Protocol

Structural Conditions in Health Care Systems and Cardiovascular Health After Release From Prison: Protocol for the SCHARP Prospective Cohort Study

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Abstract

Background: Compared with the general population, people released from prison experience a disproportionate prevalence of poor cardiovascular (CV) health, CV events, and CV mortality following release. Access to community health care services is key to preventing poor CV outcomes, yet people released from prison report barriers to accessing health care.

Objective: In the Structural Conditions and Health After Release from Prison (SCHARP) study, we aim to examine how structural conditions, or the policies, procedures, and practices, within health care systems are associated with health care utilization and CV outcomes experienced by people recently released from prison.

Methods: We recruited people recently released from prisons in Colorado into an observational cohort to follow their utilization outcomes over 12 months after study enrollment. Participants' CV health based on Life's Essential 8 (blood pressure, lipids, glucose, BMI, physical activity, diet, tobacco use, and sleep) was measured at enrollment. At enrollment, self-reported exposure to health care system conditions (eg, access experiences related to insurance status, use of peer navigators, experiences of health care discrimination, receipt of support for health-related social risk factors, and access to specialized services such as substance use treatment) since release were assessed. Using the Colorado All Payer Claims Database, we will next examine the association between exposure to structural conditions and primary outcomes of health care utilization (clinic visits, emergency visits, and hospitalization) and secondary outcome of CV hospitalization.

Results: This study was funded in September 2022. Between August 2023 and September 2025, we enrolled 508 participants. Data collection is expected to be completed in 2027 and data analysis in 2028.

Conclusions: In a large prospective cohort of people released from prison, the SCHARP study will systematically measure CV health, identify exposure to structural conditions, and link these exposures to health care utilization and CV hospitalization. These findings will be used to develop and disseminate resources for health care systems interested in improving health care utilization and CV outcomes for people released from prison.

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KEYWORDS

prisoners; cardiovascular disease; health services accessibility; health care utilization; social determinants of health

Introduction

People released from prison are at high risk of poor health outcomes, particularly cardiovascular (CV) disease [1,2]. Compared with the general population, CV risk factors are more prevalent among people in or released from prison, including hypertension, tobacco use disorder, diabetes, obesity, and poor diet [3-14]. People released from prison have an increased risk of CV hospitalizations for coronary heart disease, heart failure, stroke, and all-cause death and experience 2 times higher CV mortality than the general population [4,7,15-17]. Substance use, such as methamphetamine use, may also increase the risk of cardiac conditions, such as heart failure [18]. Access to high-quality health care following release from prison is important for preventing poor CV outcomes.

People released from prison report barriers to accessing health care related to mistrust and discrimination in health care settings, competing demands of other needs (eg, obtaining housing and employment), the burden of medical and psychiatric comorbidities, complexities of the health care system, and requirements to manage complex conditions [1,4,19-28]. System-level factors, such as insurance coverage, also create access barriers [1,28]. More than 80% of those released from US prisons are eligible for Medicaid, which plays a key role in facilitating linkage to community health care [29-31]. US states, including Colorado, have enacted policies to facilitate access, such as expanding Medicaid eligibility, pausing rather than terminating Medicaid coverage while imprisoned, and enrolling people in Medicaid prior to release from prison [29,32-35]. Evidence suggests that these important policy-level interventions that facilitate access can increase use of outpatient care, yet postrelease health care use has primarily been reported to be through more costly emergency care settings [34,36,37]. Therefore, insurance coverage alone does not ensure the use of outpatient care; structural factors within health care systems, such as policies governing the types of insurance accepted by outpatient providers, may also influence health care utilization [28,29].

We aim to examine structural conditions in US health care systems and how they influence health care utilization and CV hospitalization after release from prison [4,17,19,38-40]. “Structural conditions,” as used in this study, refers to formal and informal policies and practices in health care systems that influence how individuals access, experience, and benefit from health care services [41,42]. These system-level conditions operate external to an individual, such as institutional culture or practices; are systemically driven; and may either facilitate or impede how an individual can use health care services [41,42]. We are systematically measuring exposure to health care system structural conditions that can influence health care utilization following release, including (1) access policies and practices (eg, inability to get health care services due to type of insurance), (2) transition assistance and navigators, (3) experiences of discrimination, (4) support for social risk factors (eg, offering housing assistance), and (5) receipt of specialized services for mental health and substance use disorders [1,23,24,29,43-53]. Systematic investigation of whether these structural conditions mitigate or perpetuate disparities in health care utilization and CV hospitalization among people released from US prisons has been limited [4,54,55].

The central hypothesis for this study is that exposure to health care system structural conditions following release influences utilization of health care services and CV hospitalization. To test this hypothesis, we enrolled people recently released from prisons in Colorado into a prospective observational cohort study. We assessed exposure to structural conditions in health care since release using surveys. The cohort will be linked to the Colorado All Payer Claims Database (APCD) to assess the primary outcomes of health care utilization (outpatient clinic visits, emergency visits, and hospitalization) and the secondary outcome of CV hospitalization 12 months after enrollment. Moderation by participants’ CV health at enrollment, assessed using the Life’s Essential 8 (LE8) criteria, will also be examined. We will use this research to develop and disseminate resources for health care systems interested in improving health care utilization for people released from prison.

Methods

Study Design

This prospective observational cohort study examines the associations of health care structural conditions with health care utilization and CV hospitalization among people recently released from prison. At the enrollment visit, participants provided informed consent, completed CV health assessments, and responded to a survey regarding exposure to health care structural conditions since release from prison. The survey also covered prior health care experiences, health behaviors, social risk factors, and health conditions. To measure new or persistent exposure occurring after enrollment, beginning at 5 months and up to 12 months after enrollment, participants were contacted to complete a follow-up survey capturing exposures that have occurred since their enrollment visit. Health care utilization occurring during the 12 months following enrollment will be assessed from the Colorado APCD (Figure 1).

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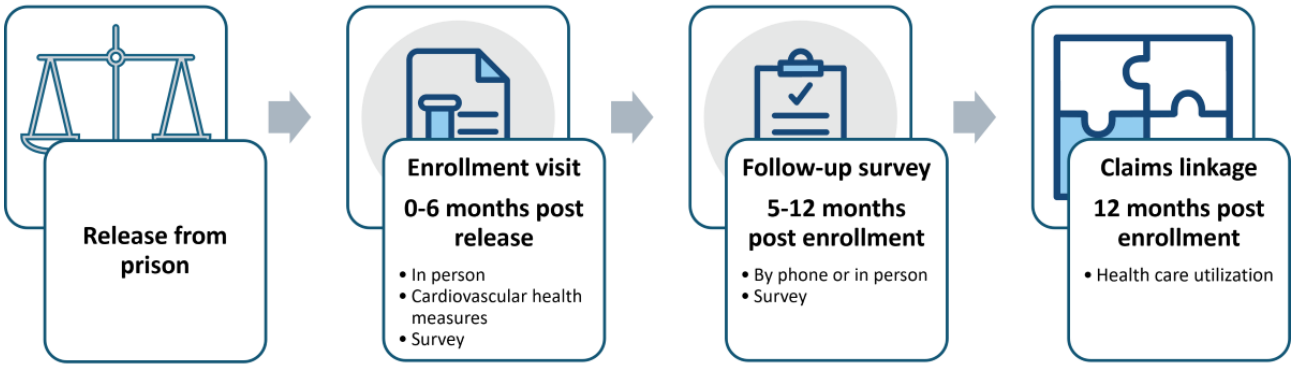
Figure 1. Flow of procedures for the Structural Conditions and Health After Release from Prison (SCHARP) study, an observational prospective cohort study of people recently released from prison.



Community Advisory Board

We established a community advisory board (CAB) to assist with study planning, execution, and oversight. The CAB includes members of relevant community organizations focused on reentry services, local health care organizations, the Colorado Department of Corrections, and people with lived experiences of incarceration. The CAB has provided input on the instruments used for the assessment of health care system conditions and on the study protocol. The group will remain involved in reviewing results and assisting with communication and dissemination of findings. CAB members are compensated for their time.

Setting and Participants

The observational prospective cohort study enrolled participants in the Denver-Aurora metropolitan area of Colorado, where population-level imprisonment rates are higher than in other areas in the state and around 40% of people in Colorado state prisons are released [56,57]. Denver and Aurora, 2 of the largest cities in the state, are within 10 miles of one another, and their combined metropolitan areas cover more than 300 square miles. The area includes approximately 1.1 million people, of whom 12% identify as African American or Black, 30% identify as Hispanic, and 15% live below the poverty level [58,59]. Black, Hispanic, and Native American people represent 55% of the population of people in Colorado state prisons [56,60].

Study recruitment and enrollment occurred in person at partnering community locations throughout the Denver-Aurora metropolitan area of Colorado. Recruitment and enrollment locations were chosen based on recommendations from our CAB. Potential participants were eligible if they were released from state or federal prison within the prior 6 months, were aged 18 years or older, were able to understand study procedures in English or Spanish, and had no plans to leave the Denver-Aurora area within the next 6 months. Individuals on parole were eligible; however, those with a “current inmate” status under correctional supervision (ie, those subject to locked confinement for part of the day or night and restrictions on their activities, such as requiring approval to attend health care appointments) were ineligible. People with and without known CV risk factors were eligible to enroll.

Recruitment, Enrollment, and Retention

Recruitment took place through community presentations, advertisements, and mailings. All materials described the study and included contact information. Study flyers were posted at community partner sites and shared with partner representatives to distribute to potentially eligible clients. We also held walk-in recruitment events at community sites, where research staff described the study and completed enrollment activities. In addition, we mailed study flyers to potentially eligible individuals identified from a list of people recently released to the Denver-Aurora area, provided by the Colorado Department of Corrections. Interested recipients were invited to contact the study team by email or phone for more information.

The study team screened individuals who contacted them to confirm eligibility. Enrollment occurred in person at community partner organizations or parole offices. During the enrollment visit, the study team confirmed eligibility, obtained informed consent, measured CV health, and administered surveys. Participants received a US $50 gift card for completing the enrollment survey and a US $25 gift card for completing the CV health measures. All potential participants, regardless of eligibility, were offered snacks; study-branded fanny packs; hygiene items (eg, socks, lip balm, and soap); a list of reentry resources; and American Heart Association LE8 information sheets on healthy diet, exercise, weight, sleep, tobacco use, cholesterol, blood sugar, and blood pressure management [61].

Retention efforts emphasized appreciation of participants’ involvement and efforts, allowance for flexible and convenient scheduling of enrollment and follow-up visits, and maintenance of accurate and up-to-date contact information [62,63]. During the enrollment visit, study staff asked participants to provide phone numbers, email addresses, and postal addresses for up to 3 alternate contacts who could assist with updated contact information if the study staff could not reach the participant directly.

To support ongoing communication between enrollment and follow-up visits, participants received a text or email message at the end of their enrollment visit thanking them for their participation and providing a link to the study consent form and contact information. Study staff asked participants with an email address to respond to an email before leaving the enrollment visit to verify that their email address was recorded correctly. In addition, participants received a wallet card indicating the

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month their follow-up survey was due, the timing of check-in messages, and the study contact information. Following the enrollment visit, participants received "check-in" texts or emails at approximately 30, 60, 90, and 120 days, each including study contact information. The 30- and 90-day "check-in" messages asked participants to confirm or update their contact information. Participants who responded to these messages received a US $10 gift card.

Follow-Up Survey

The survey was delivered again approximately 6 months after enrollment to measure new or persistent exposure to structural conditions. Participants completed the follow-up survey over the phone, in person, or online, as close as possible to 6 months and up to 12 months after enrollment. Follow-up efforts included attempts to contact by phone, text, email, and postal mail. When participants could not be reached directly, updated contact information was sought by contacting their alternate contacts, searching public records (eg, Whitepages [64]), checking with nonparole community partner organizations, and/or emailing participants an online self-administered version of the survey [62,63]. Participants who were reincarcerated and then released within their follow-up window were eligible for interview upon their subsequent release. After completing the follow-up survey, participants were given an additional US $50 gift card.

Ethical Considerations

The Kaiser Permanente Institutional Review Board approved the study procedures (IRBNet ID 1867395). During the informed consent process, study staff informed prospective participants about study activities and time commitment, risks and benefits of participation, the types of data that would be collected via the surveys and CV health measures, incentives, and confidentiality protections. Potential participants were notified that the study has a Certificate of Confidentiality from the National Institutes of Health, which prevents individually identifiable information from being shared with parole or probation officers. Potential participants were told that they could withdraw from the study at any time. As outlined above, participants were compensated US $50 for completing the enrollment survey, US $25 for completing the enrollment heart health measures, US $50 for completing the 6-month follow-up survey, and US $10 for responding to postenrollment check-in messages.

Prior to enrollment, all participants provided informed consent and Health Insurance Portability and Accountability Act (HIPAA) authorization. All participants reviewed the consent form and HIPAA authorization with the study team, verbally affirmed consent, and received a copy. A waiver of documentation of informed consent and HIPAA authorization (ie, no signed copy) was provided by the Kaiser Permanente Institutional Review Board. We requested a waiver of documentation of consent because the primary risk associated with the study was a breach of confidentiality, as disclosure of participants' former incarceration status could be stigmatizing.

Measures and Data Sources

Exposure Variables

At the enrollment visit, participants were asked about their exposure to health care structural conditions since being released from prison. Our exposure domains of interest were informed by prior literature and 89 qualitative interviews of health care system leaders, frontline clinical staff, community reentry organizations, and people with lived experience of incarceration [28]. When possible, survey questions were adapted from published surveys or developed based on prior literature. Exposure domains of interest include the following (Table 1): access policies and practices [29,45,47,53] (eg, "Since your release from prison, was there a time when you couldn't get health care because you did not have health insurance or a health care plan?") [65], transition assistance and navigators [44,46] (eg, "Since release from prison, did you get help from a peer navigator getting medical or mental health care in the community?"), health care system discrimination (eg, "How much do you think your criminal record affected how people in health care have treated you since your release from prison?") [21,23,24], support of social risk factors [49-52] (eg, "Did anyone from a clinic, emergency room, hospital, or health care organization help you with housing, employment, food, finances, or transportation since you have been released from prison?"), and receipt of specialized services [1,44] (eg, "Since your release from prison, have you seen a doctor or other health professional about substance use disorder treatment, addiction treatment, or harm reduction services?").

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Table 1. Description of the exposure and outcome variables of interest, including the time frame for data collection and the primary data source.

Measures	Enrollment	6 mo from enrollment	12 mo from enrollment
Exposure variables since release			
Access policies and practices	SR[a]	SR	—[b]
Transition assistance and navigators	SR	SR	—
Health care system discrimination	SR	SR	—
Support of social risk factors	SR	SR	—
Receipt of specialized services	SR	SR	—
Outcomes			
Primary			
Use of emergency or urgent care	—	—	CD[c]
Use of outpatient clinical care	—	—	CD
Hospitalization—all-cause	—	—	CD
Secondary			
Hospitalization—cardiovascular	—	—	CD
Cardiovascular conditions	—	—	CD

[a]SR: self-report survey.

[b]Not applicable.

[c]CD: claims data.

Outcomes

Our primary outcomes will be utilization or the number of (1) outpatient clinic visits, (2) emergency or urgent care visits, and (3) hospitalizations (Table 1). Utilization will be assessed using the Colorado APCD. The Colorado APCD is a comprehensive database of payer claims representing most covered lives (~71%) in Colorado across commercial health care plans, Medicare, and Medicaid [66]. The Colorado APCD includes 100% of Coloradans enrolled in Medicaid. Because more than 90% of individuals released from Colorado state prisons are eligible for Medicaid, we anticipate linkage to claims for 12-month outcomes in more than 90% of those enrolled in the study. We will link enrolled participants to the Colorado APCD using their name, date of birth, Medicaid, or other insurance ID numbers collected at enrollment. We will not be able to capture utilization that occurs outside of the state of Colorado.

Secondary outcomes assessed using the Colorado APCD data include the following (Table 1): CV hospitalizations (from the Colorado APCD, we will examine hospitalizations where the primary discharge diagnosis indicates CV-related hospitalization based upon Healthcare Cost and Utilization Project categories [67]) and CV conditions (we will query the Colorado APCD for *International Classification of Diseases, 10th Revision* [*ICD-10*] codes for CV risk factors and conditions, including hypertension, diabetes, hyperlipidemia, peripheral artery disease, coronary artery disease, heart failure, stroke, tobacco use, and obesity).

Participant-Level Covariates

Our participant-level covariates include sociodemographic, prior health care experiences, health-related social risk factors, and health conditions measured at enrollment.

Sociodemographic

Participants were asked about their race, ethnicity, sex, veteran status, and disability status in accordance with established data collection standards issued by the US Department of Health and Human Services [68]. Participants were also asked to self-report marital status; highest education completed; insurance status; current living situation; employment status; and lifetime months or years spent in jail, prison, or juvenile detention [46,69-71].

Prior Health Care Experiences

To assess past health care experiences, we asked participants whether they were taking medications for any physical health, mental health, or substance use conditions in prison and about their overall satisfaction with their health care while in prison. Health care access and utilization from the time of release to enrollment was assessed using the National Health Interview Survey Adult Access to Health Care and Utilization Module [65]. We revised the questions to capture utilization since release from prison, including whether medical care has been sought and the frequency of hospitalization, urgent care, or emergency care. Answers to questions related to access to health care since release from prison (eg, the place you usually go if you are sick and need health care) will be considered as exposures related to access policies and practices.

Health-Related Social Risk Factors

We used the Center for Medicaid and Medicare Services Accountable Health Communities Health-Related Social Needs Screening Tool to assess for housing instability, food insecurity, transportation problems, and financial strain [72].

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Health Conditions

Participants were asked whether they had ever been told by a health care provider that they have any of the following medical conditions: coronary heart disease, heart attack, heart failure, peripheral arterial disease, stroke, any other heart conditions, obesity, kidney disease, asthma, chronic obstructive pulmonary disease, emphysema, chronic bronchitis, anxiety disorder, depression, or a psychotic disorder [70,71]. Participants were asked if they were currently taking medications for any medical, mental health, or substance use condition. Participants rated their overall general health and mental or emotional health [71,73]. Finally, participants were asked about alcohol use since release from prison and other substance use in the past 12 months [74].

Moderators

Given the high prevalence of CV risk among people released from prison, we will use a CV health score to evaluate how CV health at enrollment influences the relationship between exposure to structural conditions and utilization outcomes [4,5]. At enrollment, we assessed the American Heart Association LE8 criteria, which include direct measures of (1) BMI, (2) blood pressure, (3) lipids, and (4) blood glucose, as well as assessments of (5) nicotine use, (6) diet, (7) physical activity, and (8) sleep via short surveys [75]. Composite CV health scores, including LE8, have a graded relationship with CV disease incidence and all-cause mortality and have been shown to be associated with many chronic illnesses [76-82].

Nonfasting lipid (high-density lipoprotein and total cholesterol) and glucose measures were obtained using a Clinical Laboratory Improvement Amendments–waived point-of-care testing device approved by the Food and Drug Administration [83]. BMI was calculated using height and weight measurements obtained with a digital scale and a stadiometer [5]. Research assistants collected point-of-care blood samples (ie, finger-stick samples) and measured blood pressure, height, and weight [84], following established clinical guidelines [84].

LE8 scores (on a 100-point scale, with higher scores indicating better CV health) will be generated for each of the 8 measures (Multimedia Appendix 1 [5,75,85-87]). An unweighted average of all 8 measures will be used to create an overall CV health score (range 0-100 points; an average score of 0-49 is low CV health, 50-79 is moderate CV health, and 80-100 is ideal or high CV health) [75,81]. Scoring for self-reported measures of diet, physical activity, nicotine use, and sleep will be adapted from other studies [5,75,81,85] (Multimedia Appendix 1). Our dietary intake questions were based on the Dietary Approaches to Stop Hypertension (DASH) eating plan and standard serving-size examples [86]. The proposed healthy CV diet score is based on meeting minimum DASH-recommended daily servings for 5 healthy food groups in a 2000-calorie diet: low-fat dairy, fruits, vegetables, whole grains, and nuts [86]. Each component will be scored 0 to 2 (0=no intake, 1=below recommendation, and 2=met or exceeded recommendation), summed to a total diet score, and converted to a CV health score [75,85,87] (Multimedia Appendix 1). When our collected measures deviate from published approaches (eg, we collected random blood glucose instead of fasting glucose or hemoglobin A_{1c}), scoring for CV health will be based on physician input within the study team (SLD, RH, and IAB).

Statistical Methods

Overview

Descriptive statistics will be computed for participant characteristics, exposures, and outcomes. The primary analysis will assess the association of the described structural condition exposure variables from the time of release (T(−X) days) to enrollment (T(0)) days) with the utilization outcomes 12 months after enrollment (T(+365) days). Our primary analysis will use the enrollment survey to determine baseline exposure status and account for time of exposure (ie, time from release to enrollment, T(−X) to T(0) days). Utilization outcomes will be assessed in the 12 months from enrollment (T(+365) days) using the claims data. For utilization occurring in the primary exposure time frame (ie, from release to enrollment), we will account for this utilization in the models as confounders or mediators, as appropriate, based on its role in the exposure-outcome relationship. Participant-level covariates will be included in multivariable models if they are related to the outcome, associated with loss to follow-up, or identified a priori as confounders. Separate multivariable generalized linear models will be used to assess the association of baseline exposures with outcomes adjusted for potential confounders, with a link function chosen based on the distribution of the outcome. Bonferroni correction (α=.05/3=.0167) will be used to adjust for multiple testing of our 3 primary outcomes. Moderation analysis will be performed by including and assessing the effect of an interaction term between exposures and the described moderator variables in multivariable models. Goodness-of-fit tests and model-fitting diagnostics will be performed to identify influential points and outliers and to evaluate alternative model specifications.

We will conduct sensitivity analysis among those who completed the follow-up survey. We will stratify these analyses by persistence of exposure to structural conditions according to survey responses at enrollment and survey follow-up time points. Our 4 exposure groups will include those never exposed (eg, no report of access challenges at enrollment or follow-up), exposed at enrollment (eg, report of access challenges at enrollment and not at follow-up), exposed at follow-up (eg, no report of access challenges at enrollment and report of access challenges at follow-up), and persistently exposed (eg, report of access challenges at enrollment and follow-up). Because the exposures and health care utilization are measured over overlapping periods, temporal ordering between exposure and outcome cannot be definitively established. Therefore, these sensitivity analyses will be interpreted as associations rather than causal effects. Multivariable generalized linear models will be used to evaluate associations between exposure groups and total health care utilization during the 12 months since enrollment, adjusting for the time between release from prison and completion of the follow-up survey and other potential confounders.

All hypothesis tests will be 2-sided with α=.05, unless otherwise indicated, with *P* values and CIs reported. Analyses will be conducted using R (R Foundation for Statistical Computing), Python, or other equivalent analytic software.

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Missing Data

Missingness of self-reported exposures was minimized by study participants completing surveys with research staff. Retention for follow-up surveys was encouraged by ensuring confidentiality of data provided, offering follow-up phone visits, maintaining accurate contact information, providing incentives, and maintaining personal contact with the study team [62,63]. Missing linked claims data are anticipated to be rare, as approximately 90% of those released from prisons in Colorado are Medicaid eligible and the Colorado APCD has 100% of Medicaid enrollees [88].

Due to the possibility of missing outcomes and exposure variables, we will examine the data to assess patterns of missingness by comparing those with missing data to those with full data. We will use all available data in analyses and adjust for covariates that are found to be associated with missingness. Sensitivity analyses will be carried out using multiple imputation approaches if needed [89,90].

Sample Size and Power Calculation

We recruited more than 500 people released from prison. Power calculations for our primary analysis shown in Multimedia Appendix 2 [36,44,46] uses exposure status at enrollment and 12-month utilization outcomes and calculates the minimum detectable effect size at 80% power for the association between the exposure variables of interest and the 3 primary utilization outcomes. Our reference group proportions and rates are based on prior work among populations with a history of incarceration [36,44,46]. We assume the analytic approach is a multivariable regression model in which 20% of the variability in the dependent variable is explained by other predictors. The α level is adjusted using a Bonferroni correction for the number of primary outcomes (.05/3=.0167). As an example, we describe the power calculation for 1 exposure (access policies limiting care due to insurance type) and 1 primary outcome (number of outpatient clinic visits over 12 months). Assuming a binary exposure variable prevalence of 20% and a final sample size of 450 (ie, 90% of the 500 enrolled with 12 months of follow-up claims data), those with no exposure to these access policies (the referent group) have 2.5 clinic visits per year. With 80% power (2-sided α=.0167), we can detect a rate ratio of 1.30, corresponding to 3.25 clinic visits per year among participants exposed to access policies vs 2.5 clinic visits per year among those not exposed (Multimedia Appendix 2).

Results

This study was funded in September 2022. Between August 2023 and August 2025, we enrolled 508 participants, with an average of 36.6 (SD 44.7) days after release. The mean age at enrollment was 41.7 (SD 10.8) years. In total, 85.6% (435/508) of participants were male, 44.7% (227/508) identified as White race, 18.9% (96/508) identified as Black or African American race, and 10.8% (55/508) identified as multiple races. When asked about ethnicity, 34% (175/508) identified as Hispanic ethnicity. At enrollment, 94.1% (478/508) reported having some form of health insurance; of these, 95.4% (456/478) had Medicaid coverage. Follow-up data collection is ongoing, with data analysis anticipated to be completed in 2028.

Discussion

Anticipated Findings

People released from prison have been previously shown to have a high prevalence of poor CV health and an increased risk of CV hospitalizations after release relative to the general population [4,7,15-17]. We hypothesize that structural conditions within health care systems, including formal and informal policies, procedures, and practices, influence patterns of health care utilization and contribute to poor health outcomes, including CV hospitalizations, among people released from prison. Studies have shown that insurance coverage alone is insufficient to eliminate the need for acute care services following release [34,36,37]. We hypothesize that exposure to access-restricting health care system policies, such as insurance restrictions, negatively impact outpatient clinic visit utilization [28,34,36,37]. Furthermore, we hypothesize that the relationships between exposure to access-restricting policies and rates of acute care utilization following release are more pronounced among those with worse CV health. To test these hypotheses, in a prospective observational cohort of more than 500 people recently released from prison in Colorado, the Structural Conditions and Health After Release from Prison (SCHARP) study is measuring exposures to health care system structural conditions and how these conditions affect participants' utilization of health care services and CV hospitalizations over 12 months after enrollment. Given that the population of individuals with a history of incarceration has a significant burden of CV disease, a critical goal of our research is to identify targets for future interventions to improve CV health for people released from prison.

Anticipated Study Contributions

The SCHARP study directly measures exposure to health care system structural conditions that may influence health disparities. Although the influence of individual factors, such as experiences of discrimination, on health disparities has been widely examined, few studies have focused on measuring system-level practices and policies that impact health care disparities [54,91-94]. Our prior work and others have highlighted health care system structural conditions that may influence health for people released from prison, including access practices (eg, limiting or restricting access for Medicaid patients), transition services (eg, use of peer navigators), culture (eg, training or programs focused on formerly incarcerated), support of social determinants of health (eg, offering housing assistance), and specialized services (eg, support of behavioral health) [1,23,24,29,43-52]. Prior interventions aimed at improving the health of people released from prison have largely been directed at individuals or focused on specific populations (eg, those with substance use disorders), with few targeting interventions at the health care system level [95,96]. To develop effective interventions for health care systems, the first step is understanding how exposure to different health care system structural conditions influences postrelease health care utilization. Our study is among the first to directly assess structural conditions that limit or facilitate health care utilization among people released from prison, with the aim of informing future interventions [4,38,43].

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Strengths and Limitations

In this prospective cohort study, we measure exposure to health care system structural conditions among people released from prison and collect prospective health care utilization data using the linked Colorado APCD. Our detailed CV health measures include (1) BMI, (2) blood pressure, (3) lipids, and (4) blood glucose, as well as assessments of (5) nicotine use, (6) diet, (7) physical activity, and (8) sleep via short surveys. Given these strengths, we will be able to examine how exposure to the measured structural conditions affects subsequent health care utilization and how these relationships are modified by CV health.

Limitations of our study include the setting of a single state. Colorado has automated Medicaid enrollment (ie, utilization outcomes will be less influenced by lack of insurance) and diverse health systems. Similar to other states, the population of people incarcerated in Colorado is overrepresented by minority racial groups. Additional limitations include the inability to examine structural conditions beyond those measured, link exposure to structural conditions to specific health systems, and capture utilization outside the Colorado APCD.

Future Directions

We anticipate that this research will contribute to the development of resources for health care systems to better meet the needs of communities, which include people released from prison [28]. The resources will include strategies to address the needs of people with a history of incarceration through changes in health care system policies and practices. We plan to include a national expert perspective so that the resources we adapt and develop have greater applicability beyond Colorado. Our final package of resources will be disseminated.

Beneficial health care system structural conditions may be applicable beyond people released from prison. For example, exposure to peer or patient navigators has been shown to improve health care access among vulnerable patient populations and people with chronic conditions, yet the literature demonstrating that exposure to peer or patient navigators improves outcomes such as utilization is more limited [97,98]. Our study takes a key step toward understanding which conditions within health care systems are associated with utilization and CV outcomes to inform future interventions to improve CV health.

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Data Availability

Although all identifiers will be removed from the final dataset, there remains a risk of deductive disclosure for individuals with uncommon characteristics. In addition, the study involves potentially vulnerable people—individuals with a history of incarceration. Accordingly, data and accompanying documentation will be shared only under a formal data use agreement that requires the following: (1) use of the data solely for research purposes and prohibition of any attempts to identify participants, (2) implementation of appropriate data security measures, and (3) destruction of the data upon completion of analyses. The agreement will also ensure that the proposed analyses are appropriate for the study design and available data.

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Generative AI Use

The authors declare the use of generative AI (GenAI) in the research and writing process. According to the Generative AI Delegation Taxonomy (GAIDeT) taxonomy (2025), the following tasks were delegated to GenAI tools under full human supervision [99]: literature search and systematization, proofreading, and editing. The GenAI tools used were Google Gemini (3; Google) and Microsoft Copilot (GPT-5.6; Microsoft). Responsibility for the final manuscript lies entirely with the authors. GenAI tools are not listed as authors and do not bear responsibility for the final outcomes.

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Authors' Contributions

SLD, MAF, MAM, RH, KJN, SRM, IVB, MNC, and IAB made substantial contributions to the conception and design of the work, the development of the survey instruments and analysis plans, and the drafting and revision of the work.

Conflicts of Interest

SLD is supported by grants from the National Institutes of Health and Kaiser Permanente Colorado. SLD receives royalties from Wolters Kluwer for authoring educational content in UpToDate unrelated to this project. IAB is supported by grants from the National Institutes of Health and receives royalties from Wolters Kluwer for educational content in UpToDate on the clinical care of adults during incarceration. All other authors declare no other conflicts of interest.

Multimedia Appendix 1

Life's Essential 8 metrics, the method of measurement, and cardiovascular health points.
[DOCX File , 32 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Detectable effect sizes for primary outcomes with 80% power across different exposure prevalences and rates of 12-month linked claims data availability.
[DOCX File , 29 KB-Multimedia Appendix 2]

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Abbreviations

APCD: All Payer Claims Database
CAB: community advisory board
CV: cardiovascular
DASH: Dietary Approaches to Stop Hypertension
HIPAA: Health Insurance Portability and Accountability Act
ICD-10: International Classification of Diseases, 10th Revision
LE8: Life's Essential 8
SCHARP: Structural Conditions and Health After Release from Prison

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