

The Harm Mapping Project: Navigating Ethics and Collaboration in Map Design

Lily Houtman (they/them)
The Pennsylvania State University
lmh5991@psu.edu

Dana Cuomo (she/her)
Lafayette College
cuomod@lafayette.edu

Madison Dennehy (she/her)
Lafayette College
madisondenney214@gmail.com

Meredith Forman (she/her)
Lafayette College
meredith4man@gmail.com

Abigail Zea (she/her)
Lafayette College
zeaa@lafayette.edu

Susan Hannan (she/her)
Lafayette College
hannans@lafayette.edu

1. INTRODUCTION

THIS ARTICLE DETAILS THE ETHICAL CHALLENGES we encountered while designing maps for The Harm Mapping Project. Led by Dana Cuomo, Susan Hannan, and three undergraduate student research assistants (Madison Dennehy, Meredith Forman, and Abigail Zea), The Harm Mapping Project examines the geography of gender-based violence occurring at Lafayette College, a small (approx. 2,700 undergraduate students) residential liberal arts college in Easton, Pennsylvania. Data collection entailed a participatory mapping exercise in which individual students were instructed to use stickers to mark locations on a blank campus map where they had experienced gender-based violence. Different color stickers indicated different types of harm (e.g., sexual assault,

verbal harassment, unwanted touching, stalking, physical abuse, and feeling vulnerable to experience gender-based violence). In addition to better understanding where on campus the student body has experienced gender-based violence, a secondary objective of the project includes providing recommendations to Lafayette College administrators regarding ways to modify the built environment to help prevent future harm from occurring. To support these objectives, the research team began working with Lily Houtman, a trained cartographer, to incorporate feminist design principles into the mapping of the project's data for public-facing audiences. Here, we describe our design process and share takeaways for cartographers working on similar projects.

2. ETHICAL CHALLENGES

OVER THE COURSE OF THE PROJECT, WE WORKED TO achieve four key goals:

- **Collaboration:** Given that the maps represent the lived experiences of undergraduate students, it was essential to involve undergraduate research assistants throughout the process of creating the maps.
- **Anonymity in Data:** Due to the sensitive nature of the data, appropriate map type and thoughtful data aggregation was necessary.
- **Administrative Change:** Readability and clarity to advocate for change at the administrative level had to be balanced with other aspects of data representation.

- **Accessible Feminist Design:** The research topic and methodological design required that the map design avoid masculine top-down styles present in many traditional campus maps, and to incorporate a practice of self-reflexivity.

2.1. COLLABORATION

A key principle of feminist research design concerns centering lived experience as a basis of knowledge and expertise (Hesse-Biber 2014). This prioritizing of lived experience disrupts ideas of who represents an “expert,” and often informs all stages of a research project, from project design to data collection and analysis. Here, the lived



© by the author(s). This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/4.0>.

experiences and insights of the undergraduate research assistants were an essential part of the map design process.

Early in the project, the research team identified their interest in creating maps to visualize the data, but no member had mapmaking experience, nor does Lafayette College have a geography department with cartography resources. Thus, the research team contacted Lily, a cartographer with scholarly interest in feminist and queer theory, to assist with designing and creating maps for the project. The resulting collaboration combined the strengths of three different groups: faculty PI from a small liberal arts college with training as a feminist geographer (Dana) and a clinical psychologist with trauma expertise (Susan); a graduate student cartographer from a large university with training in cartographic methods and design (Lily); and undergraduate research assistants with lived experience of the local campus (Madison, Meredith and Abigail).

What followed was an iterative process of collaboration in which the undergraduate research assistants played an essential role in designing the maps, despite having no cartographic training. While there were numerous examples in which collaboration with the undergraduate research assistants played a key role in influencing the ethical approach to the project, we emphasize here their part in the process of selecting a map type for visualizing the data, drawing from a related social justice-oriented cartographic project (see Bley et al. 2022).

During initial conversations, we did not feel there was an immediately obvious thematic map choice for this data. However, we did reflect on the particular tension with locations where only one person had experienced harm, as these were the personal experiences most likely to expose individuals. Subsequent conversations centered around visualizing the data by way of heat maps. Due to its continuous nature, the research team surmised that a heat map could help indicate that experiencing harm was possible across numerous locations on and adjacent to campus, even if there was no recorded data in a specific location (crowdsourcing information will always be incomplete). However, the undergraduate research assistants quickly noted that the small footprint of the college and heat map's lack of distinction concerning data points might inaccurately suggest that students were at risk for experiencing gender-based violence everywhere on campus. Importantly, we wanted the maps to be informative, but not to invoke gratuitous fear. The undergraduate research

assistants also raised concern about the close associations between heat maps and “hotspot” mapping, noting the problematic use of “hotspot” mapping in predictive policing among law enforcement departments, resulting in racialized forms of policing (Jefferson 2018).

The research team also considered a dot density or dasy-metric map, which would maintain a human element to the data by representing each participant with their own point, while also allowing for flexibility across a location. In this way, a point would not correspond exactly to the data provided by participants, and thus offer an added layer of anonymity to the data. However, through conversations with the research team, it became clear that a mismatch with the real data, while anonymous, would be a significant issue when transforming point data into a dot density map. For example, if there were four data points in “The Quad” on a dot density map, these points would be randomly distributed within “The Quad” with no tie to actual participant experiences. The undergraduate research assistants were concerned that the resulting map may do more harm than good if its random nature produced fake patterns. If Lafayette students interested in implementing personal safety plans consulted the map for information about locations to avoid, the random distribution of points across a location may be misleading.

2.2. ANONYMITY IN DATA

Following discussions about the ethical issues with various map types, the research team ultimately decided to create a series of proportional symbol maps, a map type familiar to general audiences, making the maps accessible for administration and students. The research team also decided that proportional symbol maps reflected the best option for protecting the sensitive nature of the project's data. Data could be aggregated by location and easily transferred to proportional symbols, demonstrating patterns and potential clusters in the data, while also benefiting from the anonymity of aggregation.

With the map type chosen, the research team considered anonymity in data at multiple stages of the design process. As noted above, data collection entailed participants voluntarily and anonymously placing stickers on a campus map to indicate locations where they experienced any of six types of gender-based violence, resulting in point data recording exact locations of harm. However, given the personal nature of this violence and the small campus size,

the research team discussed how data at this scale could be identifiable by individuals with specific knowledge of the recorded experiences, including perpetrators of the violence.

To support the research team’s key ethical goal of preserving anonymity, the research team manually reviewed each participant’s map (n=509) and coded each sticker to a location on campus or in the surrounding residential neighborhood. Data was aggregated to a total of 217 locations. By aggregating data to the nearest building, street or notable location, many individual experiences became less identifiable as part of a group. For example, while an individual may have experienced verbal harassment on the southeast side of the football stadium, collapsing together all occurrences at the football stadium helped to protect an individual participant’s privacy. This choice is still imperfect, given that some audiences may want to see exact locations where harm was experienced in order to avoid them. However, compared to dot density maps, the data is intentionally represented as groups instead of single points, so audiences are less likely to attribute false levels of precision.

However, frequency of experiences ranged significantly across locations. For example, while some locations had over 200 reported experiences, a large number of locations only had one reported experience of harm. The research team considered how to ensure that all data were represented on the maps so as not to “erase” a participant’s experience of harm, while also protecting the anonymity of individual participants. One option was to create a graduated symbol map where data were grouped into classes, therefore hiding whether a location had one experience (compared to more than one experience). However, the range of the

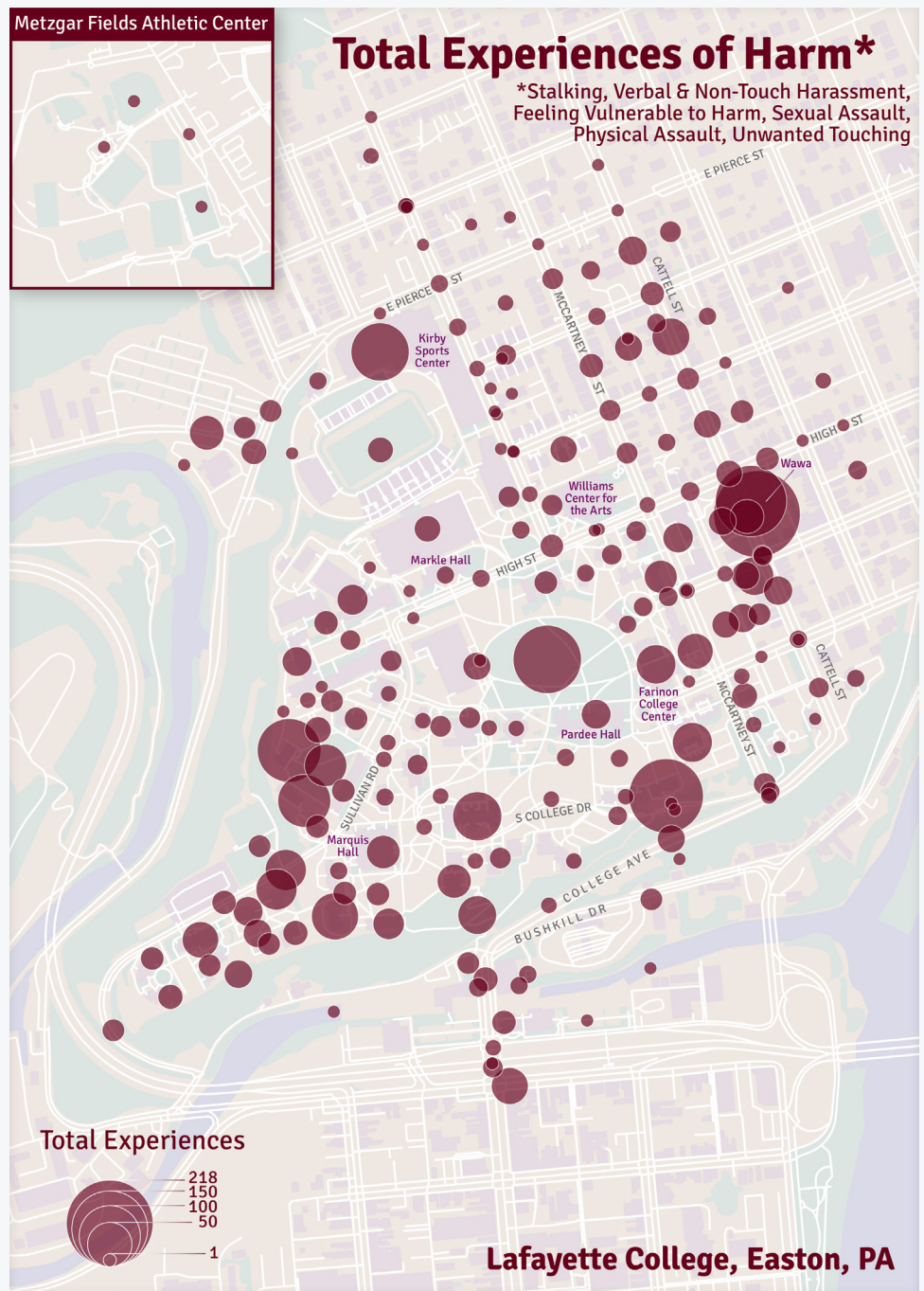


Figure 1. Map of total experiences of harm (six types)

data complicated graduated symbols. For ease of reading, all data needed to be on the same scale to compare across seven maps (one with total number of experiences, and one for each of the six types of harm). However, the map of total types of harm had a maximum of 218 experiences (Figure 1), while the map of physical assault had a maximum of 5 experiences. Other types of harm, like unwanted touching, were in between these values, with a maximum of 74 experiences (Figure 2). Keeping a consistent scale across all seven maps while ensuring the maps

Metzgar Fields Athletic Center

Experiences of Unwanted Touching

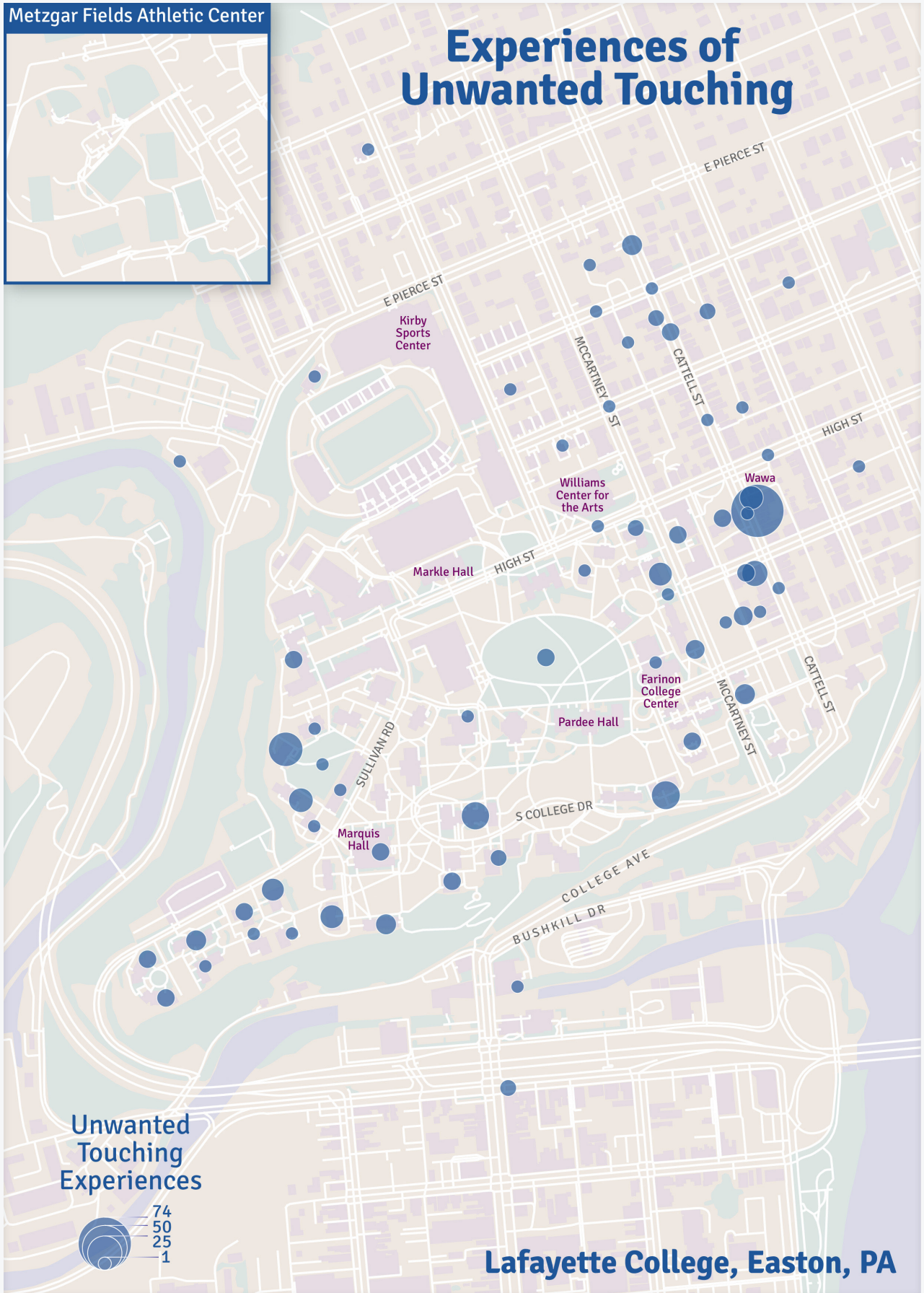


Figure 2. Individual map displaying one type of harm experience, unwanted touching

with the least amount of data remained meaningful was not possible with a graduated symbol map. For the proportional symbol map, we elected to set a limited amount of size variation across the symbols, making it slightly difficult to distinguish the difference between one experience and two or three experiences. Initially, this choice may seem similar to a graduated symbol map. However, a proportional symbol map with little variation allows a reader to see some level of variation and view which symbol is greater, even if they remain uncertain of exact values. In fact, being off by one or two counts helps to preserve anonymity.

2.3. ADMINISTRATIVE CHANGE

In addition to distributing findings to scholarly audiences, a second objective of The Harm Mapping Project included advocating to college administrators for modifications to the campus's built environment to prevent future experiences of gender-based violence. This objective impacted the research team's approach to the map design as we considered how to balance representing the geography and frequency of gender-based violence for two key audiences: administrators and students.

The timing of this project and the design of the maps coincided with a multi-year, college-wide Campus Master Planning process, in which many aspects of the built environment on campus were under review and open for alteration. At the time of this writing, we have already presented preliminary findings from The Harm Mapping Project—including the maps that are the focus of this article—to college administrators during the information gathering phase of the Master Planning process.

For administrators, the cartographic representation needed to protect the project's sensitive data, while simultaneously displaying the frequency of harm in a way that was both readable and impactful. When seeking to make change at an administrative level, clear data visualization that does not cause confusion is essential. This is one of the reasons we ultimately decided to use proportional symbol maps, which allowed us to represent the data on a clean basemap that did not require too many additional labels and locators that may be perceived as distracting. We were able to accomplish this goal in part because our local audience already had place-based knowledge of the campus. Administrators also featured in our conversations on data anonymity and protecting the privacy of individual

participants. Notably, Lafayette College's [Policy on Equal Opportunity, Harassment and Non Discrimination](#) clarifies that faculty are not considered mandated reporters when student disclosures of gender-based violence occur within the context of research, yet we remained sensitive to concerns of anonymity and retaliation when designing the maps, as noted above.

While the upper echelons of the college administration ultimately decide what elements of the built environment to prioritize and modify, numerous groups hold sway in influencing those decisions. Students play a significant role in this process. For this reason, we also considered students as a key audience for the maps we designed. We anticipate disseminating findings from The Harm Mapping Project via presentation slides, in addition to printing large scale maps for display in the campus library as a public gallery. When necessary, we have made small modifications to the maps based on audience and venue, but aim for general consistency. We view these public presentations of the maps as essential for raising awareness of the geography of gender-based violence on campus among students, whom we then anticipate will also advocate for change to administrators for how to modify the built environment on campus to help reduce future harm.

2.4. ACCESSIBLE FEMINIST DESIGN

Throughout its design and execution, this research was conducted with the local campus community and feminist principles in mind (see Kelly 2016; D'Ignazio and Klein 2020). The data displayed on these maps were a community effort of crowdsourced information, distinct from campus-based reporting of experiences of gender-based violence. Because the maps represent sensitive information, an accessible feminist design, distinct from traditional masculine and authoritarian campus maps, was essential. This process included using open-source software when possible, involving undergraduate researchers in the design process, and engaging in a self-reflexive practice that considered how the research team's social backgrounds, positions of power, and personal biases influenced our approach to the map design process.

Almost all technology used in this research was free and open-source, making it accessible to all members of the research team (Gieseking 2018). However, we acknowledge there is still the possibility for issues with this technology, particularly in relation to profits and data security. Data

from the participatory mapping exercise was aggregated in Google Sheets, resulting in cleaner data for analysis. The initial maps were produced in QGIS with basemap data pulled from OpenStreetMap. While final touches to the maps were edited in Adobe Illustrator, a piece of paid software, all files could be opened in the free and open-source program Inkscape. Both fonts on the maps were selected from [Libre Fonts By Womxn](#), which links to numerous free fonts of many styles. All cartographic design work was executed by one cartographer for this project (though with insight from the rest of the team). While we did not have time during this project to teach students to use GIS software, the use of open-source software keeps this option open, particularly regarding collaborations with smaller institutions without geography departments.

Early on, the research team decided that a custom base map (see Figures 1 and 2) would be the best way to incorporate a feminist design. To begin, the undergraduate research assistants shared images of graphics and map designs that they enjoyed and that fit with the goals of the project, relying on feelings more than logic. Once the cartographer designed an initial basemap, the undergraduate research assistants provided feedback on the choices, learning ways to talk about color in cartographic terms like hue, saturation, and value. The final basemap had a color scheme that was low in saturation and high in lightness, to feel softer than many harsh, bold campus maps. This light value also contrasted with the darker value chosen for the data. To maintain readability, the basemap included some conventions like blue for water and green for natural features. However, some hues were altered, including pink for buildings instead of a dull gray or yellow.

For the data itself, the team chose a color palette ranging from pink to bright blue for the six experiences of harm. These design choices prioritized pinks and purples, with a few nearby colors to aid in greater distinction between colors, to emphasize undervalued colors that are not always seen as authoritative because they have feminine associations. However, we were careful not to attach purples and blues, which could be associated with bruising, to certain types of physical harm and assault, to avoid any negative

associations (Figure 2). For the map of total experiences of harm, Lafayette College's primary color, maroon, was used to emphasize the association of this harm with the institution and call on the administration to consider ways of changing the campus built environment to prevent future harm (Figure 1).

Drawing on our experiences, we encourage cartographers to incorporate a practice of self-reflexivity when engaging in similar projects involving sensitive data. At multiple stages of the design process, we discussed whether our data should be mapped at all, given its sensitive nature (Wilmott 2016; Kelly and Bosse 2022). We recommend other cartographers create similar space in the development phase for this kind of reflection, and return to that question throughout the map design process. We also encourage cartographers to examine what personal biases or motivations they may have when designing maps that involve sensitive data and how those biases influence design choices. To mitigate the impact of biases, curating a multidisciplinary team of collaborators that includes subject matter experts and/or those with situated knowledge and lived experience pertaining to the data has the potential to benefit other cartographic projects. As our experiences demonstrate, members without cartographic training can offer important insight for how to visualize data.

Self-reflexivity also entails acknowledging the emotions that emerge during the map design process. Our research team navigated a range of emotions, including worry that our maps would misrepresent or reduce the lived experiences of research participants who contributed data to this project, alongside feelings of hope that the maps could play a role in raising awareness and help address systemic violence. We made space within our meetings to discuss these feelings, which allowed for a more deliberate and thoughtful process as we made decisions regarding map type and other design choices. We encourage cartographers to make similar space for reflecting on such emotions, as these reflections raise new questions and can play an important role in ethical map design. Maps are imbued with power and always have the possibility to cause harm, but it is this same power that can lead to positive substantial change.

3. CONCLUSIONS

THE HARM MAPPING PROJECT IS ONGOING, WITH distributions to the campus community, further

presentations to college administrators, and a second phase of data collection still to come. We will continue

to embrace the same collaborative, feminist principles that prioritize ethics, anonymity and real-world change in future work that we have utilized thus far. Notably, the project's maps would not have been the same without collaboration, drawing on unique skills from multiple groups. In particular, the undergraduate research assistants were an essential part of designing the maps: they contributed

lived experience as students on campus, and quickly became familiar with cartographic principles, despite no prior GIS training. The Harm Mapping Project illustrates the impact of collaboration across differently sized-institutions and team members with varying experiences, and the maps we produced were only possible because of this combined and collective knowledge.

4. REFERENCES

- Bley, Kallista, Kela Caldwell, Meghan Kelly, et al. 2022. "A Design Challenge for Transforming Justice." *GeoHumanities* 8 (1): 344–65. <https://doi.org/10.1080/2373566X.2021.1986100>.
- D'Ignazio, Catherine, and Lauren F. Klein. 2020. *Data Feminism*. Cambridge, MA: The MIT Press.
- Giesecking, Jen Jack. 2018. "Operating Anew: Queering GIS with Good Enough Software." *Canadian Geographies / Géographies Canadiennes* 62 (1): 55–66. <https://doi.org/10.1111/cag.12397>.
- Hesse-Biber, Sharlene Nagy. 2014. *Feminist Research Practice: A Primer*. Los Angeles: Sage Publications.
- Kelly, Meghan. 2016. "Collectively Mapping Borders." *Cartographic Perspectives* 84: 31–38. <https://doi.org/10.14714/CP84.1363>.
- Kelly, Meghan, and Amber Bosse. 2022. "Pressing pause, 'doing' feminist mapping." *ACME: An International Journal for Critical Geographies* 21 (4): 399–415. <https://doi.org/10.14288/acme.v21i4.2083>.
- Jefferson, Brian J. 2018. "Predictable Policing: Predictive Crime Mapping and Geographies of Policing and Race." *Annals of the American Association of Geographers* 108 (1): 1–16. <https://doi.org/10.1080/24694452.2017.1293500>.
- Wilmott, Clancy. 2016. "Small moments in Spatial Big Data: Calculability, authority and interoperability in everyday mobile mapping." *Big Data & Society* 3 (2). <https://doi.org/10.1177/2053951716661364>.

