, E. (2023). *Decolonizing Design: A Cultural Justice Guidebook*. MIT Press.

VAN DER KOLK, B. (2014). *The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma*. Penguin.

VISSER, I. (2015). Decolonizing Trauma Theory: Retrospect and Prospects. *Humanities, 4*(2), Article 2. https://doi.org/10.3390/h4020250

WEBAIM. (2022). *The WebAIM Million—The 2023 Report on the Accessibility of the Top 1,000,000 Home Pages*. https://webaim.org/projects/million/

WECHSLER, J. (2021, August 9). *Trauma-informed Design Research*. Medium. https://uxdesign.cc/trauma-informed-design-research-69b9ba5f8b08

WEINSCHENK, S. (2011). *100 Things Every Designer Needs to Know About People*. Pearson.

WIEST-STEVENSON, C., & LEE, C. (2016). Trauma-Informed Schools. *Journal of Evidence-Informed Social Work, 13*(5), 498–503. https://doi.org/10.1080/23761407.2016.1166855

WINFIELD, J. H. (2022, August 8). *Keeping Survivors Safe during UX Research*. Chayn. https://blog.chayn.co/keeping-survivors-safe-during-ux-research-eb20c1ee1f04