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BRIEF REPORT

Understanding Rural Social Networks Addressing Adverse Childhood Experiences: A Case Study of the San Luis Valley

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Introduction: The purpose of this study is to assess a cross-sector, interorganizational network addressing adverse childhood experiences (ACEs) in a rural Colorado community. We characterize the organizations in the network, assess their awareness of ACEs, and evaluate how they participate in the network. We also assess the network health. **Method:** Employing a social network analysis approach, we collected survey data from 45 organizations that support young children and their families, including nonprofits, health care clinics, and early childhood education centers, among others. **Results:** On average, nonprofit organizations had relationships with a greater percentage of network members than other types of organizations. Network members engaged in relationships focused on a wide range of activities (e.g., client assessments, sharing information, providing services), with some organizational types leading the network in certain activities. Scores across all dimensions of trust and value were above 3 (range: 2.1–3.8), which is advantageous for a network and network relationships existed across a range of relational intensities (from awareness to organizational integration). **Discussion:** Nonprofit organizations that reported high levels of connectedness in the network were able to effectively mobilize the ACEs network. Health clinics participated in a greater share of relationships involving assessment, service provision, and tool sharing than other types of organizations. As such, health care clinics may serve as leaders in directly serving children and families experiencing ACEs in rural communities. The rural context may also explain high levels of trust and value, which can serve as assets for future network development and mobilization.

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or the decision to submit the report for publication.

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Public Significance Statement

We present a case study of an adverse childhood experience network operating in rural communities in San Luis Valley, Colorado, with implications for network-building. We found: (a) network members had high levels of trust in their relationships overall; (b) nonprofit organizations were among the most connected organizations; and (c) health clinics were in a greater share of relationships involving assessment, service provision, and resource sharing, positioning them as leaders in these activities.

Keywords: adverse childhood experiences, social network analysis, rural health, organizations

Adverse childhood experiences (ACEs) significantly impact rural communities' health. ACEs are traumatic experiences encompassing abuse, neglect, and household dysfunction. Research has found 64% of adults have experienced at least one ACE (Felitti et al., 1998). ACEs relate to negative outcomes, including limited economic potential, risky health behaviors, and negative health outcomes (Centers for Disease Control and Prevention, 2019). Those who experience four or more ACEs are at increased risk of drug and alcohol abuse, depression, and suicide attempts (Felitti et al., 1998). Critical developmental periods, such as early childhood, are particularly important for buffering the long-lasting effects of ACEs. Exposure to ACEs early, from birth to age 5, negatively impacts cognitive, social, and regulatory development and can lead to health disparities and disease into adulthood (Shonkoff & Phillips, 2000).

Children living in poverty in rural communities are at an increased risk of experiencing ACEs. A study using the National Survey of Children's Health found that 45% of rural children ages birth to 5 likely experience at least one ACE compared to 35% of urban children (Health Resources and Services Administration, 2015). Those living in poverty in rural settings have unique challenges to preventing ACEs, such as barriers to health care services, including fewer local providers, unaffordable care, and limited access (Warshaw, 2017). This highlights the need to support systems of care and strengthen relationships among organizations addressing ACEs (e.g., information and resource exchange, trust, reciprocity).

Cross-sector networks are a common approach to addressing problems like ACEs with interwoven causes and effects (Varda & Sprong, 2020). Previous research has established that networks can be valuable for addressing ACEs and explored their application in several communities

(e.g., Rog et al., 2021), but there is more to learn about ACEs networks in rural communities.

Current Study and Study Context

The purpose of the present study is to understand ACE networks in a rural context, assessing the following research questions:

Research Question 1: What are the characteristics of the organizations that comprise the ACEs network in a rural setting?

Research Question 2: To what extent are organizations aware of ACEs?

Research Question 3: How do different types of organizations participate in the ACEs network in a rural setting?

Research Question 4: What is the overall health of the rural ACEs network?

This study took place in the rural San Luis Valley (SLV) of Colorado, which is isolated by the Rocky Mountain ranges. The SLV is a federally designated Medically Underserved and Health Professional Shortage Area, meaning there are severe issues with accessing a health care provider (Kirby et al., 2019). The study is part of a larger project funded by the Centers for Disease Control and Prevention, entitled Supporting Trauma Awareness and Nurturing Children's Environments (STANCE) and took a multilevel approach to prevent the intergenerational transmission of ACEs in the SLV over 5 years (2019–2024).

Method

We employed a social network analysis approach, a common way to understand partnership patterns among organizations and identify the underlying structures a community can leverage

to accomplish its goals (Varda & Sprong, 2020). We invited 59 individual participants to respond on behalf of the organizations they represent in the network. To identify relevant organizations, we created a list of organizations directly serving families (with a priority on those serving children under five) in the six-county SLV region from local resource guides, local partner knowledge, and input from our local community advisory board. We identified participants to respond on behalf of the organizations based on several priorities: (a) individuals with an overall understanding of the organization's network and how they serve children and families, (b) individuals engaged with other organizations via referrals or shared services with children and families, and (c) individuals who had direct engagement with children and families through services.

Survey Questions and Implementation

The survey consisted of 29 questions, including questions from the widely used PARTNER tool survey, which identifies, characterizes, and describes organizations and relationships (Varda & Sprong, 2020). Questions characterizing organizations in the network included roles they play in serving children and families and awareness and engagement in ACEs-related work (e.g., "To what extent are you aware of the term ACEs—Adverse Childhood Experiences?" with a 4-point scale from *not at all aware* to *very aware*). We identified network relationships using a name generator question with a roster of 59 organizations in the SLV that engage in ACEs-related work ("From the list, select all of the organizations with which your organization has an established relationship [either formal or informal]."). Participants characterized their relationships with questions asking about activities ("What activities does your relationship with this organization include?") and measures of network health: the intensity of their relationships and a validated scale of trust and value in relationships (Varda & Sprong, 2020). Each of the questions that characterized participant relationships was populated with the names of organizations that participants selected in the name generator question (e.g., a question about the activities partners engage in together would give participants an opportunity to name activities they engage in as part of each relationship they identified from the name generator question). The project

team recruited participants via email and phone from May to June 2020. Data were collected using the PARTNER CPRM (community partner relationship manager) platform, which included the PARTNER survey questions, bounded list management, email system, and network visualization tools. The survey took approximately 30 min to complete, and participants were offered a \$20 incentive.

Results

Network Overview

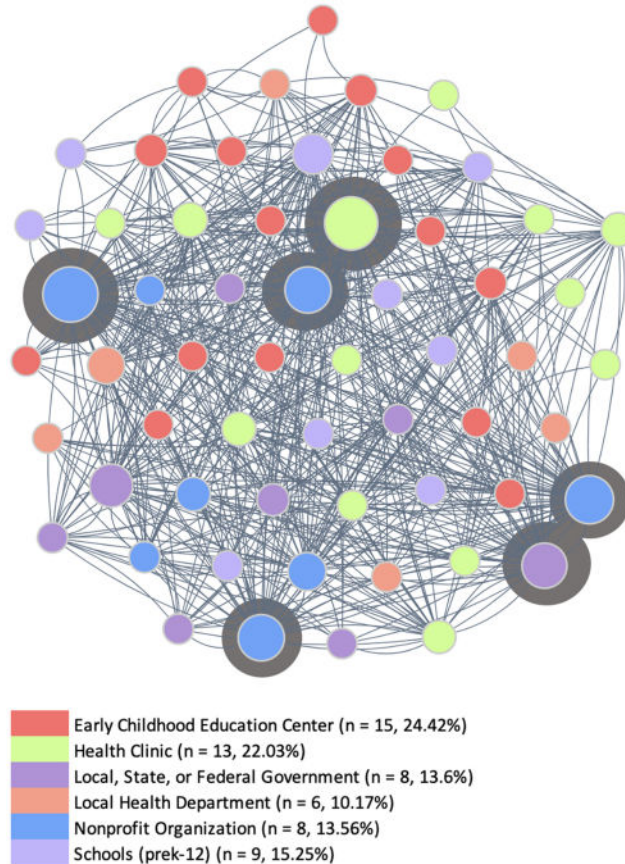
Of the 59 organizations included in the network, 45 (76.27%) participated in the survey. Participants reported about 637 relationships involving all 59 members of the network. On average, organizations had 10.80 relationships (range: 1–44). All organizations in the network were either public ($n = 37$, 62.7%) or nonprofit ($n = 22$, 37.3%) and reflected a range of sectors, most commonly including early childhood education centers ($n = 15$, 25.42%), health clinics ($n = 13$, 22.03%), and schools (prek–12; $n = 9$, 15.25%). Organizations in the network also reflected a wide service area in the SLV, with at least 10 organizations in the network serving each zip code in the SLV.

Connectedness, measured as degree centrality, varied; the most connected organization had relationships with 74.14% of network members and the least connected organization had relationships with 1.72% of network members. No organizations were isolated. Six organizations reported relationships with more than 60% of network members. Four of the six were nonprofits, one was a health clinic, and one was a local, state, or federal government organization. On average, nonprofits had relationships with a greater percentage of network members than other types of organizations. See Figure 1 for a map of the full network, with nodes colored (gray-shaded) by organization type and sized by degree centrality. Nodes with the highest centrality have gray halos to highlight them.

ACEs Awareness

Participants rated their awareness of ACEs on a 4-point scale (1 = *not at all aware*, 2 = *slightly aware*, 3 = *somewhat aware*, and 4 = *very aware*). Overall, network members reported an average score for ACEs awareness of 3.20

Figure 1
Map of All Network Member Relationships Sized by Centrality and Colored (Gray-Shaded) by Sector



Note. Prek–12 = pre-kindergarten through grade 12. See the online article for the color version of this figure.

($SD = 0.88$). Nonprofit organizations ($M = 3.75$, $SD = 0.463$) and governmental organizations ($M = 3.75$, $SD = 0.5$) reported the highest level of ACEs awareness, while health clinics reported the lowest level of ACEs awareness ($M = 2.75$, $SD = 0.707$). All other sectors reported an average ACEs awareness score between 3.00 and 3.75.

Network Member Activities

Network members engaged in various activities with partners. Information sharing and meetings/events are the most popular activities. Health clinics are more frequently engaged in partnerships that involve client assessments, service provision,

and sharing tools. Although these activities occur infrequently in the network, early childhood education centers were more frequently involved in relationships where they received funding and technical assistance than other types of organizations. Local, state, or federal government members of the network were more frequently involved in providing funding to partners. See Table 1 for an overview of each organization type and the percentage of their relationships dedicated to different types of activities.

Network Health

Average scores across trust and value dimensions were above 3 (range: 2.14–3.83), which is advantageous for a network's health. This indicates

Table 1*Network Member Activity and ACEs Awareness by Organization Type*

Concept or activity	Early childhood education center	Health clinic	Schools (prek–12)	Nonprofit organization	Local health department	Local, state, or federal government
ACEs awareness, <i>M</i> (<i>SD</i>)	3 (0.9)	2.8 (0.7)	3.3 (1.2)	3.8 (0.5)	3 (1)	3.8 (0.5)
Network activities (%)						
Client assessments	26.1	64.6	21.1	24.9	25.3	28.9
Providing services	41.8	55.4	38.2	42.5	24.2	44.5
Advocacy or policy	30.7	34.3	42.3	40.4	47.4	48.4
Meetings/events	52.3	81.1	79.7	76.2	47.4	70.3
Joint programming	15.7	22.9	20.3	25.9	8.4	11.7
Sharing other resources	13.1	22.9	21.1	24.4	6.3	16.4
Sharing information	81.1	86.3	75.6	85.0	83.2	86.7
Sharing tools	48.4	67.4	39.0	54.4	47.4	60.9
Use of the same standards/procedures	35.3	20.6	25.2	21.8	13.7	23.4
Provide funding	3.4	3.7	2.1	0.0	0.0	27.6
Receive funding	12.6	3.7	9.5	7.0	0.0	3.5
Provide TA	3.4	5.1	8.4	18.6	0.0	15.5
Receive TA	19.3	5.1	6.3	2.3	0.0	15.5

Note. Each entry in the table reflects the percentage of the organization type's relationships that include the named activity. ACEs = adverse childhood experiences; Prek–12 = pre-kindergarten through grade 12; TA = technical assistance.

members are in relationships characterized by a high level of trust and perceive value from those relationships. See Table 2 for a breakdown of each dimension. Participants characterized their relationships in four ways: awareness (knowing about each other), cooperation (informally sharing information), coordination (synchronizing activities for mutual benefit), and integration (having a formal shared work arrangement). Most commonly, relationships among network members were at the cooperative ($n = 252$, 42.5%) or integrated ($n = 157$, 26.5%) levels.

Discussion

The purpose of this study was to understand ACEs networks in rural communities through a case study of the network in the San Luis

Valley, Colorado. We identified several key findings with implications for understanding and mobilizing rural ACEs networks.

Nonprofit organizations' high levels of connectedness in the network set them up to effectively mobilize ACEs networks. They may be a good target for intervention to promote ACEs awareness and collective action. They are positioned to spread information, resources, and practices quickly. Nonprofit organizations also reported the highest level of ACEs awareness, so they may be well positioned to serve as thought leaders and share information about ACEs.

Health clinics participated in a greater share of relationships involving assessment, service provision, and tool sharing than other types of organizations. This situates them to serve as leaders in directly serving families and children experiencing ACEs in rural communities. Rural ACEs networks can also build connectivity between health clinics and organizations with high ACEs awareness (nonprofit organizations and governmental organizations) to build their capacity in this domain.

Overall, network members reported having high levels of trust in their relationships and derive value from their relationships. This may be related to the rural context where organizations are more likely to know each other well

Table 2*Trust and Value in Relationships*

Dimension	<i>M</i>	<i>SD</i>	<i>N</i>
Trust in relationships			
Reliability	3.52	0.22	59
Mission support	3.48	0.52	59
Openness	3.06	0.31	59
Value in relationships			
Power and influence	3	0.37	59
Resource contribution	3.11	0.49	59
Involvement	3.27	0.53	59

and build trusting relationships over time (Snaveley & Tracy, 2002). Approximately a quarter of relationships in the network operate at the integration level. This is indicative of close relationships with a high level of resource sharing. It suggests that network members have strong connections and engage in deep work. Such relationships can be an asset because the members engaged in them are well versed in each other's work. They can also be resource-intensive to maintain relative to coordinated and cooperative relationship types and may be difficult to shift when needed.

Limitations and Future Directions

This study builds the knowledge base on rural ACEs networks and has two limitations. This study focused on a single time point. Future work can observe how ACEs networks change over time and in response to intervention with multiple time points. This study also focused on a case study of one region. Although network analyses commonly use case studies of single networks, continuing to explore ACEs networks across rural communities can unpack partnership patterns and inform work to improve ACEs service networks. Future work can also explore additional characteristics of partners in these networks, for example, through questions about how staff members in organizations within the network talk about ACEs across roles and specific ACEs-related supports they provide to community members and each other. Asking these questions qualitatively can help unpack the characteristics of positive relationships in an ACEs service network.

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