

**Community Voice and Ownership: Qualitative Findings from a Systems Mapping Project
to Address Adverse Childhood Experiences (ACEs) and Trauma.**

Thi H. Vu¹, Jared T. Bishop¹, Leigh E. McGill¹, Luke C.V Valmadrid¹, Shelley D. Golden¹, Dane

A. Emmerling¹, Seth ?. Saeugling²

¹Institutional Affiliation

²Institutional Affiliation

Author Note

ORCID ID(s)

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Correspondence concerning this article should be addressed to [insert]

Abstract

Adverse childhood experiences (ACEs) and trauma have been linked to decreased psychosocial and physiological health functioning. While various individual and community-level interventions to address ACEs have been reported, one novel approach that has not been explored in detail is a community-engaged systems mapping process (SMP), in which diverse stakeholders work together to document the forces that are creating the outcomes and patterns being observed within the community. To better understand the impact of participation in an SMP and document the process in a transferable fashion for other communities, we conducted in-depth, qualitative interviews with 16 stakeholders who were involved in a systems mapping project facilitated by a local nonprofit in Eastern North Carolina. We used an iterative, structural coding process to generate and analyze themes from these interviews. Impacts included participants expressing a significantly greater understanding and recognition of ACEs trauma within themselves, as well as enhanced collaborative relationships with members of their community, as a result of the project. Insights into transferability included barriers and facilitators to implementation of systems mapping, such as difficulty talking about trauma, inclusion of diverse voices, having the right organizers, and investment of time and effort. All participants strongly recommended the systems-mapping approach to other communities and believed that it is a valuable tool for empowerment. Our findings suggest that systems mapping is a feasible, transferable, and promising modality for understanding and addressing ACEs at the individual, interpersonal, and community-levels. Systems mapping also has potential to translate this increased awareness into actionable solutions.

Keywords: adverse childhood experiences, trauma, resilience, systems-mapping, qualitative, participatory research

Impact Statement

[Will include prior to journal submission]

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Adverse childhood experiences (ACEs) are stressful, traumatic events experienced by children which can result in substantial emotional distress and chronic stress, and continue to impact their lives as adults. Some examples of ACEs include neglect, abuse, experiencing discrimination, bullying, and witnessing events like maltreatment family members and community violence (Alhowaymel et al., 2021). While examples and definitions of ACEs have some variation (Karatekin and Hill, 2019), data from 23 states in the 2014 Behavioral Risk Factor Surveillance System survey reported that 61.55% of 214,157 survey participants had experienced at least 1 ACE and 24.64% reported having experienced 3 or more ACEs (Merrick et al., 2018), which could be underestimations, because ACEs surveys have been noted to be limited in their coverage of what is considered an ACE (McLennan et al., 2020). Communities of color and lower-income communities face higher risks for experiencing ACEs compared to white and higher income populations (Kia-Keating et al., 2019). Drawing on studies between 1998 and 2017 in North America, the estimated total annual costs attributable to ACEs was \$748 billion (Bellis et al., 2019).

ACEs and chronic trauma exposure in childhood can result in both immediate and long-lasting health outcomes (Gilgoff et al., 2020; Overstreet and Mathews, 2011), including increased risk of lung cancer, diabetes, cardiovascular disease, and obesity; mental health conditions like PTSD, suicidality, depression, and alcoholism; changes to brain structure (Anda et al., 2006); and health-risk behaviors with strong social and environmental determinants, like tobacco use and substance abuse (Brown et al., 2010; Chapman et al., 2007; Overstreet and Mathews, 2011; Oral et al., 2016; Dong et al., 2004). Higher numbers of ACEs have also been

associated with less health care use and access (Alcalá et al., 2018). Research suggests that persons with ACEs face multiplicative, intersecting barriers to achieving their ideal health (Barnes et al., 2020).

ACEs are heavily shaped by social, historical, and environmental determinants, so it seems especially pertinent that solutions be informed by radical thought. The last few decades of literature surrounding ACEs and traumatic stress have emphasized the importance of systemic approaches that have the potential to both address and prevent trauma across multiple service systems and societal sectors (Oral et al., 2016). However, the majority of primary and secondary prevention efforts are still focused on individuals and families (Oral et al., 2016). Moving beyond trauma-specific services to trauma-informed systems that prioritize relationships could reduce the negative consequences of trauma and promote healing (Loomis et al., 2019).

Systems thinking has also been a critical component of community-based participatory research, helping stakeholders and organizations collect and connect upstream and downstream factors specific to a community and their concerns, and identify critical points to create, adapt, and implement interventions to address complex, multilevel factors (BeLue et al., 2012; Gillen et al., 2014). One tool employed in systems thinking is the creation of a systems map, a diagram of causal feedback loops that illustrate the patterns of forces that are causing and influencing observable outcomes. Systems mapping practices have provided direction and novel insights for actions taken by community organizations and researchers (Holliday et al., 2019; Hennessy et al., 2020), and have also significantly influenced program implementation and resource allocation of state-level and county-level health initiatives (Trochim et al., 2004; Adams et al., 2020). There are multiple strategies for creating systems maps, and some do rely on engaged discussion with people operating within the system. Unfortunately, the current literature lacks adequate

discussion of the processes and impacts of community-engaged systems mapping of ACEs and trauma, and the innovative approach of systems mapping is rarely developed through co-creation with local community leaders and community members, especially in contexts such as the rural southern United States of America.

The ROI Systems-Mapping Project

This qualitative project analyzes the perceived impact of a systems mapping project (SMP) facilitated by the Rural Opportunity Institute (ROI). ROI is a non-profit serving as one of the eight regional Area Health Education Centers (AHEC) across the state of North Carolina. Driven by the knowledge that unjust systems cause trauma and resilience is an inner strength in all humans, ROI strives to end generational cycles of trauma and poverty through supporting people's healing process by educating, reshaping systemic practices, and fostering deep-rooted connections (Rural Opportunity Institute, 2020). ROI operates in Edgecombe County, a rural county in eastern North Carolina with a population of almost 52,000 in 2019 (U.S Census Bureau, 2019). The median household income in 2019 was approximately \$36,000. About 21% of the population live below the poverty line (U.S Census Bureau, 2019).

Between September, 2017 to May, 2018, ROI hosted 8 community meetings to create the systems-map. These meetings were open to anyone who wanted to participate, and engaged 368 stakeholders in total (an average of 46 stakeholders per meeting). After building a rough draft of a systems map, ROI facilitators contracted with Engaging Inquiry, LLC, a purpose-built consulting practice that supports communities to use participatory systems mapping to solve complex challenges (Engaging Inquiry, 2017). Engaging Inquiry built the actual systems map model, and facilitated a Leverage Workshop with cross-sector community leaders (Saeugling, 2021). The final outcome of the workshop was the creation of a three-part strategy. The strategy

defined by community members was linear in implementation and included three parts: 1) Learn: increase knowledge and skills about what trauma/resilience is, and how to best manage stress; 2) Heal: shift practices and policies away from the currently dominant punitive response and towards a more restorative approach that helps people build skills; and 3) Connect: reconnect youth with educational opportunities and adults with professional opportunities (Saeugling, 2021). The systems-map guided the development several initiatives, such as 1) a local training collaborative that has reached over 13,000 individuals through programs such as evidence-informed Reconnect for Resilience Trainings, listening circles, and awareness-building presentations; 2) a biofeedback breathing program using HeartMath technology implemented in a local detention center and middle school; and 3) a community accountability board made up of residents who oversee the training work (Saeugling, 2021).

Aim

The present study engaged ROI stakeholders who participated in the systems-mapping project, or who have worked with ROI on initiatives informed by the systems-mapping project, to better understand: 1) perceived individual and community-level impacts of the project; 2) barriers and facilitators to the process, and how systems thinking can be leveraged to address ACEs and trauma; and 3) lessons-learned and recommendations for communities looking to apply systems thinking to addressing health issues.

Methods

Study Design and Setting

ROI collaborated with a group of public health students at the University of North Carolina at Chapel Hill to design and implement the study. The student team conducted 16 semi-structured, one-on-one interviews with current and former ROI stakeholders. We recruited

participants electronically by posting an announcement in ROI's monthly email newsletter. Participants were eligible if they either participated in any activity of the systems-mapping project, and/or were involved in initiatives informed by the systems-mapping project. All interviewers followed a semi-structured interview script with questions and probes that the student team developed in collaboration with ROI leaders and faculty qualitative experts at the Gillings School of Global Public Health. Interviewers asked participants' about their experiences and involvement with the SMP, the personal and interpersonal impacts of the SMP, and recommendations and advice for other communities looking to conduct a similar project. Interviews were conducted through Zoom (version 5.4.8), a video and voice conferencing platform. The majority of interviews were conducted over video call ($n = 11$), and the rest over a voice call ($n = 5$). Participants provided verbal consent, and received a \$30 electronic gift card for completing the interview. The University of North Carolina at Chapel Hill Institutional Review Board approved all study materials and procedures.

Data Collection and Analysis

All interviews were transcribed verbatim by Zoom, and checked for accuracy by the interviewer. Transcripts were uploaded into Dedoose (version 8.3.45), a qualitative coding software, for analysis. Two coders each reviewed a sample of two transcripts to identify preliminary themes and create an initial codebook that contained definitions and illustrative quotes. We followed an iterative coding process using this initial codebook, where two coders independently coded each transcript and met each week to resolve any discrepancies in coding application or data interpretation. The codebook was refined accordingly, and transcripts were re-coded as needed after coders came to an agreement. This process was followed for each transcript to ensure inter-coder reliability. We generated code reports and used the three aims

listed above to guide our thematic analysis. Themes were cross-checked and agreed upon by each coder.

Results

Participant Characteristics

The student team interviewed stakeholders who directly participated in the SMP (n = 8) and stakeholders who were involved in initiatives informed by the SMP (n = 8). The average age for all participants was 53.6 (range 32-73). 44% of participants identified as Black and 56% identified as female. Additional participant characteristics are found in Table 1.

Aim 1: Impact on self and community

Recognition and understanding of own trauma. When asked how the systems-mapping project was personally relevant to them, stakeholders highlighted instances where they shared aspects of their own identities, upbringing, and past traumatic experiences. For example, one participant shared:

[ROI] had these maps, all you know PowerPoints all around. And I looked at 'em and I could see people almost looking cross-eyed and I sat back and I thought, 'I understand this.' I understand it, and it all makes, all makes sense to me. It's tragic. But I understand why; how the anger gets out, how the hopelessness and why and what you have to do, which is, which was, I'm not going to say it's 180 degrees, different from my former thinking, but it was probably at least 120 degrees different. And just listening to it...it just, it resonated with me. And it made, it made sense. And that day is when I, when I really understood that it did because...I thought 'I got this. I got this'. (Local Elected Official)

Stakeholders expressed that recognition of trauma is one of the first steps in addressing the effects of trauma. One participant, for example, spoke about how the perception that trauma is “just a way of life” masks the effects of traumatic experiences and hinders efforts to address them:

I think getting different perspectives on what they thought trauma was and then being educated on what trauma is and a lot of people in the room...Something would be diagnosed as trauma, growing up, it was just a way of life. I mean it, this is what it is. So you don't see it being something that's trauma or whatever because your friends are going through the same thing you were going through. So this is like a way of life versus, versus, you know, something that shouldn't have to take place, you know? And I think that process kind of opened some eyes in the room on what adverse childhood trauma is.
(Nonprofit Executive)

Connection to other community members. The knowledge gained from the systems-mapping process, conversations with other community members, and reflections on their own trauma helped stakeholders develop a greater and more genuine connection to members of their larger community. Several participants highlighted how participating in the systems-mapping process put them in contact with individuals they would have never been connected to otherwise, especially from different sectors, organizations, and backgrounds:

So there are things, for example, like relationships built for community members that would have never spoken before, so I as a principal wouldn't necessarily have navigated. But now all of a sudden I have these connections to new people. So we're able to build partnerships for support I didn't know existed. (Principal)

Moving towards a healing mindset built on empathy. The SMP also facilitated a discussion about ACEs that took away individual blame on any one person or agency, to instead create a shared understanding around systemic causes of trauma and foster a greater sense of compassion and empathy. In short, participants experienced a shift to a mindset that was less focused on punishment and control, and more focused on healing, skill-building, and restoration. Participating in the systems-mapping process empowered individuals to take the first step towards a healing mindset not only with themselves, but also with their neighbors. Approaching the issue as a community issue and not just a personal issue illuminated the extent to which ACEs and trauma can simultaneously present, and invisible in some communities.

I think that we need to make sure that people understand that it can happen to everyone, that, it's not somebody else's problem. It's the community's problem. And lots of people have experienced trauma, but they've kept it to themselves. And they, I mean, that's proven on the ACEs score, that a lot of people have experienced trauma and just never discussed it...but just help people understand that there's nothing to be ashamed of, that what they've experienced is not their fault. Yeah, removing the blame. (Professor)

The good part is, like I said, I got to be more empathetic, I got to understand it. Even if my neighbor has an issue, my issue is not with my neighbor of mine, my issue is with the people that put the systems in place because my neighbor is a criminal, because I have stuff and if my neighbor was envious of what I have, it's not my fault. That was the point, but just to see that. My fight is not my people. (Adolescent Teen Parent Mentor)

Aim 2a: Facilitators and barriers to systems-mapping work

Stakeholders who directly participated in the systems-mapping project were asked specific questions about their experience with the process itself. The following facilitators and barriers to systems-mapping work were mentioned:

The role of organizers. ROI organizers played a crucial role in how stakeholders perceived the systems-mapping process. In particular, participants stressed that it is not enough for organizers to simply include the community; they must also let community stakeholders play a leading role. This includes organizers being open to receiving feedback and making changes as necessary:

Oh, they were very, they were very open to feedback and because with the feedback they could improve on what they would do if we gave them honest feedback and the leadership were always open to all, sometimes even criticism about the program. And they always willing to fix whatever they thought might be broken. So they are very, very open to, you know, make an adjustment to, you know, to help the most people. (Retired Social Worker)

In addition, participants expressed that organizers made genuine efforts to connect with community members on a deeper level, both within and outside of the systems-mapping process. By making themselves fully available to the community and fully invested in the community, participants felt that organizers were able to form trusting relationships with community members. These efforts created a space that was safe and affirming for community members to share their experiences with trauma.

I think that they also took risks by making themselves really available in the community. So it wasn't just like they got they learned about it. It was like you saw them at community events and they became like active interested participants of the community they serve...it felt like they joined us in the work. And I think that's, that's really important. Yeah, you know, now that I'm saying that out loud what I think that created was just like permission to be vulnerable because it never felt like we were being judged. It felt like the questions they were asking really came from the curiosity to understand the historical context. (Principal)

Diverse voices and representation at the table. Participants emphasized that the diversity of voices included in the systems-mapping process contributed to its success, noting the varied set of experiences and knowledge that each stakeholder brought to the discussion were extremely valuable. Not only did this allow stakeholders to look at an issue from different perspectives, it also helped create a shared understanding around trauma and resilience.

I really like the affirmation of one, just who they invited to the table. That was the first time that I really internalized the fact that I wasn't alone in this work. And it was very interesting to hear from healthcare professionals or probation officers, or clergymen and to be talking about the same area and the same issues, but I thought through the lens of not only how they impact events, but what they were doing about it. And so it was the first time that I saw that like the issue that I see can be solved in more than one way. And I think that that gave me a lot of hope. So unlike the surface level, I think it was very engaging to know that this was a community doing community work. (Principal)

Gaps in community representation. While participants expressed that organizers made efforts to include diverse perspectives in the systems-mapping process, they also felt there were still voices that were missing from the discussion. Representation from government officials, youths, and residents of neighboring counties, in particular, were noted as lacking.

Well, I think the system makers, the board makers, the people that's on the board and all that, you know, put the systems in order and then none of them was at the table. We're always talking to the people that was affected by the system, but nobody that was no serious players in place ever came to the table here. (Adolescent Teen Parent Mentor)

Talking about trauma can itself be traumatic. Participation in the systems-mapping process prompted stakeholders to share personal identities and experiences that was re-traumatizing for some stakeholders.

I'm remembering some of our conversations...a lot of is individualized and the emotions that I had to deal with were, I'm happy that I was able to have been able to cope with a lot of these before our conversation... but, but even now, I still you know, are dealing with some of those things; emotionally trying to work through some of those things. You know, this year I lost my mother, I lost my brother, and, and it kind of made you revisit some of those things. (Director of Student Support Services)

Yeah, so it had me thinking a lot, you know...during that time, you know, and I think I was having a lot of flashbacks and I remember some of the things that I went through as a child--how it made me feel, what was some of the effects of it, you know, how it had an effect on my life today. (Nonprofit Executive)

Aim 2b: Leveraging systems thinking to address trauma

Visualizing systemic sources of trauma. Stakeholders highlighted that the visualization aspect of systems thinking, specifically systems-mapping, is a unique asset that shines a spotlight on individual, interpersonal, and structural causes of trauma. Systems thinking allowed participants to translate their stories into visual feedback loops, and then to see how these stories and loops connected with each other. Visualizing these stories allowed participants to take a step back and reflect on how their own personal experiences with trauma relate to larger systemic and intergenerational causes of trauma. Not only could participants see their experiences represented in the systems-map, but also they observed interconnections with the experiences of their neighbors.

If you look at the map itself. Are these areas that have like plus sign and minus sign. And that's kind of like, you know, the areas that the loop is reinforced or weakened and I thought that it was just really interesting to think about. It's just life right, that like right there are some things compounded that are good and some things that are compounded that are bad. And let's make meaning of the outcome. And I just thought that was a really interesting reflection, because again I hadn't considered that before...This is like super interesting to see all those circles and cycles working in tandem to create the site problem and or solution based on how you look at it. Yeah, so I just really like the idea of creating a map of how these things are all interrelated and then again like getting curious about, like, then what can you, what can you are aware, maybe it's an appropriate thought to, like, where do you intervene, then in this and I never thought about that before.

(Principal)

Incorporating SMP skills to everyday and professional life. Stakeholders spoke about how the results of the project affected their own understanding of trauma and efforts to address it. Two participants, for example, spoke about applying the knowledge gained from the systems-mapping process into their own work as educators:

Cause the school system has come aboard now and [ROI has] introduced the biofeedback program to schools, and a lot of schools and principals have come aboard and really want to implement these practices and tools to their students, so it's a really good impact.

(Pastor)

We want students to understand that we know that you go through things as well. We know that you have things that you're dealing with. But when you come to school, 'how can we make school life better, even though you have these things going on?' And building that relationship with, with the students in order to allow them to be the best student as a whole, instead of just their academics. 'How is home?' You know, 'is there anything that I can do to help you to help make things better for you at home,' as opposed to just come into school learning math, science, social studies and language arts.

(Guidance Counselor)

One participant emphasized that the SMP has given her increased confidence in talking about and addressing trauma in her work as a counselor:

It's given me confidence in working with clients...I'm learning new things and...I would say it's given me some renewed confidence and working with children and adults that have been impacted by trauma. (Health Care Provider)

The map itself provided a framework and starting point for discussion that helped connect community members based on values of mutual support and empowerment.

I don't think I would have a framework to address. I think it would still be putting out fires, to use an analogy, instead of a process that has the beginning and you make progress as you work through it. Like you may not, you know, solve the problem, but we have, we have a framework within which to work and to make continual progress with. Even though it's gradual, you can see the progress, you can see the benefit, even though it

doesn't solve a problem, you know, and I think maybe without ROI, I would still be trying to solve problems with one little quick fix. (Guidance Counselor)

Furthermore, one participant noted that by including key players in the mapping process, there was community investment in the initiatives that arose from the findings of the systems-mapping project:

You know, I think, in doing that mapping process, [ROI] integrated key players. It allowed them and help them to buy into the whole idea, to the whole process. So it became a way of uniting all the key players in this process...So, you know, people start gaining interest and they start gaining a voice and by having that voice, they have ownership to what's being done with being said, which is going to increase their commitment. So I don't think I don't think they would have the, the commitment, the level of buying had they not done that mapping process. (Counselor and Licensed Therapist)

Aim 3: Lessons and takeaways for other communities

Inclusion of diverse voices. As noted, participants highly valued the diversity of experiences and knowledge included in the SMP. Thus, they stressed the importance of including perspectives from as many representatives of the community as possible for communities looking to do similar work:

I would say that the program doesn't work if you don't have a lot of different segments of the community represented and if you're finding that most of the people are from one group, that it's probably not going to work all that well. You need people who can identify problems, people who can understand problems, who can effect change in the community. You, you just need a lot of different types of people with different types of expertise to come together. (Primary Care Physician)

The role of leadership and organizers. Participants suggested having dedicated leaders and organizers who are genuine, compassionate, and intentional in their efforts is crucial to stakeholder experience and successful project outcomes. Participants repeatedly emphasized their positive experiences with ROI leadership as one of the reasons they started working with and are continuing to do work around trauma and resilience in partnership with the organization.

I assume that without the right people, leading it like [names redacted], for example, that it could just become you know, a well intended event or activity that doesn't actually drive to the right leverage point. And so I just think it's important, how it's facilitated right. (Principal)

Time and effort. Participants expressed that there is no “quick fix” to systemic and intergenerational trauma, and communities should recognize that the systems mapping approach requires substantial time and energy.

Again feet on the ground hands to the handle. It's just going to take that sort of thing, it, it, it has taken generations to break and be broken, and it's going to take generations to fix. We got to have people who are willing to change, willing to fix things, willing to self disclose, willing to self examine, and, and so yes it'll take a lot of work in every community. (Director of Student Support Services)

The truth hurts. And this hurt, to see where it takes you. But if you, if you don't travel that journey. You don't feel that pain, you don't understand it and you're not gonna have any chance at all, any chance to rectify. And you got to also understand, this is not a quick fix. It's a generational investment in time and resources. I will be dead and gone, before, if we start on this program like we should and get the resources, before you really begin to see a meaningful improvement. But you know what? That's okay. Because I don't want my grandchildren, having the conversation that you and I are having right here. And I don't want those kids' grandchildren that are growing up now, to have this, have to have that same conversation, or be in prison, because they were stealing to eat. (Local Elected Official)

Discussion

Our qualitative findings highlight the individual, interpersonal, and community-level impacts of a systems-mapping project to address ACEs on a community in Eastern North Carolina. Participation in the process helped stakeholders reflect on their own trauma and relate their personal experiences to those of their larger community. Stakeholders were also able to translate the skills and knowledge they gained from the project into their everyday personal and professional lives.

The project provided opportunities for long-time residents to connect with individuals with whom they would not have otherwise been connected. Inclusion of diverse voices is crucial to stakeholder experience, with many participants highlighting the fact that ROI invited as many representatives of the community as possible as a key factor in fostering community collaborations and new linkages between different agencies to promote change. Furthermore, these relationships led to tangible coordinated action, in line with a community-built strategy, to address ACEs.

Participants also offered insights into what worked well and what could be improved about using a systems thinking approach to address ACEs. Overall, participants express positive experiences with ROI organizers and facilitation of the project, citing the genuineness of ROI organizers and their intentional efforts to ensure an affirming and safe environment for participants to share their experiences. Organizers also approached community members with authenticity, concern, and humility. A unique aspect of a systems-mapping method is that it offers a tangible, visual product that links the experiences of an array of stakeholders. This visual product function not only as a result of the project, but also as a starting point for future conversations interventions. This visual product also shows the patterns, aka “feedback loops”, that are the forces, or “root causes” of the outcomes that are being observed in the community. The ability to have these feedback loops be based on community-members stories proved very valuable. On the other hand, participants noted that the emotional labor required of stakeholders to participate in such a project was a difficult barrier to overcome in the beginning stages. Additionally, despite ROI’s outreach efforts, participants felt that voices were still missing from the conversations, particularly those of marginalized community members, youths, politicians, and employers.

While there are barriers to overcome to enact a successful systems-mapping project, all participants believed that other communities could greatly benefit from a similar project focused on systems thinking to address ACEs. One participant stated that going through such a process enables people to “know what is bothering the community, what the community needs in order to build itself or rebuild itself. It is a valuable tool and it is a tool that everyone should use and take advantage of” (Retired Social Worker).

Our study expands on findings from previous studies that suggest a systems thinking approach is a valuable tool for looking at complexities and interconnectedness of health issues (Belue et al., 2012; Gillen et al., 2014, Trochim et al., 2004). While there is a substantive body of literature on interventions to address trauma resulting from ACEs, such as psychosocial and behavioral training (Agazzi et al., 2019; Cohen et al., 2010; Hutchison et al., 2020; Brotman et al., 2007), educational programs (Miller-Cribbs et al., 2020; Lowell et al., 2011; Dubowitz et al., 2009), and arts-based therapies (Lapum et al., 2019; Brooks et al., 2015; Shakoor et al., 2021; Kuhn et al., 2020), there is a limited amount of information on how to leverage systems thinking as a tool to address ACEs and trauma. However, the potential for systems thinking to address trauma has been noted. Mendenhall and Berge (2010), for example, examined how systems thinking could be used in the context of disaster-preparedness trauma response teams through the lens of family therapy, concluding that this approach “elicits positive individual, relational and family growth in both acute and long-term phases of support” (2010). There is also some literature on how systems thinking can be leveraged to address trauma from a clinical perspective (Papero, 2017; Bashford et al., 2016; Ko et al., 2008).

Our qualitative analysis adds to this current literature by highlighting how a systems mapping process could directly engage community members to address ACEs. The

social-ecological model in public health posits that it is important for interventions to not only target various societal, community, interpersonal, and individual-level factors, but to also examine the dynamic relationships between these factors (Centers for Disease Control and Prevention, 2021). While exposure to trauma is pervasive across cultural and geographical boundaries, context matters. Public health interventions should not only target the source of the trauma itself, but also the interpersonal, environmental, and social factors that affect trauma exposure, outcomes, and interventions (Magruder et al., 2017). Community members' voices are critical to understanding the ways in which these factors connect and intersect within different communities. All of the participants we interviewed valued the process, and felt that the participation of people from so many facets of the community not only highlighted the systemic factors underpinning ACEs, but also fostered collaborations and connections to address shortcomings of the system that perpetuates trauma. The current evidence suggests that systems mapping is a viable and transferable approach with potential to address ACEs at multiple levels by engaging and integrating community voices to inform actionable solutions.

Limitations

The community-engaged process described here, however, does underscore that the lessons offered from this systems mapping project may not apply to other community contexts and populations. This study summarized the reactions of 16 people to a process that engaged almost 400 community stakeholders in total. Although respondents were demographically diverse and represented different sectors of the community, some participant opinions may not be represented. In particular, participants who did not value the process may have removed themselves from ROI communications and not been aware of, or interested in, contributing to

this study. In addition, participant recall bias may have impacted participant responses , given that the systems-mapping project took place in 2017-2018 and the interviews in 2020-2021.

Despite these limitations, this study highlights many short-term benefits of the systems mapping process engaging members of a community in a rural Southeastern county. Future research should explore how systems thinking can be leveraged to address ACEs within different community contexts and with various groups of stakeholders, as well as more downstream effects of a systems-mapping project.

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Table 1*Self-Reported Characteristics of Participants*

Characteristic	Overall (n=16)*	Participated in SMP (n=8)*	Did Not Participate in SMP (n=8)
Mean age (range), years	53.6 (32-73)	54.7 (32-73)	52.6 (45-61)
Racial Identity			
Black	7	3	4
White	8	4	4
Gender			
Female	9	1	8
Male	6	6	0
Highest Level of Education			
High School	1	0	1
Some College	1	1	0
Bachelor's	4	2	2
Master's	7	2	5
Doctorate or more	2	2	0

*One participant's demographic information was not obtained. Percentages were calculated excluding that missing information.

**One participant declined to share their age. Percentages were calculated excluding that missing information.

Table 2

Themes and additional illustrative quotes

Theme	Quotes
Aim 1: Impact of systems-mapping project	
Recognition and understanding of own trauma	<p>The thing that probably affected me personally was a lot of these things I know from my background personally and some of those things I had to deal with, you know, even as a older adult, you know, you still deal with these traumas that may be buried, you know; and so, you know, you know, a lot of things came back and having to deal with those things or rethink, you know, and so that was probably the most difficult. (Director of Student Support Services)</p> <p>I was part of a group, we went to Tarboro. And met over there and [ROI] had these maps, all you know PowerPoints all around. And I looked at ‘em and I could see people almost looking cross-eyed and I sat back and I thought, ‘I understand this.’ I understand it, and it all makes, all makes sense to me. It’s tragic. But I understand why; how the anger gets out, how the hopelessness and why and what you have to do, which is, which was, I’m not going to say it’s 180 degrees, different from my former thinking, but it was probably at least 120 degrees different. And just listening to it...it just, it resonated with me. And it made, it made sense. And that day is when I, when I really understood that it did because...I thought ‘I got this. I got this’. (Local Elected Official)</p> <p>I think that we need to make sure that people understand that it can happen to everyone, that, um, it's not somebody else's problem. It's the community's problem. And lots of people have experienced trauma, but they've kept it to themselves. And they, I mean, that's proven on the ACEs score, that a lot of people have experienced trauma and just never discussed it...but just help people understand that there's nothing to be ashamed of, that what they've experienced is not their fault. Um, yeah, kind of removing the blame. (Professor)</p>

	<p>I think getting different perspectives on what they thought trauma was and then being educated on what trauma is and a lot of people in the room...Something would be diagnosed as trauma, growing up, it was just a way of life. I mean it, this is what it is. So you don't see it being something that's trauma or whatever because your friends are going through the same thing you were going through. So this is like a way of life versus, versus, you know, something that shouldn't have to take place, you know? And I think that process kind of opened some eyes in the room on what adverse childhood trauma is. (Nonprofit Executive)</p> <p>Well, the personal value for me was that it gave me an opportunity to really look at myself to look at the weaknesses that I had that I didn't address and also it made me look at the strength that I had that I can use to overcome those weaknesses and, and that's that's what it did, it made me basically an open book I look first at myself. (Retired Social Worker)</p> <p>Well, I really got to go inside my, my communities' homes, but not just their homes but their mindset and or how they set up a home because of the systemic things set in place, but that was the downside about that broke my heart. Because even though they seem good on the outside my people are still crying on the inside. (Adolescent Teen Parent Mentor)</p>
<p>Connection to other community members</p>	<p>I feel like I'm part of that system. I feel more like I'm a part of the community. I feel More related to other members of the community, even if I can't remember all the names or even the faces necessarily I can remember what we did together. There's a bit of a natural alliance, as I encounter people going forward in the future. Oh, yes, we work together on the ROI project...There was a very diverse group everybody had a little piece of knowledge to add to that systems map. And people getting to know each other who didn't know one another before... So community bonding, I would say...,maybe that'll enable us to affect social change more effectively. (Primary Care Physician)</p>

	<p>So there are things, for example, like relationships built for community members that would have never spoken before, so like I as a principal wouldn't necessarily have navigated. But now all of a sudden I have these connections. So we're able to build partnerships for things I didn't know existed, you know. (Principal)</p> <p>I got to know some people better than I ever thought even [name redacted], who was, we were good friends before I mean, you know, we're, you know, we talk all the time about stuff that we never talked about and and so it, it allowed it allowed people to to come together to share, but also gave them an opportunity to realize, too, that we're not so different, you know, and, and so we have, I believe it's given the community a better opportunity to become more intimate with each other and understand and understand that if I hurt, everybody's hurting you know so and if I can't figure it out, then we're all lost. (Director of Student Support Services)</p> <p>I think it was a good reminder to keep an open mind with people. I try to do that anyway, but I think this was a very good reminder that you know everybody has their own stuff that they're dealing with and being kind can't hurt. (Law Enforcement Personnel)</p> <p>Okay, and the good part about is that, you know, I got to be more empathetic. The good part is, like I said, I got to be more empathic, I got to understand it. Even if my neighbor has an issue, my issue is not with my neighbor of mine, my issue is with the people that put the systems in place because my neighbor is a criminal, because I have stuff and if my neighbor was envious of what I have, it's not my fault. That was the point, but just to see that. My fight is not my people. (Adolescent Teen Parent Mentor)</p>
<p>Aim 2: Leveraging systems thinking to address ACEs and trauma</p>	
<p>The role of organizers</p>	<p>Oh, they were very, they were very open to feedback and because with the feedback they could improve on what they would do if we gave them honest feedback and the leadership were always open to all,</p>

	<p>sometimes even criticism about the program. And they, they always willing to fix whatever they thought might be broken. So they are very, very open to, you know, make an adjustment to, you know, to help the most people. (Retired Social Worker)</p> <p>Well, [organizers] were very interested in what I had to say. Yeah, I thought they were open to comment. And I didn't feel like they were resistant to anything I had to offer. (Primary Care Physician)</p> <p>I think that they also took risks by making themselves really available in the community. So it wasn't just like they got they learned about it. It was like you saw them at like community events and they became like active interested participants of the community they serve. I didn't feel like I was like under a specimen. You know, it felt like they joined us in the work. And I think that's, that's really important. Yeah, you know, now that I'm saying that out loud what I think that created was just like permission to be vulnerable because it never felt like we were being judged. It felt like the questions they were asking really came from the curiosity to understand the historical context. (Principal)</p> <p>They met with everybody you know and you know you meet with people you; Let them know you're, you're not here to tear down, you're here to build them up, you're here to participate. Not, you know, observe and You want to pull people together not, you know, pull them apart, you want to, you want to be a part of the solution, not a part of the problem you, you want to help, not hurt. You know, so all those things. I think they did that and they took their time and they listen, listen to everybody. (Director of Student Support Services)</p>
<p>Diverse voices and representation at the table</p>	<p>I really like the affirmation of one, just who they invited to the table. That was the first time that I really internalized the fact that I wasn't alone in this work. And it was very interesting to hear from healthcare professionals or probation officers, or clergymen and to be talking about the same area and the same issues, but I thought through the lens of not only how they impact events, but what they were doing about it. And so it was the first time that I saw that like the issue that I see can be solved in more than</p>

	<p>one way. And I think that that gave me a lot of hope. So unlike the surface level. I think it was like very engaging to know that this was a community doing community work. (Principal)</p> <p>I think that ROI did an excellent job. That was always at the forefront of, like, who do we need to invite to the next meeting, are we adequately representing demographics, gender, age, where in the community outlet where people might be missed. And then those people would be at the next meeting. (Principal)</p> <p>I found it very uplifting. It was, I enjoyed working with a diverse group of people. I enjoyed being a primary care physician. I have met a lot of people over time in the community and it's good to see some of those same people over time in different settings and to be able to work together with them. It was rewarding for me to be able to work with [ROI] it was, as I already said it very rewarding to me to be exposed to a new idea totally novel to me really a new way of getting at the truth. (Primary Care Physician)</p> <p>I'm a people person, so I like to bring people together. You know, and they were bringing people together who I normally don't work with a, you know, to come to the table to come up with some solutions to help you know better than the community. (Nonprofit Executive)</p>
<p>Gaps in community representation</p>	<p>Well, I think the system makers, the board makers, the people that's on the board and all that, you know, put the systems in order and then none of them was at the table. We're always talking to the people that was affected by the system, but nobody that was no serious players in place ever came to the table here. (Adolescent Teen Parent Mentor)</p> <p>The children were missing. Hmm, we would talk because we were talking, we were talking about. We were talking about the children and a lot of problems and issues that the children had but eventually the children were born into it because the program was set up in the school to deal with the trauma. That they have But other than other than that, again, I still say the parents in general were not really included as they should have. (Retired Social Worker)</p>

	<p>Um, I think the marginalized, those folks who are marginalized don't always have an opportunity to express themselves. (Director of Student Support Services)</p> <p>I think in this day and time, with some of the larger companies like around here: Cummings, Pfizer, Honeywell, the hospital, Nash, UNC, and some others. I think at the lowest point, their HR person at the lowest. And it would be great to have their senior management, one or two from senior management there as well. I think, um, some retired educators that have the time and the skillset and they have the passion for it. They retired from teaching, but like my late mother was a teacher 40 years, that can maybe give some guidance. (Local Elected Official)</p> <p>Yeah, like I said, I think that probably could have had a little bit more influence from Rocky Mountain. Because of where it was located...because you have you can do something in Edgecombe County and it's going to affect Nash County, too, because they're just twin County. (Nonprofit Executive)</p>
<p>Talking about trauma can itself be traumatic</p>	<p>I'm remembering some of our conversations...a lot of is individualized and the emotions that I had to deal with were, I'm happy that I was able to have been able to cope with a lot of these before our conversation... but, but even now, I still you know, are dealing with some of those things emotionally trying to work through some of those things. You know, this year I lost my mother, I lost my brother, and, and it kind of made you revisit some of those things. (Director of Student Support Services)</p> <p>I think just inherently when you spend time discussing the realities of the world, it can become overwhelming. And so I remember there was pieces of like going through the process to really see how things that we do or systems that are created in a community like perpetuate negative things. And so when you think specifically about like adverse childhood experiences and the trauma, there's like compounding factors. And I found that the avenues in which I served in terms of like education and what we were doing, we were a large part of that through things like suspensions. And lack of</p>

	<p>community engagement and lack of social awareness and I think we just like contributed to that in a lot of ways. In terms of like, you know, with the best of intentions but you saw it show up in a way that just kind of was overwhelming to know that you're like in a system that's perpetuating this. (Principal)</p> <p>Yeah, so it had me thinking a lot, you know...during that time, you know, and I think I was having a lot of flashbacks and I remember some of the things that I went through as a child--how it made me feel, what was some of the effects of it, you know, how it had an effect on my life today. (Nonprofit Executive)</p>
<p>Visualizing systemic sources of trauma</p>	<p>Um, if you look at the map itself. Are these areas that have like plus sign and minus sign. And that's kind of like, you know, the areas that the loop is reinforced or weakened and I thought that it was just really interesting to think about. It's just life right that like right there are some things compounded that are good and some things that are compounded that are bad. And let's make meaning of the outcome. And I just thought that was really interesting reflection, because again I hadn't considered that before...This is like super interesting to see all those circles and cycles working in tandem to create the site problem and or solution based on how you look at it. Yeah, so I just really like the idea of creating a map of how these things are all interrelated and then again like getting curious about, like, then what can you, what can you are aware, maybe it's an appropriate Thought to, like, where do you intervene, then in this and I never thought about that before. (Principal)</p> <p>The thing that helped me the most was the visual. When, when they took this information and processed it and put it on paper, not just sticky notes, but putting in a diagram. And we talked about each segment of this diagram and it got more and more and more. But yet, is it got complicated I can actually see it better...So the visual for me was probably the most impressive and and their ability to you know, just put it in a situation where, you know, it wasn't a thought on the way home, and I write on a note paper and and lose the note paper, but they were able to keep everything and and document it and put it in a situation where, you know, where we could see and</p>

	<p>evaluate it and reevaluate it. (Director of Student Support Services)</p> <p>I think we sat down at tables of about four people each. And somehow we talked a bit about who we were and what our disciplines. We had lots of little pieces of paper. We started writing down ideas. We presented our ideas to the group and then we started adding them to this huge paper chart. That showed what the issues and what the forces were in the community that were related to toxic stress. (Primary Care Physician)</p>
<p>Incorporating SMP skills into everyday and professional life</p>	<p>Cause the school system has come aboard now and [ROI has] introduced the biofeedback program to schools, and a lot of schools and principals have come aboard and really want to implement these practices and tools to their students, so it's a really good impact. (Pastor)</p> <p>We want students to understand that we know that you go through things as well. We, we know that you have things that you're dealing with. But when you come to school, 'how can we make school life better, even though you have these things going on?' And building that relationship with, with the students in order to allow them to be the best student as a whole, instead of just their academics. 'How is home?' You know, 'is there anything that I can do to help you to help make things better for you at home,' as opposed to just come into school learning math, science, social studies and language arts. (Middle School Guidance Counselor)</p> <p>It's given me confidence in working with clients...I'm learning new things and...I would say it's given me some renewed confidence and working with children and adults that have been impacted by trauma. (Health Care Provider)</p> <p>I don't think I would have a framework to address. I think it would still be putting out fires, to use an analogy, instead of a process that has the beginning and you make progress as you work through it. Like you may not, you know, solve the problem, but we have, we have a framework within which to work and to make continual progress with. Even though it's gradual, you can see the progress, you can see the</p>

	<p>benefit, even though it doesn't solve a problem, you know, and I think maybe without ROI, I would still be trying to solve problems with one little quick fix. (Middle School Guidance Counselor)</p> <p>I think that the impact on that small group of people is big, because I think that it, it's information which empowers people. (Special Education Teacher)</p> <p>I don't know just connecting, connecting, it sounds crazy, but just connecting systems like mapping out how can we all support and benefit each other. (Middle School Guidance Counselor)</p> <p>You know, I think, in doing that mapping process, [ROI] integrated key players. It allowed them and help them to buy into the whole idea, to the whole process. So it became a way of uniting all the key players in this process...So, you know, people start gaining interest and they start gaining having a voice and by having that voice, they have ownership to what's being done with being said, which is going to increase their commitment. So I don't think I don't think they would have the, the commitment, the level of buying had they not done that mapping process. (Counselor and Licensed Therapist)</p>
<p>Aim 3: Lessons-learned and recommendations</p>	
<p>Inclusion of diverse voices</p>	<p>There was a very diverse group everybody had a little piece of knowledge to add to that systems map. And people getting to know each other who didn't know one another before... So community bonding, I would say. Maybe that'll enable us to affect social change more effectively. It was very rewarding to be exposed to a new idea, totally novel to me, a new way of getting at the truth. (Primary Care Physician)</p> <p>I would say enthusiastically, and I would say I would do it. It's just such a rich process. I would do it because it helps people to bond together. It gets the players knowing one another. It assembles people from diverse backgrounds. Each of whom has some relevant piece of information to add that other people may not because of the diversity of their backgrounds. And I really feel like when you draw that type of insight together, from such a diverse group of people that it's a different but valid way of getting</p>

	<p>at the truth. And so I think it's what I would recommend it to another community because I think it'd be good for the community. (Primary Care Physician)</p>
<p>The role of leadership and organizers</p>	<p>I assume that without the right people, leading it like [names redacted], for example, that it could just become you know, a well intended event or activity that doesn't actually drive to the right leverage point. And so I just think it's important, how it's facilitated right. (Principal)</p> <p>I also think that um with [ROI organizers] being who they are, and had anybody different come in to try to do what they are doing, I don't think the outcome would be the same. I think that their openness and willingness to understand and meet people where they are had a profound effect on how this is actually working out, you know, and it's no, no big Is and little Ts when it comes to them, we're all on the same playing field, which is what it should be. And it has made, it has allowed people who I work with closely, with ROI, I would have never thought that they would have done some of the things that they're doing, had it not been for [ROI organizers], or been in a place where they could even have the opportunity to do it. (Middle School Guidance Counselor)</p>
<p>Time and effort</p>	<p>Again feet on the ground hands to the handle. It's just going to take that sort of thing, it, it, it has taken generations to break and be broken, and it's going to take generations to fix. We got to have people who are willing to change, willing to fix things, willing to self disclose, willing to self examine, and, and so yes it'll take a lot of work in every community. (Director of Student Support Services)</p> <p>It is hard work. It does call you to...come, you know, come to grips with some things that even maybe you didn't know, and you may experience some things that you didn't expect to experience, but the end result is well worth it. (Middle School Guidance Counselor)</p>

	<p>The truth hurts. And this hurt, to see where it takes you. But if you, if you don't travel that journey. You don't feel that pain, you don't understand it and you're not gonna have any chance at all, any chance to rectify. And you got to also understand, this is not a quick fix. It's a generational investment in time and resources. I will be dead and gone, before, if we start on this program like we should and get the resources, before you really begin to see a meaningful improvement. But you know what? That's okay. Because I don't want my grandchildren, having the conversation that you and I are having right here. And I don't want those kids' grandchildren that are growing up now, to have this, have to have that same conversation, or be in prison, because they were stealing to eat. (Local Elected Official)</p>
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Figure 1. Participants engaging in a systems-mapping activity, Edgecombe County, NC. From “Prevent Child Abuse Conference - Community-Based Systems Mapping to Promote Healing: Building empathy as a community engagement tool,” by Seth Saeugling, 2021. [PowerPoint Presentation]. Copyright 2019 by Rural Opportunity Institute. Reprinted with permission.

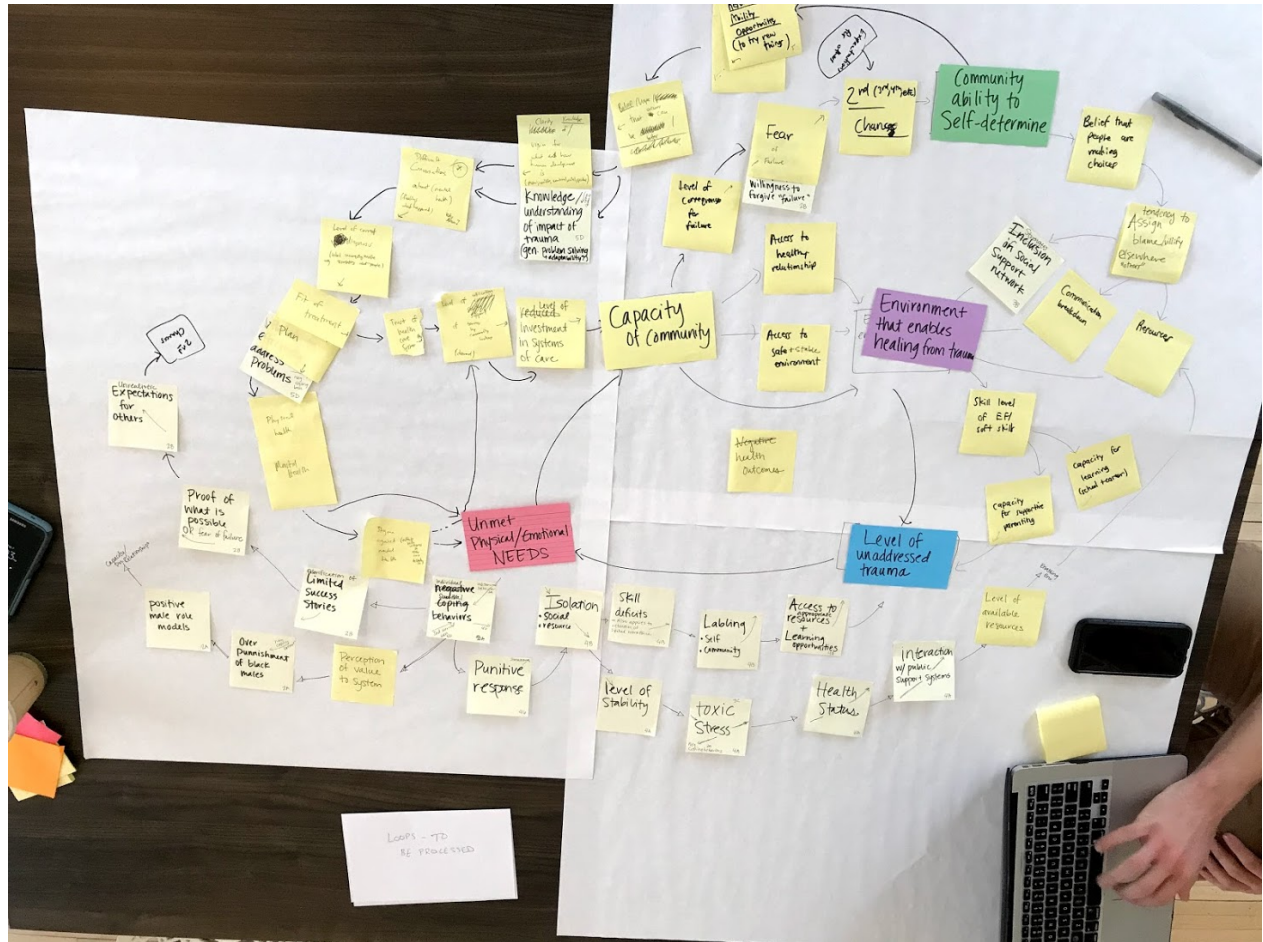


Figure 2. A draft of the systems-map created by participants, Edgecombe County, NC. From “Prevent Child Abuse Conference - Community-Based Systems Mapping to Promote Healing: Building empathy as a community engagement tool,” by Seth Saeugling, 2021. [PowerPoint Presentation]. Copyright 2019 by Rural Opportunity Institute. Reprinted with permission.

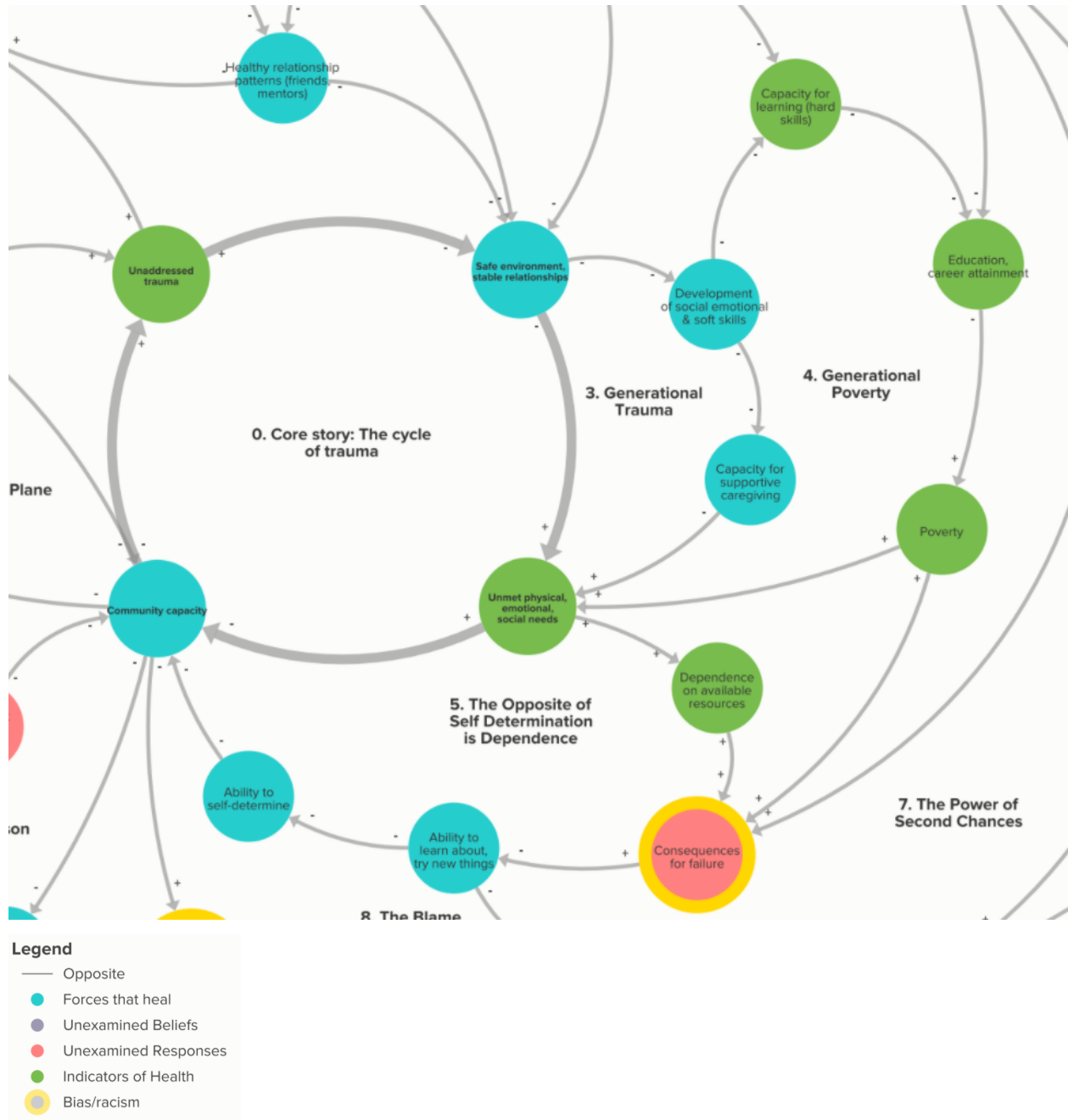


Figure 3. A section of the final systems-map, Edgecombe County, NC. From “Prevent Child Abuse Conference - Community-Based Systems Mapping to Promote Healing: Building empathy as a community engagement tool,” by Seth Saeugling, 2021. [PowerPoint Presentation]. Copyright 2019 by Rural Opportunity Institute. Reprinted with permission.