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A cross-sectional survey exploring organizational readiness to implement community pharmacy-based opioid counseling and naloxone services in rural versus urban settings in Alabama

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ABSTRACT

Background: Rural US regions experience lower naloxone dispensing rates compared to urban counterparts, particularly in Alabama. In light of this, strategies to enhance opioid counseling and naloxone services (OCN) in rural community pharmacies are critical. However, organizational readiness to implement OCN in rural versus urban contexts where resource networks may differ is not well understood.
Objectives: The purpose of this study was to explore organizational readiness and identify factors associated with implementation of OCN in rural versus urban Alabama community pharmacies.
Methods: Alabama community pharmacists and technicians were recruited to participate in an anonymous online cross-sectional survey via email. The survey instrument was adapted from the Organizational Readiness to Change Assessment (ORCA). Primary outcome measures included 3 overarching ORCA domains (Evidence, Context, and Facilitation) with 19 subscales regarding OCN implementation readiness, measured via 5-point Likert-type scales (1 = strongly disagree, 5 = strongly agree). Secondarily, pharmacy OCN implementation status (implementer, non-implementer, or in-development) was measured via multiple-choice (1-item). Differences in mean domain and subscale scores between rural and urban pharmacies were evaluated using Mann-Whitney *U* tests and influential factors affecting OCN implementation status were assessed via logistic regression (alpha = 0.05).
Results: Of 171 respondents, the majority were pharmacists (78.6 %) in urban locations (57.1 %). Mean[SD] clinical experience evidence (Evidence) (3.98[0.69] vs 3.74[0.71]; $p = 0.029$), staff culture (Context) (4.04 [0.66] vs 3.85[0.76]; $p = 0.047$), service measurement goals (Context) (3.92[0.77] vs 3.66[0.79]; $p = 0.034$), and senior management characteristics (Facilitation) (3.87[0.72] vs 3.71[0.66]; $p = 0.045$) subscales were higher in urban versus rural pharmacies. Notably, 66.7 % of pharmacies were current OCN implementers, and pharmacies with higher ORCA context domain scores had 3.230 greater odds of implementing or being in the process of developing OCN (95 % CI = 1.116–9.350; $p = 0.031$).
Conclusion: Organizational readiness to implement OCN was higher among urban versus rural pharmacies in terms of perceived strength of clinical evidence, staff culture, service measurement goals, and senior management characteristics. Future research may leverage key contextual factors to enhance OCN implementation.

1. Introduction

Opioid misuse is a major public health issue in the United States, with about 25 % of fatal drug overdoses worldwide occurring in the US.[1] Over 80,000 people died due to opioid overdose in 2021,[2] and over 131 million prescriptions for opioid pain relievers were written in 2022.[3] This is especially critical in the Deep South, as the opioid prescribing rate is disproportionately higher in this region, with the state of

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Alabama having one of the highest opioid prescribing rates in the nation at 74.5 per 100 persons, versus 39.5 nationwide in 2022.[4] In rural Alabama the situation is even more dire, with opioid prescribing rates up to 135.5 per 100 persons.[4] Further, although the rate of fatal opioid overdoses in Alabama was below the national average in 2022 (23.4 versus 25.0 per 100,000),[5] overdose rates in some rural counties were in excess of 43 per 100,000.[6] Combined with the 6.9-fold increase in fentanyl-related overdose deaths in Alabama from 2018 to 2022 (from 121 to 835 deaths),[7] this points towards evolving regional patterns of opioid use within the state. This may, in part, be contributed to the unique needs and resources in rural communities compared to urban settings, including lack of employment opportunities, educational resources, and healthcare centers that limit access to evidence-based care.[8] Thus, methods to expand to access to opioid misuse and overdose prevention strategies in rural Alabama are critical.

Community pharmacists offer a solution. Since 2015, all 50 states have passed laws allowing pharmacists to dispense naloxone, an opioid overdose antidote, without a physician's visit.[9–11] While most naloxone formulations maintain their prescription-only status, the approval of over-the-counter (OTC) status for naloxone nasal spray (Narcan®) in March 2023 further enhanced naloxone access via pharmacies.[12] Considering that there are nearly four times as many pharmacies in the U.S. compared to opioid misuse treatment centers, as well as walk-in availability at most pharmacies, this represents an opportunity for pharmacists to make a large impact in preventing opioid overdose deaths.[13,14] In fact, it has been shown that providing longer pharmacy access on weekends, when recreational drug use may occur more frequently, can promote naloxone provision.[15]

However, although naloxone dispensing from pharmacies increased from 2019 to 2022 with a rate of 0.5 naloxone prescriptions dispensed for every 100 persons nationwide in 2022,[16] the number is still below capacity as only one naloxone prescription is dispensed for every 70 high-dose opioid prescriptions on average.[17] In Alabama, naloxone dispensing is even lower at 0.3 prescriptions per 100 persons,[16] with the lowest naloxone dispensing rates in rural counties.[17,18] Structural and logistical barriers may play a role in the lower naloxone provision seen in rural regions. For example, private counseling areas and drive-throughs, which can help ease access to substance use treatment and overdose prevention, are less pervasive in rural versus urban pharmacies.[15] Furthermore, individual pharmacist-level barriers may also play a role in low naloxone dispensing rates. In particular, the perceived need for more training relating to naloxone and opioid overdose,[19] lack of confidence in counseling patients about naloxone dosage forms,[20] and apprehension about approaching and communicating with patients about opioid overdose risk[20,21] have been identified as major barrier in previous studies. Therefore, strategies to enhance opioid counseling and naloxone services (OCN) in rural Alabama community pharmacies, where resources are scarce and need is high, are critical.

In order to enhance community pharmacy-based OCN services, we need first to understand the extent to which Alabama pharmacies are already implementing services, what pharmacy staff are willing and able to do, and factors associated with these services in rural versus urban contexts where resource networks may differ. However, these factors are not well understood. Therefore, the purpose of this study was to explore organizational readiness and identify factors associated with the implementation of opioid counseling and naloxone services in community pharmacies in the rural versus urban Deep South. By understanding organizational readiness for change, we can leverage influential factors in future studies to increase the implementation of OCN services.

2. Methods

2.1. Study design and participant recruitment

This study utilized a cross-sectional survey design and was conducted from January 27th to February 10th, 2022. Pharmacy personnel, including pharmacists and technicians employed in Alabama community pharmacies, were recruited to participate in an online survey via email with a maximum of 2 contact attempts. After an initial email containing the survey link and study information letter, a reminder email was sent after one week to unfinished respondents. A one-item eligibility screening question was included at the beginning of the survey to confirm whether respondents were employed in a community pharmacy setting. Community pharmacies were defined as retail pharmacies that serve the public. Pharmacist and technician email addresses were obtained from the Alabama Board of Pharmacy (ALBOP) listserv and the continuing education office listserv at the primary author's institution, respectively. Participants received a $50 electronic gift card upon survey completion.

2.2. Sample size calculation

G*Power software version 3.1.9.7 (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany)[22,23] was used to conduct an a priori power calculation. Estimating a small effect size of 1.68 (expected odds ratio) based on Chen and colleagues' criteria[24] with an alpha of 0.05, a minimum sample size of 133 was anticipated to be adequate to evaluate the primary outcome measure (predictors of naloxone service implementation level) via multivariable logistic regression with 80 % power. The number of completed survey responses exceeded the minimum sample size required (see Results section).

2.3. Data collection and measures

The link to an anonymous online survey was distributed to participants via email. The survey instrument was adapted from the validated Organizational Readiness to Change Assessment (ORCA).[25] The ORCA is a 77-item instrument developed to assess organizational readiness for implementation of health services based on the Promoting Action on Research Implementation in Health Services (PARIHS) framework.[25–27] Originally developed for quality improvement purposes, the ORCA is composed of 3 overarching domains, including evidence (Cronbach's alpha = 0.74), context (Cronbach's alpha = 0.85), and facilitation (Cronbach's alpha = 0.95) as well as 19 subscales.[25]

Primary outcome measures in the current study included the 3 overarching ORCA domains (evidence, context, and facilitation) and 19 subscales regarding organizational readiness to implement community pharmacy-based OCN services. Measures were adapted from the ORCA[25] by altering the wording of question stems and scale items to incorporate the specific health service being assessed (OCN services) and the organizational setting (community pharmacies) in the current study. For example, the item *"The proposed practice changes or guideline implementation are consistent with clinical practices that have been accepted by VA [Veterans Administration] patients"* in the original ORCA[25] evidence domain was altered to read, *"Pharmacist-delivered opioid counseling and naloxone services are consistent with clinical practices that have been accepted by community pharmacy patients."* See Appendix A for a copy of the full survey instrument.

"Evidence" was defined as the perceived strength of evidence surrounding community pharmacist-delivered OCN services. The evidence domain was composed of 4 subscales, including general strength of evidence among the pharmacy team (2-items), research evidence (3-items), clinical experience (3-items), and perceived patient preferences (4-items). The general strength of evidence subscale was measured using 5-point Likert-type items from 1 = very weak to 5 = very strong. Research evidence, clinical experience, and perceived patient preference were measured using 5-point Likert-type scales from 1 = strongly disagree to 5 = strongly agree. A "Don't know / Not applicable" option was included for all items.

"Context" was defined as the quality of the community pharmacy setting to support pharmacist-delivered OCN services and focused on pharmacy culture, leadership, and resources. Specifically, the context

domain was composed of 6 subscales including senior management culture (3-items), staff culture (4-items), formal leadership (4-items), leadership via opinion leaders (e.g., well-respected pharmacy personnel who are not necessarily in formal leadership positions) (4-items), service measurement goals (4-items), and resources (4-items). Contextual factors external to the pharmacy organization (e.g., state policies) were not incorporated, as the ORCA focuses on internal organizational context. All context subscales were measured using 5-point Likert-type items from 1 = strongly disagree to 5 = strongly agree, including a "Don't know / Not applicable" option.

"Facilitation" was defined as the capacity of the pharmacy to enhance OCN-related workflow, including employees' roles, skills, attributes, and implementation processes. The facilitation domain was composed of 9 subscales including senior management characteristics (4-items), champion characteristics (4-items), leader roles (4-items), team roles (4-items), OCN implementation plan (4-items), communication (4-items), implementation progress tracking (4-items), implementation resources and incentives (6-items), and implementation evaluation (5-items). All facilitation subscales were measured using 5-point Likert-type items from 1 = strongly disagree to 5 = strongly agree and included a "Don't know / Not applicable" option. In cases where facilitation items asked participants to report actions that were taken during OCN services implementation, non-implementer pharmacy staff members were instructed to imagine a scenario in which their pharmacy decided to initiate OCN services.

Additionally, community pharmacy OCN services implementation status was measured via self-report using a 1-item multiple-choice question: *"Does your pharmacy offer opioid counseling and naloxone services?"* Implementation status was divided into three categories: 1) implementers (pharmacies currently offering OCN services), 2) non-implementers (pharmacies not offering OCN services, and 3) in development (pharmacies in the process of developing OCN services). OCN services were defined as *"any routine actions performed by pharmacy personnel (pharmacists or technicians) related to opioid medication counseling, opioid overdose risk screening or education, naloxone recommendations, naloxone dispensing, or naloxone education."*

2.4. Data analysis

Descriptive statistics were used to characterize all demographic data and measures. Likert-type scale items were summed and averaged to create total mean subscale and domain scores, and internal consistency of subscales and domains was assessed using Cronbach's alpha with an acceptable threshold of 0.7.[28] Reverse coding of scale items was not necessary, as all items adapted from the ORCA were phrased such that higher mean scale scores indicated a greater amount or a more positive perception of a construct (e.g., more OCN implementation resources available, higher perceived strength of evidence surrounding OCN). In cases of item non-response, measures with missing data were excluded from calculations of overall scale means. Differences in mean ORCA subscale and domain scores between rural and urban community pharmacies and between implementer/in-development versus non-implementer pharmacies were evaluated via two-sided Mann-Whitney *U* tests (data were nonparametric with Kolmogorov-Smirnov $p < 0.05$). Furthermore, disparities in OCN implementation status across rural and urban pharmacy settings were assessed using Chi-Square tests, with all tests using an a priori alpha level of 0.05. Rural or urban pharmacy designation was determined via the county in which the pharmacy was located as defined by the Alabama Rural Health Association guidelines.[29]

Additionally, multivariable logistic regression was utilized to assess influential factors affecting OCN implementation status (dependent variable dichotomized as implementer or in development versus non-implementer pharmacy). Two models were assessed: 1) an unadjusted model including the mean ORCA domains scores as predictors, and 2) an adjusted model including the mean ORCA domain scores as predictors and controlling for organization-level and individual-level covariates. Organization-level covariates included team member role dichotomized as pharmacist versus technician, community pharmacy location dichotomized as rural versus urban, pharmacy type dichotomized as corporately-owned versus independently-owned, daily prescription volume (continuous), and daily opioid prescription volume (continuous). Individual-level covariates included age (continuous), sex dichotomized as male versus female, and race/ethnicity dichotomized as White versus Asian, Black, or Hispanic/Latino(a). Analyses were performed using SPSS Statistics software version 29 (IBM Corp, Armonk, NY, USA). Findings are reported using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) criteria for cross-sectional studies.[30]

3. Results

Of the 5064 individuals emailed, 260 accessed the survey (5.13 % response rate). Among these, 202 met the eligibility criteria, with 171 completed survey responses (65.77 % completion rate). Analyses were performed using the 171 completed responses, the majority of whom were female (71.2 %), White (87.1 %), and with a mean age of 41.54 years (Table 1). Respondents were composed of 78.6 % pharmacists and 21.4 % technicians, with most (51.3 %) employed in corporately-owned community pharmacies and located in urban areas of Alabama (57.1 %).

Pharmacies averaged a mean (SD) of 309.31 (255.85) prescriptions dispensed per day, 44.37 (50.94) opioid prescriptions daily, and 34 (156.85) naloxone prescriptions annually. Around 87 % of all pharmacies currently stocked the prescription naloxone nasal spray formulation or had stocked it at least once in the past year. Other than a higher proportion of independently-owned pharmacies in rural versus urban locations ($\chi^2 = 26.591$, $p < 0.001$), no statistically significant differences in demographic variables between rural and urban pharmacies existed.

3.1. Evidence

Cronbach's alpha was above 0.7 for the evidence domain and all evidence subscales (Table 2). Among all pharmacies, the overall mean (SD) evidence domain score was 3.86 (0.59), with research evidence for community pharmacy-based OCN services being the highest rated subscale (mean [SD] subscale score: 4.01 [0.73]). Clinical experience evidence (3.87 [0.71]) and general strength of evidence among the pharmacy team (3.86 [0.89]) were the next highest rated subscales, while evidence related to perceived patient preferences was the lowest rated (3.69 [0.71]). Specifically, 86.2 % of respondents agreed or strongly agreed that pharmacist-delivered OCN services should be effective based on current scientific knowledge (Appendix A, Table A1). Furthermore, while the belief that OCN services are supported by research evidence from non-community pharmacy settings was high (77.6 %), only 28.6 % believed that OCN services are supported by research evidence from community pharmacy settings. Notably, while 77.5 % agreed or strongly agreed that pharmacist-delivered OCN services appear to have more advantages than disadvantages for community pharmacy patients, only 46.5 % believed that previous studies had demonstrated acceptance of OCN services by community pharmacy patients.

When comparing urban and rural pharmacies, evidence domain scores were slightly higher in urban versus rural locations (3.94 [0.59] versus 3.76 [0.58]; $p = 0.047$) (Table 2). In particular, clinical experience evidence was rated higher in urban pharmacies (3.98 [0.69]) compared to rural pharmacies (3.74 [0.71]; $p = 0.029$). There were no other statistically significant differences among evidence subscales across pharmacy locations.

3.2. Context

The context domain and subscales demonstrated acceptable internal

Table 1
Respondent characteristics ($N = 171$).

Characteristics	n (%) [a]		
	All	Rural ($n = 73$)	Urban ($n = 97$)
Sex			
Male	49 (28.8)	20 (27.4)	29 (30.2)
Female	121 (71.2)	53 (72.6)	67 (69.8)
Race and ethnicity			
Asian	7 (4.1)	2 (2.7)	5 (5.2)
Black or African American	13 (7.6)	3 (4.1)	10 (10.4)
Hispanic/Latino(a)	2 (1.2)	1 (1.4)	1 (1.0)
White	148 (87.1)	67 (91.8)	80 (83.3)
Position			
Pharmacist	132 (78.6)	57 (78.1)	75 (78.9)
Technician	36 (21.4)	16 (21.9)	20 (21.1)
Community Pharmacy Type [b]			
Independently-owned	75 (48.7)	49 (72.1)	26 (30.2)
Corporately-owned	79 (51.3)	19 (27.9)	60 (69.8)
Pharmacy Location		–	–
Rural	73 (42.9)		
Urban	97 (57.1)		
Naloxone Dosage Forms CURRENTLY in Stock			
Nasal spray	149 (87.1)	63 (86.3)	85 (87.6)
Auto-injector	24 (14.0)	9 (12.3)	15 (15.5)
IM injection vial + syringe	16 (9.4)	9 (12.3)	7 (7.2)
Pre-filled syringe +/− atomizer	16 (9.4)	8 (11.0)	8 (8.2)
Naloxone Dosage Forms in Stock AT LEAST ONCE in the Past Year			
Nasal spray	150 (87.7)	64 (87.7)	85 (87.6)
Auto-injector	35 (20.5)	13 (17.8)	22 (22.7)
IM injection vial + syringe	25 (14.6)	17 (23.3)	8 (8.2)
Pre-filled syringe +/− atomizer	17 (9.9)	7 (9.6)	10 (10.3)
		Mean (SD)	
Age, years	41.54 (9.47)	41.15 (10.76)	41.77 (8.45)
Prescription Volume			
Total prescriptions, daily	309.31 (255.85)	274.45 (171.39)	337.49 (302.97)
Opioid prescriptions, daily	44.37 (50.94)	41.13 (37.12)	47.22 (59.58)
Naloxone prescriptions, annually	34.32 (156.85)	50.49 (235.00)	22.33 (40.54)

[a] Frequencies and percentages may differ due to item non-response.
[b] Rural and urban differences are statistically significant; $\chi^2 = 26.591$, $p < 0.001$ (Chi-square test).

consistency (Cronbach's alpha >0.7) (Table 2). The overall mean (SD) context domain score across all pharmacies was fairly positive at 3.78 (0.62). Leadership via opinion leaders was the highest rated contextual factor with a mean (SD) subscale score of 3.99 (0.60), with staff culture also highly rated at 3.96 (0.71). Formal leadership (mean [SD] subscale score: 3.84 [0.78]), senior management culture (3.83 [0.77]), and service measurement goals (3.81 [0.79]) were positive but less highly rated. Availability of resources within the pharmacy was rated lowest at 3.29 (0.95). In particular, 83.5 % of respondents agreed or strongly agreed that opinion leaders within their pharmacy think current practice patterns can be improved, and 82.4 % believed that pharmacy staff members have a sense of personal responsibility for improving patient care (Appendix A, Table A1). However, comparatively fewer pharmacy staff agreed or strongly agreed that they had access to necessary resources to support new services in terms of budget (52.5 %), training

Table 2
Comparison of Mean ORCA Domains and Subscale Scores for OCN Services Across Rural and Urban Pharmacy Locations (N = 171).

ORCA Domains and Subscales	Cronbach's Alpha	Mean (SD)			*p*-value[a]
		All	Rural	Urban	
Evidence	**0.771**	**3.86 (0.59)**	**3.76 (0.58)**	**3.94 (0.59)**	**0.047***
General strength of evidence [b]	0.749	3.86 (0.89)	3.74 (0.88)	3.97 (0.88)	0.084
Research evidence	0.812	4.01 (0.73)	3.95 (0.74)	4.05 (0.72)	0.374
Clinical experience	0.858	3.87 (0.71)	3.74 (0.71)	3.98 (0.69)	0.029*
Perceived patient preferences	0.835	3.69 (0.71)	3.58 (0.69)	3.78 (0.71)	0.093
Context	**0.881**	**3.78 (0.62)**	**3.72 (0.62)**	**3.83 (0.62)**	**0.139**
Senior management culture	0.764	3.83 (0.77)	3.90 (0.76)	3.79 (0.79)	0.483
Staff culture	0.875	3.96 (0.71)	3.85 (0.76)	4.04 (0.66)	0.047*
Formal leadership	0.871	3.84 (0.78)	3.79 (0.78)	3.88 (0.78)	0.382
Leadership via opinion leaders	0.832	3.99 (0.60)	3.90 (0.56)	4.10 (0.61)	0.056
Service measurement goals	0.871	3.81 (0.79)	3.66 (0.79)	3.92 (0.77)	0.034*
Resources	0.864	3.29 (0.95)	3.30 (0.96)	3.30 (0.96)	0.981
Facilitation	**0.940**	**3.71 (0.63)**	**3.67 (0.57)**	**3.74 (0.67)**	**0.203**
Senior management characteristics	0.830	3.80 (0.69)	3.71 (0.66)	3.87 (0.72)	0.045*
Champion characteristics	0.911	4.04 (0.67)	4.04 (0.59)	4.04 (0.73)	0.690
Leader roles	0.857	3.87 (0.70)	3.80 (0.61)	3.93 (0.76)	0.060
Team roles	0.800	3.66 (0.76)	3.63 (0.74)	3.68 (0.78)	0.797
Implementation plan	0.842	3.90 (0.66)	3.88 (0.63)	3.91 (0.68)	0.643
Communication	0.905	3.64 (0.80)	3.54 (0.78)	3.71 (0.81)	0.163
Implementation progress	0.864	3.54 (0.84)	3.52 (0.79)	3.56 (0.89)	0.537
Implementation resources	0.894	3.51 (0.83)	3.50 (0.73)	3.52 (0.90)	0.521
Implementation evaluation	0.899	3.54 (0.87)	3.50 (0.82)	3.56 (0.91)	0.526

[a] Analyzed using Mann-Whitney U tests with a priori alpha = 0.05.
[b] General strength of evidence is not included in the calculation of the mean score or Cronbach's alpha for the overall Evidence domain.

(59.8 %), facilities (57.5 %), and staffing (36.9 %).

Overall, the mean (SD) context domain scores did not differ significantly between urban (3.83 [0.62]) and rural (3.72 [0.62]; $p = 0.139$) pharmacies, although certain subscales varied (Table 2). Specifically, staff culture (4.04 [0.66] versus 3.85 [0.76]; $p = 0.047$) and service measurement goals (3.92 [0.77] versus 3.66 [0.79]; $p = 0.034$) were rated higher in urban versus rural pharmacies.

3.3. Facilitation

Internal consistency was acceptable (Cronbach's alpha >0.7) for the facilitation domain and subscales (Table 2). Compared to evidence and context, the mean (SD) facilitation domain score was the lowest-rated ORCA domain at 3.71 (0.63). Within the facilitation domain, champion characteristics was the highest rated subscale (mean [SD] subscale score: 4.04 [0.67]), followed by OCN services implementation plan (3.90 [0.66]), leader roles (3.87 [0.70]), and senior management characteristics (3.80 [0.69]). Although positive, team roles (3.66 [0.76]) and communication (3.64 [0.80]) were less highly rated. Notably, OCN

services implementation progress tracking (3.54 [0.84]), implementation evaluation (3.54 [0.87]), and implementation resources (3.51 [0.83]) were the lowest rated facilitation subscales. Specifically, 84.0 % of respondents agreed or strongly agreed that the OCN service champion (the pharmacy team member spearheading the OCN service) would or did have the authority to carry out the implementation of the service (Appendix A, Table A1). Additionally, although 80.3 % stated that pharmacy team members would or did have clearly defined OCN service roles, comparatively fewer (60.5 %) reported that communication was or would be maintained through regular meetings with the service champion and team members. Staff incentives (38.2 %) and provider buy-in (46.0 %) to enhance OCN services implementation were reported by few pharmacies.

There was no statistically significant difference in the mean (SD) facilitation domain score between urban (3.74 [0.67]) and rural (3.67 [0.57]; $p = 0.203$) pharmacies (Table 2). However, at the subscale level, senior management characteristics were more highly rated by urban versus rural pharmacies (3.87 [0.72] versus 3.71 [0.66]; $p = 0.045$).

3.4. OCN implementation status

Among all pharmacies, OCN implementation was fairly low, with 66.7 % currently offering OCN services (implementers), 5.8 % in the process of developing the service, and 27.6 % non-implementers (Table 3a). Urban pharmacies tended to have a greater proportion of implementers (69.3 %) compared to rural pharmacies (63.2 %), but this difference was not statistically significant ($p = 0.704$).

Notably, pharmacies currently implementing or in the process of developing OCN services reported higher mean (SD) ORCA context domain scores (3.90 [0.58]) compared to non-implementers (3.54 [0.61]; $p = 0.003$), although there were no differences in evidence or facilitation domain scores (Table 3b). In fact, all mean (SD) context subscale scores were higher among implementers or pharmacies with OCN services in development compared to non-implementers, including senior management culture (3.97 [0.73] versus 3.61 [0.79]; $p = 0.024$), staff culture (4.07 [0.65] versus 3.72 [0.73]; $p = 0.011$), formal leadership (3.97 [0.73] versus 3.58 [0.81]; p = 0.011), leadership via opinion leaders (4.08 [0.57] versus 3.83 [0.61]; $p = 0.040$), OCN service measurement goals (3.92 [0.79] versus 3.57 [0.75]; $p = 0.066$), and availability of resources (3.41 [0.97] versus 2.97 [0.89]; p = 0.024). Implementer and in-development pharmacies also reported higher scores for two facilitation subscales when compared to non-implementers, specifically OCN service champion characteristics (4.10 [0.69] versus 3.85 [0.66]; $p = 0.041$) and an implementation plan (3.97 [0.67] versus 3.67 [0.63]; $p = 0.013$).

Additionally, influential factors affecting OCN implementation status were assessed via logistic regression (Table 4). After adjusting for organization- and individual-level covariates, pharmacies with a higher ORCA context domain score had greater odds of implementing or being in the process of developing OCN services. Specifically, as the mean context domain score increased by one, the odds of implementing or developing OCN services increased by 223 % (aOR = 3.230, 95 % CI = 1.116–9.350; $p = 0.031$). Findings were similar for the unadjusted (Model 1) and adjusted (Model 2) models.

4. Discussion

This study assessed Alabama community pharmacies' organizational readiness to implement OCN services, exploring differences in readiness between urban and rural pharmacy settings as well as influential factors affecting OCN implementation level. The Organizational Readiness to Change Assessment (ORCA)[25] was used to evaluate the degree of readiness to implement community pharmacy-based OCN services in several key domains, including perceived evidence, context, and facilitation.

Pharmacy personnel's perceived strength of evidence surrounding OCN services was positive, although there was room for growth.

Table 3
a-b. (a) OCN Services Implementation Status Across Rural and Urban Pharmacy Locations; (b) Comparison of Mean ORCA Domain and Subscale Scores by Pharmacy Implementation Status (N = 171).

(a)

	n (%) [a]			p-value [b]
OCN Implementation Status	All	Rural	Urban	
Implementer	104 (66.7)	43 (63.2) [c]	61 (69.3) [c]	0.704
In development	9 (5.8)	4 (5.9) [c]	5 (5.7) [c]	
Non-implementer	43 (27.6)	21 (30.9) [c]	22 (25.0) [c]	

(b)

ORCA Domains and Subscales	Mean (SD)		p-value [d]
	Implementer or In Development ($n = 113$)	Non-Implementer ($n = 43$)	
Evidence	**3.92 (0.58)**	**3.73 (0.65)**	**0.124**
General strength of evidence [e]	3.90 (0.92)	3.77 (0.86)	0.352
Research evidence	4.06 (0.66)	3.88 (0.92)	0.511
Clinical experience	3.93 (0.70)	3.78 (0.72)	0.168
Perceived patient preferences	3.77 (0.72)	3.61 (0.79)	0.070
Context	**3.90 (0.58)**	**3.54 (0.61)**	**0.003***
Senior management culture	3.97 (0.73)	3.61 (0.79)	0.024*
Staff culture	4.07 (0.65)	3.72 (0.73)	0.011*
Formal leadership	3.97 (0.73)	3.58 (0.81)	0.011*
Leadership via opinion leaders	4.08 (0.57)	3.83 (0.61)	0.040*
Service measurement goals	3.92 (0.79)	3.57 (0.75)	0.066*
Resources	3.41 (0.97)	2.97 (0.89)	0.024*
Facilitation	**3.75 (0.65)**	**3.53 (0.58)**	**0.055**
Senior management characteristics	3.83 (0.72)	3.69 (0.67)	0.311
Champion characteristics	4.10 (0.69)	3.85 (0.66)	0.041*
Leader roles	3.92 (0.73)	3.72 (0.56)	0.068
Team roles	3.70 (0.81)	3.49 (0.66)	0.143
Implementation plan	3.97 (0.67)	3.67 (0.63)	0.013*
Communication	3.69 (0.82)	3.43 (0.75)	0.050
Implementation progress	3.56 (0.88)	3.36 (0.74)	0.129
Implementation resources	3.57 (0.81)	3.30 (0.87)	0.133
Implementation evaluation	3.55 (0.94)	3.39 (0.70)	0.148

[a] Frequencies and percentages may differ due to item non-response.
[b] Analyzed using Chi-square tests with a priori alpha = 0.05 and post-hoc pairwise comparisons using z-tests with Bonferroni correction.
[c] Proportions with the same subscript do not differ significantly at the alpha = 0.05 level (post-hoc z-tests with Bonferroni correction).
[d] Analyzed using Mann-Whitney U tests with a priori alpha = 0.05.
[e] General strength of evidence is not included in the calculation of the mean score for the overall Evidence domain.

Specifically, research evidence was the most highly rated subscale (mean 4.01 out of 5), followed by clinical experience evidence (3.87) and evidence related to perceived patient preferences (3.86). Notably, although research evidence was highly rated overall, fewer believed that current research supports OCN services in community pharmacy settings (28.6 %) compared to non-community pharmacy settings (77.6 %). Indeed, although studies assessing the implementation of naloxone services and harm reduction strategies in community pharmacies have been increasing in recent years,[20,31–33] the preponderance of published literature in the field is focused on inpatient and outpatient clinic settings as well as public health initiatives such as layperson training.[34–41] Combined with the lower rating for evidence related to perceived patient preferences in the current study, this points towards the need for

Table 4
Predictors of OCN Implementation Status (N = 171) [a].

	Model 1: Nagelkerke R^2 = 0.116 [b]			Model 2: Nagelkerke R^2 = 0.243 [c]		
Predictors	OR	95 % CI	p-value	aOR	95 % CI	p-value
Evidence	1.447	0.742–2.820	0.278	2.215	0.915–5.360	0.078
Context	3.325	1.265–8.737	0.015*	3.230	1.116–9.350	0.031*
Facilitation	0.770	0.313–1.892	0.568	0.646	0.219–1.911	0.430

Abbreviations used: OR = Odds Ratio; aOR = Adjusted Odds Ratio; CI = Confidence Interval; Ref = Reference.

[a] Logistic regression with statistical significance at the alpha = 0.05 level indicated by *. Dependent variable = OCN implementation status (dichotomized as implementer or in development versus non-implementer [ref]). Independent variables = mean ORCA domain scores for evidence, context, and facilitation.

[b] Model 1 includes mean ORCA domain scores as continuous predictor variables.

[c] Model 2 includes mean ORCA domain scores as continuous predictor variables, controlling for organization-level covariates of: team member role (dichotomized as pharmacist [ref] versus technician), pharmacy type (dichotomized as independently-owned [ref] versus corporately-owned), pharmacy location (dichotomized as rural [ref] versus urban), daily prescription volume (continuous), and daily opioid prescription volume (continuous); and individual-level covariates of age (continuous), sex (dichotomized as male [ref] versus female), and race and ethnicity (dichotomized as White [ref] versus Asian, Black, or Hispanic/Latino[a]). No outliers (Cook's Distance <1) or multicollinearity (variance inflation factor [VIF] < 5) were detected.

future research focused on patient-level outcomes (economic, clinical, and humanistic) resulting from community pharmacy-based OCN services. In particular, limited published research exists regarding patient preferences and satisfaction with community pharmacy-based OCN service structures and processes.[42] Furthermore, the overall perceived strength of evidence was higher among urban versus rural pharmacies, particularly the clinical experience evidence subscale. This may reflect a multitude of factors, including increased access to professional development opportunities[43] and more robust healthcare infrastructure in urban regions,[44] with 88.68 % of primary care provider shortage areas in Alabama being rurally located.[45] A higher number of pharmacy clientele who used opioids in urban versus rural locations may also contribute to this finding, corresponding to the higher opioid overdose mortality rate seen in urban (28.6 per 100,000) versus rural (26.2) regions nationwide in 2020.[46] However, given that the overdose rate far exceeds the average in certain rural counties in Alabama (for example, 43.13 in St. Clair County),[6] further investigation into disparities influencing the lower perceived strength of evidence supporting OCN services in these high priority rural counties is warranted. Education sessions highlighting emerging evidence in support of community pharmacy-based OCN services targeted to these rural regions may be a first step in increasing implementation readiness across the state.

Additionally, the context within pharmacy organizations (culture, leadership, resources) to support OCN services was fairly positive. For example, opinion leaders and staff culture were highly rated. Interestingly, these staff-focused elements of leadership and culture were more highly rated than formal leadership and senior management culture, implying that a bottom-up rather than top-down approach to management may be more prevalent within these organizations. This is especially true of pharmacies located in urban areas, as their staff culture was rated significantly higher compared to their rural counterparts in the current study. A lack of resources and opportunities for professional development in rural pharmacies may contribute to this difference, as employees in rural organizations more highly value defined job responsibilities, provision of sufficient resources, and opportunities for professional advancement compared to their urban counterparts.[47] Previous research in New Mexico has shown that a bottom-up approach in pharmacies, including peer-to-peer coaching and staff training, is effective in enhancing the implementation of naloxone services.[48] Given that much of New Mexico is classified as rural, these strategies may also be effective in enhancing staff culture in rural Alabama pharmacies.[49] Furthermore, the availability of resources to support OCN services within the community pharmacy was rated lowest, with relatively few pharmacies reporting adequate staff training (59.8 %), facilities (57.5 %), budget (52.5 %), and staffing (36.9 %). Partnering with colleges of pharmacy may enable pharmacies to obtain necessary training through continuing education programs and some additional staff via student pharmacists.[48] However, a more top-down approach incorporating formal leadership support is necessary to improve facilities, budget, and most staffing needs. Partnerships between community pharmacies, state departments of public health, and state associations of pharmacy may help to achieve the critical mass necessary to gain senior management buy-in through email campaigns and telephone calls.[48] Colleges of pharmacy may serve a critical role in facilitating these partnerships in their local communities and thus fostering a culture of collaboration and innovation in harm reduction.

The capacity of pharmacies to facilitate OCN-related workflow, including employee roles/characteristics and implementation processes, was positive overall, but areas for improvement were noted. Specifically, respondents identified that, on average, they agreed that staff members who would likely be put in charge of OCN services (champions) would have positive characteristics, such as accepting responsibility and working well with others, to be able to facilitate the implementation of these services. Formal leader roles and senior management characteristics were likewise rated positively but with more room for growth compared to champion characteristics, aligning with the trends observed regarding pharmacy culture described above. Further, senior management characteristics were rated significantly lower in rural pharmacies, an interesting fact when combined with the lower-rated staff culture reported in these regions. Indeed, the characteristics of an organizations' management team have been shown to have a trickle-down effect on staff culture, with perceived ethical management leading to more positive job performance and vice versa.[50] Open dialogue sessions and transparent communication between pharmacy management teams and staff members may help to improve perceptions of senior management characteristics and staff culture in lower-rated rural regions.[51] Additionally, higher scores were reported when survey respondents were asked to rate what their implementation plan will/did outline, including whether it identified roles and responsibilities, described tasks and timelines, and included provider/patient education. However, implementation processes, particularly OCN service progress tracking, evaluation, and resources such as staff incentives and provider buy-in had the greatest room for improvement. This was a similar finding to a North Carolina survey that sought to identify barriers to dispensing naloxone.[19] In that survey, approximately 35 % of respondents reported "workflow concerns" as a barrier, which parallels the sentiment respondents to this survey had with implementation processes.[19] Additionally, one study conducted in Birmingham, Alabama, evaluated the availability of several naloxone formulations, pharmacists' attitudes towards naloxone, and barriers to naloxone distribution.[52] The authors identified differences in patient education materials and resources among rural versus urban settings and chain versus independent pharmacies.[52] The lack of satisfactory training resources for patients aligns with our study's findings that Alabama pharmacists may not have the capacity to provide OCN services due to the absence of proper implementation resources. This is

compounded by operational factors that may limit sustainability of OCN services in the United States, particularly third-party reimbursement. Specifically, although pharmacies can currently receive reimbursement from some private and public insurance payers for dispensing of naloxone prescriptions, cost to patients remains a major barrier, and community pharmacists cannot bill and receive payment for opioid counseling or naloxone education through patient insurance, necessitating alternative business models such as cash-pay or contracting with employer groups.[53,54] Collaboration with colleges of pharmacy may facilitate evidence-based implementation resource generation and dissemination through research to improve patient awareness of pharmacist-based OCN and grant funding to provide initial funds for staff incentives until management buy-in can be secured.[55] Further, online repositories of resources either from external sources such as PrescribetoPrevent (https://prescribetoprevent.org/)[56] or internal to the organization (e.g., demonstration videos, patient brochures, and editable document templates such as provider fax forms) may aid in enhancing community pharmacy capacity for OCN services implementation.[20]

Furthermore, OCN implementation level and influential factors affecting implementation were assessed. Over a quarter of pharmacies were not offering OCN services (non-implementers), while approximately 6 % were in the process of developing services. Contextual factors appeared to be the greatest differences between implementer and non-implementer pharmacies, with all contextual elements, including culture, leadership, and opinion leaders rated higher among implementers and those in development compared to non-implementers. Notably, staff culture and leadership via opinion leaders were particularly high among implementers and those in development, with mean (SD) scores of 4.07 (0.65) and 4.08 (0.57) out of five, respectively. Indeed, although the study was not powered to detect the influence of individual subscales on implementation status, logistic analysis revealed that higher ratings in the ORCA context domain increased the odds of implementing or developing OCN services by 223 %. This aligns with previous research in the hospital setting that identified contextual factors such as resources (budget, staffing, training) as significant contributors to implementation of antibiotic stewardship services.[57] In addition, as would be expected, implementer pharmacies reported significantly higher scores than non-implementers on the facilitation subscales related to champion characteristics and implementation plans. Thus, in order to enhance OCN services adoption and implementation, future studies may wish to focus on strategies centered around improving contextual factors and select facilitation factors within the pharmacy, such as identifying opinion leaders and training champions,[57–59] fostering a transparent leadership and staff culture via open dialogue sessions,[51] developing and improving implementation plans via goal-focused recurring meetings and use of tools like Gantt charts,[60,61] and partnering with colleges of pharmacy to gather and develop training and education resources for patients and employees.[48,55]

4.1. Limitations

There are several limitations to take into account. First, this study utilized an observational cross-sectional design, limiting the causal conclusions that can be drawn. Future studies may assess changes in readiness to provide OCN services over multiple points in time, which may shed light on the impact of policy changes on harm reduction services in the community pharmacy landscape. The effect of one such policy change, the approval of OTC naloxone in March of 2023, soon after the completion of the current study,[12] was not able to be assessed but poses as a landmark for future studies evaluating pharmacy-based naloxone dispensing and workflow. Further, the voluntary and self-reported nature of the survey may bring up issues of selection and social desirability bias; however, the anonymous format was a mitigating factor for the latter. Along the same lines, this study took place in the state of Alabama, so results may not be generalizable to other states. However, findings and suggestions can be adapted to other Deep South states with similar urban and rural geography and naloxone access laws. Additionally, pharmacy OCN services implementation status was determined via a single multiple-choice question to determine whether any service components were being implemented (implementers), none were being implemented (non-implementers), or were in the process of development (in development). Varying degrees of OCN service provision, such as pharmacies who offered opioid counseling but not naloxone dispensing, were not assessed. Investigators wishing to utilize the current survey instrument for future evaluation of pharmacies' organizational readiness to provide OCN services may wish to query participants regarding the implementation status of each OCN service component (e.g., opioid counseling, naloxone dispensing, naloxone education) rather than the service as a whole. Similarly, investigators adapting the current survey instrument for future studies may wish to explore additional external contextual factors that were not incorporated in the ORCA tool, such as state and federal policies surrounding harm reduction, structural stigma related to opioid use disorder (OUD) in the broader health system, professional attitudes towards OUD, remuneration, and pharmacy professional governance and their influence on OCN implementation status. Lastly, although a power calculation indicated that the sample size was sufficient to assess our primary outcome measure, the sample size was inadequate to perform additional subgroup analyses based on team member roles (e.g., staff pharmacists, pharmacy owners/managers, technicians, clerks); this represents an area for future study.

5. Conclusion

Overall, Alabama community pharmacy-based OCN implementation was low across rural and urban settings. Organizational readiness to implement OCN was higher among urban versus rural pharmacies in terms of perceived strength of clinical evidence, staff culture, service measurement goals, and senior management characteristics. Key organizational readiness factors identified in the current study can be leveraged in future research by using targeted interventions to enhance the implementation of OCN services and potentially increase access to naloxone in rural regions.

Ethics approval

The primary author's Institutional Review Board (IRB) approved all study procedures via an exempt protocol (Protocol No. 20–591 EP 2012) and informed consent was provided by all survey participants.

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CRediT authorship contribution statement

Lindsey Hohmann: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Kavon Diggs:** Writing – review & editing, Writing – original draft, Visualization,

Formal analysis, Data curation. **Giovanna Valle-Ramos:** Writing – review & editing, Writing – original draft, Visualization, Data curation. **Jessica Richardson:** Writing – review & editing, Writing – original draft, Visualization, Data curation. **Haley Phillippe:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Chris Correia:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Karen Marlowe:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Brent I. Fox:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors have no conflicts of interest to declare.

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Appendix A. Supplementary data

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