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Implementing and documenting cultural adaption of evidence-based practice strategies to reduce opioid overdose deaths: examples and lessons from the HEALing communities study

Erin B. Gibson[1,2] · LaShawn Glasgow[3] · Monica Nouvong[2] · Margaret McGladrey[4] · Darcy Freedman[5] · Deborah Chassler[6] · Rachel Vickers-Smith[7] · Madeline D'Onfro[6] · Dawn A. Goddard-Eckrich[8] · Timothy Hunt[8] · Avik Chatterjee[9] · JaNae Holloway[3] · Katie Fain[3] · Rachel Sword Cruz[2] · Linda Sprague Martinez[6]

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Abstract

Introduction Addressing the opioid overdose crisis requires developing contextually specific strategies promoting the adoption of evidence-based practices (EBPs) to prevent and treat opioid use disorder (OUD), including overdose education and naloxone distribution (OEND) and medications for OUD (MOUD). To effectively reach the groups most affected by the opioid crisis, EBP strategies must be adjusted to fit the culture and contexts of different communities.

Methods The HEALing Communities Study engaged coalitions in 67 communities across four states to select and implement EBP strategies to reduce opioid overdose mortality. Coalitions were encouraged to culturally adapt EBP strategies for "special populations," which were defined as groups that are highly impacted by OUD and face unique challenges in accessing prevention and treatment services. EBP strategies, and any efforts to culturally adapt them, were documented in coalition action plans. We collected quantitative and qualitative details from coalitions' action plans. Following the first wave of the intervention (January 2020 – June 2022), we utilized the DATA (Describe, Analyze, Theorize, and ACT) model to evaluate the HEALing Communities Study approach to reaching special populations and identify areas for improvement. Finally, we identified variations across states in how cultural adaptation was interpreted and implemented. We provide strategies to improve how cultural adaption strategies are developed, documented, implemented, and monitored in future studies.

Results Coalitions selected and implemented a variety of culturally tailored EBP strategies. However, complete understanding of the nature and effectiveness of cultural adaptation was limited by varying interpretations of what counts as cultural adaptation, inconsistent use of reporting guidance across research sites, and lack of data on the reach of each EBP strategy. Examples of cultural adaptation that successfully reached special populations included locating EBP strategies near each other to reduce transportation barriers, funding community-based organizations to help unhoused individuals meet basic needs, and hiring a bilingual and bicultural workforce to support prevention and treatment for OUD. Future studies should improve reporting of intersectional identities, measure EBP strategies' reach, utilize real-world evidence

✉ Erin B. Gibson, erin.gibson@tuftsmedicine.org | [1]Tufts Medical Center, 35 Kneeland Street, 8th floor, Boston, MA 02111, USA. [2]General Internal Medicine, Boston Medical Center, Boston, MA, USA. [3]RTI International, Research Triangle Park, NC, USA. [4]Department of Health Management and Policy, College of Public Health, University of Kentucky, Lexington, KY, USA. [5]Department of Population and Quantitative Health Sciences and Mary Ann Swetland Center for Environmental Health, School of Medicine, Case Western Reserve University, Cleveland, OH, USA. [6]School of Social Work, Boston University, Boston, MA, USA. [7]Department of Epidemiology, College of Public Health, University of Kentucky, Lexington, KY, USA. [8]School of Social Work, Columbia University, New York, NY, USA. [9]Department of Medicine, Boston University Chobanian & Avedisian School of Medicine, Boston, MA, USA.

of successful implementation strategies for cultural adaptation, and incorporate qualitative methods to contextualize cultural adaptation at local levels.

Conclusion We call on funders, researchers, evaluators, and implementers to invest in training and technical assistance, robust documentation and monitoring protocols, and thoughtful community engagement to support cultural adaptation of EBP strategies to reduce overdose for the most vulnerable populations.

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Keywords Opioid use disorder · Overdose prevention · Community intervention · Health equity · Access to care · Cultural adaptation · Culturally responsive · Health disparities · Stigma

Abbreviations

DATA	Describe, analyze, theorize, and ACT model
EBP	Evidence-based Practice: MOUD or OEND
EBP Strategies	Individual interventions to reduce opioid overdose fatalities under the umbrella MOUD and OEND EBP categories (e.g., OEND via peer networks, OEND via Naloxboxes, MOUD via mobile van and telemedicine, MOUD via a brick-and-mortar Opioid Treatment Program)
KY	Kentucky
LGBTQ +	Lesbian, gay, bisexual, transgender, queer
MA	Massachusetts
MOUD	Medication for opioid use disorder
NY	New York
OEND	Overdose education and naloxone distribution
OH	Ohio
ORCCA	Opioid-overdose reduction continuum of care approach
ORCCAT	Opioid-overdose reduction continuum of care approach tracker
OUD	Opioid use disorder
SOP	Standard operating procedure

1 Introduction

More than 80,000 people died of an opioid overdose in 2023, a number that has increased dramatically over the last decade [1]. This is mostly due to the fact that fentanyl and other synthetic opioids have become more common in the drug supply [2, 3] The COVID-19 pandemic also made the problem worse [4]. Addressing the opioid overdose crisis requires increasing the adoption of evidence-based practices (EBPs). EBPs include overdose education and naloxone (a medication to reverse an opioid overdose) distribution (OEND) [5, 6] and medications used to treat opioid use disorder (MOUD) such as buprenorphine and methadone [7–9]. These EBPs need to reach people who are at the highest risk of overdosing [10], which includes those who 1) have had a prior opioid overdose [11], 2) have a reduced ability to tolerate opioids (e.g., those who have not used opioids for a while after release from jails, treatment centers, and hospitals) [12], 3) use other drugs [13], 4) have serious mental health problems [14], and/or 5) major medical conditions [15].

Some population groups are more affected by opioid use disorder (OUD) than others. These groups include unhoused individuals [16–18], people who don't speak English and/or are immigrants [19, 20], individuals who are pregnant or post-partum [21], older adults with chronic pain [22], and racially and ethnically minoritized populations [23, 24]. The HEALing Communities Study, the largest implementation science research project focused on reducing overdose deaths to date [25], categorizes these groups as "special populations." Special populations may experience unique challenges when trying to get treatment for OUD. A complete list of the HEALing Communities Study special populations and the distinct challenges they face are detailed in Table 1.

Moreover, stigma against people with OUD or on MOUD treatment is widespread [44]. Many believe that people who use drugs are unworthy of help [45], and there are policies and regulations that block access to services and treatment [46]. Such stigma may prevent people from seeking or staying in treatment [47]. Structural racism, or forms of racism embedded in systems, laws, or policies, worsens the impact of stigma [48]. There are long-standing racial and ethnic inequalities in drug treatment that have been well-documented [33, 49], including the harmful "War on Drugs" that unfairly labeled people who use drugs as criminals [50, 51]. People who use drugs may face more stigma because other

Table 1 Unique OUD-Related Challenges Experienced by HEALing Communities Study Special Population Groups

HEALing Communities Study Special Population Groups	Unique Challenges Experienced by Special Population Groups
Unhoused,* rural populations without transportation, and other factors related to severe poverty	■ Rural populations often have few nearby treatment facilities and trained providers, and opioid use disorder (OUD) treatment options and mental health and psychosocial support services can be limited [18] ■ Unhoused individuals are less likely to be offered medication for opioid use disorder (MOUD) [26] ■ Unhoused populations experience less employment and more social isolation and trauma, making retention in MOUD more challenging [27] ■ Strict MOUD program requirements stigmatize unhoused populations [16] ■ Residents of rural counties experienced longer drive times to the nearest opioid treatment program than urban county residents [17] ■ Access to transportation in rural regions presents a serious and persistent barrier to accessing treatment services [18]
People who don't speak English and/or immigrants	■ Limited availability of services in language spoken by individuals seeking care [28] ■ The U.S. immigration system creates immigration-related barriers to evidence-based addiction treatment; immigrants risk deportation for admitting to drug use [19] ■ Many immigrants who experience OUD may avoid traditional addiction services out of fear of arrest or distrust in the health system [20]
People involved in transactional sex	■ People who engage in transactional sex experience the double stigmas of sex work and OUD and are at elevated risk for HIV and violent crime [29, 30] ■ Women who engage in sex work represent a particularly vulnerable group showing poorer mental health and a higher drug use compared with women not engaging in sex work [31]
Pregnant and post-partum persons	■ Fewer special addiction services continue after pregnancy and delivery, increasing likelihood of discontinuing addiction treatment [21] ■ Stigmatizing policies in the healthcare and child welfare sectors discourage people from seeking treatment during pregnancy [32]
Racially and ethnically minoritized populations**	■ While initial trends indicated that OUD impacted white Americans more, Black and African American populations are increasingly affected [33] ■ The increased involvement of synthetic opioids such as fentanyl has resulted in increased OUD mortality rates among Black individuals aged 45–64 in urban areas [33] ■ Black and Hispanic individuals are less likely than white individuals to be prescribed MOUD after an opioid overdose [23] ■ Racially and ethnically minoritized populations are less likely to stay on MOUD treatment due to structural challenges [24] ■ The impacts of historical trauma and lack of community-centered and culturally responsive interventions for American Indian/Alaskan Native communities make them vulnerable to OUD and overdose [34]
Veterans	■ Veterans are at a unique risk for post-traumatic stress disorder and other mental health problems, which increases their risk for OUD [35, 36] ■ Opioid overdose rates among Veterans Health Administration veterans increased due to increases in heroin and synthetic opioid use [36]
People with mental health disorders and mental/physical disabilities	■ Individuals with undiagnosed mental illnesses are at an increased risk for OUD, which can impact their ability to make healthcare decisions [37] ■ People with disabilities face barriers accessing OUD care. Studies suggest that people with disabilities are at greater risk of OUD than persons without disability but are less likely to receive and stay on essential treatment for OUD [38]

Table 1 (continued)

HEALing Communities Study Special Population Groups	Unique Challenges Experienced by Special Population Groups
People who use multiple substances	■ People who use multiple drugs tend to experience other barriers to services, such as lacking housing [39]
People who have chronic pain	■ Individuals with chronic pain and OUD are more likely to have greater difficulties in managing their OUD than individuals with OUD alone [22]
People who are lesbian, gay, bisexual, transgender or queer (LGBTQ +)	■ LGBTQ + people experience acute stress due to discrimination and victimization from a young age, which can disrupt their psychological coping processes and increase their risk for opioid misuse [40, 41]
Adolescents	■ Pediatricians and adolescent healthcare providers feel ill-equipped to address adolescent addiction, thus leaving many adolescents out of care [42] ■ Without care, adolescents are more likely to encounter prison systems and insufficient treatment programs after experiencing an overdose [42]

[*] *Originally referred to as homeless individuals but revised to be more neutral and inclusive*

[**] *Originally referred to as "racial and ethnic minority groups" but revised to align with updated guidance* [43]

parts of their identities, like race or gender, are also stigmatized. This can make it harder for them to get and stay in treatment. Research shows that individuals who have both racial/ethnic and sexual minority identities experience greater health challenges compared with white, straight individuals [40, 52]. Discrimination based on race, gender, sexuality, etc., can also increase the risk of substance use disorders for women and Black, Latinx, American Indian/Alaskan Native, and Asian adults [53].

To optimize the reach of EBPs, they should be adapted to align with the culture, values, and needs of special populations that are disproportionately burdened by OUD. [54–56]. As calls for culturally responsive interventions for OUD increase [16, 41, 57–61], this paper offers timely examples of cultural adaptations implemented by communities that participated in the intervention arm of the HEALing Communities Study and worked to improve reach of OEND and MOUD services among special populations. This paper also shares lessons on documenting cultural adaptation efforts in large, complex studies.

2 Methods

2.1 HEALing communities study trial

In 2019, the University of Kentucky, Boston Medical Center, Columbia University, and The Ohio State University were awarded grants from NIDA and SAMHSA in response to a funding opportunity announcement. To maximize impact, the four states, in partnership with their funders, formed a research consortium and created a common protocol which became the Communities That HEAL intervention. The HEALing Communities Study looked at how well the Communities That HEAL intervention worked to reduce opioid-related overdose deaths in 67 communities across Kentucky (KY), Massachusetts (MA), New York (NY), Ohio (OH) [62]. The three key pillars of the Communities That HEAL intervention were published previously [63]. These include engaging communities through coalitions to help them adopt and keep using EBPs to reduce opioid-related overdose deaths [64]. Coalitions were then guided by research teams to use the Opioid-overdose Reduction Continuum of Care Approach (ORCCA). The ORCCA is an extensive menu of strategies for reducing overdose deaths, under the three umbrella EBP categories of OEND, MOUD, and Safer Prescribing practices. For the purposes of these analyses, we focused on OEND and MOUD strategies, as Safer Prescribing strategies generally target prescribers and are less amendable to cultural adaptation within communities. Examples of EBP strategies include OEND via peer networks, OEND via Naloxboxes, MOUD via mobile van and telemedicine, and MOUD via a brick-and-mortar Opioid Treatment Program. Coalitions used the ORCCA to create action plans specific to their local needs [25]. Action plans are community-specific documents detailing EBP strategies selected, implementing organization(s), special populations category, budget, etc., for each HEALing Communities

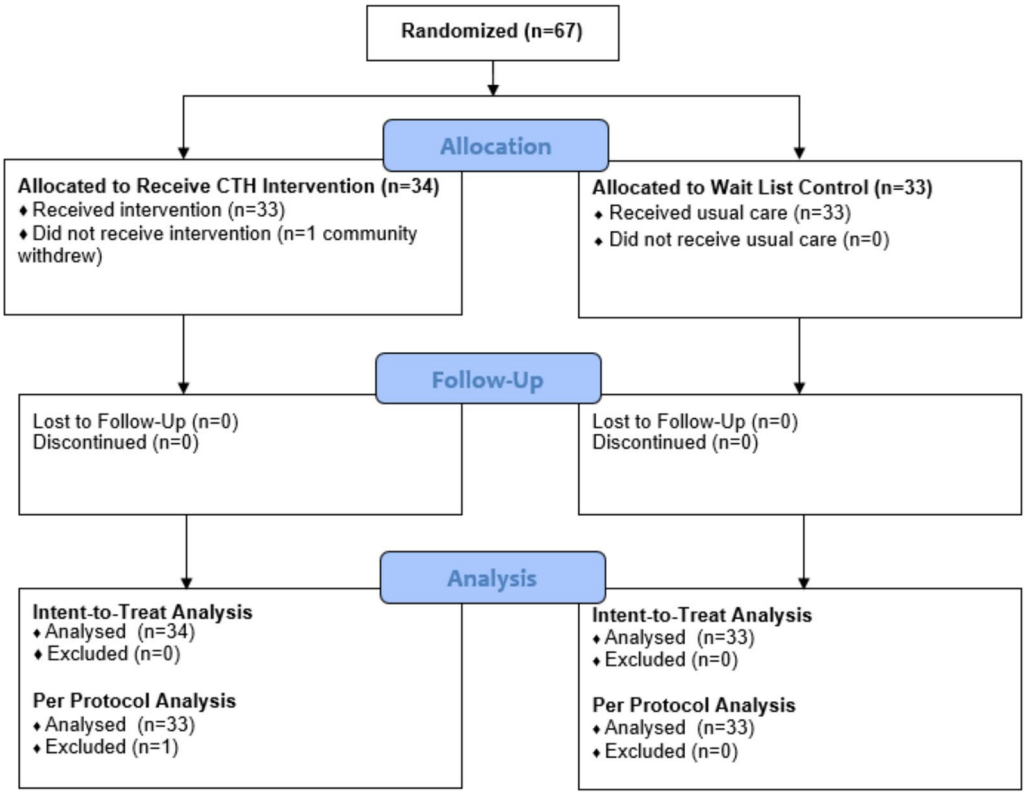

Fig. 1 CONSORT Flow Diagram: HEALing Communities in KY, MA, NY, and OH

Study community. The third pillar of the Communities That HEAL intervention involves running health communication campaigns to reduce stigma around OUD and encourage people to adopt EBPs [65]. For more information on how the study has focused on racial equity, see Chatterjee et al. [66].

The HEALing Communities Study employed a parallel-group, community-level cluster randomized, unblinded, waitlist-controlled comparison design with communities as the unit of analysis. Communities consisted of counties, cities, towns, or rural clusters of small towns. Communities were selected based on detailed eligibility criteria, including elevated OUD fatality rates, willingness to implement OEND and MOUD-focused intervention, and interest in developing partnerships across healthcare, behavioral health, and criminal legal settings [63]. Thirty-four communities were assigned to Wave 1 (intervention arm) and 33 communities were assigned to Wave 2 (waitlist control arm) based on a covariate constrained randomization procedure (see Fig. 1 for the original CONSORT Flow Diagram from the HEALing Communities Study). Constraint variables were opioid overdose death rate, community population, and rural/urban classification. One Wave 1 community withdrew from participation immediately following randomization. Analyses were performed using the intention-to-treat principle for the 67 randomized communities to provide the most unbiased estimate of the effect of the Communities That HEAL intervention. Wave 1 communities received the Communities that HEAL intervention between January 2020 – June 2022.

The current manuscript presents a secondary analysis of the HEALing Communities Study, focusing only on Wave 1 communities. However, we describe lessons learned that were applied to Wave 2 communities when they later received the Communities That HEAL intervention.

The study protocol (Pro00038088) was approved by a HEALing Communities Study single Institutional Review Board (sIRB), Advarra Inc. HEALing Communities Study received a Waiver of Consent and a Full Waiver of HIPAA Authorization for secondary data analysis (Advarra, 10/25/2019, MOD00521925). The National Institute on Drug Abuse (NIDA) chartered an independent data and safety monitoring board.

- Select "yes" only if [the EBP] is intentionally designed to reach special populations *and* the focus on special populations is explicit in the action plan or implementation plan. For example, the Active OEND at high-risk venues [EBP] is implemented in partnership with bilingual community health educators in emergency departments to better reach Spanish-speaking community members, and this intentional effort to reach special population groups is explicitly noted in the action or implementation plan.

- NOTE: implementing [an EBP] in a venue that serves a diverse population, such as emergency departments, is not sufficient for selecting "yes." To select "yes", there must be an intentional and explicit [strategy] for reaching special populations documenting in the action or implementation plan.

Fig. 2 Opioid Overdose Reduction Continuum of Care Tracker (ORCCAT) Standard Operating Procedures guidance on reporting adaptions to reach special populations

2.2 Communities that HEAL intervention and implementation monitoring

HEALing Communities Study coalitions included partner organizations from multiple sectors (e.g., healthcare, behavioral health, criminal legal system); community-based human services organizations; people with lived experience using opioids; and local government officials. As part of the Communities that HEAL intervention, HEALing Communities Study researchers worked with these coalitions to review data about the opioid crisis in their communities, to choose EBP strategies based on the data, and to develop action and implementation plans for those strategies [63]. Coalitions were encouraged, though not required, to adapt OEND and MOUD EBP strategies to reach special populations in their communities.

HEALing Communities Study researchers developed a data collection tool, the ORCCA Tracker (ORCCAT), to capture coalitions' action plan details and track progress on EBP strategy implementation. HEALing Communities Study staff entered ORCCAT data into site-specific databases that were securely sent to the HEALing Communities Study Data Coordination Center. For this paper, researchers used Wave 1 ORCCAT data to analyze the following information: the type of strategy (OEND or MOUD), a description of the intervention (open-ended), whether there was a clear effort to reach special populations (yes or no), the special population category, and the date implementation started. Over time, researchers expanded the list of special populations, which is shown in Table 1. Any new groups added after the ORCCAT was programmed were recorded manually in the"Other"category.

The HEALing Communities Study researchers also developed Standard Operating Procedures (SOPs) for the ORCCAT to support consistent reporting across sites. The SOP included guidelines and examples for identifying special populations in the ORCCAT field (see Fig. 2). The data coordinating center conducted descriptive analysis to identify the number and percentage of EBP strategies culturally adapted to reach special populations, organized by type of strategy, state, and special population category. Only EBP strategies with an implementation start date entered in ORCCAT at the time of this analysis were included. The SOP defines the implementation start date as "the date when the first action to implement the EBP occurred," such as meeting with a service organization, creating job descriptions, or gathering partners. This date does not reflect when services were first delivered, as that information was not consistently recorded in Wave 1.

2.3 Cultural adaptation qualitative study

Aligned with the DATA (Describe, Analyze, Theorize, and ACT) model for reflective practice in evaluation [67, 68], the authors worked together to explore cultural adaptation of OEND and MOUD EBPs in the HEALing Communities Study. We met to *describe* efforts to reach special populations and each site's approach to documenting culturally adapted strategies. We *analyzed* quantitative ORCCAT data alongside action plan content and explored inconsistencies. We *theorized* about how to improve data collection based on the implementation monitoring experience. Finally, we identified *actions* to better implement and document cultural adaptation strategies in future studies.

Our critical review of the descriptive analysis results included reviewing the brief descriptions of culturally adapted strategies reported in ORCCAT alongside descriptions in KY, MA, and OH coalition action plans (n = 24). Details in NY's coalition action plans replicated the brief descriptions in the ORCCAT, so were not further examined. Our goal was to

examine the strategies selected by coalitions and their approach to implementation for identified populations. Coalition action plans were uploaded to NVivo 12.0 [69] and analyzed using directed content analysis by a two-member team: one coder and one reviewer [70]. After coding, the team generated reports, summarized findings, and selected text excerpts to highlight key topics. The qualitative findings were linked to the ORCCAT quantitative summaries to provide more detail on the culturally adapted EBP strategies. This process also helped categorize the types of adaptation strategies used by HEALing Communities Study communities. The authors discussed inconsistencies in reporting, gaps in the data, how cultural adaptation was understood differently across sites, and steps to improve implementation and documentation of these strategies in the future.

2.4 Data availability statement

Data release is governed by 20 Data Use Agreements (DUAs) involving the data coordinating center with specific restrictions on data sharing by various state agencies and data owners. The data sharing plan complies with the NIH HEAL Initiative® ClinicalTrials.gov Public Access and Data Sharing Policy, the NIH Data Sharing Policy, the NIH Policy on Dissemination of NIH-Funded Clinical Trial Information, and the NIH Clinical Trial Registration and Results Information Submission rule, and governing HEALing Communities Study data use agreements. We plan to share allowable data in ICPSR's data repository (ICPSR Data Excellence Research Impact (umich.edu)) by Summer 2025. Additionally, HEALing Communities Study data will be searchable via NIH's HEAL data platform (healdata.org/landing). The datasets generated and/or analyzed during the current study are not publicly available due to restrictions outlined in Data Use Agreements but may be available from the corresponding author on reasonable request and with permission of research sites and partners covered by DUAs.

3 Results

3.1 ORCCAT descriptive statistical analysis

Table 2 displays the counts and percentages of OEND and MOUD strategies adapted to reach special populations as reported in the ORCCAT. Overall, Wave 1 communities reported cultural adaptation for 125 (20.0%) of the 626 OEND and MOUD EBP strategies with an implementation start date at the time of analysis. By ORCCA menu, 56 (17.7%) of the 317 OEND EBP strategies and 69 (22.3%) of the 309 MOUD EBP strategies were culturally adapted. Excluding the "other" category, most of the OEND (44.6%) and MOUD (69.6%) EBP strategies were adapted to reach the special populations category, "Unhoused populations, rural populations lacking transportation, and other factors related to severe poverty," followed by "Racial and ethnic minoritized populations" (32.1% of OEND and 44.6% of MOUD EBPs). Across both OEND and MOUD ORCCA menus, Wave 1 communities did not report any cultural adaptation efforts to reach LGBTQ + individuals, and counts of EBP strategies adapted to reach "People involved in transactional sex" and "Veterans" equaled ≤ 10 in each menu. However, it is likely that there were EBP strategies that did reach these populations but were not categorized in the ORCCAT as being specifically focused on a particular special population. Write-in "Other" special populations included "Adolescents," "People with mental health disorders and mental/physical disabilities," "People in the fishing industry," "Park rangers," "People in construction," "Faith-based organizations," "People without insurance," "People who lack transportation," and "People in and/or recently released from incarceration."

3.2 Content analysis of action plans and ORCCAT

Qualitative analysis of Wave 1 action plans, along with brief strategy descriptions in the ORCCAT, improved understanding of culturally adapted EBP strategies. Most adapted strategies focused on implementation, such as methods of delivering services, the providers involved, service location, modes of delivery, and additional support services [54]. Table 3 showcases examples of cultural adaptation strategies used in Wave 1 communities to serve special populations. These strategies included involving peers with lived experience and individuals from special population groups in service delivery, as well as providing transportation, housing support, and other services to address barriers to care. Implementation-focused strategies also featured mobile MOUD programs which offered same-day access to medications for opioid use disorder (MOUD) at remote locations. These programs were specifically tailored for populations like rural individuals and people experiencing homelessness [71]. Some coalition action plans also included content-focused adaptation strategies (i.e.,

Table 2 Evidence-based Practice (EBP) Strategies Adapted to Reach Special Populations by Study Site for N = 33 Wave 1 Communities in the HEALing Communities Study[c,d]

	Study Site				Total
	KY	MA	NY	OH	
# of Communities	8	8	8	9	33
Overdose Education and Naloxone Distribution (OEND) EBPs, n	134	63	53	67	317
EBPs Adapted to Reach Special Populations, n(%)[a]	6 (4.5%)	38 (60.3%)	10 (18.9%)	2 (3.0%)	56 (17.7%)
Homeless [unhoused] Persons, Rural Populations Lacking Transportation, and Other Factors Related to Severe Poverty[b]	3 (50.0%)	19 (50.0%)	3 (30.0%)	0 (0.0%)	25 (44.6%)
Non-English Speaking and/or Immigrants[b]	1 (16.7%)	13 (34.2%)	1 (10.0%)	1 (50.0%)	16 (28.6%)
People Involved in Transactional Sex[b]	0 (0.0%)	8 (21.1%)	2 (20.0%)	0 (0.0%)	10 (17.9%)
Pregnant and Post-Partum Women[b]	1 (16.7%)	4 (10.5%)	0 (0.0%)	0 (0.0%)	5 (8.9%)
Racial and Ethnic Minoritized Populations[b]	0 (0.0%)	14 (36.8%)	2 (20.0%)	2 (100.0%)	18 (32.1%)
Veterans[b]	0 (0.0%)	1 (2.6%)	1 (10.0%)	0 (0.0%)	2 (3.6%)
LGBTQ + Individuals[b]	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other[b]	1 (16.7%)	28 (73.7%)	2 (20.0%)	0 (0.0%)	31 (55.4%)
Medication for Opioid Use Disorder (MOUD) EBPs, n	101	65	76	67	309
EBPs Adapted to Reach Special Populations, n(%)[a]	3 (3.0%)	44 (67.7%)	21 (27.6%)	1 (1.5%)	69 (22.3%)
Homeless [Unhoused] Persons, Rural Populations Lacking Transportation, and Other Factors Related to Severe Poverty[b]	2 (66.7%)	24 (54.6%)	13 (61.9%)	0 (0.0%)	39 (69.6%)
Non-English Speaking and/or Immigrants[b]	0 (0.0%)	16 (36.4%)	1 (4.8%)	0 (0.0%)	17 (30.4%)
People Involved in Transactional Sex[b]	0 (0.0%)	2 (4.6%)	4 (19.1%)	0 (0.0%)	6 (10.7%)
Pregnant and Post-Partum Women[b]	0 (0.0%)	8 (18.2%)	4 (19.1%)	0 (0.0%)	12 (21.4%)
Racial and Ethnic Minoritized Populations[b]	0 (0.0%)	17 (38.6%)	7 (33.3%)	1 (100.0%)	25 (44.6%)
Veterans[b]	1 (33.3%)	1 (2.3%)	1 (4.8%)	0 (0.0%)	3 (5.4%)
LGBTQ + Individuals[b]	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other[b]	0 (0.0%)	33 (75.0%)	0 (0.0%)	0 (0.0%)	33 (58.9%)

[a]Percent out of total OEND/MOUD EBPs selected

[b]Percent out of strategies to reach Special Populations; percentages can add to over 100% as multiple special populations can be selected for one strategy

[c]This table includes data as reported, including misclassifications: 17 (60.1%) of Massachusetts' (MA's) 28 OEND EBP strategies and 15 (45.5%) of MA's 33 MOUD EBP strategies had an "Other" special population write-in of "People in and/or recently released from incarceration," which is classified as a "high-risk" population in the HEALing Communities Study, but not a special population. 5 OEND and 12 MOUD strategies miscategorized "People who lack transportation" in the "Other" category, instead of the special populations category, "Homeless [unhoused] populations, rural populations lacking transportation, and other factors related to severe poverty."

[d]Results based on data pulled on the following dates: 11/25/2022 (MA), 11/28/2022 (Kentucky, Ohio), 11/29/2022 (New York)

what is being delivered), such as partnering with a Native American-led organization to integrate tribal values in OEND and MOUD messaging and translating educational materials into locally spoken languages.

3.3 Reflective practice insights

Authors' reflective practice discussions and collective review of results revealed several challenges and gaps in the study. These included varying interpretations of what counts as cultural adaptation and inconsistent use of reporting guidance across research sites. However, the reflective process also led to practical insights and strategies to improve how cultural adaption strategies are developed, documented, implemented, and monitored in future studies (Table 4).

3.3.1 Mixed interpretation and reporting of cultural adaptation strategies

As we investigated differences in cultural adaptation strategies across sites, we found notable variation in how cultural adaptation was interpreted. For instance, MA reported cultural adaptation twice as often as the other three sites combined. KY, OH, and NY reported cultural adaptation only if the EBP strategy was designed exclusively for a specific special

Table 3 Example cultural adaptation strategies from wave 1 communities' action plans by special population

Special Population	Cultural Adaptation Strategy Highlights
Homeless [unhoused] populations, rural populations lacking transportation, and other factors related to severe poverty	• Partner with emergency shelters, shelters for unhoused persons, and soup kitchens to place Naloxboxes (Narcan/naloxone dispensing units) on site and engage partners' staff in naloxone distribution • Co-locate Overdose Education and Naloxone Distribution (OEND) and Medication for Opioid Use Disorder (MOUD) mobile outreach units near shelters • Utilize study resources to support clinical staff who can provide on-site or telehealth-facilitated MOUD induction and retention services for shelter residents • Establish space in hotels and motels and other emergency shelter venues to provide MOUD initiation and retention services • Partner with community-based human services organizations, shelters, and local syringe service programs to distribute cell phones and data plans for unhoused or marginally housed individuals to help mitigate factors that impede consistent access to OEND and MOUD • Partner with community health workers to conduct education and outreach to people in encampments and parks to help link special populations to needed care and resources • Utilize study resources to provide bus, rideshare vouchers, and gas cards to help address transportation barriers to care • Implement peer-led transportation programs so drivers with lived experience can distribute naloxone and provide a non-stigmatizing, supportive ride experience to MOUD and behavioral health appointments, pharmacies, and other service locations
Non-English speaking or immigrants	• Partner with organizations led by or serving bi- or multi-lingual populations and provide resources and training so partners are equipped to provide OEND, information about MOUD, and respond to stigma in the community • Offer "pop-up" bilingual OEND training in popular community venues • Utilize study resources to help coalition partners hire bilingual and bicultural recovery coaches, mobile unit and community health workers, harm reduction specialists, and patient navigators who can distribute naloxone, provide information about MOUD and harm reduction services, and help address insurance and other access barriers
Racial and ethnic minoritized populations	• Expand the coalition to include faith-based partners with diverse congregations and collaborate with them to provide community-based OEND, harm reduction, and MOUD engagement and retention services • Hire racially and ethnically diverse peer support specialists to establish a peer support system in a county jail with a high population of individuals from racial and ethnic minoritized groups
Veterans	• Install naloxone distribution boxes in a residential program housing veterans • Partner with a veterans reintegration center to improve MOUD initiation and retention by providing access to telehealth technology • Utilize study resources to help implement a peer support program in a veterans' treatment court

population. Additionally, KY and OH also maintained strict adherence to the ORCCA special population descriptions. For example, in OH, an EBP strategy adapted to reach individuals impacted by human trafficking (not designated as a special population in the HEALing Communities Study) was not reported as cultural adaptation in ORCCAT even if some individuals reached by the strategy were involved in transactional sex (designated as a HEALing Communities Study special population). In contrast, MA applied a more liberal interpretation of the guidance. For example, MA reported that an EBP strategy aimed at increasing MOUD initiation and retention among high-risk residents at a community health center offering bilingual, bicultural care had been culturally adapted. In this case, MA viewed the health center's culturally tailored services as meeting the ORCCAT SOP's cultural adaptation criteria.

In addition to the varied interpretation of what counts as cultural adaptation, we found errors related to specifying a focus on special populations in the ORCCAT data. For example, 17 (60.1%) of MA's 28 OEND EBP strategies and 15 (45.5%) of MA's 33 MOUD EBP strategies had an "Other" special population write-in of "People in and/or recently released from incarceration." This group is classified as a "high-risk" population in the HEALing Communities Study but not a special population, so they should have been captured in a separate ORCCAT field. An additional 5 OEND and 12 MOUD strategies

Table 4 Recommendations for funding, implementing, and monitoring culturally adapted strategies to reach special population groups

	Recommendation
Funding	• Design funding announcements to more effectively engage special populations • Support required training on cultural adaptation for funding agency personnel and grantee researchers and staff prior to release of funding • Allocate funding for experienced implementation staff who can deliver culturally adapted strategies
Implementation – inquiry and design to enhance impact	• Create explicit connections between intersectionality (multiple stigmatized identity) frameworks and research methods/reporting • Utilize practice-based evidence, including examples that detail how cultural adaptation strategies can be applied in the real world to effectively reach specific special population groups • Proactively develop intentional plans, strategies, and study designs to reach and engage specific special populations • Learn from the expertise of individuals who represent these special populations to develop strategies to meet their preferences and needs • Integrate qualitative inquiry, such as key informant interviews or case studies, to better understand the need for and impact of specific cultural adaptation strategies
Data Collection and Monitoring	• Consult with implementation partners on data collection tool development, and train staff to ensure data entry fidelity • Broad, mixed categories of special population groups should be divided into distinct categories but allow for documentation of and adaptations for intersecting identities • Identify and collect common implementation metrics for each type of strategy as well as demographics (race/ethnicity, age, and sex) of individuals • Include reporting fields that capture the focus of cultural adaptation strategies (i.e., content, implementation, both) and types of strategies within each focus (e.g., type of service provider(s), location, modality, supplemental support services) • Critically review cultural adaptation strategies over time to facilitate the development of practice-based evidence and data-informed quality improvement

indicated "People who lack transportation" in the "Other" category, which should have been reported under the special population category, "Unhoused populations, rural populations lacking transportation, and other factors related to severe poverty." Lastly, we discovered some misalignment between the spirit of the special populations focus (i.e., ensuring EBP strategies reach populations that face structural inequities and are disproportionately burdened by OUD) and some of the unique population groups reported in the "Other" category, such as "Park rangers," "People in construction," and "Faith-based organizations."

4 Discussion

People with OUD face significant barriers to treatment [10]. These barriers are amplified for special populations, such as unhoused individuals [16], women who are pregnant or post-partum [21], and racially and ethnically minoritized populations [23, 24]. These special populations face added structural barriers to OUD care which make them especially vulnerable to overdose death. Cultural adaptation of EBPs is critical to improve the reach of OEND and MOUD EBP strategies among special populations [54], and community engagement is essential for the cultural adaptation of these EBP strategies [74, 75]. The HEALing Communities Study assessed the impact of the Communities That HEAL intervention on reducing opioid overdose deaths in 34 intervention (Wave 1) compared to 33 wait-list control (Wave 2) communities. The current analyses assessed how the intervention communities culturally adapted EBP strategies to reach special populations. Cultural adaptation strategies reported by Wave 1 communities align with published approaches for adapting EBP strategies focused on substance use [54]. However, we found few published examples of cultural adaptation of EBP strategies to reduce opioid overdose deaths [54]. This paper complements and expands on these recent publications by providing examples of culturally adapted OEND and MOUD EBP strategies designed through community engagement for multiple special populations. Additionally, to promote more practice-based evidence in this area, we share lessons and practical tips for documenting and monitoring cultural adaptation strategies (Table 4).

HEALing Communities Study staff partnered with community coalitions to select, tailor, and adopt EBP strategies. Through the coalition planning process, community stakeholders were encouraged, though not required, to culturally adapt EBP strategies for special populations. We applied a DATA-aligned reflective practice process [68] to gain insights

on the types of cultural adaptation strategies Wave 1 communities employed to reach special populations (see Table 3). The reflective practice process also revealed challenges with documenting adaptation efforts and opportunities to improve future reporting. Opportunities include systematically documenting cultural adaptations using implementation monitoring tools and collecting common metrics to measure the reach of EBP strategies.

To advance cultural adaptation of EBP strategies to reduce opioid overdose deaths, we need more practice-based evidence. This should include examples that detail how different types of cultural adaptation strategies are applied in the real world for specific special population groups. Our reflective practice process revealed several opportunities for enhancing documentation of cultural adaptation strategies within the HEALing Communities Study that could inform future adaptation efforts and monitoring. Based on our experience with reporting errors, a refined list of special populations could support more useful monitoring of cultural adaptations. Broad, mixed categories of special population groups, such as the HEALing Communities Study category, "Unhoused populations, rural populations without transportation, and other factors related to severe poverty," should be divided into distinct categories. Critically, the ORCCAT allowed for the selection of multiple special population groups per EBP strategy, but we were not able to document which populations were actually reached. We also could not identify which strategies were effective at reaching individuals in multiple intersecting special population categories. In future implementation studies, efforts should be made to document EBP strategy adaptations to reach people in multiple intersecting special population categories. This may help address the need for more explicit connections between intersectionality frameworks and research methods/reporting [72].

As noted previously and in other HEALing Communities Study publications, intentional efforts to reach special populations changed over the study [66, 73]. However, due to the size and complexity of the HEALing Communities Study, it was not feasible to make significant or repeated revisions to reporting instruments as the study's focus on special populations evolved. Therefore, cultural adaptation reporting in the ORCCAT was limited to closed-ended special population fields, an open-ended "Other" field, and a character-limited EBP strategy brief description field. Moreover, there was no explicit guidance for describing culturally adapted strategies in coalitions' action plans, only a general requirement that coalitions needed to indicate in their action plans which EBP strategies were culturally adapted. Thus, action plan documentation differed across the four states. Despite the limitations of the ORCCAT and action plan data sources, additional documentation training may have yielded more consistent, relevant, and detailed descriptions.

We acknowledge several study limitations. Staff working on data entry typically were not involved with the development of the ORCCAT reporting tool. Thus, providing training on data entry to include clear descriptions of the EBP strategy may have resulted in closer fidelity to reporting guidelines. It also would be beneficial to engage partners responsible for strategy implementation on developing a robust reporting tool to better capture strategy details, context, challenges, and insights. It is likely that the urgency of the opioid overdose crisis and the constrained study timeline may have biased EBP strategy selection toward easy-to-implement strategies, rather than those requiring additional time and expertise for cultural adaptation. In addition, many Wave 1 coalitions lacked diverse representation from special populations, which limited expertise on and advocacy for potentially effective cultural adaptations. We also recognize that subjectivity plays an important role in how strategies were documented. Even with training, staff and community interpretation of whether an EBP strategy was explicitly adapted to reach a special population and the rigor of the cultural adaptation might vary. In some communities, eagerness to reach special populations may have resulted in over-reporting of strategies designed to reach these populations. However, other staff and/or communities may have felt that efforts focused on special populations would lead to greater stigmatization or that focused efforts were unnecessary. In the future, efforts should be made to train staff on the benefit of cultural adaptation and to learn from individuals who represent these special populations.

Given the mixed interpretation of guidance on reporting adaptations to reach special populations (Fig. 2), reporting may have been aided by additional ORCCAT fields that align with the focus and types of cultural adaptations described in this analysis. In future studies, we will consider reporting fields that capture the focus of cultural adaptation strategies (i.e., content, implementation, both) and types of strategies within each focus (e.g., implementation-focused modifications: service providers, service location, service modality, supplemental support services). As resources allow, reporting protocols should require updates on cultural adaptation strategies over time to facilitate the development of practice-based evidence and data-informed quality improvement. Investment in qualitative inquiry, such as key informant interviews or case studies, to better understand cultural adaptation strategies, is also encouraged.

Changes to Wave 2 training, documentation, and coalition development guidance improved upon Wave 1 processes. For example, during Wave 2 of the intervention, we enhanced training on SOP guidance on reporting adaptations to reach special populations. KY also developed and utilized a coalition-facing action planning dashboard that pre-populated selections for menus, sectors, and special populations into drop-down lists to document strategies more clearly

and efficiently. Another improvement in Wave 2 was the collection of implementation metrics for each EBP strategy to capture the number and demographics (race/ethnicity, age, and sex) of individuals reached to assess whether strategies reached the intended special populations. Finally, explicit efforts were made to enhance the diversity of Wave 2 coalition membership and elevate the voices of impacted populations, particularly racial and ethnic minoritized populations and individuals with lived experience with OUD. See Table 4 for recommendations for funding, implementing, and monitoring culturally adapted strategies to reach special populations.

As one of the largest implementation science research studies in the addiction field, the HEALing Communities Study supported the adoption of EBP strategies in 34 Wave 1 communities across four states through a community-engaged coalition planning process. Therefore, we expect the cultural adaptation examples and insights shared in this paper to be applicable to a broad range of OEND and MOUD interventions. However, we recognize that neither our cultural adaptation examples nor our monitoring and documentation lessons are exhaustive or generalizable. Additionally, our analysis includes EBP strategies that achieved initial implementation, but data are not available on the actual reach of EBP strategies. Thus, we are unable to evaluate or compare the effectiveness of specific cultural adaptations, which should be a key focus for future research.

Cultural adaptation of EBP strategies is a critical element of an equitable response to the opioid crisis. This cannot happen without community engagement. To reach special populations by implementing EBP strategies in the HEALing Communities Study, communities required funding for staff, services, and supplies like phones and gas cards. Working with local social service organizations also facilitated outreach. In other words, reaching special populations requires not only intentional plans, strategies, and designs, but also dedicated funding, training, and efforts to embed OUD care within community support systems. We call on funders, researchers, evaluators, and implementers to invest in training and technical assistance, robust documentation and monitoring protocols, and thoughtful community engagement to support cultural adaptation of EBPs to reduce overdose for the most vulnerable populations.

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Author contributions EBG conceived of the manuscript topic. EBG and LSM developed the methodology for the manuscript analyses. EBG, MN, MM, DF, DC, RV-S, DAG-E, TH, AC, RS-C, LSM were involved in collecting data and documenting community coalition activities at their respective research sites. EBG, MD'O, and MN conducted the qualitative analyses. JH and KF provided the quantitative data. EBG and MN described and analyzed the data and developed the tables. The HEALing Studies Consortium developed Fig. 1 and the language in Fig. 2. EBG and LG wrote the first draft of the manuscript. All authors reviewed and provided comments on the subsequent revisions of the manuscript and approved the final version.

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Data availability The datasets generated and/or analyzed during the current study are not publicly available due restrictions outlined in Data Use Agreements but may be available from the corresponding author on reasonable request and with permission of research sites and partners covered by DUAs.

Declarations

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