

# CESTRR

Coordinated Entry System Triage Tool Research and Refinement



# CESTRR

Coordinated Entry System Triage Tool Research and Refinement

## Table of Contents

<b>1. Executive Summary</b> . . . . .	<b><u>1</u></b>
<b>2. CESTRR Project Overview</b> . . . . .	<b><u>13</u></b>
<b>3. Community Engagement Strategy</b> . . . . .	<b><u>23</u></b>
<b>4. How to Improve the Wording of the Tool</b> . . . . .	<b><u>30</u></b>
<b>5. How to improve Tool Administration</b> . . . . .	<b><u>35</u></b>
<b>6. Data Science Insights to improve the VI-SPDAT Assessment Tool</b> . . . . .	<b><u>43</u></b>
<b>7. The Pilot Study to Assess the Feasibility and acceptability of the Assessment and Administration Changes</b> . . . . .	<b><u>55</u></b>
<b>8. Changes to Scoring and Prioritization and Scoring of Revised Triage Tool</b> . . . . .	<b><u>71</u></b>
<b>9. Policy Design with Machine Learning and Optimization Methods</b> . . . . .	<b><u>74</u></b>
<b>10. Directions for Future Research</b> . . . . .	<b><u>80</u></b>
<b>Appendices:</b>	
<b>1. Revised Triage Tool</b> . . . . .	<b><u>85</u></b>
<b>2. Tool Mapping VI-SPDAT and Revised Tool</b> . . . . .	<b><u>92</u></b>
<b>3. Technical Appendix from CPL</b> . . . . .	<b><u>97</u></b>
<b>4. Technical Appendix for Proof of Concept</b> . . . . .	<b><u>109</u></b>
<b>5. History of the VI-SPDAT and CES for Context</b> . . . . .	<b><u>117</u></b>
<b>References</b> . . . . .	<b><u>126</u></b>

# CESTRR

## Coordinated Entry System Triage Tool Research and Refinement

### Acknowledgements

The Coordinated Entry System Triage Tool Research and Refinement (CESTRR) project was a three-year community-based research project. It would have been impossible to conduct this research without the dedication and commitment from our funders and community partners. While the views expressed in this report are those of the CESTRR team, this work is the product of a deep collaboration with the community. We want to thank all those who spoke to us in the various listening sessions, meetings, and forums. We listened to you and have tried to represent your values and priorities in our work. Thank you!

In particular we want to thank our funders: The Conrad N. Hilton Foundation, Home for Good Funders Collaborative, and The Homeless Policy Research Institute.

We are indebted beyond measure to our Community Advisory Board, who met with us, shared their truth, and worked diligently to help us ground this work in the needs of the community. We thank all 20 members, and want to acknowledge those CAB members who wanted to be named publicly: Tajwana Dixon, Debra Jackson, Christina Ruiz, Debra Gatlin, Jacqueline Robles, and Apolonio E. Muñoz III.

We are equally indebted to our Core Planning Group whose specific membership shifted over time, but whose commitment to the policy implications of this research was constant. Our CPG consisted of members of the following organizations: Ad Hoc Committee on Black People Experiencing Homelessness, Conrad N. Hilton Foundation, Homeless Policy Research Institute (HPRI), Los Angeles Department of Mental Health, Los Angeles Housing Services Authority (LAHSA), and United Way Home for Good.

We would also like to thank the groups we met with on an ad hoc basis throughout the project where we shared preliminary information and listened to their needs. We thank, LAHSA's Lived Experience Advisory Board, LAHSA's Homeless Youth Forum of Los Angeles, CES Policy Council, LAHSA Policy & Planning committee, Los Angeles CoC Board, Los Angeles County Homeless Deputies, Black People Experiencing Homelessness Implementation Steering Committee, Domestic Violence-HS Coalition, LAHSA's Adult System CES Matchers, and the United Way Home for Good Policy Team.

We must take time to acknowledge the commitment and contributions of the organizations who assisted us in our pilot study work: Kingdom Causes Bellflower, HOPICs, St. Joseph's Center, House of Ruth-Claremont, HYN Helpline Youth, Valley Oasis, LA Family Housing, Union Station, and the Los Angeles Department of Mental Health.

We also thank the many case managers and clients who engaged with us as participants in our research throughout the study. Your insights and experiences were vulnerable and powerful.

And finally, we want to acknowledge all those who still struggle to find stable housing in Los Angeles. This research was intended for your benefit and we hope that it will help you in your journey.

### Chapter 1. Executive Summary

#### A. Introduction

The Coordinated Entry System Triage Tool Research and Refinement (CESTRR) project was a three-year community-based research project from March 2020 to May 2023. The goal of the project was to investigate the use of triage tools within the context of the Los Angeles' Coordinated Entry System (CES) and to improve these tools, with respect to race equity. We understand that structural racism impacts housing and homelessness in Los Angeles, particularly as it impacts Black people. The goal of CESTRR was thus to research these triage tools and make recommendations as to how the tools could be changed in order to reduce bias and improve access for Black, Latinx, and other racial/ethnic minority groups; women; transgender and non-binary individuals; gay, lesbian, bisexual, queer or questioning individuals; and aging persons.

Since 2012, the U.S. Department of Housing and Urban Development (HUD) has required communities who receive funding to implement coordinated entry by standardizing assessment practices and prioritizing the most vulnerable persons to receive available housing resources (HUD, 2014; 2015a; 2015b; 2017; 2019b). In Los Angeles, the assessment tools developed by OrgCode – the VI-SPDAT, the Family-VI-SPDAT and the TAY-VI-SPDAT – were the triage tools selected. Until very recently, and up until the inception of this project, the most widely used tool for prioritizing services to persons experiencing homelessness was the VI-SPDAT. Of approximately 400 CoCs in the United States, more than 1 in 4 report implementing the VI-SPDAT (OrgCode Consulting, Inc. and Community Solutions, 2015). The tools were designed to assist communities in assessing vulnerability and assist in making decisions about prioritization. While the VI-SPDAT family of tools have been valuable for Los Angeles, early research, provider feedback, and client experience suggest that the tool and how it is utilized may need to be enhanced to better serve all populations.

Los Angeles is home to one of the largest communities of persons experiencing homelessness in the country, with an estimated 69,144 people experiencing homelessness on any given day (Greater Los Angeles Homeless Count, 2022). Additionally, while 9% of the overall population is Black, Black people represent 30% of those experiencing homelessness

(Greater Los Angeles Homeless Count, 2022). In response to this crisis, Los Angeles convened an ad hoc committee to address issues of structural racism in homelessness and housing. In December 2018, that committee released “Report and Recommendations of the Ad Hoc Committee on Black People Experiencing Homelessness,” (LAHSA, 2018). Report recommendations noted a need for research on the CES Triage Tools and how they may unequally impact Black people experiencing homelessness. These recommendations were echoed by the Ad Hoc Committee on Women and Homelessness, which indicated that these tools may not be capturing the full vulnerability of particular populations. Thus, the understanding that systemic racism impacts homelessness and housing is one of the major drivers of the CESTTRR effort. The work presented in this report focuses on the tool used in the Single Adult system, as that is the largest system in Los Angeles and the tool which was identified by our community partners as being in the most urgent need of revision.

## B. Research Goals

Three goals for the CESTTRR project were established by Home for Good Funders Collaborative, the Homelessness Policy Research Institute (HPRI) and the Los Angeles Homeless Services Authority (LAHSA), in response to the recommendation made in the aforementioned ad hoc report: to investigate the (1) assessment, (2) administration, and (3) application of the triage tools with respect to race equity. The original call for proposals language is in bold text. Goal 1: **“ASSESSMENT – the language, length, order, and type of questions in the actual tool”** Assessment refers to the questions used, the wording of those questions, types of questions, and measure length in each of the three triage tools. Goal 2: **“ADMINISTRATION – the who, where, when, and how we survey participants.”** Tool administration thus refers to the interpersonal process between clients and providers when using the tools in practice in the field; specifically, the “who, where, when, and how” of the assessing persons experiencing homelessness. Goal 3: **“APPLICATION – how we score and what we do with data collected.”** Tool application refers to the scoring mechanism and use of the tools in the context of housing policy, along with how the responses can inform services/next steps.

**All three goals require additional work to be finalized and implemented by LAHSA and other key stake-holders.** The CESTTRR research team conducted rigorous research, informed by many community stake-holders in service of developing a new tool that reduces inequitable vulnerability assessments. Implementing our recommended changes lies in the capable hands of the community. The report does not include a plan on operationalizing the recommendations set forth and we look to system leads for contextualizing an operations plan for the recommendations based on current system functions. The report makes recommendations on how adopting a new assessment tool with new administering practices would support a more equitable approach to equitable vulnerability identification.

## C. Our Community-Based Research Method

What follows is a brief description of the Community Based Participatory method we developed for actively engaging community in the revision of the Triage Tool used in Los Angeles. We suggest that communities follow this method, or something similar if they are interested in revising the tools which they use. We think that a community-engaged process will ensure that community needs are met. We strongly encourage communities to engage in a process parallel to ours rather than use our specific tool and specific results. The voice of people with lived expertise of homelessness, the community of professionals who work on homelessness, organizational leaders in the sector, and local governments agencies should be a part of every community's local tool revision process.

We see five primary tasks in this method. Step 1 was to establish community stake holder partnerships. Step 2 was to engage in data science work to determine the accuracy and bias of the existing tool and make recommended changes based on past data. (This step may not be possible in all communities, and we suggest that step 3 and 4 may proceed without step 2, although an understanding of data-based biases is not possible without step 2). Step 3, community-driven rewriting of questions to address problems in questions related to trauma, equity, clarity, and bias. Step 4, determine with community issues in current tool administration, develop new practices, and develop new trainings around revised administration practices.

### **Step 1: Create Stakeholder Partnerships**

We describe in chapter 3 the details of how we established these groups for this project in Los Angeles. First, we created a Community Advisory Board (CAB) composed of persons with lived expertise of homelessness and direct service providers who work closely with persons experiencing homelessness. Second, we created a Core Planning Group (CPG) made up of key system-level stakeholders, including LAHSA, the Los Angeles Department of Mental Health, United Way Home for Good, the Ad Hoc Committee on Black People experiencing homelessness, and HPRI. Third, each year, the team presented work in progress at key stakeholder meetings and forums across Los Angeles (for example CES Policy Council and Los Angeles County Homeless Deputies).

The CAB was primarily composed of people with lived experience (73%), providers of homelessness services (59%), and employees of public agencies (32%). we prioritized: (1) people with lived experience of homelessness, (2) persons from populations experiencing marginalization, which included racial/ethnic minorities, gender minorities, and sexual identity minorities, and (3) representation across SPA, age, and system (i.e. Adult, Families, and Youth) as determined by existing data. We found this composition to be very useful for providing a grounded perspective in the day-to-day experiences of people living with homelessness and working in the sector.

We constituted a CPG, that was made up of about 15 persons. Members of LAHSA leadership, leaders from Department of Mental Health, leadership from the United Way Home for Good, foundation funders, members of the Ad Hoc Committee on Black People Experiencing Homelessness, and members of the USC Homelessness Policy Institute were regular participants. We also had regular convenings where preliminary results were shared with other county and city stake holder groups throughout the project (for example Homeless Youth Forum of Los Angeles, CES Policy Council, Los Angeles County Homeless Deputies, etc.). We suggest that communities interested in revising their vulnerability assessment/triage tools, establish each of these groups.

### **Step 2: Community-Informed Data Science**

A full description of this process is provided in Chapter 6. A critical part of this work is to engage regularly with the CAB and SPG as this work unfolds. Communities must decide how to assess the accuracy and bias of the existing tools. This requires linking scores to outcomes, which may be challenging. Not all desired outcomes may be available to explore based on data collected by a community. We suggest that data scientists or statisticians develop possible outcome measures in close consultation with CAB and CPG members as we did and then allow the CAB and CPG members to guide the final decisions about outcomes.

After outcomes are established, the data driven work can assess how accurate the existing tools are with respect to predicting the outcome. Likewise, the existing tools can be interrogated for bias with respect to the prediction of this outcome. Subsequently, additional data science work can be done to select which items, with what weights are needed to create the most accurate and least biased questions and scoring systems. The CAB and the CPG were shown preliminary results at several steps and asked to provide guidance around model refinement. In our case, the preliminary results were perceived by the community as too short, not inclusive of some key constructs, driving further revisions. Our process for doing this work is detailed in Chapter 6.

### **Step 3: Community-Driven Question Rewriting**

We describe in detail the work we did on this process in Chapter 4. First, we determined which questions needed to be revised. The data science team initially reduced the number of questions to 19. Then the CAB then met to work on determining which of the remaining 19 questions required revision, based on several criteria: concerns for equity, trauma experiences, sensitivity, and clarity. These criteria emerged from CAB and CPG concerns.

Then the CAB rewrote the questions that were perceived to be problematic. After which the research team compiled several question variants and asked the CAB to vote via online survey software for their preferred wording. These “winning” wordings were then compiled by the research team, who tested in role-plays the question wording with CAB members. Subse-



quent revisions were made until the CAB and research team reached consensus on revised wording.

#### **Step 4: Community-Driven Revisions to Administration Practices**

We describe in detail our process in Chapter 5. First, we gathered information from the community about what the perceived problems in existing tool administration were. We collected survey data from providers and used this to engage in discussions with our CAB to discuss these issues, we met with our CPG to discuss these issues. We also collected extensive one-on-one semi-structured interviews with service providers and persons with lived experience to discuss issues of tool administration. We then shared these results with the CAB and CPG to further refine our understanding of tool administration issues. We found surveying and in-depth interviews to be very helpful in gathering information and informing CAB and CPG discussions. We believe such methods could be augmented by or replaced by focus groups, town halls, or other community engagement strategies.

Based on the feedback from our CAB and CPG, we then developed a list of priorities in tool administration refinements. In Los Angeles, these issues focused on race equity, trauma-informed practices, gender-identity equity, and building a sense of safety and trust. The CAB, in particular, helped the team to translate findings into practice. In some cases by making specific suggestions and in other cases by role-playing and demonstrating to the team how such practices could be enacted. This led to specific areas of training and prompts built into the assessment tool to help tool administrators engage in these revised practices. We then piloted these practices with the CAB. CAB members who were providers role-played with CAB members with lived expertise and demonstrated to the research team how to conduct appropriate interviews. The team worked with the CAB to refine these practices and developed a training for case managers based on this work, which we subsequently pilot tested (see Chapter 7).

#### **Step 5: Linking Prioritization around Vulnerability to Specific Resource Allocation Policies**

The last and perhaps most challenging part of our method is how communities choose to use the revisions made to prioritization in relation to policies around resource allocation. Having a more equitable, better functioning system for assessing vulnerability does not create more housing resources. It likewise, will not change the forces of systemic racism, homophobia, transphobia or sexism that contribute to populations who experience marginalization and discrimination from disproportionately experiencing homelessness in the first place. Fair prioritization is not the same as fair allocation of resources. The revisions that we developed can ensure that equity and trauma issues are addressed in the selection of items, the wording of items, and the process of administering tools. The revisions also generate fairer, less biased, and more accurate determinations of vulnerability which can be used

to make prioritization decisions that do not disadvantage specific communities. We provide in Chapter 8 a description of how our prioritization scoring system in Los Angeles works.

Persons with lived experience, service providers, policy-makers and other community partners must determine what policies around housing allocation are to be in relation to improved prioritization practices. A fairer prioritization process will result from our method, but how that is tied to resource allocation must still be determined by specific policies, governed by local jurisdictions. A community must decide what its values are with respect to prioritization to vulnerable persons and allocation of scarce resources. PSH may be needed for people who do not score high in vulnerability and similarly, some persons who score high in vulnerability may succeed with less intensive resources such as RRH. We describe in Chapter 9 how equitable vulnerability assessment and equitable resource allocation are not the same process. Fairly identifying the most vulnerable persons, does not guarantee that resources will be allocated fairly, nor that outcomes will be achieved fairly. Communities must make hard decisions about what they value and design allocation systems accordingly. We think that vulnerability assessment is an important part of this process, but not the only factor that should be considered.

## D. Recommendations and Summary of Key Findings

In this section we summarize our recommendations for improving the assessment, administration and application of the VI-SPDAT for Adults in Los Angeles. After each recommendation, we provide a high-level summary of key research findings that motivated each recommendation. These research motivating these recommendations is detailed in the body of the report in Chapters three through nine.

**Recommendation 1:** Implement the shorter more concise version of the Revised Triage Tool based upon data science recommendations and vetting/rewording by the Community Advisory Board (CAB).

## Findings and activities that motivated this recommendation:

- ⌘ Each question was vetted, and if needed, reworded by members of our CAB.  
CAB members identified assessment items which needed to be reworded and provided suggestions for rewording those items. Most of the 19 items were reworded to increase clarity, reduce triggering of trauma, and reduce triggering of fears of stigma.
- ⌘ Considerations of race equity, trauma-informed practice, and real world experiences with the prior tool all informed the rewording. Surveys with providers who work with the VI-SP-DAT identified issues of race/ethnicity linked to the current assessment. In 2020, 45 providers, across 18 agencies were surveyed online. Almost none of the providers felt the existing tool worked “very well” for clients who identified as White (13%), Black (6%), Latinx (4%) or Native American (5%). Providers also identified several other groups for whom the VI-SPDAT did not seem to work “very well,” including: transgen-der persons, LGBTQ persons, victims of domestic violence, and person who have been trafficked.
- ⌘ The Revised Triage Tool is only 19 questions based on a data science model that predicts “adverse events” using HMIS and county ELP data. The VI-SPDAT is a long questionnaire containing 35 multiple choice questions, some of which have complicated answers. Community stakehold-ers worked to help to refine the assessment of vulnerability by helping to define an outcome by which to assess tool accuracy and bias that was measurable with exist-ing objective data. The CESTTRR research team worked with a CAB and a CPG to identify “adverse outcomes” (e.g., jail, hospitalizations, psychiatric holds, death) as definition of a measurable vulnerabili-ty outcome captured in county data records.
- ⌘ Pilot results indicate that shorter version with rewording was well received by case managers and clients who tested the revised assessment. A pilot study of the new Tri-age Tool, focused on issues of assessment revealed that the new Triage Tool is supe-rior to the existing VI-SPDAT. Nine agencies were identified as partners and 18 case managers and 49 clients were involved in testing the revised Triage Tool. Surveys with clients revealed comfort with the revised question wording. Qualitative interviews with case managers suggested that the improvements to the tool were successful. The shorter length and less awkward question wording were appreciated. 2022 pilot results indicate that shorter version with rewording was well received by case managers and clients who tested the revised assessment.

**Recommendation 2:** Implement the Revised Triage Tool’s embedded practices that incorporate race equity and a trauma-informed approach. In addition, the Revised Triage Tool: (a) should not be used as an intake, nor conducted at intake; (b) the Revised Triage Tool should be read word for word to clients, until case managers

---

are comfortable enough to make minor “off script” adjustments; (c) the tool should be administered in a private place whenever possible so as to maximize client comfort in answering personal questions.

### **Findings and activities that motivated this recommendation:**

- ⌘ Surveys with providers who work with the VI-SPDAT identified issues in tool administration. Provider survey results from 2020 indicated many problems: with race equity, a lack of trauma informed approaches, and lack of trust building in the original VI-SPDAT. Based on the same 2020 survey discussed above, more than two-thirds of providers indicated that question sensitivity introduced a serious challenge to tool administration. This was followed by cultural barriers (58%), client trust for information (52%), client understanding (50%), trauma informed (44%), language barriers (38%), racial discordance (27%), staff trust in the tool (27%), length of tool (27%), and staff understanding of the tool (21%).
  
- ⌘ Qualitative interviews with case manager and clients in 2021 described in detail problems with the existing VI-SPDAT administration and made concrete suggestions for improvements to increase equity, trauma-informed practice and trust. Based on the in-depth qualitative interview, potential improvements to the tool administration process were identified.
  
- ⌘ CAB worked with the CESTTRR team to turn these findings into embedded practices within the Revised Triage Tool. These improvements were refined with feedback from the CAB and incorporated into the new tool and included such issues as: instructions to not administer the tool at first meeting, asking the client their preferred pronouns, asking the client if they would like someone else to administer the tool, and asking the client if they need to take a break after difficult questions are asked.
  
- ⌘ Pilot study results show that both clients and case managers approved of the new tool administration processes and suggest that the Revised Triage Tool is superior to the existing VI-SPDAT. Nine agencies were identified as partners and 18 case managers and 49 clients were involved in testing the revised Triage Tool. Surveys with clients revealed comfort with the revised process of tool administration. Qualitative interviews with case managers suggested that the improvements to the tool were successful. Improved administration practices (especially check-ins with clients throughout the process) and not administering the tool at first meeting were identified as important improvements.

**Recommendation 3:** Use the new scoring system that is anchored in predicting “adverse events.”

## Findings that motivated this recommendation:

- ⌘ The new scoring system is more accurate and less biased with respect to race/ethnicity than the original VI-SPDAT scoring system.
- ⌘ **Data science techniques revealed that the existing VI-SPDAT scoring system is not accurate with respect to identifying more vulnerable people.** Using the community-defined measure of vulnerability, the current VI-SPDAT tool is not much more accurate than a random guess at predicting vulnerability.
- ⌘ **Data science techniques revealed that the existing VI-SPDAT scoring system is biased toward White clients relative to Black and Latinx clients with respect to identifying people who are vulnerable.** Using the community-defined measure of vulnerability, the current VI-SPDAT is biased toward white clients when assessing for vulnerability. This means that Black and Latinx clients generally get lower scores on the VI-SPDAT compared to White clients, even when they are more likely to experience adverse outcomes in the future.
- ⌘ **Data science techniques were able to improve upon the VI-SPDAT across three competing dimensions: (1) complexity of tool administration from the number of items; (2) accuracy of predicting vulnerability; and (3) bias by race/ethnicity when predicting vulnerability.** By re-weighting the 35 data elements on the VI-SPDAT tool, the CESTTR research team was able to produce a more accurate and less biased tool relative to the VI-SPDAT using fewer items. Because there are trade-offs across these three dimensions for improvement, the CESTTR team presented preliminary results to the CPG and the CAB for input. Based on this feedback, the CESTTR research team produced a final updated tool that included only 19 items, increased a measure of tool accuracy by 11%, and reduced race/ethnicity bias from 5.9% to 0.7% for Black clients, and 3.2% to 0.2% for Latinx clients.

**Recommendation 4:** Prioritize persons scoring higher on the new scoring system for supportive housing resources . We are NOT recommending a cut point where persons below that range are deemed *ineligible* for housing resources.

- ⌘ This tool is a vulnerability assessment not a matching algorithm. Persons with higher scores are in greater need of assistance. The vulnerability score does not directly translate to a recommendation for a specific housing intervention. As discussed above, the new scoring system is no longer biased with respect to race/ethnicity.

**Recommendation 5: Incorporate additional information with the new scoring system to determine how housing will be allocated (i.e. matching decisions).**

The Revised Triage Tool is a vulnerability assessment and NOT a housing matching tool. It assesses who is in greatest need of resources based upon vulnerability to “adverse events”. It can prioritize persons, but does not match them to interventions. It does NOT provide information as to what specific intervention or services be provided to those highly vulnerable persons.

⌘ Because different groups of people can have different average scores, even in an unbiased tool, a single cut score as the only information used to determine eligibility can not prevent bias in allocation of resources.

⌘ Additional information should be included in the decision-making process that leads to the allocation of a specific intervention to a given person.

**Recommendation 6: We suggest that communities outside of Los Angeles follow a method similar to ours to engage the community and data scientists to work collaboratively to generate a Revised Tool that addresses the needs and experiences of the community.**

⌘ We have developed a method based in deep community engagement. We worked closely with a CAB (made of persons with lived expertise of homelessness and providers of homeless services) and a CPG (made up of LAHSA, funders, and key stakeholder organizations).

⌘ Other communities undergoing a tool revision process should intentionally engage the community and people with lived experience in a meaningful process to ensure adaptations are driven by people most proximate to the issue. Our LA-based method is model for such engagement.

## E. Recommendations for Future Work

**Future Work 1: Evaluate HMIS data on a regular basis to ensure that the new Triage Tool is helping to equitably allocate housing.**

⌘ Because we have reworded questions and changed tool administration processes, people will be more forthcoming about their vulnerability.

⌘ HMIS data must be checked regularly to make sure that changes are resulting in the desired allocation of resources, especially with respect to race/ethnicity of clients.

**Future Work 2: Implement quality improvement procedures to revise the Revised Triage Tool as needed.**

⌘ We urge Los Angeles to revisit tools on a regular basis.

⌘ We feel our approach serves as a blueprint for how such future efforts could be conducted.

**Future Work 3: Create trauma-informed trainings based on our pilot work, specifically around how to deliver the Revised Triage Tool.**

⌘ We developed a training in the context of the pilot study, this training however was delivered by the research team as a pilot, a formal training that can be delivered at scale was beyond the scope of this project.

⌘ We suggest that engaging with the UCLA Prevention Center of Excellence or other organizations who specialize in trauma-informed training be consulted to create such a training program.

**Future Work 4: Create a youth tool and a family tool replicating the methods that were used to develop the Revised Triage Tool for the single adult system.**

⌘ Establish a CAB drawn from people with lived expertise of homelessness and providers of homeless services from the impacted community (i.e. Youth or Families).

⌘ Establish a CPG, made of systems leads, organizational leaders, funders or other relevant stakeholders.

⌘ Work to identify appropriate outcomes to define vulnerability for these systems with community partners. Do not assume “adverse events” is the outcome that defines vulnerability in the other two systems.

⌘ Conduct data science work with these outcomes to identify useful questions and fair scoring, as was done here with the adult tool.

⌘ Involve community in identifying problematic questions and revising them.



- ⌘ Incorporate the race-equity, trauma informed embedded practices developed here (e.g. check-ins with clients after difficult questions).

**Future Work 5: Replicate this process with other culturally unique groups that require consideration.**

- ⌘ A Spanish language version needs to be developed and piloted, with a specific Spanish-language CAB to develop language issues. This should be followed for any other language translations.
- ⌘ Some groups (e.g. Native Americans, survivors of domestic violence, Non-cisgender persons) need to engage in a process similar to the one we have developed here, so as to insure culturally appropriate adaptation of the Revised Triage Tool.
- ⌘ Establish a CAB drawn from people with lived expertise of homelessness and providers of homeless services from the impacted community (i.e. Spanish-speaking, Non-cisgender).
- ⌘ Establish a CPG, made of systems leads, organizational leaders, funders or other relevant stakeholders.
- ⌘ Work to identify appropriate outcomes to define vulnerability for these systems with community partners. Do not assume “adverse events” is the outcome that defines vulnerability in the other two systems.
- ⌘ Conduct data science work with these outcomes to identify useful questions and fair scoring, as was done here with the adult tool.

**Future Work 6: Explore optimization approaches to matching policies, which could create data-driven recommendation systems to improve the fairness of allocation of resources when using the Revised Triage Tool.**

- ⌘ Optimization algorithms can be developed that move beyond prioritization into the realm of making recommendations for fair housing allocation. These algorithms can be designed to take into account race equity and work toward fairness in the recommended allocation of resources.
- ⌘ We provide proof-of-concept analyses to show the potential for such efforts, which we believe could improve system performance and ensure fairness, in ways which simple cut scores cannot.



## Chapter 2. CESTTRR Project Overview

### A. Overview

The Coordinated Entry System Triage Tool Research and Refinement (CESTRR) project was a three-year community-based research project conducted from March 2020 to March 2023. Through the lens of race equity, the goal of the project was to investigate the use of and improvement to triage tools within the context of the Los Angeles' Coordinated Entry System (CES) and to improve these tools. We understand that structural racism impacts housing and homelessness in Los Angeles, particularly as it impacts Black people. The goal of CESTTRR was thus to research these triage tools and make recommendations to how the tools could be changed in order to reduce bias and improve access for Black people, Latinx, and other racial/ethnic minority groups; women; transgender and non-binary gender individuals; gay, lesbian, bisexual, queer or questioning individuals; aging persons; and persons who are survivors of violence.

Nationally, homelessness has reached crisis levels. Los Angeles is home to one of the largest impacted communities, with an estimated 69,144 people experiencing homelessness on any given day (Greater Los Angeles Homeless Count, 2022). Since 2012, Housing and Urban Development (HUD) has required communities who receive funding to implement coordinated entry by standardizing assessment practices and prioritizing the most vulnerable persons to receive available housing resources (HUD, 2014; 2015a; 2015b; 2017; 2019b). In Los Angeles, the assessment tools developed by OrgCode, the VI-SPDAT, the Family-VI-SPDAT and the Youth-VI-SPDAT, were the triage tools selected to be a part of CES. These tools attempt to assist communities in assessing vulnerability and assist in making decisions about prioritization.

It is critical to acknowledge that Triage Tools, such as the VI-SPDAT, are integral parts of CES, but CES is far more complex than simply Triage Tools. According to LAHSA's website, CES is the network that aligns homeless services in the County together to ensure that resources are efficiently and equitably distributed to support people experiencing homelessness. While the assessment tools collected in the context of people's CES engagement can and do impact their experience of accessing housing, these tools are but one component. We direct you to LAHSA for more details. <https://www.lahsa.org/ces/home/inaction>

Though the VI-SPDAT family of tools have been valuable for Los Angeles, early research, provider feedback, and client experience suggest that the tool and how it is utilized may need to be enhanced to better serve all populations. In particular, based on the findings and recommendations of the Ad Hoc Committee on Women and Homelessness and the Ad Hoc Committee

on Black People Experiencing Homelessness there is an understanding that this tool may not be capturing the full vulnerability of particular populations.

One of the major drivers of the CESTTRR effort is the understanding that systemic racism impacts homelessness and housing. In Los Angeles, 9% of the overall population is Black, but Black people represent 30% of those experiencing homelessness (Greater Los Angeles Homeless Count, 2022). In response to this crisis, Los Angeles convened an Ad Hoc Committee to address issues of structural racism in homelessness and housing. In December 2018, that committee released “Report and Recommendations of the Ad Hoc Committee on Black People Experiencing Homelessness,” (LAHSA, 2018). The Report noted and recommended a need for research on the CES Triage Tools and how they may unequally impact Black people experiencing homelessness. The full report can be found online here.

Understanding the importance of the survey tool and need for potential enhancement, the Home For Good Funders Collaborative partnered with the LAHSA and Homelessness Policy Research Institute to release a “CES Triage Tool Upgrade Request for Partnership” to identify a research team for a multi-year project to study and strengthen the assessment survey, administration of the tool, and application of responses.

Three goals for the CESTTRR project were established by the LAHSA, Home for Good Funders Collaborative, and the Homelessness Policy Research Institute in response to the Ad Hoc report for this research project. To investigate the assessment, administration, and application of the triage tools with respect to race equity. The original call for proposals language is in bold text. **Goal 1: “ASSESSMENT – the language, length, order, and type of questions in the actual tool”** Assessment refers to the questions used, the wording of those questions, types of questions, and measure length in each of the three triage tools. **Goal 2: “ADMINISTRATION – the who, where, when, and how we survey participants.”** Tool administration thus refers to the interpersonal process between clients and providers when using the tools in practice in the field; specifically, the “who, where, when, and how” of the assessing persons experiencing homelessness. **Goal 3: “APPLICATION – how we score and what we do with data collected.”** Tool application, refers to the scoring mechanism and use of the tools in the context of housing policy, along with how the responses can inform services/next steps.

The following specific questions were further formulated by Home for Good Funders Collaborative, the Homelessness Policy Research Institute, and LAHSA.

**Goal 1: “ASSESSMENT – the language, length, order, and type of questions in the actual tool”**

- ⌘ Does the existing tool (the VI-SPDAT) accurately assess the vulnerability of participants?

- ⌘ Does the existing tool (the VI-SPDAT) assess vulnerability of participants in a way that is biased by race/ethnicity? In particular, is the tool less accurate for Black and Latinx participants?
- ⌘ How can we increase accuracy of responses by using alternative wording of questions? In particular, can the questions be rewritten or changed to better address equity, stigma and trauma?
- ⌘ Knowing that the current length of the survey can lead to incomplete surveys, can we create a shorter survey that retains or even improves the potential accuracy of assessing vulnerability?

**Goal 2: “ADMINISTRATION – the who, where, when, and how we survey participants.”**

- ⌘ What can administrative data tell us about who and when persons are assessed with the current VI-SPDAT? Are there potential race inequities which need to be examined?
- ⌘ What processes in survey administration best promote participant engagement and response accuracy? (i.e., who is administering the survey, when it is administered, how it is administered, and the space it is administered in)?
- ⌘ How can tool administration processes be improved in such a way as to increase client trust, reduce race inequity in engagement, and be more trauma-informed?

**Goal 3: “APPLICATION – how we score and what we do with data collected.”**

- ⌘ What should the role of the tool be? How should the responses/score from the survey be used in relation to other available information, such as regional case conferencing and validated County data? Are there ways the tools should not be used in assessing acuity and connecting participants to housing and services?
- ⌘ Given potential problems in housing allocation that rely too heavily on score alone, are there ways to re-imagine data-driven matching processes which are not score-based?

All three goals require additional work to be finalized and implemented by LAHSA and other key stakeholders, not the CESTTRR research team, although we will provide recommendations based on the findings of our research.

## B. Background/History

### The Coordinated Entry System and Triage Tools in Los Angeles

According to LAHSA, the Los Angeles County CES “facilitates the coordination and management of resources and services throughout the crisis response system.” (LAHSA, 2022 <https://www.lahsa.org/news?article=332-coordinated-entry-system-policies>) Moreover, they state that the “Los Angeles County CES works to equitably connect people experiencing homelessness in the community to available housing and supportive services.” As such, CES is much broader in its scope than the triage tools which are the focus of this research project. Understanding the basic history of CES in Los Angeles, however, is needed to contextualize our work.

Los Angeles began the creation of its CES in 2010. As LAHSA states, this work was done to “create a real-time list of individuals experiencing homelessness in our communities, and a means to efficiently and equitably match people to available housing resources and services that best fit their needs.” (LAHSA, 2022 <https://www.lahsa.org/ces/home/about/>). Initially, the CES was a series of pilots conducted in Los Angeles’ Skid Row area. By 2014, CES had been adopted across all eight of the Los Angeles Service Planning Areas (SPAs). As it operates today, CES is broken down into three unique systems. As it operates today, CES is organized into three population systems: adults, families with children, and youth. Each population system relies on regional leadership within each of the eight Service Planning Areas (SPAs).

LAHSA provides a thorough history and description of the Los Angeles County CES on their website. We highly recommend that readers interested in understanding more fully the context in which the triage tools are used in Los Angeles go there for [additional information](#).

### OrgCode Backed Away from the VI-SPDAT in late 2020

Until very recently, and up until the inception of this project, the most widely used tool for prioritizing services to persons experiencing homelessness was the VI-SPDAT. In December 2020, OrgCode announced that Continuums of Care (CoCs) should phase out the VI-SPDAT and that it should be replaced by something better. Their rationale for this announcement and decision is detailed on [their website](#). Here, we quickly summarize their three primary points. First, they point out that they worked with partners to create a tool to replace past approaches dedicated to first come first serve, good (or bad) luck, or housing as a reward for good behavior. The VI-SPDAT was intended to assist communities in a more fair, transparent distribution and allocation of limited resources. Second, they cite a disconnect between their intended tool administration practices (i.e., who should administer, when should it be administered, linked to what contexts) and how communities operationalized tool administration in practice. Third,

they believe that debates over the merits of the VI-SPDAT as a specific tool are a distraction from the more important goal of housing individuals.

Orgcode addressed many other concerns, but two additional issues they raise are worth mentioning in the context of the CESTTRR project. First, OrgCode is deeply concerned about race equity and systemic racism and encourages communities to address these issues. Second, they encourage communities to take ownership of the triage tool process and select the tool and approach to using that tool that works best for that community as determined by that community. We agree and hope that the work of the CESTTRR project will assist Los Angeles in using a revised triage tool, revised tool administration practices, and revised scoring system to prioritize the most vulnerable persons in a way that is not biased with respect to race.

In response to OrgCode's retreat from the VI-SPDAT, a new dialogue about triage tools has emerged. Perhaps the most cogent statement of the ideas which could drive community decisions about triage tools has come from Marybeth Shinn and Molly K. Richard, published in March 2022 in the *American Journal of Public Health* (Shinn & Richard, 2022). They argue that there are several issues that need to be addressed.

First, most communities want to use triage tools to assess risk and prioritize resources accordingly, but there has been little agreement as to how to define risk. Part of the problem is that while preventing homelessness may be a clear outcome of interest for homelessness prevention services, what the expected outcomes or risks to be avoided are unclear in many other services.

Second, they argue that it is not clear who should get services first. Yes, there seems to be agreement that those at highest risk should get services but other values come into play. For example, the successes in housing veterans from 2010 to 2019 is the result of a value-based policy to prioritize veterans for housing resources.

Third, they point out that communities must still determine what resources go to which individuals. The older recommendations of the VI-SPDAT, they argue, assumed that a single spectrum of service needs matched neatly onto a single spectrum of increasing service intensity. This assumption, however, they point out is not supported by the research from randomized control trials of housing interventions. They suggest that both progressive engagement strategies, which forgoes an assessment phase altogether, or using two approaches, one for assessment of priority and one for allocating interventions, both seem to offer a more sensible approach.

### **Prioritization is NOT the Same as Matching**

We believe it is important to distinguish prioritization and resource allocation (or matching). Prioritization is the process of determining which individuals should be given special

attention, or “placed at the front of the line.” Prioritization unto itself does not equate to allocation. A person with high priority may be allocated resources before a person who is of lower priority, but what those resources are is not defined by prioritization. As Shinn and Richard have pointed out, until there are sufficient resources to address the needs of all persons experiencing homelessness, once a person is designated as vulnerable or high priority, communities must still determine which of the precious few resources available to offer that person (Shinn & Richard, 2022). Thus prioritization and resource allocation are not equivalent.

Prioritization and allocation, however, have become very blurred in practice. In many communities across the country we have observed that persons who are of high priority (as determined by a VI-SPDAT score of 8 or more) are often allocated Permanent Supportive Housing (PSH) (Petry et al., 2021) and that persons of lower priority (as determined by a VI-SPDAT score of less than 8) are allocated Rapid Rehousing (RRH, as of 2023 LAHSA has begun to use Time Limited Subsidies. In this report we use RRH as it was the term at the time of the research.) or no resources. This allocation process, however, is not logically tied to prioritization. It is entirely possible that persons who score high on a vulnerability tool like the VI-SPDAT and are thus deemed high priority could succeed with RRH, which we have also observed (Petry et al., 2021). **Designating someone as high priority with a tool does not lead to an automatic decision as to what resources or interventions that person may need.**

### **COVID-19’s Impact on Housing Priorities and the VI-SPDAT During the CEST-TRR Project:**

In the face of the global pandemic, LAHSA supported the creation of new temporary priorities for housing persons who might risk death due to COVID-19. The CES Policy Council adopted a formal policy to address COVID by May 2020. But actions were taken immediately, beginning in March 2020, such that by May more than 6,100 persons had been sheltered through programs such as Project Room Key (LAHSA, 2021 <https://www.lahsa.org/documents?id=5214-covid-19-ces-prioritization-policy-amended-02-24-21>).

The COVID-19 crisis impacted the CESTTRR project in two ways. First, our quantitative data analyses of HMIS data focused on the period prior to 2020, as prioritization in 2020 and 2021 was dramatically impacted by COVID-19. Second, in order to understand the impact of COVID-19 on the housing landscape in Los Angeles, we did a rapid survey with providers. The findings of this report are included as an appendix and are available online here: <https://cais.usc.edu/wp-content/uploads/2021/09/COVID-19-Report-09-02-21.pdf>

## C. Research Team

We are a diverse, highly experienced group of researchers, with a long history of work on homelessness and housing in Los Angeles. We are motivated by our desire to help improve the lives of thousands of people experiencing homelessness. This project has been an opportunity to partner with stakeholders, providers, and persons with lived expertise to bring about meaningful change. Our intention was to create a safe space where the community would partner with us in a meaningful way to work with us to improve the systems in Los Angeles. We will detail our team composition in a later section. We will also detail below the process through which we engaged community stakeholders throughout this project. These partners, particularly the CAB, the CPG, and our Pilot Study Partners (PSP), provided extensive feedback and input into this project from the outset in 2020 through to final recommendations presented here.

We would like to express our appreciation to the members of our CAB who worked closely with our team throughout the duration of our project.

Our team consisted of the following individuals who contributed to the work over the course of the last three years and to this report.



**Eric Rice, PhD** served as the Project Lead:

Professor at the USC Suzanne Dworak-Peck School of Social Work, Director of the USC Center for AI in Society. His research focuses on community-based collaborative research with persons experiencing homelessness, particularly transition age youth (TAY) and single adults. His focus has been on HIV prevention and housing interventions, with a lens of race/ethnicity and LGBTQ diversity and equity. He has designed prioritization tools, and validated them using statistical and qualitative methods. He is also a recognized community advocate. For three years, he co-chaired the West Coast Convening, a forum for about 100 providers and advocates from California, Washington, and Oregon who meet twice a year.

**Norweeta G. Milburn, PhD** served as the Lead for Community Stakeholder Engagement Team:

Research Psychologist/Professor-in-Residence, Department of Psychiatry, UCLA. Her expertise is in community-based collaborative research with persons experiencing homelessness (TAY and family-based interventions); she is a recognized expert on diversity and equity research. She leads the UCLA Center for AIDS Research Health Disparities Core and Serves on the National Alliance to End Homelessness Research Council. She has been a national leader in homelessness research, focusing on issues of race and equity since the 1980s.

**Laura Petry, MSW** supported the Community Stakeholder Engagement Team:

PhD Candidate, USC Suzanne Dworak-Peck School of Social Work, studying under Rice. Her expertise is in community-based collaborative research with persons experiencing homelessness, with a special focus on young adults, homelessness policy, and qualitative methods. She has conducted community needs assessments and extensive research on effective homeless point-in-time count methods as part of her previous work at LAHSA and Applied Survey Research.

**Hailey Winetrobe Nadel, MPH** supported the Community Stakeholder Engagement Team:

Center Operations Coordinator, USC Center for AI in Society. Her expertise is in community-based collaborative research with persons experiencing homelessness, with a focus on TAY and single adults, using quantitative and qualitative methods.

**Phebe Vayanos, PhD** served as the Lead for the USC Data Science and Computerized System Design Team:

Assistant Professor of Industrial & Systems Engineering and Computer Science, USC Viterbi School of Engineering, Associate Director of the USC Center for AI in Society. She



focuses on data-driven optimization (e.g., planning algorithms like Uber or Google Maps) and machine learning (e.g., predictive analytics like Google) with the aim to tackle decision- and policy-making problems. Since 2017, she has worked with Rice on simulation modeling of CES and assessment tool refinements that focus on enhancing equity, fairness, and eliminating racial bias.

**Bill Tang** supported the USC Data Science and Computerized System Design Team:

PhD student in Industrial & Systems Engineering, USC Viterbi School of Engineering, studying under Vayanos. He applies machine learning and optimization towards social policy issues like affordable housing and consumer credit.

**Sina Aghaei** supported the USC Data Science and Computerized System Design Team:

PhD student in Industrial & Systems Engineering, USC Viterbi School of Engineering, studying under Vayanos. He focuses on data-driven optimization (i.e., prescriptive analytics) and machine learning (i.e., predictive analytics) with the aim to tackle real-world decision- and policy-making problems.

**Janey Rountree, JD** is the Co-Lead for UCLA Data Science and Data Linkages Team:

Founding Executive Director of the California Policy Lab (CPL) at UCLA. In addition to leading CPL, she is a member of the National Alliance to End Homelessness Research Council and Deputy Director of the Homelessness Policy Research Institute. With Milburn, Von Wachter, and Blackwell, she led the effort to provide key statistical analysis support to the Ad Hoc Committee on Black People Experiencing Homelessness.

**Brian Blackwell** supported the UCLA Data Science and Data Linkages Team:

Senior Data Scientist, California Policy Lab at UCLA. He leads CPL's data science research on a wide range of projects related to homelessness in Los Angeles, with a particular focus on predictive analytics, program evaluation, and data architecture.

**Robert Santillano, PhD** is the Co-Lead for the UCLA Data Science and Data Linkages Team:

Research Director of the California Policy Lab at UCLA. He currently leads research projects related to the experience of homelessness, homelessness prevention, services for low-income families, and workforce development. His focus is on causal methods and producing actionable research for government partners in Los Angeles and across California.

**Chyna Hill, MSW, PhD** is the Lead for the USC Mixed Methods Community-Based Research Team:

Postdoctoral Researcher, USC Suzanne Dworak-Peck School of Social Work. Her expertise is in community-based collaborative research with persons experiencing homelessness (primarily TAY), and is an expert in diversity/equity research, data science methods, and qualitative methods. She designed a survey for TAY attending drop-in centers focused on the impact of discrimination on service access and needs.

**Robin Petering, PhD** Lead for Community Engagement with Persons with Lived Experience Team:

Founder and senior researcher at Lens Co, a community-engaged research and advocacy enterprise that combines scientific rigor with real-world experience. Her mission is to empower change for creating an equitable and just society through the strategic and appropriate use of data. She has extensive experience conducting quantitative and qualitative research with community partners, including hiring and training persons with lived experience as part of research teams. Much of her work has focused on issues of violence and survivors of violence.

**Hsun-Ta Hsu, PhD** is a Co-Investigator for the USC Mixed Methods Community-Based Research Team:

Associate Professor, School of Health Professions at the University of Missouri. His research focuses on community-based collaborative research with persons experiencing homelessness, and is an expert in diversity/equity research, data science methods, and qualitative methods. He has extensive experience doing work in Los Angeles with Black women, Black men, and TAY experiencing homelessness. Recently, he has helped organize efforts with the Missouri Balance of State engaging in issues of rural homelessness.

**Laura Onasch-Vera, MSW** (Project Administrator)

Project Administrator for the CESTTRR Project. Onasch-Vera has six years of experience managing homelessness-related studies, including a large HIV prevention intervention with homeless young adults with Rice, assisting with the Los Angeles youth point-in-time homeless count, and working with Petering on community engaged research and advocacy.

## Chapter 3. Community Engagement Strategy

The team was deeply committed to community engagement. We agree wholeheartedly with the recommendations LAHSA's Ad Hoc Committee on Women and Homelessness and Ad Hoc Committee on Black People Experiencing Homelessness, who both strongly recommended that any work done to address the Triage Tools used in the context of Los Angeles County's CES should involve community members and key stakeholders. We applied three strategies for community engagement. First, we created a CAB composed of persons with lived expertise of homelessness and direct service providers who work closely with persons experiencing homelessness. Second, we created a CPG made up of key system-level stakeholders, including LAHSA, the Los Angeles Department of Mental Health, United Way Home for Good, the Ad Hoc Committee on Black People experiencing homelessness, and HPRI. Third, each year, the team presented work in progress at key stakeholder meetings and forums across Los Angeles (for example Homeless Youth Forum of Los Angeles, CES Policy Council, Los Angeles County Homeless Deputies, etc.). The remainder of this chapter details how we engaged in each of these three strategies.

### Strategy 1: Community Advisory Board

The role of the CAB was to work with the research team to identify pain points associated with the tool (for both providers and clients), create best practices for tool administration, and refine the tools with trauma-informed and culturally sensitive language. As we wanted the CAB to play a primary and central role in system and tool refinements, it was important that the CAB be composed of community stakeholders who were reflective of those most impacted by homelessness.

Consequently, we deployed an intensive outreach strategy that centered people with marginalized identities and lived experience. Specifically, we wanted a CAB that reflected the diversity of the Los Angeles homeless population and service providers--youth, adults, families, people of color, LGBTQ, and varying geographic areas (SPAs). To reach these individuals, we first shared our desire to form a CAB at various community meetings and extended an invitation to members of the Lived Experience Advisory Board and Homeless Youth Forum of Los Angeles. Second, we obtained contact information for providers who distribute one or more of the CES tools and reached out to them individually. Through a series of exchanges with community members, we continuously encouraged providers who were not included on LAHSA's CES Leadership list to apply and personally extended invitations to providers from underrepresented groups. Third, we reached out to providers of homeless services who offered services targeted at intimate partner violence and/or who specialized in youth services and serving the LGBTQ community. Other outreach efforts included working with our partners who serve Native Americans, the Ad Hoc Committee on Women and Homelessness, and the

Ad Hoc Committee on Black People Experiencing Homelessness. Lastly, people who completed a CAB application were asked to nominate and provide contact information for people they thought would be a good fit. We forwarded applications to these individuals directly. Between August 7 and August 31, 2020, the CAB application was distributed to 57 people via email. We had 47 applicants. Of those 47 applicants, 21 were selected to serve on the CAB. In terms of our selection process, we prioritized:

1. Lived experience of homelessness.
2. Marginalized populations, which included racial/ethnic minorities, gender minorities, and sexual identity minorities.
3. Representation across SPA, age, and system (i.e. Adult, Families, and Youth) as determined by existing data.

The process described above created an inclusive and representative CAB composition. Most notably, our CAB was primarily composed of people with lived experience (73%), providers of homelessness services (59%), and employees of public agencies (32%). CAB members worked across the single adult (41%), youth (18%), and family systems (14%). In terms of key demographics, the CAB was predominantly composed of women (55%).

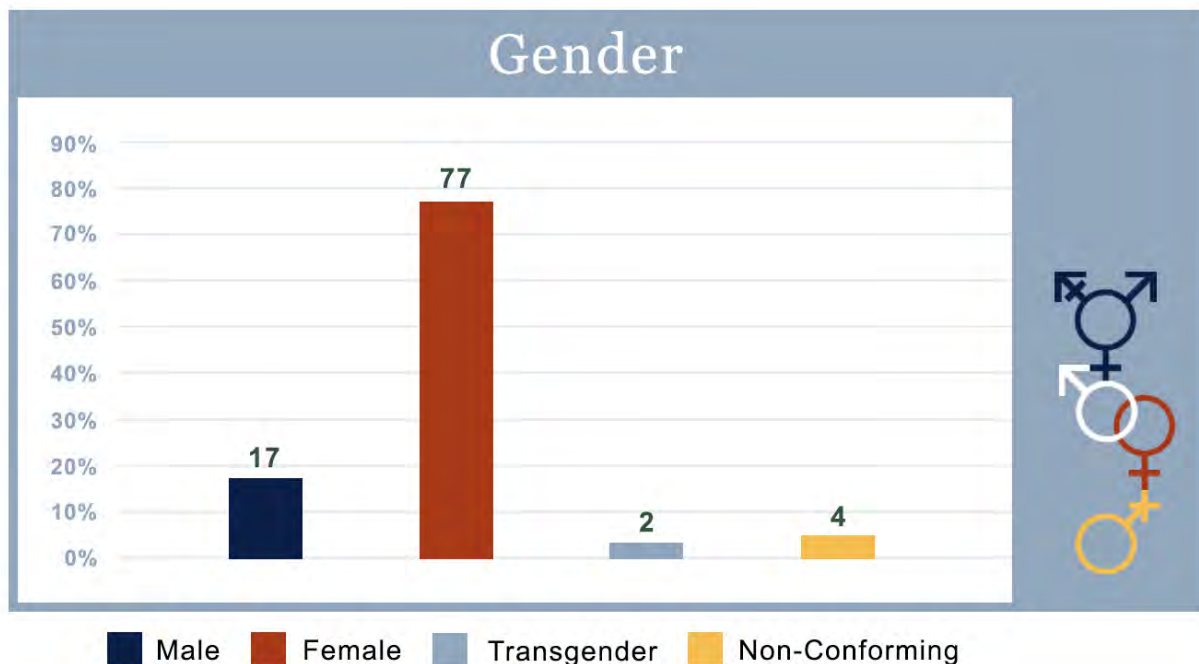


Fig. 3.1

CAB members were primarily between the ages of 26 and 49 (45%). Over 75% of CAB members identified as racial and/or ethnic minorities. Specifically, 32% of CAB members were Black, 27% were Hispanic, 18% were multiracial, and 14% were White.

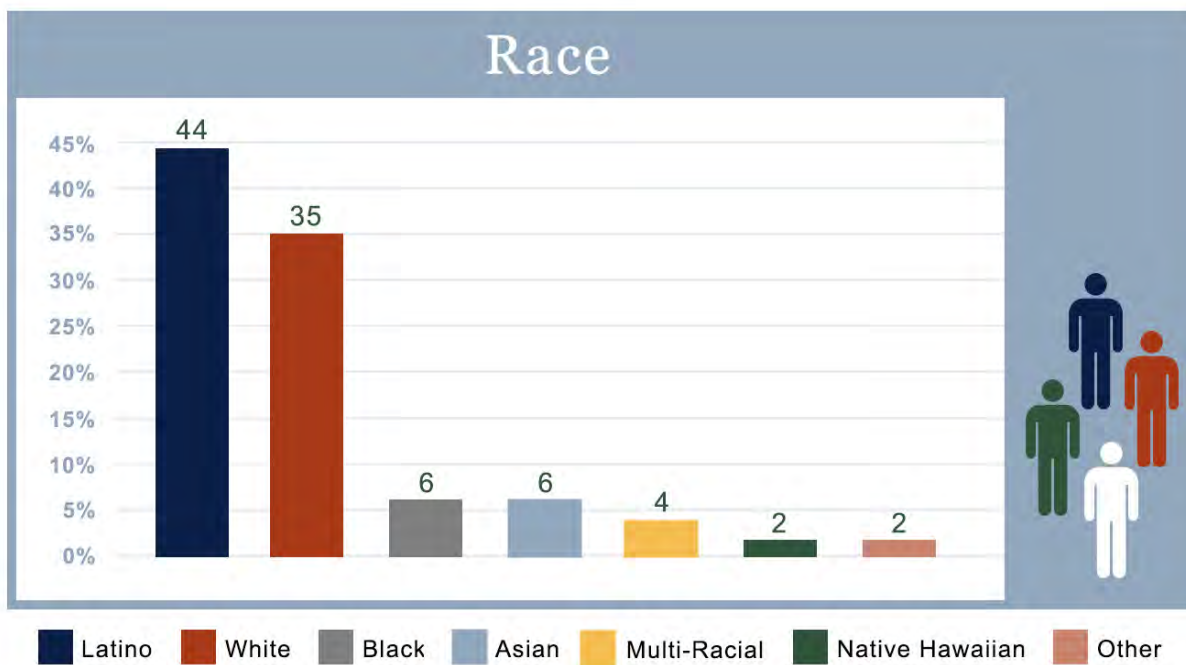


Fig. 3.2

In addition, LGBTQ people comprised 23% of the CAB and transgender people comprised 14% of all CAB members. In terms of SPA representation, 14% of CAB members worked or lived in SPA 1 (Antelope Valley), 9% worked or lived in SPA 2 (San Fernando), 9% worked or lived in SPA 3 (San Gabriel), 32% worked or lived in SPA 4 (Metro), 9% worked or lived in SPA 5 (West), 27% worked or lived in SPA 6 (South), 18% worked or lived in SPA 7 (East), and 14% worked or lived in SPA 8 (South Bay/Harbor).

Our CAB was ultimately composed of 20 members, one of whom co-chaired the group with a member of the research team. CAB responsibilities included attending virtual CAB meetings and providing feedback on issues under discussion, voicing feedback, questions, and concerns from the communities and study participants, advising in the development and implementation of study methodology and approach, and using their expertise to inform the study team about CES triage tool experiences and to evaluate the feasibility of proposed changes by the study team. The table below contains an overview of community engagement activities.

### Strategy 2: Core Planning Group

The CPG represented key policy-making stakeholders. Their input was sought on several key issues throughout the project. The CPG was convened by the research team in conjunction with the funders of the project. The organizations represented in the CPG were stable over the course of the project, but as particular individuals transitioned jobs and roles throughout the three years of the project, some changes to this group were inevitable. The research team met with the CPG on average four times per year throughout the three years of the project.

## Community Engagement Team Activities

Activity	Timeline	Description
Provider Survey	July 6, 2020 - August 14, 2020	We distributed a 78-question survey to 27 agencies (105 providers). We sent 1,050 email requests for completion. We had a completion rate of 43% (N = 45 providers).
CAB Member Recruitment	August 7, 2020 - August 31, 2020	We invited 57 providers and people with lived experience to join our CAB. We received 47 applications and 21 people were asked to join the CAB.
CAB Meeting #1	October 14, 2020	Project overview and shared preliminary results collected from provider survey. Discussed larger issues of problems and equity in tools in Los Angeles.
CAB Meeting #2	December 9, 2020	Shared preliminary findings regarding data on tool use historically in Los Angeles. Further discussion of equity and tool administration in Los Angeles.
CAB Meeting #3	February 3, 2021	More discussion of use of tools in Los Angeles, problems in current tool questions and tool process-es. Discussed having working groups that explore population specific tool issues.
Provider Survey Reports Shared with CPG	May 2021	Two reports were created and shared with Cor Planning Group, based on provider survey results.
CAB Meeting #4	June 2, 2021	Data science team led conversation about what should the tool predict? Discussed possible outcomes that could anchor results, what is available in existing data and pros and cons.
CAB Workgroup Meeting #1	June 26, 2021	CAB discussed questions on the VI-SPDAT in terms of sensitivity and desire to refine or remove.
CAB Workgroup Meeting #2	July 9, 2021	CAB discussed questions on the VI-SPDAT in terms of sensitivity and desire to refine or remove.
Provider Survey (Launch 2)	June 7, 2021 - July 23, 2021	We re-launched the provider survey to capture a wider range of participants. We received an additional 42 responses, bringing our total N to 87.



## Community Engagement Team Activities

Activity	Timeline	Description
Best Practices Interviews	June 17, 2021 - July 23, 2021	We conducted qualitative interviews with 9 clients and 21 providers about tool administration and best practices across service systems (Youth, Adults, and Families)
CAB Workgroup Meeting #3	July 24, 2021	CAB discussed questions on the NST for youth in terms of sensitivity and desire to refine or remove.
CAB Workgroup #4	August 6, 2021	CAB discussed questions on the NST for youth in terms of sensitivity and desire to refine or remove.
CAB Workgroup #5	August 9, 2021	CAB discussed questions on the VI-FSPDAT in terms of sensitivity and desire to refine or remove
Workgroup Meetings	June 26, 2021 - August 9, 2021	Between June and August 2021, we hosted 5 workgroup sessions (each session was 90 minutes in length). During this time, we worked with the CAB members to identify questions that needed to be reworded or removed.
CAB Meeting #5	October 6, 2021	Tool administration interview findings, best practices, & workgroup conclusions
CAB Workgroup Meeting #6	October 22, 2021	CAB discussed questions on the VI-FSPDAT in terms of sensitivity and desire to refine or remove
CAB Workgroup Meeting #7	October 25, 2021	CAB reviewed all of the previous tools and confirmed the desire to refine or remove specific questions.
Tool Refinement Survey Part 1	November 23, 2021	CAB members worked to rewrite specific questions on the various tools that were deemed culturally insensitive, invasive, or triggering via the previous work group sessions.
Tool Refinement Survey Part 2	November 29, 2021	CAB members voted on which version of the new questions they liked best via a survey
CAB Meeting #6	December 1, 2021	Detailed feedback on revised question wording, initial role playing of questions, and question revisions.
CAB Meeting #7	January 26, 2022	Discussion of tool administration revisions.

## Community Engagement Team Activities

Activity	Timeline	Description
CAB Meeting #8	March 23, 2022 and March 30, 2022	Feedback session on proposed tool administration process, demonstrated through role plays effective tool administration practitioners, revisions and reworking of process
CAB Meeting #9	May 18, 2022 and May 25, 2022	CAB members “piloted” revised triage tool administration in role plays, helped team refine training around administration
CAB Meeting	November 9th, 2022	Shared preliminary results from pilot study collected summer and fall of 2022

**The organizations who constituted the membership of the CPG was as follows:**

- ⌘ Los Angeles Housing Services Authority (LAHSA), which include individuals in leadership, CES policy team, data team, and others brought in on an ad hoc basis
- ⌘ Los Angeles County Department of Mental Health
- ⌘ Los Angeles County of Department of Health Services
- ⌘ Homelessness Policy Research Institute
- ⌘ United Way Home for Good
- ⌘ Hilton Foundation
- ⌘ Ad Hoc Committee on Black People Experiencing Homelessness

**The CPG was involved in key decision-making throughout the project’s duration. They were consulted on:**

- ⌘ Current policies guiding the use of triage tools in the Los Angeles County CES
- ⌘ How LAHSA was shifting policies regarding the use of triage tools
- ⌘ How COVID-19 was impacting the use of triage tools.



The CPG was also used as a place to vet the agenda for the research project and the key research questions to be addressed. The research team was committed to conducting research that would influence policy in Los Angeles and be useful to our key stakeholders and the CPG was the primary body that guided this agenda setting. For example, the focus on the VI-SPDAT used in the single adult system as the priority tool to be investigated and revised was guided by this group. Likewise, the analyses exploring the potential value of creating a “cut point” for the revised tool (Chapter 8) was requested by the CPG.

### Strategy 3: Sharing Ongoing Work with other Key Stakeholders

For the first two years of the project,

<p><b>Recurring</b></p>	<p><b>2020 presentations touched on:</b></p> <p>Overview of the CESTTRR project, introducing the research team and discussing the recruitment of the CAB</p> <p><b>2021 presentations touched on:</b></p> <p>Outcome of the CABre-cruitment, Provider Survey process and findings, Year 2 workplan, Data Science Update from CPL regarding defining outcomes.</p> <p>Ad Hoc meetings addressed specific topics or concerns brought up by the stakeholder group or requests due to the work being done by the research team:</p> <p><i>Example:</i></p> <p>Meeting with CES Matchers from various SPAs so we can share with them the work we are doing to get their input/feedback.</p>
<p>LAHSA’s Lived Experience Advisory Board</p> <p>LAHSA’s Homeless Youth Forum of Los Angeles</p> <p>CES Policy Council</p> <p>LAHSA Policy &amp; Planning committee</p> <p>Los Angeles CoC Board</p> <p>Los Angeles County Homeless Deputies</p>	
<p><b>Happened Ad Hoc</b></p>	
<p>Black People Experiencing Homelessness Implementation Steering Committee</p> <p>Domestic Violence-HS Coalition</p> <p>LAHSA’s Adult System CES Matchers</p> <p>United Way Home for Good Policy Team</p>	

# Chapter 4. How to Improve the Wording of the Tool

## Overview

**Recommendation 1:** Implement the shorter, more concise version of the Revised Triage Tool based upon data science recommendations and vetting/rewording by the CAB.

### Overview of Findings that motivated this recommendation:

- ⌘ **Finding 1:** Issues of race equity, trauma-informed practice, and real world experiences with the prior tool all informed the rewording. Surveys with providers who work with the VI-SPDAT identified issues of race/ethnicity linked to the current assessment. In 2020, 45 providers, across 18 agencies were surveyed online. Almost none of the providers felt the existing tool worked “very well” for clients who identified as White (13%), Black (6%), Latinx (4%) or Native American (5%). Providers also identified several other groups for whom the VI-SPDAT did not seem to work “very well,” including: transgender persons, LGBTQ persons, victims of domestic violence, and person who have been trafficked.
- ⌘ **Finding 2:** Each question was vetted, and if needed, reworded by members of our CAB. The CAB members identified assessment items which need-ed to be reworded and provided suggestions for rewording those items. Most of the 19 items were reworded to increase clarity, reduce triggering of trauma, and reduce triggering of fears of stigma.
- ⌘ **Finding 3:** The Revised Triage Tool is only 19 questions based on a data science model that predicts “adverse events” using HMIS and county ELP data. Community stakeholders worked to help to refine the assessment of vulnerability by helping to de-fine an outcome by which to assess tool accuracy and bias that was measurable with existing objective data. The CESTTRR research team worked with a Community Ad-visory Board (CAB) and a CPG to identify “adverse outcomes” (e.g., jail, hospitalizations, psychiatric holds, death) as definition of a measurable vul-nerability outcome captured in county data records. (Presented in Chapter 6)
- ⌘ **Finding 4:** The 2022 pilot results indicate that shorter version with rewording was well received by case managers and clients who tested the revised assessment. A pilot study of the new Triage Tool, focused on issues of assessment revealed that the new Triage Tool is superior to the existing VI-SPDAT. Nine agencies were identified as partners and 18 case managers and 36 clients were involved in testing the revised

Triage Tool. Surveys with clients revealed comfort with the revised question wording. Qualitative interviews with case managers suggested that the improvements to the tool were successful. The shorter length and less awkward question wording were appreciated. (Presented in Chapter 7).

## Detailed Findings:

⌘ **Finding 1:** Issues of race equity, trauma-informed practice, and real world experiences with the prior tool all informed the rewording. Surveys with providers who work with the VI-SPDAT identified issues of race/ethnicity linked to the current assessment. In 2020, 45 providers, across 18 agencies were surveyed online. Almost none of the providers felt the existing tool worked “very well” for clients who identified as White (13%), Black (6%), Latinx (4%) or Native American (5%). Providers also identified several other groups for whom the VI-SPDAT did not seem to work “very well,” including: transgender persons, LGBTQ persons, victims of domestic violence, and person who have been trafficked.

### Provider Survey of Perceptions of the CES Triage Tool Administration

The CESTTRR team sent the “Provider Survey” via email to every non-LAHSAs employee listed on the LAHSAs CES leadership list. The provider survey was 78 questions in length, and took approximately 20 minutes to complete. Beginning July 6th, 2020, the survey was distributed to 105 unique individuals who comprised 27 unique agencies and programs. There were 11 emails that bounced back as undeliverable (10%). Qualtrics was the platform used for data collection. The initial request provided a deadline of August 14th, 2020 for survey completion. The CESTTRR project team sent reminder emails twice a week (Mondays and Fridays) for a period of six weeks. Collectively, the CESTTRR team sent 1,050 email requests for survey completion. Service providers who completed the survey received a \$10 cash gift of their choice via Cash App, Venmo, PayPal or e-gift card for their time. Surveys were submitted by 45 providers, across 18 agencies, with a completion rate of 43%.

Of the providers who completed the survey, 44% were Latinx, 35% were White, 6% were Black, 6% were Asian, 4% identified as Mixed race/ethnicity, 2% were Native Hawaiian or Pacific Islander, and 2% identified as some other race. Most providers identified as female (77%). Almost two-thirds of providers had been with their agency for 1-3 years, and 35% of providers had been working in the homelessness field for 10 years or more.

Previous findings from the Ad Hoc Committee for Black People Experiencing Homelessness suggests that the VI-SPDAT may not work very well for Black, Indigenous, and People of Color (BIPOC). To explore this assertion further, providers of homeless services were asked to indicate how well the tool works for specific racial and ethnic groups. Responses

from providers suggest that they do not believe the tool works “very well” for anyone. While the tool works somewhat better for White people, the perceptions of tool utility for BIPOC are extremely poor. In addition to the previously mentioned, one third of providers indicated that they were unsure how well the tool works for racial and ethnic groups.

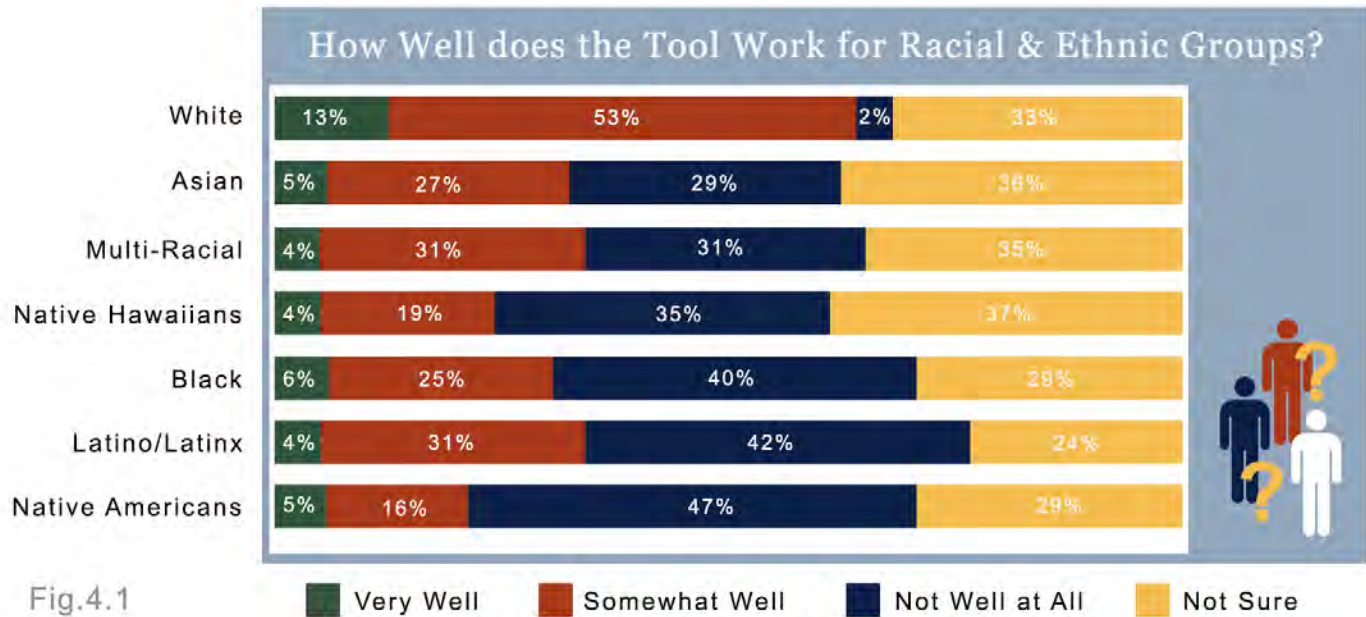


Fig.4.1

Providers of homeless services were also asked to indicate how well they believe the tool works for other marginalized groups. Once again, it is noteworthy that almost no one responded that they thought the tool worked “very well” for anyone, but relative to race and ethnicity, there is less uncertainty among other marginalized groups. Responses from providers suggest that while the tool works somewhat well for women, it does not work very well for survivors of intimate partner violence, the LGBTQ community, and survivors of human trafficking. It is interesting to note that the “not sure” response rates are lower here than in the figure that explores race/ethnicity issues.

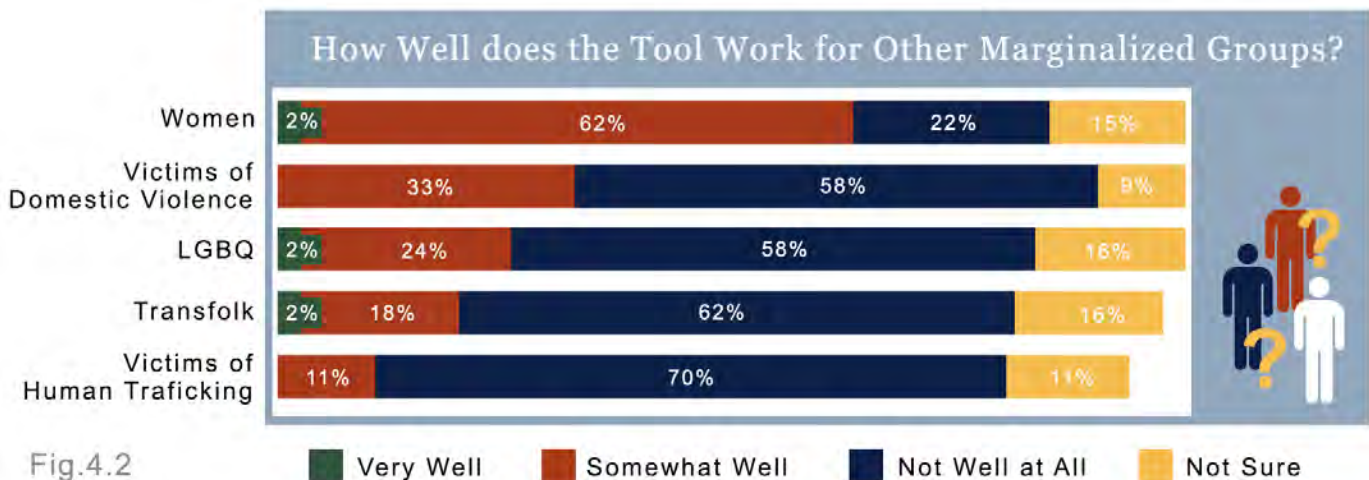


Fig.4.2

⌘ **Finding 2:** Each question was vetted, and if needed, reworded by members of our CAB. The CAB members identified assessment items which need-ed to be reworded and provided suggestions for rewording those items. Most of the 19 items were reworded to increase clarity, reduce triggering of trauma, and reduce trig-gering of fears of stigma.

The CAB, who is described in detail in Chapter 3 worked closely with the research team, vetted questions and reworded those questions. First, we determined which questions need-ed to be revised. The data science team initially reduced the number of questions to 19. Then the CAB then met to work on determining which of the remaining 19 questions required revision, based on several criteria: concerns for equity, trauma experiences, sensitivity, and clarity. These criteria emerged from CAB and CPG concerns.

Then the CAB rewrote the questions that were perceived to be problematic. After which the research team compiled several question variants and asked the CAB to vote via online survey software for their preferred wording. These “winning” wordings were then compiled by the research team, who tested in role-plays the question wording with CAB members. Subse-quent revisions were made until the CAB and research team reached consensus on revised wording.

The following chart outlines the timeline of engagement and the major tasks of the CAB in the work on question wording for the Revised Triage Tool.

Timeline of Engagement and Major Tasks of the CAB		
Activity	Timeline	Description
CAB Workgroup #5	August 9, 2021	CAB discussed questions on the VI-FSPDAT in terms of sensitivi-ty and desire to refine or remove
Workgroup Meetings	June 26, 2021 - August 9, 2021	Between June and August 2021, we hosted 5 workgroup sessions (each session was 90 minutes in length). During this time, we worked with the CAB members to identify questions that needed to be reworded or removed
CAB Meeting #5	October 6, 2021	Tool administration interview findings, best practices, & work-group conclusions
CAB Workgroup Meeting #6	October 22, 2021	CAB discussed questions on the VI-FSPDAT in terms of sensitivi-ty and desire to refine or remove
CAB Workgroup Meeting #7	October 25, 2021	CAB reviewed all of the previous tools and confirmed the desire to refine or remove specific questions



## Timeline of Engagement and Major Tasks of the CAB

Activity	Timeline	Description
Tool Refinement Survey Part 1	November 23, 2021	CAB members worked to re-write specific questions on the various tools that were deemed culturally insensitive, invasive, or triggering via the previous work group sessions
Tool Refinement Survey Part 2	November 29, 2021	CAB members voted on which version of the new questions they liked best via a survey
CAB Meeting #6	December 1, 2021	Detailed feedback on revised question wording, initial role playing of questions, and question revisions
CAB Meeting #7	January 26, 2022	Discussion of tool administration revisions
CAB Meeting #8	March 23, 2022 and March 30, 2022	Feedback session on proposed tool administration process, demonstrated through role plays effective tool administration practicers, revisions and reworking of process
CAB Meeting #9	May 18, 2022 and May 25, 2022	CAB members “piloted” revised triage tool administration in role plays, helped team refine training around administration
CAB Meeting	November 9th, 2022	Shared preliminary results from pilot study collected summer and fall of 2022

The full wording of the Revised Triage Tool in Appendix 1

## Chapter 5. How to Improve Tool Administration

### Overview

**Recommendation 2:** Implement the Revised Triage Tool's embedded practices that incorporate race equity and a trauma-informed approach. In addition, the Revised Triage Tool: (a) should not be used as an intake, nor conducted at intake; (b) the Revised Triage Tool should be read word for word to clients, until case managers are comfortable enough to make minor "off script" adjustments; (c) the tool should be administered in a private place whenever possible so as to maximize client comfort in answering personal questions

### Findings that motivated this recommendation:

- ⌘ **Finding 1:** Provider survey results from 2020 indicated many problems: with race equity, a lack of trauma informed approaches, and lack of trust building in original VI-SPDAT. Surveys with providers who work with the VI-SPDAT identified issues in tool administration. Based on the same 2020 survey discussed above, more than two-thirds of providers indicated that question sensitivity introduced a serious challenge to tool administration. This was followed by cultural barriers (58%), client trust for information (52%), client understanding (50%), trauma informed (44%), language barriers (38%), racial discordance (27%), staff trust in the tool (27%), length of tool (27%), and staff understanding of the tool (21%).
- ⌘ **Finding 2:** Qualitative interviews with case manager and clients in 2021 described in detail problems with the existing VI-SPDAT administration and made concrete suggestions for improvements to increase equity, trauma-informed practice and trust. Based on the in-depth qualitative interview, potential improvements to the tool administration process were identified. These improvements were refined with feedback from the CAB and incorporated into the new tool and included instructions to not administer the tool at first meeting, asking the client their preferred pronouns, asking the client if they would like someone else to administer the tool, and asking the client if they need to take a break after difficult questions are asked.
- ⌘ **Finding 3:** CAB worked with research team to turn these findings into embedded practices within the Revised Triage Tool

### Detailed Findings:

- ⌘ **Finding 1:** Provider survey results from 2020 indicated many problems: with race equity, a lack of trauma informed approaches, and lack of trust building in the original VI-SP-DAT.

The methods for the 2020 provider survey are detailed in Chapter 4. Here we want to focus on the findings that specifically address issues of tool administration.

Providers of homeless services were asked to identify which barriers posed the most challenges when administering the VI-SPDAT. More than two-thirds of providers indicated that question sensitivity introduces a serious challenge to tool administration. This is followed by cultural barriers (58%), client trust for information (52%), client understanding (50%), trauma informed (44%), language barriers (38%), racial discordance (27%), staff trust in the tool (27%), length of tool (27%), and staff understanding of the tool (21%).

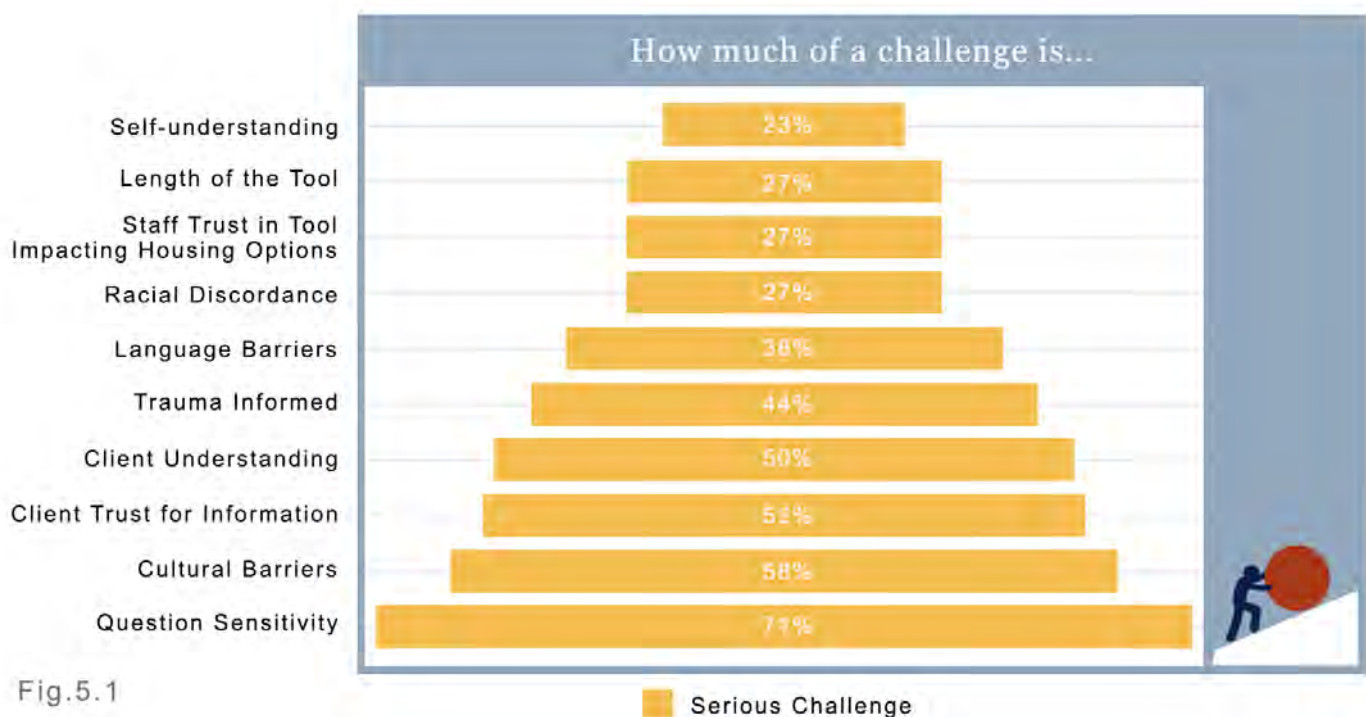


Fig.5.1

⌘ **Finding 2:** Qualitative interviews with case manager and clients in 2021 described in detail problems with the existing VI-SPDAT administration and made concrete suggestions for improvements to increase equity, trauma-informed practice and trust.

Prior to the onset of COVID-19 and the associated lockdowns, the USC Research team planned to observe live administrations of the VI-SPDAT by various providers around Los Angeles county. Unfortunately, COVID-19 restrictions hindered our ability to conduct in-person observations and as result, we elected to conduct virtual interviews via Zoom with providers of homeless services and clients who at some point in their homeless experience had been administered the VI-SPDAT. The purpose of these interviews were to explore how the VI-SPDAT was administered, barriers to administration, and generate insights on how tool administration can be improved. Provider interviews investigated the following:



- ⌘ Thoughts on the purpose of the triage tool
- ⌘ How the triage tool is administered at the provider's agency
- ⌘ How clients are engaged in order to solicit the most accurate information
- ⌘ Any trauma-informed techniques used to ask sensitive or triggering questions
- ⌘ Questions that are uncomfortable to ask clients
- ⌘ Whether the triage tool provides a clear picture of a client's risks and needs

**Client interviews assessed the following:**

- ⌘ Thoughts on the purpose of the triage tool
- ⌘ Personal experience with the triage tool
- ⌘ Whether the tool is appropriate for people who share their race or ethnicity
- ⌘ Whether the tool is appropriate for people who share their gender identity
- ⌘ Whether the tool is appropriate for people who share their sexual orientation
- ⌘ Suggestions for people who are administering the tool

**Data Collection & Analysis**

Between June 17th and July 12th, 2021, we reached out to 70 potential interviewees (as recommended by members of the CAB, LAHSA, and other study participants) via e-mail. During the outreach phase of this study, potential interviewees were contacted a maximum of 5 times. Across 70 participants, we sent 160 emails. We received 30 (20 providers and 10 clients) responses and conducted interviews between July 7th and July 23rd. We spoke to providers who, at the time of their interview, were employed by the Los Angeles LGBT Center, St. Joseph's, the Los Angeles County Department of Mental Health, HOPICS, My Friend's Place, Valley Oasis, Sanctuary of Hope, United American Indian Involvement, and Torres Martinez Tribal TANF. All interviews were conducted over Zoom with a member of the research team. Interviews lasted approximately 60 minutes. All interviews were audio-recorded and transcribed via Zoom.

For the analysis of the responses, rapid assessment procedures were used, which does not require the in-depth, time-intensive procedures of traditional grounded-theory qualitative

approaches but instead focuses on categorizing and characterizing. This approach generates key themes and issues which effectively answer research questions that guide the understanding of our core concerns regarding evaluating the administration of the existing triage tools..

Four members of the research team participated in the qualitative analysis (Hill, Rice, Onasch-Vera, and Winetrobe-Nadel). Each interview was read by two different members of the research team and main themes and sub-themes were identified. The research team then met and compared notes on themes, agreed to themes and identified quotes from the interviews which supported those themes. Across providers and clients, three central themes emerged:

- 1) Rapport-building
- 2) Culturally sensitive and trauma-informed administration practices
- 3) Additional context about purpose of the tool, availability of resources, and next steps

### **Rapport Building**

Across providers and clients, rapport-building emerged as both a critical barrier to tool administration and an area of potential improvement. Most notably, interviewees shared that tool administration often occurs during initial contact and there is little time, if any, to establish rapport or get to know each other. The providers did not think that administering the tool on the first meeting with a client was a good practice. Most notably, one provider noted,

***“I think this tool is, it goes into depth of trauma history and it’s hard to connect with youth on the first few times, even the third time some people won’t fully open up, which is absolutely understandable but the more youth easier it’ll be for them to be honest about what happened or specific answers to questions.”***

Client’s who were administered the tool upon initial contact confirmed provider sentiments above, noting,

***“I wasn’t really aware of myself taking the tool assessment when I was first being intaken. I don’t think I was aware that it was an assessment.”***

In cases where the tool has to be administered upon initial contact, providers share concerns that client responses may not accurately capture their experiences and therefore impact the overall matching process. One provider shared,

***“When people are entering a new transitional space, they could still be in shock from their last situation and not know that they’re suppressing certain details in order to be okay in that moment.”***

For providers and clients, the opportunity to build rapport is absolutely critical to tool administration but the accuracy of the matching process and appropriateness of the housing resource.

As tool administration can be lengthy and many of the questions are sensitive in nature, the inability to establish a rapport often results in discomfort and hinders a client from wanting to provide information that may be critical to providing a holistic depiction of their vulnerabilities.

***“So for me, if I know that our agency is we’re having discussions about helping a client increase their housing score, what I would do is maybe a week or two before I know that that’s going to happen, I will talk with the client about it to see how they feel about it. And then if they wanna proceed with the process, I would schedule a date and time the following week to be able to perform the CS tool with them. I will kind of briefly explain things that are going to be asked in advance so they can prepare their answers and understand things that I am going to ask them in order to help them out in the process. Because some clients are very what’s the word I’m looking for, they’re very distrusting of programs because [00:09:00] they feel like they have felt them in the past. So in order to help them moving forward, you have to re-explain why this is being done in order to build that rapport with them in order to get them to go through this process all over again. So that’s typically how I would do it. I would notify the client in advance, do it with them and then forward it over for processing afterwards.”***

Clients, especially, would like to be administered the tool by someone they have had repeated contact with and asked if they feel comfortable with the person who is administering the tool.

***“I think an intuitive way Someone would think like, oh, let’s administer it as soon as they get in. But it’s potential that the person should have, if they’re checking in to a new living space that it should be a week or more after they settle in. Because when people are entering a new transitional space, they could still be in shock from their last situation and not know that they’re suppressing certain details in order to be okay in that moment. But then I know that the assessment is sometimes taken in drop-in spaces and so I feel like an appropriate time to administer the tool would be before a therapy session or Yes. What? As soon as the person arrives. If it’s for drop-in services, but before a therapy session or before a counselor, a separate counselor can check in on the person, I think.”***

## Culturally Sensitive & Trauma-informed Administration Practices

Second, both providers and clients highlighted the absence of culturally- and trauma-informed tool administration practices. The absence of the previously mentioned sensitivity often triggers clients and prevents the accurate collection of homeless experiences. As one provider put it:

***“... I think that with some of the clients when it comes to their past, anything that has to do with their past I know that even when doing assessments with, for other assessments that I have to do and what I try and do, because this is what part of my training also is to inform a client. I just wanna let you know, I’m going to write that down if that’s okay with you. If there’s any, I’m not going to show this to anybody, this is really just for my notes. And at some point in time that’s still in your mind I can give [00:20:30] it back to you or we can put it in the shredder. Something to help them to maintain that safety within themselves and their comfortability with it.”***

To remedy the previous assertions, clients have recommended that the following be incorporated into the tool to reduce the likelihood of retraumatization:

- ⌘ Inclusion of supplemental probing questions to ensure they’re able to get the most accurate information
- ⌘ Offer the option to skip and re-visit questions as needed
- ⌘ Administer the tool in a private place
- ⌘ Assess for immediate needs (food, water, rest) and signs of discomfort

One client summarized many of these key issues, saying:

***“If any question makes you feel uncomfortable, you can absolutely say, I wanna skip this question. Or you can choose to stop the interview at any time. Your decision not to participate doesn’t result in any penalty or loss of benefits or anything else. As far as risk and discomforts there might be a couple of questions that make you feel uneasy or embarrassed, and that’s okay. Just let me know and we can skip those or you don’t have to answer those.”***

**Additional context about purpose of the tool, availability of resources, and next steps**

Lastly, clients would like to be provided more context about the purpose of the tool, avail-

ability of resources, and next steps. As one client said:

*“Yeah, sometimes when I was the program in the XXX area I felt like they were kind of lagging a bit with information. They was just kind of very lazy with it. It was just kinda like, here go this, you need to do this in order to get into the program. And I was like, did you finish it? Okay, you finished it. And then another one where I’ve been to XXX down in XXXXX area, there was a bit more hands-on with it. They had a whole meeting, it lasted a whole two hours. We talked, they wanted to know all of the answers, all type of things. You made an exit plan, all type of stuff like that. So it just depends, I guess it just depends, I guess I wanna say where you go, but also just in a demographic area as well.”*

⌘ **Finding 3:** CAB worked with research team to turn these findings into embedded practices within the Revised Triage Tool.

The Resulting Tool Administration Recommendations vetted by the CAB were:

- (1) Incorporating race-equity thinking into the process.** This can manifest in two ways: (a) asking the client if they are comfortable with the person administering the tool; and  
(b) adding additional embedded language to reassure clients they will not be penalized for answering questions that are especially sensitive in communities of color, such as those pertaining to incarceration, substance use, and mental health services.
- (2) Incorporating trauma-informed practice into the process.** This can manifest in: (a) initially taking the time to ensure the client is ready to take the assessment (e.g. not exhausted, not thirsty or hungry); and (b) asking the client if they need to take a break after difficult questions are asked.
- (3) Not administering the tool as an intake.** Currently, the existing CES Triage Tool used by Los Angeles County has three sections: an intake, the VI-SPDAT itself, and an extensive set of questions about service engagement and eligibility criteria. The revised Triage Tool should be conducted at a separate time. Inmate information should be collected prior to assessment and eligibility information should only be collected if a client is likely to receive housing assistance.
- (4) Suggestions for building rapport.** Case managers should determine when a client is ready to take the revised Triage Tool. We do NOT think this should be done at first meeting, but only after a case manager feels they have sufficient rapport with a client to administer the tool and receive honest answers to difficult questions.
- (5) Ensuring privacy.** To the extent possible, the revised Triage Tool should be conducted in a private location away from persons who could overhear the answer clients provide to these very personal questions.

These findings were reviewed at CAB meeting #5 and incorporated into the workgroup meeting moving forward.

Activity	Timeline	Description
CAB Meeting #5	October 6, 2021	Tool administration interview findings, best practices, & workgroup conclusions
CAB Workgroup Meeting #6	October 22, 2021	CAB discussed questions on the VI-FSPDAT in terms of sensitivity and desire to refine or remove
CAB Workgroup Meeting #7	October 25, 2021	CAB reviewed all of the previous tools and confirmed the desire to refine or remove specific questions
Tool Refinement Survey Part 1	November 23, 2021	CAB members worked to re-write specific questions on the various tools that were deemed culturally insensitive, invasive, or triggering via the previous workgroup sessions
Tool Refinement Survey Part 2	November 29, 2021	CAB members voted on which version of the new questions they liked best via a survey
CAB Meeting #6	December 1, 2021	Detailed feedback on revised question wording, initial role playing of questions, and question revisions
CAB Meeting #7	January 26, 2022	Discussion of tool administration revisions
CAB Meeting #8	March 23, 2022 and March 30, 2022	Feedback session on proposed tool administration process, demonstrated through role plays effective tool administration practicers, revisions and reworking of process
CAB Meeting #9	May 18, 2022 and May 25, 2022	CAB members “piloted” revised triage tool administration in role plays, helped team refine training around administration.

## Chapter 6. Data Science Insights to Improve the VI-SPDAT Assessment Tool

### Overview

**Recommendation 3:** Use the new scoring system that is anchored in predicting “adverse events.” The new scoring system is more accurate and less biased with respect to race/ethnicity than the original VI-SPDAT scoring system.

- ⌘ **Finding 1:** Data science techniques revealed that the existing VI-SPDAT scoring system is not accurate with respect to identifying more vulnerable people. Using the community-defined measure of vulnerability, the current VI-SPDAT tool is not much more accurate than a random guess at predicting vulnerability. Even so, it may still be better than a system with no tool where human decisions and perceived biases can lead to those who are less vulnerable to be identified as more vulnerable.
- ⌘ **Finding 2:** Data science techniques revealed that the existing VI-SPDAT scoring system is biased toward White clients relative to Black and Latinx clients with respect to identifying people who are vulnerable. Using the community-defined measure of vulnerability, the current VI-SPDAT is biased toward white clients when assessing for vulnerability. This means that Black and Latinx clients generally get lower scores on the VI-SPDAT compared to White clients, even when they are more likely to experience adverse outcomes in the future.
- ⌘ **Finding 3:** Data science techniques were able to improve upon the VI-SPDAT across three competing dimensions: (1) complexity of tool administration from the number of items; (2) accuracy of predicting vulnerability; and (3) bias by race/ethnicity when predicting vulnerability. By reweighting the 35 data elements on the VI-SPDAT tool, the CESTTR research team was able to produce a more accurate and less biased tool relative to the VI-SPDAT using fewer items. Because there are trade-offs across these three dimensions for improvement, the CESTTR team presented preliminary results to the CPG and the CAB for input. Based on this feedback, the CESTTR research team produced a final updated tool that included only 19 items, increased a measure of tool accuracy by 11%, and reduced race/ethnicity bias from 5.9% to 0.7% for Black clients, and 3.2% to 0.2% for Latinx clients.

### Detailed Findings:

We used data science techniques to explore the accuracy and equity of the existing tool. Subsequently, data science techniques were used to make adjustments to the VI-SPDAT so as to improve both accuracy of predictions and fairness of predictions across racial groups. This work resulted in a reduced and rescored tool to assess vulnerability.



## Goals for Data Science Work on Vulnerability Scoring

Our goal with this work was to create an updated assessment tool that could predict risk more accurately, more equitably, and more efficiently than the current VI-SPDAT. To be clear, this goal represents improvements in three dimensions that require trade-offs with each other. While the typical process for creating a risk prediction tool typically focuses on the accuracy of the tool alone—that is, its ability to distinguish between high- and low-risk participants—the CESTTRR project placed equal emphasis on the equity of the tool. The focus on equity is a direct response to the work of the Ad Hoc Committee on Black People Experiencing Homelessness. That work highlighted widespread community concerns that the current results from the VI-SPDAT are likely to be biased by race/ethnicity, and these concerns could be spread to gender and/or age.<sup>1</sup> Finally, there was a goal to simplify tool administration and remove items that did not improve the tool’s accuracy.

To accomplish this goal, we combined data science techniques with a community collaborative process that we describe here. This resulted in an updated tool that is similar to the VI-SPDAT, in that it can be administered using pencil and paper, but is more accurate in predicting risk; more equitable across race/ethnicity, gender, and age groups; and more efficient in having fewer and simpler questions.

To improve the accuracy of the tool, we trained a machine learning (ML) algorithm on historical data where outcomes could be observed. Specifically, we used 71,747 VI-SPDAT assessments completed from July 2015 through October 2018 where we were able to observe two years of outcomes after the assessment was completed. The training process assigns a point value to each question based on correlations between questions and outcomes, with the points values for each question summing to an overall risk score for each participant. The resulting scores are then compared to realized outcomes to evaluate the accuracy and equity of the tool.<sup>2</sup>

While these traditional data science methods improve the accuracy of the tool, they are not by themselves guaranteed to create an equitable tool that addresses policy goals or the needs of the community. We therefore collaborated with the community on equity and interpretability considerations at every stage of the process, including:

---

<sup>1</sup> For details and recommendations from this ad hoc committee, visit: <https://www.lahsa.org/news?article=436-lahsa-ad-hoc-committee-on-black-people-experiencing-homelessness> (last accessed 9/7/2022).

<sup>2</sup> Technically, the model is trained on a random subset of individuals while the accuracy and equity are tested on a sample of individuals that were not used to train the models. This ensures that the models are not “overfitted” to fabricate accuracy improvements. More details are provided in the technical appendix.

- ⌘ **Defining adverse outcomes.** We involved the community (the CAB and the CPG) in the definition of the adverse outcomes to be predicted—the negative events in the data that the scores are intended to measure. This was done in recognition that the choice of these outcomes can have important implications for equity.
- ⌘ **Incorporating local context.** Because the tools are already being used to assign permanent housing (i.e., RRH and PSH), we used statistical techniques to adjust the data to ensure that the updated tool is not biased by the effectiveness of these services.<sup>3</sup>
- ⌘ **Adjusting the tool to reduce bias.** We incorporated equity adjustments into the algorithm to ensure that the errors made by the new tool don't discriminate against racial/ethnic, gender, or age groups.
- ⌘ **Adjusting the final form of the tool.** Because an unadjusted ML algorithm can sometimes exclude policy-relevant questions, we incorporated community (CAB and CPG) feedback to reintegrate important questions that were not originally selected by the algorithm.

## Dataset and outcome definition

The data used in this study come from an integrated dataset in Los Angeles County that pools records across various county agencies.<sup>4</sup> One of these agencies is LAHSA, and this study used information from 71,747 VI-SPDAT assessments completed between July 2015 through October 2018 to perform the analysis. Because some individuals can be assessed more than once, this represented 54,543 unique persons.<sup>5</sup>

---

<sup>3</sup> This is a technical complexity of creating prediction models using “real world” data when housing resources are already provided to some clients. To create the updated tool, we make adjustments based on strategies to “remove” the effects of these housing resources. Details are provided in the technical appendix.

<sup>4</sup> The dataset is called the Infohub and it is maintained by Los Angeles County's Chief Executive Office. The agencies providing data that were included in this study are: the Department of Health Services, the Department of Mental Health, the Department of Public Social Services, the LAHSA, the Los Angeles Sheriff's Department, the Medical Examiner-Coroner, and Probation.

<sup>5</sup> For training and evaluating the predictive models, the data were randomly split into three partitions. Two of the three partitions (N=47,349) were used during the model development and community collaborative phases in 2021-22, with two-fold cross-validation metrics being presented during interim presentations. The third data partition (N=24,398) was held out in reserve from the outset of the project and was not used in the project until the generation of final evaluation metrics for this report in August 2022.

## Community-Engaged Process for Defining Adverse Events as an Outcome

To identify an outcome on which predictions would be made, we engaged in a community based process. Specifically, presentations were made to both the CPG and CAB on alternative options along with strengths and weaknesses related to measuring the experience of homelessness. The options under consideration relied on the integrated dataset so that the outcome measure could come from a county agency other than LAHSA. Based on that community process, the outcome variable is defined as a binary indicator for the occurrence of one or more of the following events in a two-year window following assessment: (i) emergency or inpatient visits in DHS facilities; (ii) crisis stabilization episodes in DMH facilities; (iii) justice involvement (Sheriff bookings or probation); (iv) substance use disorder diagnoses in DHS or DMH facilities; (v) death as recorded by the Medical Examiner-Coroner.

### Measuring accuracy and equity to create a revised tool

The accuracy and equity of a prediction tool represents two distinct dimensions in which a tool can be improved. For example, methods to increase accuracy might decrease equity and vice versa. For this reason, it was necessary for us to consider these two aspects for improving the tool jointly.

To determine the accuracy and equity of any tool, the specific measures of accuracy and equity need to be selected. For accuracy, the evaluation of a risk prediction tool involves comparing predicted risk scores with actually observed outcomes. While many metrics are available to evaluate accuracy<sup>6</sup>, we focus on a widely used metric called the Area Under the Receiver Operating Curve (AUC). Although no single accuracy metric captures all aspects of the performance of a risk prediction tool, the AUC provides a simple and interpretable summary of how well a tool distinguishes between low-risk and high-risk participants. For example, an AUC of 0.5 represents a prediction model that is no better than random guessing, while an AUC of 1.0 represents perfect predictions.<sup>7</sup>

Similarly, we identified a single measure of equity to assess the prediction tools. There are many different ways in which a risk prediction tool can be evaluated for equity.<sup>8</sup> Although

---

<sup>6</sup> We use the term ‘accuracy’ in the broad sense of how closely the scores relate to adverse outcomes. This should be distinguished from a more technical sense of ‘classification accuracy’ which refers to the percentage of observations correctly classified by a tool generating binary (yes/no) predictions.

<sup>7</sup> More formally, the AUC can be interpreted as follows: for any randomly selected participants  $x$  and  $y$  where  $x$  experiences an adverse outcome and  $y$  does not, what is the probability that  $x$  is assigned a higher score than  $y$ .

<sup>8</sup> See Hedden (2021) for a concise summary of typically used equity metrics and the relationships between them.

these metrics can have complicated technical definitions, the underlying idea is that even though all risk prediction tools make errors (by classifying high-risk participants as low-risk, and vice versa), those errors should not systematically discriminate against vulnerable groups (i.e., by race/ethnicity, gender, age, or other protected factors).

In general, a risk prediction tool can make two kinds of errors: false negatives (in which participants who are actually high-risk are falsely assessed as low-risk) and false positives (in which participants who are actually low-risk are falsely assessed as high-risk). Based on the current context of resources being prioritized to those who need it, we focus on false negatives because they indicate that vulnerable participants may have missed out on the chance to be prioritized for housing.

Specifically, we use the Generalized False Negative Rate (GFNR), which is a measure of false negatives applicable to a range of risk scores, which is what is produced by a prediction tool.<sup>9</sup> The GFNR can be interpreted as follows: out of every 100 participants who were actually vulnerable (i.e., experienced an adverse outcome), what percentage did the tool fail to recognize as vulnerable? If there are differences between GFNRs for different groups—for example, the GFNR for Black participants is higher than the GFNR for White participants—this indicates that vulnerable Black participants were more likely to be missed by the tool.<sup>10</sup> In other words, Black participants who are more likely to experience an outcome receive lower risk scores compared to White participants who are less likely to experience those same outcomes.

With these two measures in place, we are able to assess the accuracy and equity of prediction tools and use the results to guide the creation of a revised triage tool. Specifically, we first applied data science techniques to optimize the accuracy of a revised tool, which is reflected in higher values of the AUC. We then made adjustments to the modeling process in an effort to improve the equity of the revised tool, which is reflected in smaller gaps across race/ethnic groups for the GFNR. Importantly, as adjustments to improve equity are made, the improvements in accuracy generally decrease, which highlights the two dimensions of these measures and the accuracy-equity trade-off that is required. This was done until “meaningful” improvements in both measures could be made relative to the original VI-SPDAT. However, because we are unable to evaluate by how much these trade-offs should be made for policy, we presented results to the community through the CPG and CAB and incorporated their feedback when creating the final revised triage tool. Full technical details of this process can be found in a technical appendix.

---

<sup>9</sup> The Generalized False Negative Rate is defined formally as:  $E[1 - p \mid Y = 1]$ , where  $p$  is the predicted probability and  $Y$  is the outcome variable.

<sup>10</sup> Differences in GFNR can alternatively be interpreted as representing differences in average risk scores for participants who experience an adverse outcome. This captures the intuition that while average scores could plausibly differ between groups, they should not differ between groups who are definitively observed to be high-risk in the data.

- ⌘ **Finding 1:** Data science techniques revealed that the existing VI-SPDAT scoring system is not accurate with respect to identifying more vulnerable people. Using the community-defined measure of vulnerability, the current VI-SPDAT tool is not much more accurate than a random guess at predicting vulnerability. Even so, it may still be better than a system with no tool where human decisions and perceived biases can lead to those who are less vulnerable to be identified as more vulnerable.
  
- ⌘ **Finding 2:** Data science techniques revealed that the existing VI-SPDAT scoring system is biased toward White clients relative to Black and Latinx clients with respect to identifying people who are vulnerable. Using the community-defined measure of vulnerability, the current VI-SPDAT is biased toward white clients when assessing for vulnerability. This means that Black and Latinx clients generally get lower scores on the VI-SPDAT compared to White clients, even when they are more likely to experience adverse outcomes in the future.
  
- ⌘ **Finding 3:** Data science techniques were able to improve upon the VI-SPDAT across three competing dimensions: (1) complexity of tool administration from the number of items; (2) accuracy of predicting vulnerability; and (3) bias by race/ethnicity when predicting vulnerability. By reweighting the 35 data elements on the VI-SPDAT tool, the CESTTR research team was able to produce a more accurate and less biased tool relative to the VI-SPDAT using fewer items. Because there are trade-offs across these three dimensions for improvement, the CESTTR team presented preliminary results to the CPG and the CAB for input. Based on this feedback, the CESTTR research team produced a final updated tool that included only 19 items, increased a measure of tool accuracy by 11%, and reduced race/ethnicity bias from 5.9% to 0.7% for Black clients, and 3.2% to 0.2% for Latinx clients.

### **How accurate and equitable is the VI-SPDAT, and how much more accurate and equitable is the revised triage tool?**

We found that improvements to the VI-SPDAT were available for both accuracy and equity in a revised tool. Specifically, using our test sample, we found that the VI-SPDAT has an AUC of 0.54 while random guessing is reflected as an AUC of 0.5. After optimizing a model for accuracy only, we were able to identify a triage tool with an AUC of 0.64. Although this is far from a model with perfect predictions (that is, an AUC of 1.0), it represents a meaningful improvement. However, this improved accuracy does not yet consider equity. As we describe in the next paragraph, measures of equity for both the original VI-SPDAT and a tool optimized for accuracy maintain gaps in the GFNR that favor White participants over other race/ethnicity

groups. Therefore, we applied equity adjustments to decrease these gaps. After doing so, the final revised prediction tool we identified and presented to the CPG and CAB has an AUC of 0.60. Again, this still reflects a meaningful increase in the AUC of 11% relative to the VI-SP-DAT. Although the accuracy improvements are not drastic, they make a meaningful difference in the ability of the tool to distinguish between high and low risks: for example, 57% of the top decile of high-risk participants identified by the improved tool experienced an adverse outcome, as opposed to 49% for the VI-SPDAT.

The final revised tool also meaningfully improves equity relative to the VI-SPDAT. Our measure for equity is reflected as differences or “gaps” in the GFNR by race/ethnicity groups. However, since all tools make errors, it is useful to contextualize what values for the GFNR we should generally expect. Using a rich prediction model based on our full integrated dataset — not just the responses to the VI-SPDAT — we determined that the best possible tool would have a GFNR of 42%.<sup>11</sup> Using that as a baseline, we found that the VI-SPDAT has large and statistically significant differences in GFNRs for Black, Latinx, and Native Hawaiian/Pacific Islander participants, as shown in Figure 6. The GFNR is 54% for White participants when using the VI-SPDAT, and positive gaps are as high as 8.5%. However, once we applied the equity adjustments, we were able to identify a revised triage tool that reduced these disparities to under 1%, as shown in Figure 7.

---

<sup>11</sup> To generate this baseline, we trained a Random Forest using approximately 100 features drawn from the VI-SPDAT, participant demographics and SPA, prior HMIS contact, and prior county service utilization in health, mental health, benefits, and justice agencies. The AUC for this hypothetical model is 0.831, which represents very good performance for a predictive model in a social service setting.

<sup>12</sup> See Figure 12 [currently “Figure 12”] in the Technical Appendix for a full breakdown of GFNR disparities by race/ethnicity, gender, age, and race/gender intersection.

---



## VI-SIPDAT Results

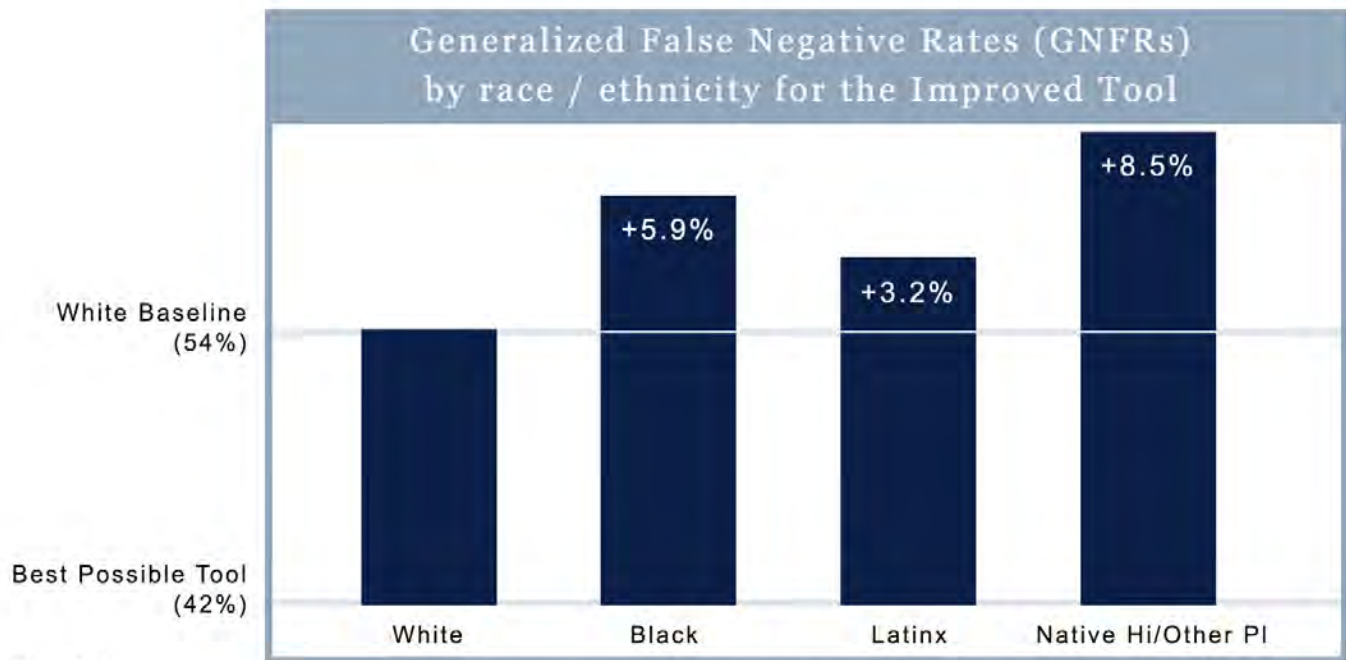


Fig.6.1

Note: No significant differences for Asian and Multiracial Groups

## Revised Tool Results

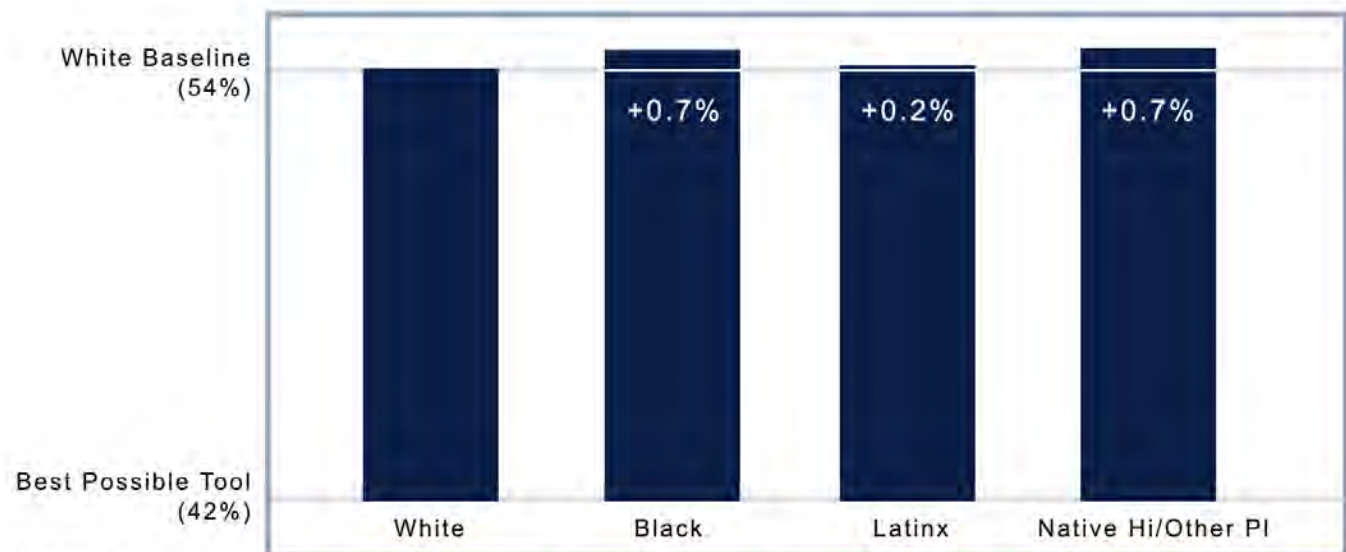


Fig.6.2

Note: Differences for Latinx and Native Hi/Other PI are no longer significant at the  $p < 0.05$  level. No significant differences for Asian and Multiracial Groups.

Overall, we were able to identify a revised triage tool that increased both accuracy (from an AUC of 0.54 to an AUC of 0.60) and equity (from GNFR gaps as high as 8.5% to GNFR gaps less than 1% across included groups). As discussed below, this was also done while using fewer items than the current VI-SPDAT.

### What questions from the VI-SPDAT are retained in the Improved Tool?

The VI-SPDAT is a long questionnaire containing 35 multiple choice questions, some of which have complicated answers. For example, some of the questions ask individuals to pre-



cisely answer questions related to the amount of time they were experiencing homelessness or the number of times they were in a certain situation (e.g. visits to an emergency room). Answering these questions precisely may be difficult and could introduce item-level measurement error that decreases their contributions for measuring general vulnerability. Further, the number and form of the questions increases administrative burden.

In response to the length of the VI-SPDAT, another goal of the data science work was to improve the efficiency of a triage tool by decreasing the number of included items. We did this in two ways. First, we allowed for simplified responses to the VI-SPDAT questions to be considered for a revised tool. For example, in addition to considering a measure of the number of times someone visited an emergency room, we also considered simple yes/no responses for whether someone ever visited an emergency room. Second, the data science techniques that were used to identify a more accurate tool also identified items that were not useful in predicting the target outcome. This allowed us to drop items without sacrificing improvements in accuracy and equity.

The full process resulted in the identification of 19 final items for the revised tool. The accuracy and equity analyses described above had initially identified only 9 items for a revised tool, but there were contextually important questions that were identified by community members in the CPG and CAB for inclusion. Unlike the more direct trade-offs between accuracy and equity made above, adding these items back to the tool does not meaningfully alter the accuracy and equity improvements that were identified. The completed improved tool can be found in Appendix 1.

Revised Triage Tool New Scoring System		
Question #	USC Reworded Question	Points Value (if answer is yes)
1	Where do you sleep most frequently? ⌘ Which park or shelter or overpass are you living in? (if answer is outside = yes)	1
2	Has it been over three months since you last lived in permanent stable housing?	3
3	Have you been unsheltered two or more times in the last three years?	1
4	4a. In the past six months, have you been to an Emergency Room for any type of service? 4b. In the past six months, have you taken an ambulance to the hospital?	1

## Revised Triage Tool New Scoring System

Question #	USC Reworded Question	Points Value (if answer is yes)
5	In the past six months, have you been hospitalized as an in-patient (this means an overnight stay and may include mental health reasons)?	1
6	In the past six months, have you used a crisis service, including sexual assault crisis, family/intimate violence, distress centers, and suicide prevention hotlines?	1
7	In the past six months, have you been detained (held, kept) for more than 24 hours by law enforcement?	5
8	8a. Have you threatened or tried to harm yourself in the last year?  8b. Have you threatened or tried to harm anyone else in the last year?	1
9	Do you have any past or current legal affairs that may hurt your ability to obtain housing? For example, you owe money to:  <ul style="list-style-type: none"> <li>⌘ Public housing authority,</li> <li>⌘ Bankruptcy,</li> <li>⌘ Eviction,</li> <li>⌘ Identity fraud,</li> <li>⌘ Other</li> </ul>	1
10	Is there any person who thinks you owe them money?  <ul style="list-style-type: none"> <li>⌘ Past landlord,</li> <li>⌘ Business,</li> <li>⌘ Bookie,</li> <li>⌘ Dealer,</li> <li>⌘ Government group (IRS)</li> </ul>	1

## Revised Triage Tool New Scoring System

Question #	USC Reworded Question	Points Value (if answer is yes)
11	In the last year has anybody forced you or tricked you to do things that you do not want to do? Answering yes to this question will not result in punishment or any negative consequences for you.	1
12	Are you 60 years old or older?	1
13	If the client is less than 60 years old: Are you currently pregnant?	1
14	<p>Is your current homelessness in any way caused by the following? Choose all that apply.</p> <ul style="list-style-type: none"> <li>⌘ Relationship that broke down</li> <li>⌘ Unhealthy or abusive relationship</li> <li>⌘ Family or friends caused you to become evicted</li> <li>⌘ Evicted because of other lease violations</li> <li>⌘ Other</li> <li>⌘ None of the above</li> </ul>	
15	<p>Has your physical health ever hindered your ability to take care of yourself resulting in having to leave an apartment, shelter program, or other place you were staying. Or would you say that your physical health makes it difficult to live self-sufficiently on your own? If yes, are you:</p> <ul style="list-style-type: none"> <li>a. Are you visually impaired</li> <li>b. Are you immobile?</li> <li>c. Do you have hearing loss?</li> <li>d. Do you have a chronic health condition? If so, what?</li> <li>e. Are you an amputee?</li> <li>f. Do you use a walker?</li> </ul> <p>Other (ask the client if they'd like to expand)</p>	1

## Revised Triage Tool New Scoring System

Question #	USC Reworded Question	Points Value (if answer is yes)
16	Would you be interested in housing resources that assist people who live with HIV or AIDS?	2
17	Do you feel or believe that in the past drinking or drugs may have created barriers to secure and maintain housing?	1
18	Ask only if the client said yes to #17: Will drinking or drug use make it difficult for you to stay housed or afford your housing? Answering "yes" to this question will not result in punishment or negative consequences for you.	2
19	Do you have medication that you choose to sell instead of taking to help support yourself financially? Answering "yes" to this question will not result in punishment or negative consequences for you.	1

# Chapter 7. The pilot study to assess the feasibility and acceptability of the assessment and administration changes

## Overview:

The Pilot Study results are critical pieces of information that led to our first two recommendations, so we repeat those recommendations here.

**Recommendation 1:** Implement the shorter more concise version of the Revised Triage Tool based upon data science recommendations and vetting/rewording by the CAB.

⌘ 2022 pilot results indicate that shorter version with rewording was well received by case managers and clients who tested the revised assessment.

⌘ A pilot study of the new Triage Tool, focused on issues of assessment revealed that the new Triage Tool is superior to the existing VI-SPDAT. Nine agencies were identified as partners and 18 case managers and 36 clients were involved in testing the revised Triage Tool. Surveys with clients revealed comfort with the revised question wording. Qualitative interviews with case managers suggested that the improvements to the tool were successful. The shorter length and less awkward question wording were appreciated.

**Recommendation 2:** Implement the Revised Triage Tool's embedded practices that incorporate race equity and a trauma-informed approach. In addition, the Revised Triage Tool: (a) should not be used as an intake, nor conducted at intake; (b) the Revised Triage Tool should be read word for word to clients, until case managers are comfortable enough to make minor "off script" adjustments; (c) the tool should be administered in a private place whenever possible so as to maximize client comfort in answering personal questions.

⌘ Pilot study results from 2022 show that both clients and case managers approved of the new tool administration processes. A pilot study of the new Triage Tool, focused on issues of assessment revealed that the new Triage Tool is superior to the existing VI-SPDAT. Nine agencies were identified as partners and 18 case managers and 36 clients were involved in testing the revised Triage Tool. Surveys with clients revealed comfort with the revised process of tool administration. Qualitative interviews with case managers suggested that the improvements to the tool were successful. Improved administration practices (especially check-ins with clients throughout the process) and not administering the tool at first meeting were identified as important improvements.

## Detailed Findings:

The aim of the pilot study was to test the feasibility and acceptability of the revised 19-item tool and the new best practice recommendations which are embedded in the revised tool. To accomplish this goal, we collaborated with 9 agencies across Los Angeles County, who provided 2 case managers who we trained to administer the pilot tool (18 total case managers). Initially, in Summer 2022, these providers then pilot tested the revised tool with 2 existing clients who had already completed the existing VI-SPDAT in the prior 12 months (36 total clients). We then conducted client satisfaction surveys with all 36 clients and in-depth interviews with 17 of the 18 case managers. After sharing the results with the CAB and CPG, our community partners requested that we return to the field to collect more data from Black persons, people over the age of 65, and transgender and/or gender non-conforming persons. We returned to the same agencies and case managers with this request. An additional 13 clients were then enrolled in the pilot in Spring of 2023, resulting in a total of 49 clients participants.

Our findings indicate that both clients and providers much prefer the revised tool and its administration procedures to the original VI-SPDAT.

(1) Incorporating race-equity thinking into the process. (2) Incorporating trauma-informed practice into the process. (3) Not administering the tool as an intake. (4) Suggestions for building rapport. (5) To the extent possible, the revised Triage Tool should be conducted in a private location away from persons who could overhear the answers as client provides to these very personal questions. See the last section of chapter 5 for a more detailed description of these changes.

### Pilot Study Methods

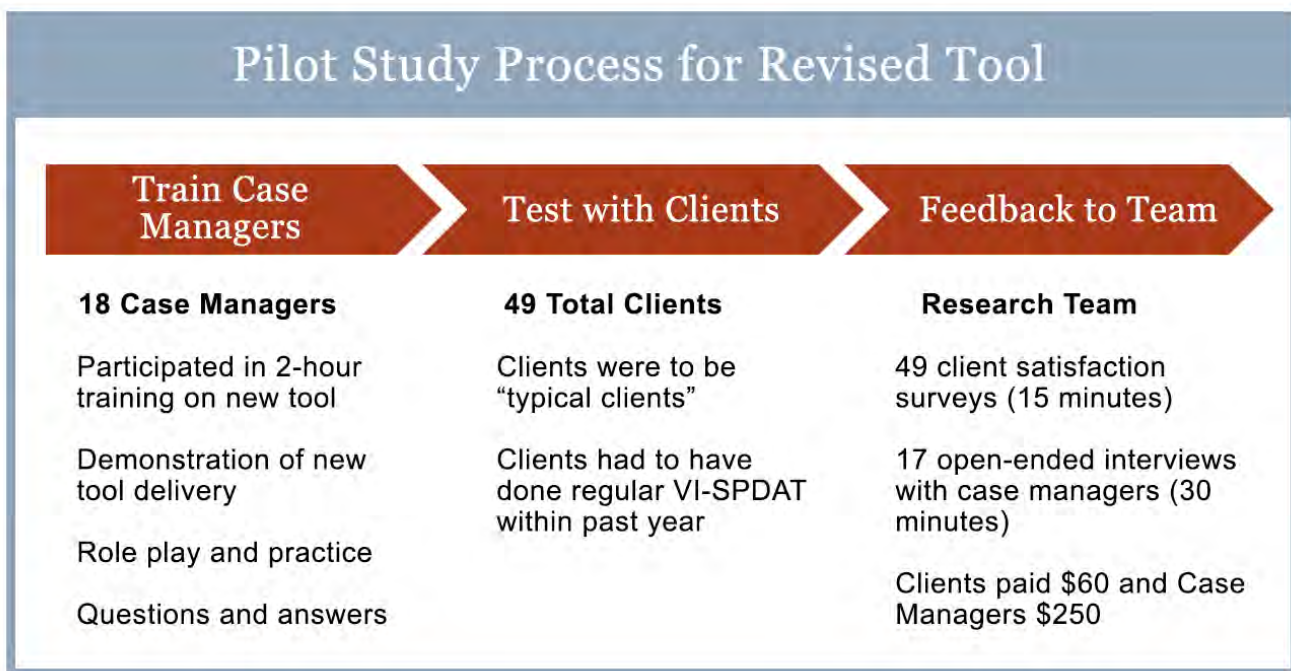
First, we identified 9 agencies to participate in our pilot study. We worked closely with the CPG, LAHSA and our CAB to identify agencies. The agencies who volunteered to participate in the pilot represent a diverse set of providers. Some agencies are larger, some small. Agencies served a diversity of populations, although we were sure to include agencies who served Black, Latinx, LGBTQ+, and survivors of domestic violence. We list here our agency partners.

- ⌘ **Los Angeles County Department of Mental Health (DMH)**
- ⌘ **Union Station**
- ⌘ **HOPICS**
- ⌘ **LA Family Housing**
- ⌘ **St. Joseph Center**
- ⌘ **Kingdom Causes Bellflower**
- ⌘ **Helpline Youth Counseling**
- ⌘ **Valley Oasis**
- ⌘ **House of Ruth Claremont**



The research team conducted a series of 2-hour trainings on tool administration best practices with the 18 homeless service providers. The training focused on: (1) reviewing the new 19-item tool, (2) reviewing best practices, (3) modeling effective delivery of the tool, (4) case manager partner role playing with research team staff observation to provide feedback and answer questions, and (5) question and answer discussion of the new tool, best practices, and process of testing the revised tool with existing clients. With the exception of the two providers from DMH, who were ineligible for participant compensation, providers were paid \$100 (\$50 per hour) for their participation in the training.

Following tool administration training, providers were given the revised VI-SPDAT to pilot with two existing clients currently experiencing homelessness. We asked that these two clients have previously taken the original VI-SPDAT within the past year. Our desire was to understand client perceptions in the differences between the original tool and our revised tool. We did not retain responses to the revised tool from clients. Providers were paid \$50 for each of their two pilot assessments conducted with clients.



Following the completion of the revised tool, the case manager with the client called a member of the research team who then conducted an anonymous client satisfaction survey, with just the client, over the phone. Surveys took approximately 15 minutes to complete. All 49 clients who participated in the pilot study completed the client satisfaction survey. Clients were paid \$50 for their participation in the revised assessment with the provider and an additional \$10 for the client satisfaction survey. Clients were paid a total of \$60 for their participation.

Providers were asked to complete a pre-test and a post-test survey. They were given a



survey before their training and again after they administered the revised tool to two clients to explore providers' perceptions of CES triage tools, assess the functionality of CES triage tools, and explore the application of CES triage tools among subgroups of the homeless population prior to the start of the pilot test and then after doing the training and administering the revised triage tool to two clients. We then conducted 20- to 30-minute individual in-depth interviews to explore provider (n=17) experiences with the revised VI-SPDAT and tool administration best practices. Providers were paid a total of \$250 for their participation in the pilot study.

### Client Satisfaction Results

Between July 27 and September 15, 2022, Los Angeles County case managers piloted the new tool to clients. Following the administration of the new tool, the community engagement team administered phone-based client satisfaction surveys (N = 36) to pilot participants. Between March 24 and April 21, 2023 and additional 13 clients were surveyed. The average survey completion time was 22 minutes. Pilot participants ranged from 22 to 70 years old. Additionally, pilot participants predominantly identified as female (55%), 8% were transgender or gender non-conforming and/or heterosexual (84%). We place in quotations the table labels that were write-in responses to gender or sexual identities. Over 86% of pilot participants identified as racial and/or ethnic minorities. Specifically, 41% of participants were Hispanic, 31% were Black, and 8% were multiracial and 6% entered write-in identities which we place in quotations in the table.

Gender	#	%	Race	#	%
Male	18	37%	Latino	20	41%
Female	27	55%	Black	15	31%
Transgender			White	7	14%
(Male to Female)	2	4%	Mixed	4	8%
"Human"	1	2%	"African"	1	2%
"Transform nonbinary"	1	2%	"Hebrew"	1	2%
			"Creole"	1	2%
Sexual Orientation	#	%	Age	#	%
Straight	41	84%	22 - 29	7	14%
Bisexual	3	6%	30 - 39	13	27%
Pansexual	3	6%	40- 49	11	22%
Lesbian			50 - 59	11	22%
"Androflexible"	1	2%	60 - 70	6	12%
			refused	1	2%

Fig. 7.1

Informed by our work with the CAB and previous research, the research team revised the new tool with culturally sensitive and trauma-informed language to accurately capture homeless experiences and the diversity of client needs. In an attempt to measure the new tool's ability to achieve this, the client satisfaction survey explored transparency, sensitivity, comprehension, and overall satisfaction in the administration and revised content of the new tool.

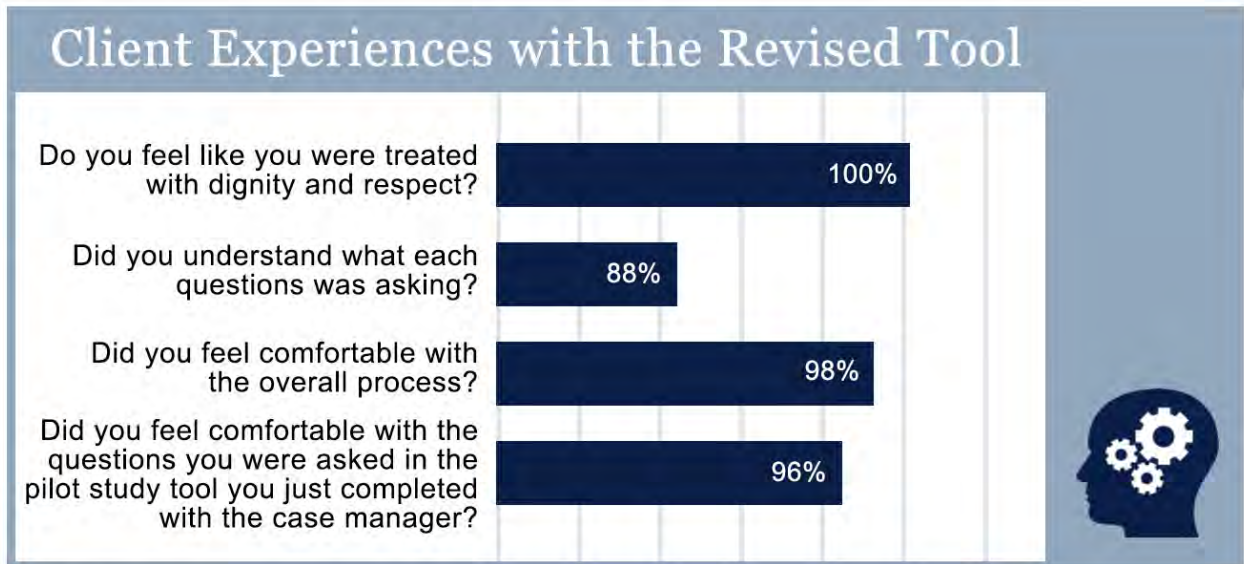


Fig.7.2

As it relates to perceptions of the revised administration process, 98% of pilot participants shared that they were comfortable with the overall process. Specifically, 94% of participants indicated that they were provided information about the pilot study tool and asked if they felt comfortable with the person who would be asking the pilot study tool questions. Furthermore, 84% of pilot participants were asked if they wanted to pause after sensitive questions and 100% of participants noted they were treated with dignity and respect during the administration process. In terms of the content included on the revised tool, almost all clients (90%)

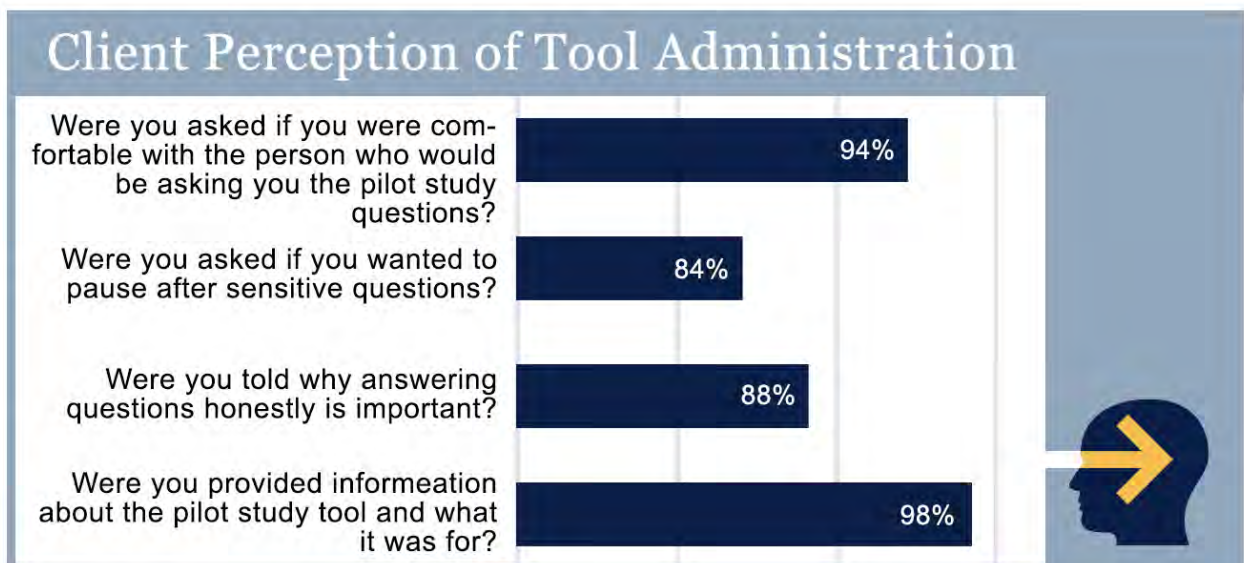


Fig.7.3

thought that the tool provided a good picture of their experiences with homelessness. Moreover, 82% of participants noted they believed the new tool provided a good background on their health and behavior and would help them get the support and resources they needed, if it were being used to help place people in housing.

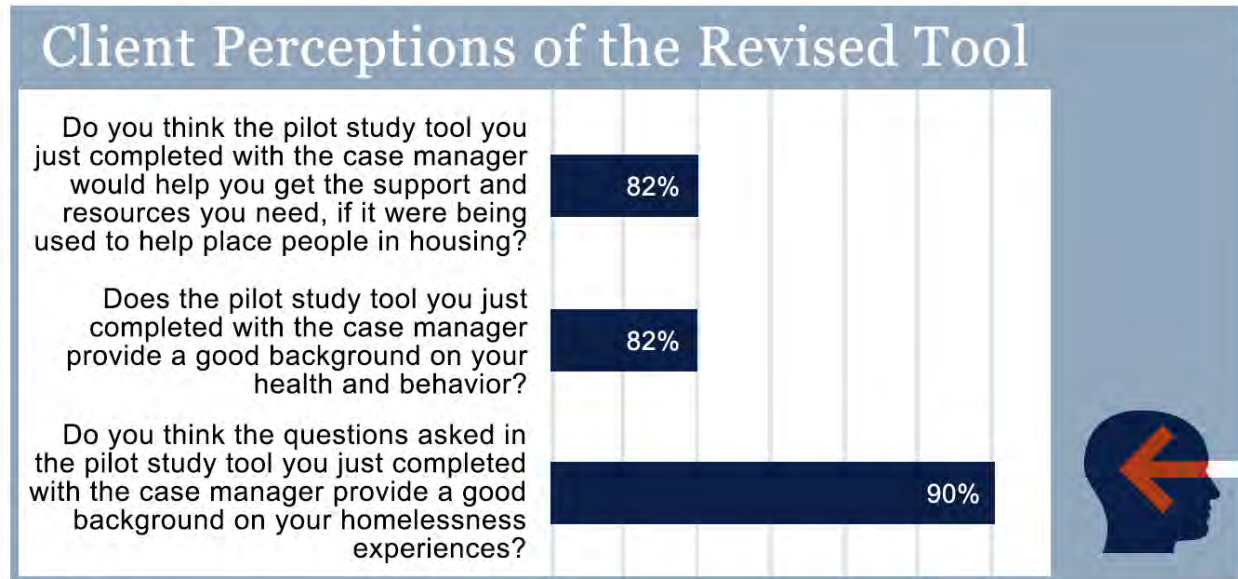


Fig.7.4

Of pilot participants who recalled completing the VI-SPDAT previously (N = 30), 55% indicated that the new tool was better. One client in particular noted, “Questions are a lot easier, faster and more understandable now.”

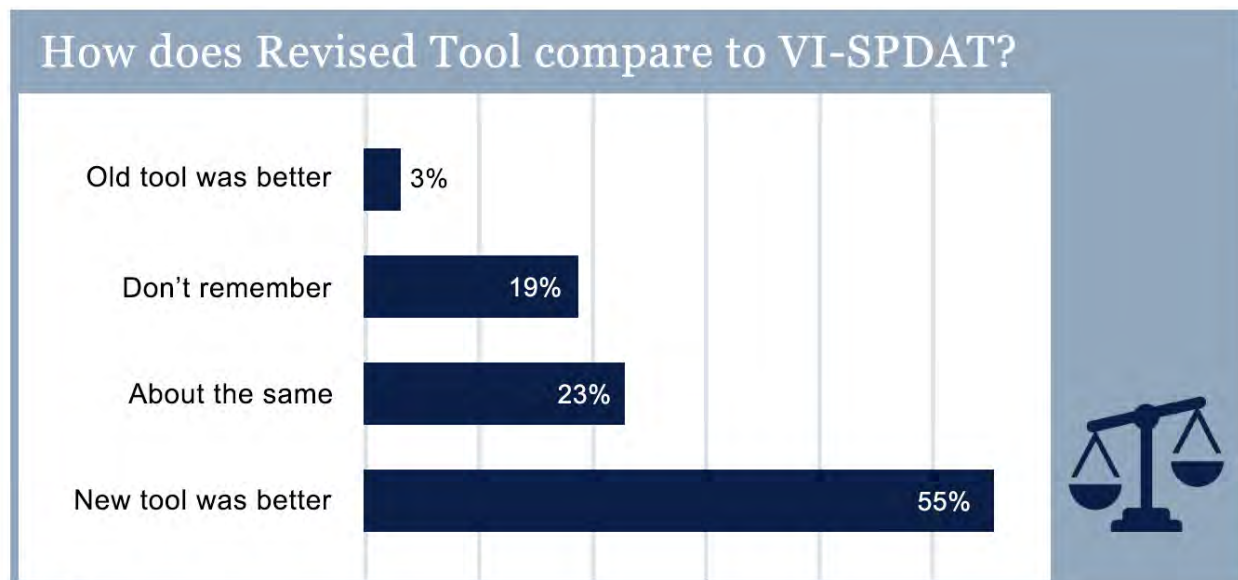


Fig.7.5

## Qualitative Interviews with Providers

A critical piece of the evaluation of the pilot study is to understand from the perspective of case managers who administer the tool, what improvements they perceive to have been made. From August to October 2022, all 18 providers who pilot tested the revised tool were invited to participate in an individual, semi-structured interview with community engagement team staff. Seventeen of the eighteen providers completed this interview. (The one case manager who did not complete the interview left the agency after administering the revised tool to two clients.)

The interviews sought to answer the following questions:

- ⌘ How long did the survey take you to complete?
- ⌘ Overall, how did you feel about administering this version of the triage tool compared to the VI-SPDAT?
- ⌘ What do you like about this new version of the tool? Please be specific.
- ⌘ What did you not like about this new version of the tool? Please be specific.
- ⌘ What improvements would you make to the new tool?
- ⌘ Did anything unique happen when administering this new version of the tool that you had not experienced before?
- ⌘ What recommendations do you have for the administration of the triage tool?
- ⌘ Were there any questions that caused discomfort among clients? If so, which questions and why do you think this happened?
- ⌘ Do you believe clients provided more accurate answers than they may have with the original VI-SPDAT?
- ⌘ Do you believe the tool prepared you to ask sensitive and triggering questions?
- ⌘ Are there questions that made you uncomfortable? If so, which questions and why?
- ⌘ Does the new VI-SPDAT give you a clear picture of your client's risks and needs?
- ⌘ Is there anything you would like to be sure that the researchers know regarding this new version of the tool?



## Data Collection and Analysis

All interviews were conducted over Zoom with one member of the research team. Interviews lasted approximately 30 minutes. All interviews were audio-recorded with the Zoom system and transcribed with Rev.com software.

For the analysis of the responses, rapid assessment procedures were used. This process does not require the in-depth, time-intensive procedures of traditional grounded-theory qualitative approaches but instead focuses on categorizing and characterizing. This approach generates key themes and issues which effectively answer research questions that guide the understanding of our core concerns regarding evaluating the administration of the existing triage tools.

Four members of the research team participated in the qualitative analysis (Rice, Onasch-Vera, Winetrobe Nadel, and Petry). Each interview transcript was read by two different members of the research team and main themes and subthemes were identified. The research team then met and compared notes on themes, agreed to themes, and identified quotes from the interviews which support those themes. The four major themes which were identified are: 1) improvements to the revised tool, 2) improvements to the process of tool administration, 3) the impact of the revised tool on clients, and 4) additional suggestions for improvements. Several subthemes for each of these themes emerged, which we discuss in the sections that follow.

### Improvements to the Revised Tool Perceived by Providers

Universally, the providers who worked on the pilot study perceived improvements to the revised tool. Most of these findings focus on the format, question length, and the language incorporated into the revised tool. These improvements focused on several key domains. First, many providers noted that the revised tool was shorter and took less time to administer with clients. Indeed the range of time reported by our providers was 15 to 45 minutes, with an average administration time of about 20 minutes. As one provider said, “[I] think it got to the point... I felt like it was quicker” . Another provider went further, explaining that the shorter format created less burden on the client,

***“So with the old CES, it’s like, it’s too many questions to get burned out. It’s like, I’m overwhelmed, I can’t do this. And sometimes it build, it, it it kills the rapport like with a client because we’re like, Dude, you’re, you’re drilling me for all these questions. What is this gonna help my housing? I just wanna get my keys. So it kind of puts that barrier for build trust and rapport. Unlike this one, it’s like, okay, we got the general questions that we needed. It goes straight to the point, boom, boom, boom, done.”***

Second, many providers also commented that the revised tool was not only shorter, but that the questions felt more “*to the point*” and more “*straight forward.*” As one provider succinctly put it,

***“I liked that the questions were very straightforward. straight to the point, to measure vulnerability and the client’s needs.”***

Another participant elaborated more on this point saying,

***“So with this one, it’s like straight to the point. I need history. Boom. Done. Um, and if with those 19 questions it gives you more of a story, then those 39 questions, the same questions, you know what I’m saying? Just condensed. So I think this particular CES is much better. “***

Third, some providers also made a point of noting that the new 19-item revised tool was less repetitive than the original VI-SPDAT which they have been administering to date.

***“It got to the point, instead of asking so much repetitive questions.”***

Fourth, providers also perceived the revised tool to provide a better picture of client needs than the original VI-SPDAT. Indeed, in some cases, new information emerged in the context of the pilot study revised tool test administration.

***“Actually I’ve been working with these two clients for over a year now... and I felt like I learned new things about them during the assessment because they, um, re they talked about things that I haven’t heard them say before in the past.”***

Fifth, some providers noted that the question wording in the revised tool was less awkward and more conversational than the language used in the original VI-SPDAT. As one provider explained,

***“The questions are easy to incorporate into a conversation. So it’s not like a, like a formal interview. It’s not like an investigator asking a bunch of questions. I mean, I just sat there and had a conversation.”***

Another provider commented,

***“I actually was really happy when I was conducting it. Like I said, it was very easy to follow it, very conversational”***

That said, there was a minority opinion that even the revised tool was awkward to read



verbatim to a client. As one provider said, “

***It kind of felt like a little, little robotic, but I do understand that like we kind of have to keep going on, um, on the script. Um, I think maybe because we’re not used to that, maybe if felt robotic.”***

Sixth, many of the providers who pilot tested the tool shared with the team that the new wording of the questions was clearer, less confusing, and required less additional explanation from them when administering the tool with their clients. One provider commented,

***“they were basically about the same questions just worded differently, which I, I like because when we would do the other SPDAT, you know, the clients would look at us with like a blank face and then we had to kind of let them know in layman’s terms so to speak what the question was.”***

Another case manager elaborated further, explaining how the existing VI-SPDAT is often confusing and requires them to provide quite a bit of additional explanation,

***“With the original VI-SPDAT, I’ve, I’ve noticed with the experience, I have to kinda put my own version into my own input into how to explain the question. Um, and with this new triage tool, um, I don’t feel I have to do that. I just have to just go by the format. And, um, and I’ve noticed the participant doesn’t look as confused or uncertain of what questions being asked.”***

Finally, it is worth noting that some providers also commented on the continuity between the original VI-SPDAT and the revised tool. Some of this commentary can be heard in the quotes above, but as one provider put it,

***“they were basically about the same questions just worded differently,”***

## **Perceived Improvements to the Tool Administration Process**

The CESTTRR team sought not only to improve the language of the VI-SPDAT with the revised tool, but also to improve the overall process of tool administration. As discussed in Chapter 5, all of the suggested changes to the process of tool administration were suggested by providers and clients who have experience with the VI-SPDAT. Some of the most crucial findings to emerge from the provider interviews center on how effective these new tool administration procedures were perceived by the case managers who participated in the pilot.

First, almost all of the providers noted that they appreciated the inclusion of “breaks” or “check-ins” after potentially triggering questions. The script now encourages providers to

stop and check in with clients, ask them how they are doing, and give them an opportunity to pause if they are feeling uncomfortable. As one provider said,

***“I really like that the, um, breaks were implemented within after the questions. I think that’s, um, really helpful because sometimes we’ll like inform clients like, ‘Hey, let us know if you need to take a break’ or ‘let us know if you need to pause.’ But they don’t always feel comfortable asking for those pauses.”***

### The importance of Checking in with Clients Throughout the Administration

***“I do like the option that we did offer breaks and, and, and it’s, you know, like, and it’s, it’s a question like, are you okay to, are you okay to move forward? And, and what I noticed was the participant would sit there and think about it and they’d be like, No, I’m okay.”***

***“I think it helped, um, the fact that we’re able to like ask them exactly when, um, like let’s say we were preparing them for that question, and then after the question we were asking like, ‘Are you okay?’ kind of thing. So it’s just a little reminder because sometimes we’ll probably, so in, so, um, what’s it called? So into the, the administer administration part that like, we don’t realize that, oh, I should probably give them a break or something. So it’s a, it was a nice, um, nice thing to have a reminder.”***

Second, most of the case managers who pilot tested the revised tool were enthusiastic about the recommendation to NOT administer the revised tool at the first meeting with a client, but rather to build some rapport first with a client prior to the administration of the tool. As one provider said,

***“Not the tool itself, but the, when we do the, the assessment that should probably get changed. Like, it shouldn’t be a first time meeting type of thing. Or like if you walk into an office and they wanna administer it there, it should be someone who’s, um, worked with you for at least like month or two. I know it’s a little bit more about you than, um, a first time meet.”***

Third, and related to the above point, case managers were clear that building rapport with a client is a critical part of successful tool administration. As one provider commented,

***“I think having a rapport with the client allows you to get a better, um, I guess real answer and, and make sure that you’re not, um, leaving anything out.”***

The importance of privacy in creating a safe and comfortable environment for clients was also something which was recommended and positively endorsed by providers who pilot

tested the new tool administration process. Privacy may not be possible in all contexts of tool delivery, but it is certainly desirable. One provider articulated the concern particularly well,

***“I do work in a private office so clients do tend to share more with me, uh, whereas our staff out front, they’re in like a bullpen cubicles and so I think clients are a little more less inclined to get into like the details, uh, in those situations. But I think it would still be nice to like leave that space for people to kind of take a breath adjust because if they just said yes and somebody’s right across the hall from them that they can even see, right, it could be a little awkward.”***

## The Value of Training

Related to improving the tool administration process, service providers participating in the pilot of the revised tool cited the value of receiving training prior to administering the VI-SP-DAT. In reflecting on the need for training on tool administration, one case manager noted that when they first started,

***“there was training on the CES assessment, but it was not really like...in-depth or like, thorough training. And I kind of had to figure it out for myself a little bit.”***

Case managers indicated that the training provided for the pilot was helpful in administering the revised tool effectively and in a trauma-informed way. In particular, observing facilitators model possible scenarios that arise during tool administration and providing the opportunity for trainees to role-play administering the tool were mentioned as beneficial aspects of the training. One service provider described the benefit of having staff role-play order to become familiar and comfortable with the script,

***“Cause I think they’re gonna skip the script in front of participants if they feel uncomfortable.”***

Another provider commented on practicing both asking and answering questions, stating,

***“I think it makes a difference when you’re the one asking the questions and then you’re the one answering them, right? So even though we have the, um, The questions in front of us and when, for me at least it kind of put me in on the other side, I’m usually the one asking the questions, so it puts me on the other side and it’s, it kind of gives me, although I knew I didn’t really have to answer them, cause also training, but at the same time, it kind of does give us a different perspective, like what we’re putting, what the clients may go through, maybe even on a deeper level because they’re the ones experiencing these things. Um, so that definitely kind of put me in a different mindset when you are the one that is answering these questions. So I think for me, that was helpful.”***

In addition to becoming familiar with the tool and potential client scenarios, case managers also mentioned the need for other types of training to help staff administer the VI-SPDAT successfully. This included methods for communicating effectively with vulnerable populations, trauma-informed care, and diversity, equity, and inclusion. With respects to the latter, case managers acknowledged the importance of recognizing their privilege and how they can be perceived by clients. As one provider noted,

***“I think there are some times where we don’t recognize the privilege that we have, and it’s good to be able to...get that training and be like, this is the things that people are going through...and this is how the things we say or the things that we do... can seem to our clients.”***

Another provider commented on the privilege held by case managers in relation to their unhoused clients,

***“Like we are comfortable, we go home every day versus our clients. And a lot of times our clients do say that like, this is my house, it’s the shelter that they’re referring to. And they say, This is my home. Like, you go home, I stay here. So it’s very different dynamic and I think once a case manager clicks in their brain that like, it’s very different for them versus like, for us than administering the assessment and analyzing the assessment changes it.”***

## Impact of the Revised Tool on Clients

While it is critical to learn from clients their perceptions of the revised tool, the issues of client impact were of central concern to all of the case managers who participated in the pilot. Several issues in this vein were raised by providers.

First, case managers reported that they believed the revised tool allowed clients to be more honest and to disclose more potentially difficult past experiences. Clients were not forced to overshare and clients were reassured that honest answers would not lead to negative consequences. As one case manager explained,

***“this gave clients an opportunity to be like truthful without like oversharing. Cause I feel like sometimes they feel like they have to overshare, um, or they have to tell us like specific parts of their story. Um, but this was just like, ‘have you experienced this? Yes or no?’ Um, so I gave ‘em the opportunity to say like, ‘Yes, I have, and that’s all I wanna say about it.’ And, um, but also allowing them that space to expand if they want to.”***

Another provider commented,

***“...I really loved the fact that we, um, made it clear that whatever their answers were didn’t wasn’t going to harm them. I felt like that allowed them to relax a little bit about the questions, especially ones around, um, chemical dependency or like substance abuse. Um, and then like selling if they needed to, you know, um, for survival tactics. Honestly, what I really liked about this is that I feel that this, these questions were, um, just like an equitable approach to asking potentially difficult questions.”***

Another provider noted that the revised tool allowed for clients to explain their needs.

***“It gives the client an opportunity to explain themselves and that’s what we want them to explain themselves, their situation.”***

Second, many providers pointed out that the revised tool resulted in less negative emotions, that clients were not as overwhelmed, and that the process was less triggering to clients. As one case manager explained,

***“The client didn’t seem to be overwhelmed or anxious, so it made for, you know, a better, uh, better assessment.”***

Another case manager expanded upon these ideas explaining,

***“I didn’t feel like my client wanted to leave most of the time. That’s how it feels like when you’re administering an assessment, they wanna leave as fast as possible. Um, but this one felt very calm. It was consistent. Like there was consistent energy throughout the assessment. And I think because I had let them know in the instructions, it’s not gonna take that long. It’s only like a few questions. And I think providing that reassurance throughout the assessment kind of gave them the opportunity to take a break if they wanted to.”***

It is important to note that providers also commented that some questions were still challenging for clients. In particular, providers pointed out that questions concerning HIV/AIDS housing, substance abuse, self-harm, and street victimization continue to be challenging questions for clients. That said, instituting breaks and check-ins appears to help mitigate this discomfort. As one case manager said,

***“right after that question 14.... there was a moment where it said, let’s do another check-in. I feel like that one, that one specifically was perfectly timed. I, I feel like when I encountered that area of this, they needed a break.”***

## Additional Suggestions from Providers

While the providers who pilot tested the tool were largely enthusiastic about the reduction in the number of questions, the rewording of the questions, and the suggested tool administration process, they still offered additional suggestions for further refinements. A couple providers noted that in the context of the pilot study, clients were financially compensated for conducting the revised tool. They suggested that paying all clients to be assessed could help to increase client participation in assessments.

Second, several providers suggested that case managers be allowed to ask questions in their own words and not read the revised tool verbatim while conducting the assessment. This was perceived to be useful to maintain rapport with clients. As one case manager commented

***“I think maybe being able to go off script a little bit. Um, I personally, I like administer the VI-SPDAT once I kind of already have a good rapport with the client. So, um, maybe kind of, um, making it so that you know your client and you know, their style. So maybe making it so that they’re comfortable with that,”***

Another case manager said,

***“like if I were to read it word for word and every single time, um, the participants wouldn’t, they, like, they would be, that’s just not how I talk to them, you know. Like I talk to them like normal person, not like super, super like reading from a book or something.”***

Third, again in keeping with a desire to personalize the assessment process. Some providers had additional suggestions for rewording certain questions, particularly to meet the needs of their clients in the moment. As described above, the general consensus from the providers was that the wording of the revised tool questions was superior to the original VI-SPDAT. There was no consensus, however, on a particular question or questions that needed revising, rather a general sense that some freedom in rewording in the moments would help providers to meet the needs of their clients, with respect to comprehension and comfort.

Fourth, and related to the above, some providers wanted more freedom with respect to checking in with clients about a client’s need to take a break. While all the providers were enthusiastic about the process of the check-ins, some had concerns about the frequency or exact placement of the check-ins and wanted the freedom to judge their client’s needs in the moment. As one provider stated,



***“Cause I believe there was a question where it’s like, ;Okay, let’s take a break. And then like jumping back into it, like, have you tried to harm yourself?’ And we’re like, Okay, we’re back in the trenches.”***

Fifth, and what came up when we did our expansion of the pilot was insights that highlighted different ways staff need to be supported in administering these tools, whether that’s additional population-specific training and resources or more clinical supervision. These comments related to difficulty asking and hearing responses to questions on the tool regarding harm and utilizing crisis services as well as a direct request to get more resources to better serve the LGBT community. As one provider shared,

***“More research or maybe some guidance for the, you know, us service providers to administer the tool because like I said, we deal with a lot of different populations and we’re not always well versed and how to speak with someone. So maybe, um, like I said, some pamphlets on LGBT community, you know what I mean? This community period. I know for myself I want to learned a lot.” “...And also ensure that the site provider are maybe, you know, whatever program that we’re working with, we have links and resources for this community because they are underserved.”***

## **A Final Suggestion from the CAB**

After sharing our results from the pilot study with the CAB, they made a last suggested change to the wording of the item regarding HIV/AIDS housing. The version of the question we tested in the pilot was *“Would you be interested in housing resources that assist people who live with HIV or AIDS?”*. The providers reported that this question continued to create confusion. The CAB then suggested the following as a reworking of that question.

***“The next question can be quite sensitive for some people. When I ask it, I am not making any assumptions about you or your behaviors. When this question is asked, it is not meant to judge you or anyone else. There are some housing resources that are just for people who are living with HIV or AIDS. Would you be interested in applying for housing that is for people living with HIV or AIDS? Would you be interested in housing resources that assist people who live with HIV or AIDS?”***

## Chapter 8. Changes to Scoring and Prioritization and scoring of revised triage tool

### Overview

**Recommendation 4:** Prioritize persons scoring 17 or higher on the new scoring system for permanent supportive housing. We are NOT recommending this as a cut point where persons below that range are deemed ineligible for housing resources.

⌘ **Finding:** The threshold score of 17 maintains the improved accuracy and equity results of the overall improvements in the assessment of risk from the new tool and historically represents approximately 5% of those assessed. In this way, the housing allocation process will be informed up front by a more accurate and equitable assessment of each client's vulnerability.

### Detailed Findings

The goal of this work was to create a vulnerability assessment tool that was more accurate, more equitable, and easier to implement when compared to the VI-SPDAT. As clarified in the previous chapter, we have done that.

**With this new tool in hand, the next question is: How should it be used?**

Before answering this question, **it is important to emphasize that a score from a risk tool is not the same thing as a resource allocation rule.** A risk score can serve as an input when making resource allocation decisions, but there are other inputs that need to be considered along with risk. In the context of homelessness services in Los Angeles County, those include a client's needs and preferences, eligibility criteria for specific housing types, other policy priorities, and the availability of resources. Using a risk score as one input in a system with multiple inputs can provide useful guidance as to which clients may be most vulnerable while still maintaining flexibility in the housing enrollment process. This approach is similar to how assignments are currently being made. For example, during the time of the study, 14% of PSH participants had no VI-SPDAT score while 5% had a score at or above the score prioritization threshold of 8.

**When implementing the new Adult tool, we recommend those with a score of 17 and above receive a priority flag for access to PSH.** Presumably other factors beyond the priority flag, such as client preferences and unity eligibility criteria, will continue to affect the allocation of PSH in the system. The threshold score of 17 maintains the improved accuracy and equity results of the overall improvements in the assessment of risk from the

new tool and historically represents approximately 5% of those assessed. In this way, the housing allocation process will be informed up front by a more accurate and equitable assessment of each client’s vulnerability.

To provide a sense of populations prioritized with various scores as an input, we present the demographic composition of individuals under a few scenarios. Specifically, Figure 1 presents the percentage of individuals who are Black, White, or Latinx according to various thresholds on risk assessments as well as actual historic PSH allocation for 1/1/2016 through 10/1/2018.

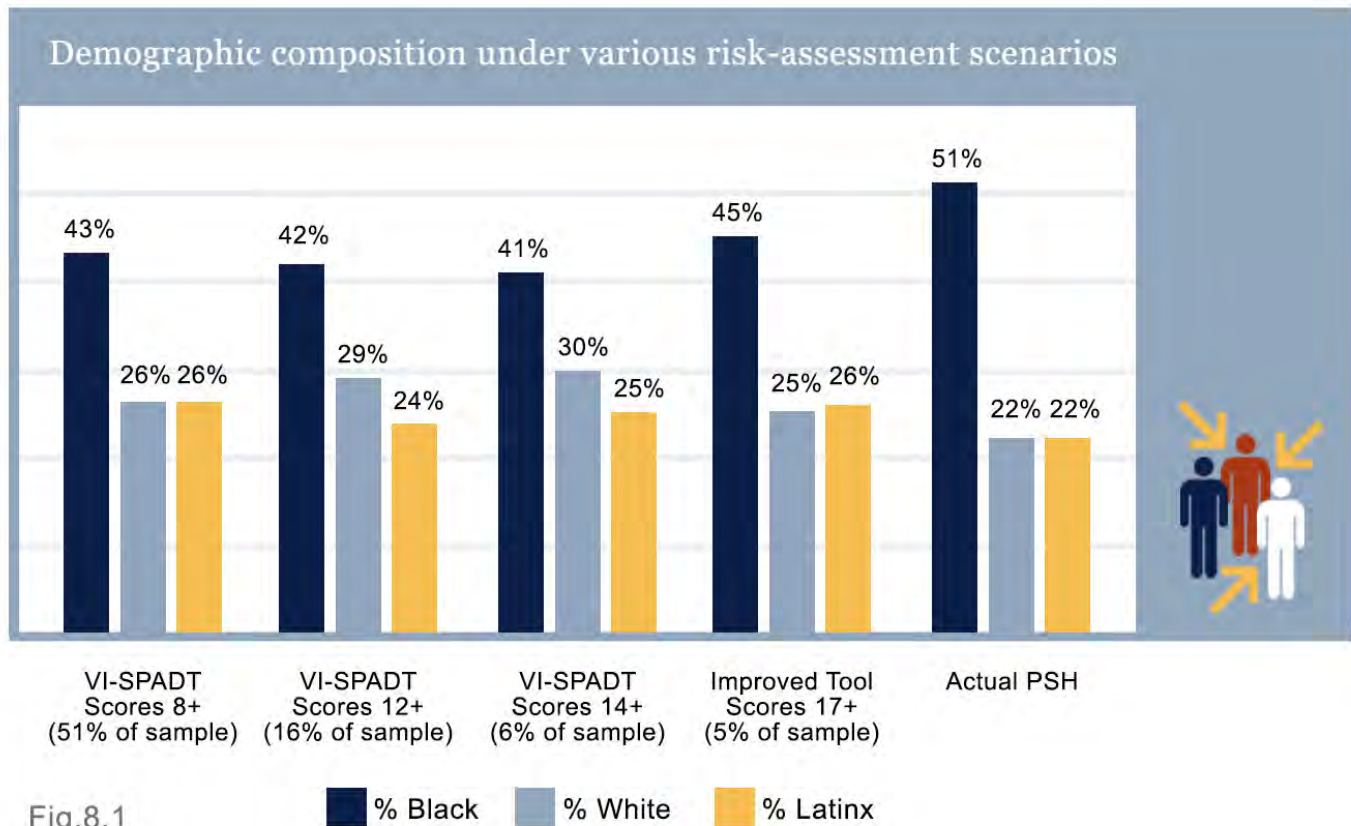


Fig.8.1

The first three groupings are thresholds of 8+, 12+, and 14+ applied to the VI-SPDAT. The next grouping is for a threshold of 17+ applied to the new tool, and the final grouping is Actual PSH assignments. There are a few things to note. First, when using the new threshold of 17+ to prioritize participants, 45% of the group is composed of Black individuals and 26% is composed of Latinx individuals. Both of these percentages are higher than their respective percentages under any of the other VI-SPDAT prioritization thresholds. Second, 51% of the historically assigned PSH sample is composed of Black individuals, which is higher than any of the prioritizations from the various assessment thresholds. This again highlights the fact that there are additional inputs that go into the final allocation decision. Although we do not have information on what those inputs are, if the only change in the current process is to replace the prioritization from the VI-SPDAT thresholds to the new tool thresholds, we would expect the accuracy and equity of that process to improve as well.

There are important limitations with picking a threshold for the new tool. The first is that making adjustments from 17 could decrease equity and precision from the new tool. Specifically, extending the threshold to a value below 17 will reduce the equity gains identified through this research. We studied this by extending the equity analysis from Chapter 6 to the revised tool under various threshold options. We found that the accuracy and equity gains from reweighting the existing responses to the VI-SPDAT start to steadily deteriorate at threshold values below 17. These details are included in Appendix 3] , and, for this reason, we do not recommend changing this threshold until new data are obtained and an updated analysis is performed.

The second limitation is that the suggested threshold prioritizes a relatively small share of the population compared to previous VI-SPDAT thresholds. Using historical data, the new tool with a threshold of 17 would have prioritized 5% of the population compared to over 60% of VI-SPDAT respondents who had a score over 8 and were prioritized for PSH. Although the system does not have PSH resources to serve that 60%, the larger percentage provides a larger pool of prioritized individuals to be matched to resources. That said, at 8% within 12 months and 12% within 24 months, the total percentage of respondents who actually received PSH is closer to 5%. Finally, it is unclear how individuals will score on the tool in the future. Not only is the population changing over time, but the improvements in tool administration were made precisely to elicit more complete responses. A natural result would be for the new tool to produce higher scores on average – even if an individual's circumstances are actually the same.

## Chapter 9. Policy Design with Machine Learning and Optimization Methods

As discussed in Chapter 2 and Chapter 6, a prioritization tool is not equivalent to a resource allocation tool. A prioritization tool can be incorporated into other sources of information and community values to create resource allocation decisions. In the context of homelessness services in Los Angeles County, those may include a client's needs and preferences, eligibility criteria for specific housing types, other policy priorities, and the availability of resources. Shinn and Richard argue that until there are sufficient resources to address the needs of all persons experiencing homelessness, once a person is designated as vulnerable or high priority, communities must still determine which of the precious few resources available to offer that person (Shinn & Richard, 2022).

In this chapter we provide “proof-of-concept” results for demonstrating how machine learning and optimization algorithms can be used to create a fair housing allocation system. We used existing data available in the Los Angeles HMIS database. We include this research to demonstrate that additional decision aids that address race equity can be developed and implemented. The Revised Triage Tool, with 19 items and revised points values presented in the prior chapter is only a prioritization tool, not a resource allocation tool. In this chapter we explore an initial “proof-of-concept” resource allocation tool, which represents a future frontier in algorithmic decision aids.

In the previous Chapter, we emphasized that the improved risk tool serves as a useful guidance of client vulnerability, but should be only one of multiple inputs used for housing allocation. In this chapter, we present results for an algorithmic data-driven allocation/matching recommendation tool that uses additional client information beyond risk score to decide on the type of resource (e.g., RRH, PSH) that an individual should be waitlisted for, taking into account the shortage of resources. Each time a resource arrives in the system, it is matched to the first person that is document-ready that is waitlisted for that type of resource and that is willing to accept the resource (based on e.g., their personal preferences).

Our proposed tool uses the answers to the VI-SPDAT and other client characteristics to recommend a specific type of housing intervention/resource for each individual that enters the system. It uses data-science (and in particular causal inference and machine learning) combined with optimization methods to design a resource recommendation policy that maximizes a predefined policy goal (such as exits from homelessness) subject to system constraints like resource availability and desired equality or equity goals. We show that the recommended intervention balances the benefit to the individual with the impact that giving them the resource will have on overall system efficiency and fairness. The key results are presented in the fol-

lowing while methodological details are provided in the Technical Appendix that accompanies this chapter. The full data-science and mathematical details on the methods and results presented in this section can be found in the work of Tang et al. (2023). Our algorithmic resource recommendation tool can also incorporate requirements such as eligibility criteria. Our results serve as a proof of concept of an algorithmic resource matching tool.

For the purposes of proof of concept, we define a positive outcome for a client as not observing a return to homelessness within a two-year window following intervention. We define a return to homelessness following intervention as one or more subsequent enrollments into “emergency shelter,” “safe haven,” and “street outreach,” within the HMIS data. Further details on the outcome definition can be found in the Technical Appendix that accompanies this chapter, in the “Data Preparation” section. These enrollments were chosen as proxies for returns to homelessness based on discussions with PSH matchers. The resources considered as permanent interventions in these results are RRH and PSH. In particular, we break up PSH into two categories, ‘PSH Tenant’ and ‘PSH Site’ since our conversations with matchers indicate that these are very different kinds of interventions. Given concerns around racial equity, we focus on race for demonstrating results around fairness of the algorithmic matching recommendation tool, and consider non-White individuals to be part of a minority/vulnerable group.

In the following results and figures, the “Base” allocation tool recommends resources in order to maximize overall client positive outcomes subject to resource availability. However, in order to address concerns of fairness, we create two extensions of the “Base” tool to incorporate two different notions of fairness. The “Allocation Minority Prioritization” extension allocates resources so that the proportion of individuals assigned a resource in minority racial groups is at least as high as the proportion of White individuals receiving a resource. This extension aims to allocate resources to satisfy a notion of fair allocations by prioritizing minority groups. The second extension, “Outcome Minority Prioritization”, allocates resources so that the proportion of individuals with a positive outcome in minority racial groups is at least as high as the proportion of White individuals with a positive outcome. This version seeks to assign resources to achieve a notion of equitable outcomes by prioritizing minority groups. Other versions of fairness are also valid and can be incorporated, such as requiring the proportion of individuals receiving a resource in each racial group to be approximately equal.

In Figure 9.1, all three versions of the algorithmic matching tool achieve an improvement above the historical policy of at least 1.9 percentage points in terms of overall proportion of positive outcomes, which would translate to hundreds more individuals exiting homelessness. In addition, we see that imposing fairness constraints (for “Allocation Minority Prioritization” and “Outcome Minority Prioritization”) does not lead to significantly fewer exits from homelessness as the proportion of positive outcomes is at most 0.01 percentage points less than the “Base” tool with no fairness constraints.



Figure 9.1. Proportion of population with a positive outcome under historical and proposed allocation policies

Policies	Proportion Positive Outcomes
Historical Policy	60.35%
Proposed Base	62.25%
Proposed - Allocation Minority Prioritization	62.24%
Proposed - Outcome Minority Prioritization	62.25%

Fig.9.1

Figure 9.2 shows fairness in allocations in terms of racial breakdown of PSH allocations under the historical and proposed allocation. For each allocation rule, which is a separate category on the x-axis, we show the proportion of each racial group receiving PSH if we allocated using that tool’s recommendations, which are the vertical bars. We see that under the “Allocation Minority Prioritization” case, the proportion of individuals receiving PSH for minority groups is higher than for White individuals. This is seen by the higher vertical bars for Black, Latinx, and Other racial groups compared to White individuals under the “Allocation Minority Prioritization” category. This is not the case for the historical or other allocation rules.

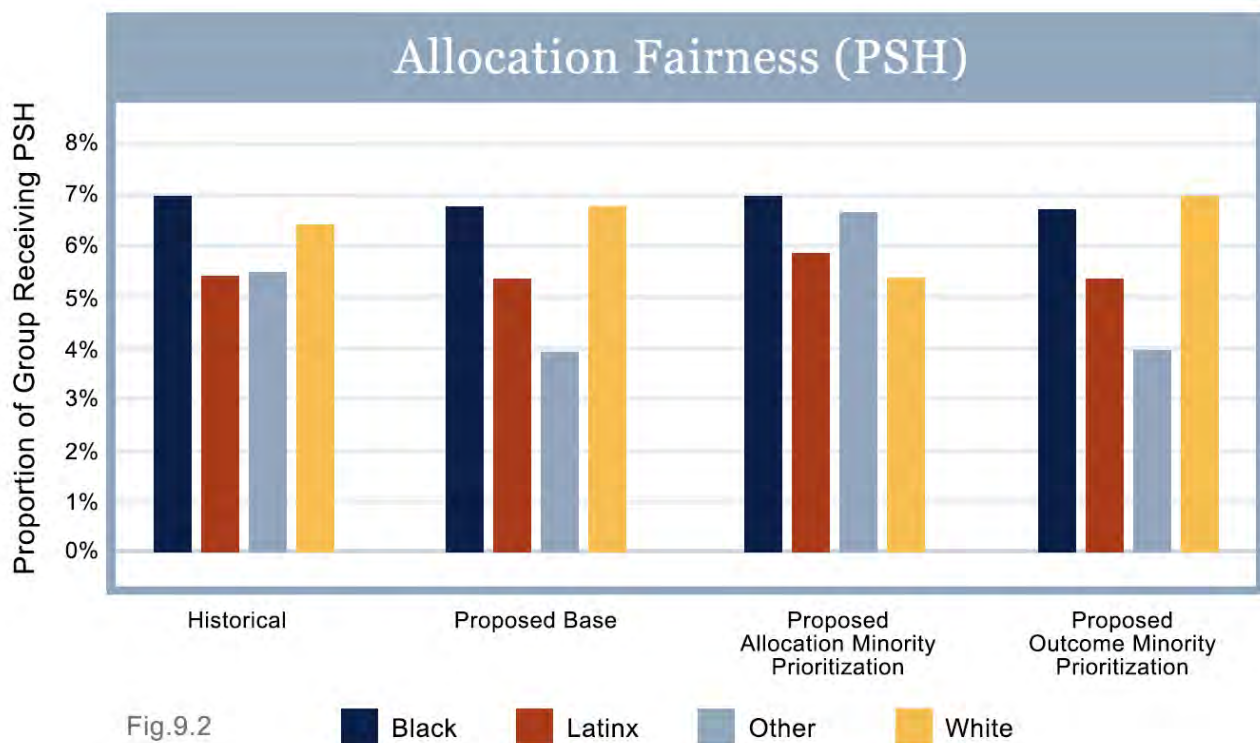


Fig.9.2

■ Black ■ Latinx ■ Other ■ White

Figure 9.3 shows fairness in allocations in terms of racial breakdown of RRH allocations under the historical and proposed allocation. While the “Allocation Minority Prioritization” tool did not result in the proportion of individuals receiving RRH for Latinx and Other racial groups to be higher than for White individuals, the disparities are similar to what we saw historically and are relatively small. By imposing a fairness constraint for prioritizing minorities, we at least ensure allocation disparities, if any, are improved relative to the “Base” model. On the

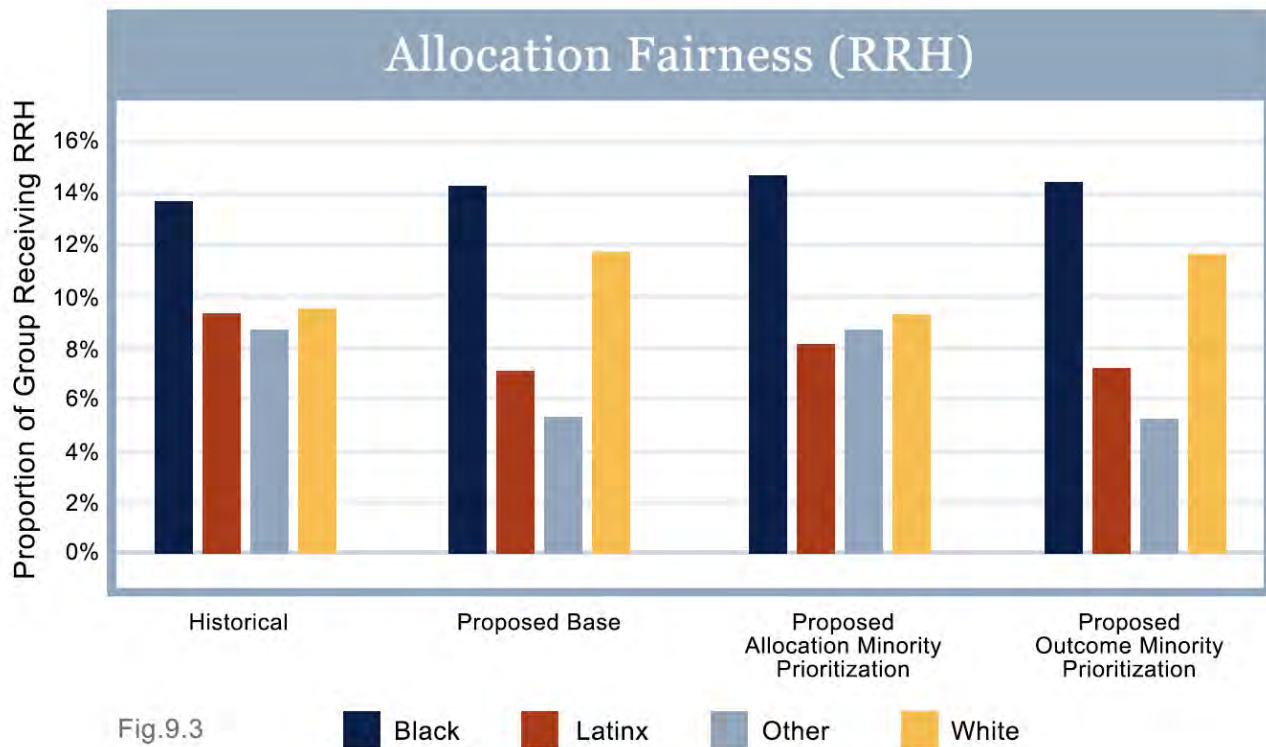
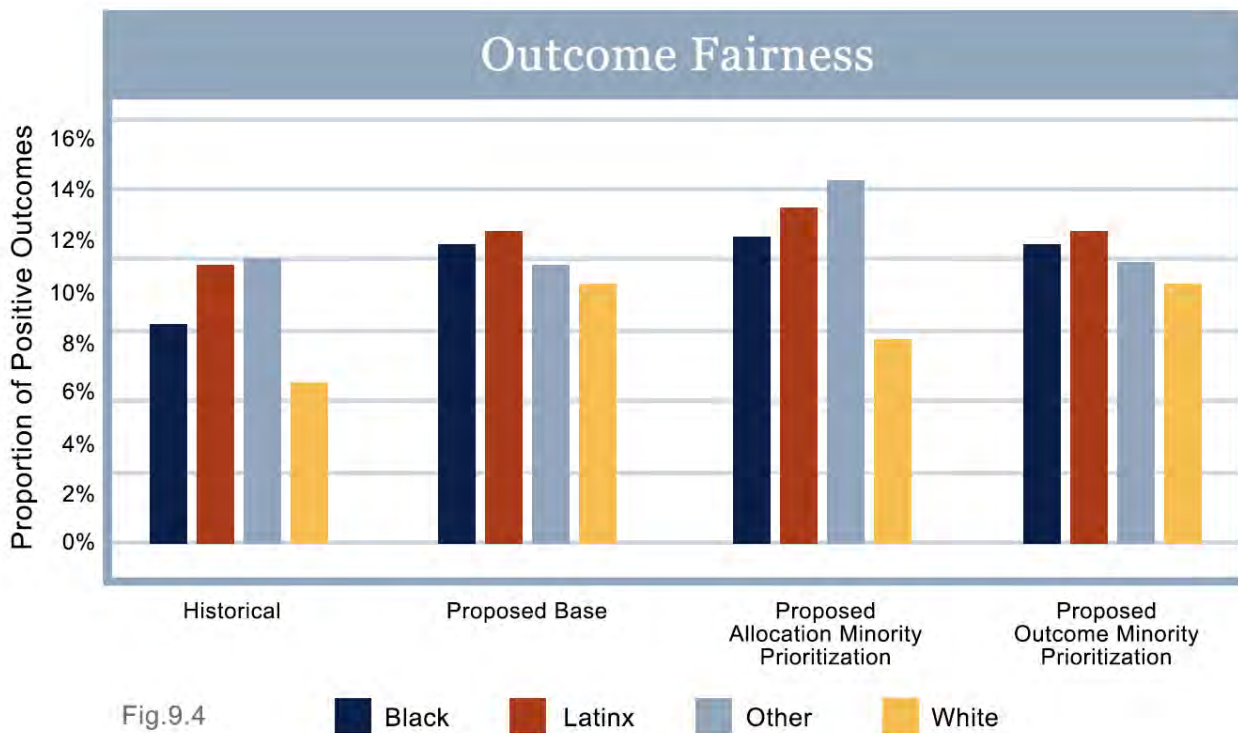


Fig.9.3

other hand, we may be more concerned with having equitable outcomes for each racial group rather than allocation fairness. In Figure 9.4, we show the proportion of positive outcomes for each racial group under the historical and the three different allocation rules we have discussed. If we wanted to prioritize the minority groups’ overall proportion of positive outcomes, we see that the “Outcome Minority Prioritization” achieves this goal (as do the other two allocation rules). Compared to the historical policy, however, our proposed allocation rule also improves the positive outcome rate for Black and White individuals as well without worsening outcomes for Latinx and Other racial groups. These results serve as a proof of concept of potentially using an algorithmic recommendation tool for allocation resources where we can achieve better system level outcomes while also satisfying various notions of fairness.

Figure 9.4. Proportion of each racial group with a positive outcome under historical and proposed allocation policies. The implementation of the optimization based allocation system



presented in this section requires computing counterfactuals under each housing resource for each individual based on their characteristics from the VI-SPDAT and HMIS data. Such a system can be efficiently implemented in practice to quickly waitlist individuals for interventions. For general estimation models, we only need to maintain the model parameters, access to the necessary characteristics required to compute counterfactuals, and whether an individual is “move-in-ready” to waitlist individuals for an intervention. By storing the model parameters in a spreadsheet, the calculations for determining an intervention can be done immediately once an individual’s characteristics are inputted into the spreadsheet. In the case where the counterfactual models are linear and computed as a weighted sum of responses to the VI-SPDAT, the calculations can even be done using pen and paper similar to existing triage tools. Such a system would ensure consistency since individuals with the same characteristics would always be waitlisted for the same intervention. Finally, because such an optimization based allocation system can be calibrated to account for the number of clients and supply of resources, it would ensure the waitlists for each intervention would not build up significantly over time by appropriately matching the supply and demand for housing.

### Fairness Impossibility Results

In the previous subsection “Policy Design with Machine Learning and Optimization Methods”, we showed how optimization based allocation tools can incorporate different fairness

notions without impacting overall performance in terms of helping individuals exit homelessness (and even improving performance relative to the status quo). In this section, we provide more nuance in choosing fairness notions that can be incorporated as fairness constraints in the allocation system. This discussion serves to help guide stakeholders in designing an allocation system with fairness concerns in mind. The results in this subsection come from the work of Jo et al. (2023).

In general, stakeholders may desire an allocation system that is fair both in terms of allocation, in which the proportion of each racial group receiving housing is roughly equal, and outcomes, in which each racial group experiences positive outcomes at roughly equal rates. However, we shown mathematically that these two notions, fairness in terms of allocation and outcomes, are incompatible with one another and it is generally impossible for both to hold simultaneously (whether the system is designed using algorithms or not). Policymakers thus in general need to choose between prioritizing equality, i.e., fairness in allocation, or equity, i.e., fairness in outcomes.

In Chapter 8, we stressed that a risk score tool is not the same as an allocation rule and should be only one of several inputs, such as client preferences and eligibility criteria, used for resource allocation. Even if the scoring tool is accurate and equitable, using vulnerability scores alone does not guarantee anything about the demographic composition of those prioritized for resources. We show that allocation systems that prioritize based on vulnerability scores alone will in general also not result in equal outcomes across racial groups, even if the score is perfectly accurate and unbiased. This result comes from the fact that prioritizing based on vulnerability scores, while desirable, does not account for the intervention effects of resources that affect final outcomes such as exiting homelessness. To achieve outcomes that are as fair as possible across different racial groups, the allocation policy will need to use as much additional information as possible, including an individual's characteristics from the VI-SPDAT or their group status in addition to their vulnerability score and potential intervention effects. For further details on the results of this discussion, see the work of Jo et al. (2023).

## Chapter 10 Directions for Future Research

**Future Work 1:** Evaluate HMIS data on a regular basis to ensure that the Revised Triage Tool is helping to equitably allocate housing.

- ⌘ Because we have reworded questions and changed tool administration processes, people will hopefully be more forthcoming about their vulnerability.
- ⌘ HMIS data must be checked regularly to make sure that changes are resulting in the desired allocation of resources, especially with respect to race/ethnicity of clients.

Data must be examined on a regular basis to ensure that fair allocation of resources results from the use of the Revised Triage Tool. Because we have reworded questions and changed tool administration processes, people will hopefully be more forthcoming about their vulnerability. HMIS data must be checked regularly to make sure that changes are resulting in the desired allocation of resources, especially with respect to race/ethnicity of clients.

**Future Work 2:** Implement quality improvement procedures to revise the Revised Triage Tool as needed.

- ⌘ We have done the best we can to make improvements to the tool, but no tool is perfect.
- ⌘ We urge Los Angeles to revisit tools on a regular basis.
- ⌘ We feel our approach serves as a blueprint for how such future efforts could be conducted.

The Revised Triage Tool is a step forward but not the final answer; future efforts should be made to revise the tool as needed. We have done the best we can to make improvements to the tool, but no tool is perfect. We urge Los Angeles to revisit tools on a regular basis. We feel our approach serves as a blueprint for how such future efforts could be conducted.

**Future Work 3:** Develop trauma-informed trainings specifically around how to deliver the Revised Triage Tool.

- ⌘ We developed a training in the context of the pilot study, this training however was delivered by the research team as a pilot, a formal training that can be delivered at scale was beyond the scope of this project.



- ⌘ We suggest that engaging with the UCLA Prevention Center of Excellence or other organizations who specialize in trauma-informed training be engaged to create such a training program.

It was clear from community feedback throughout the research process that trauma-informed interactions around assessment were critical. More intentional and carefully crafted trainings for those who work with these tools are needed to ensure that trauma-informed practices are enacted. The research team was not a group who specialized in developing trainings. We see a great need to engage a group such as the UCLA Prevention Center of Excellence who does specialize in such trainings to develop a training for those who will work with this tool in the future.

**Future Work 4:** Create a youth tool and a family tool replicating the methods that were used to develop the Revised Triage Tool for the single adult system.

- ⌘ Identify appropriate outcomes to define vulnerability for these systems with community partners. Do not assume “adverse events” is the outcome that defines vulnerability in the other two systems.
- ⌘ Conduct data science work with these outcomes to identify useful questions and fair scoring, as was done here with the adult tool.
- ⌘ Involve community in identifying problematic questions and revising them
- ⌘ Incorporate the race-equity, trauma informed embedded practices developed here (e.g. check-ins with clients after difficult questions)

While the VI-FSPDAT (family triage tool) and the Next Step Tool (TAY triage tool) were also discussed by the CAB, most of our efforts focused on the VI-SPDAT used in the single adult housing system, as that is where the largest number of individuals are served and where the issues of race equity were perceived by Los Angeles County to need the greatest investigation. The VI-SPDAT tool is also the original vulnerability assessment tool; the family and youth tools were developed subsequently.

Across the nation, HUD encouraged the development of three parallel systems for resolving homelessness, one for Adults, a second for Families, and a third for Youth (ages 18-24 years). Orgcode developed a vulnerability assessment or tool for each of these systems. These are the three tools used in Los Angeles County. For Adults, the tool is the VI-SP-DAT; for Families, the tool is the VI-FSPDAT; for Youth the tool is the Next Step Tool. Most of the work of the CESTTRR project focused on the VI-SPDAT. We believe that the methods we developed for assessing the validity of the VI-SPDAT, connecting it to anchor outcomes iden-



tified by the community, and working with community stakeholders to revise the exact questions to be used, the language to be used for those questions, and a scoring system need to be replicated for the family and youth systems.

The context of each of these three systems is different. The resources available in the community are often tied to specific populations. The shared goal of housing individuals cuts across all three systems, yet what might be the focus of an “outcome” to prevent or predict with a vulnerability tool will vary. For example, as we detail in this report, the outcome of “adverse events” (i.e., jail, hospitalization, psychiatric holds, and/or death) was seen as an appropriate outcome to prevent for Adults. In prior work conducted by our team on the TAY Triage Tool, communities identified “long term homelessness” (defined as five or more years) for youth as the appropriate outcome to prevent (Rice, 2013; Rice 2014; Rice & Rosales 2015).

Work on any New Tool should follow the community-based method we created

- ⌘ Engage community collaborators in the creation of an outcome definition, that can be observed in existing data, that is specific to the impacted system or population
- ⌘ Conduct data science work to assess the accuracy and fairness of the currently used tool for that system or population.
- ⌘ Conduct data science work to revise the question number and weighting to address making improvements in fairness.
- ⌘ Engage a CAB (with expertise in the system or population) to identify problematic questions and reword those questions
- ⌘ Interview stake holders (both clients and providers) to understand needs for tool administration process changes.
- ⌘ Embed new tool administration best practices into the revised tool as was done with the our Revised Triage Tool
- ⌘ Pilot test new processes to ensure that likely good practices will result

**Future Work 5:** Replicate this process with other culturally unique groups that require consideration.

- ⌘ A Spanish language version needs to be developed and piloted, with a specific Spanish-language CAB to develop language issues. This should be followed for any other language translations.

- ⌘ Some cultural groups (e.g. Native Americans, Non-cisgender persons) need to engage in a process similar to the one we have developed here, so as to insure culturally appropriate adaptation of the Revised Triage Tool.

Based on our work with our CAB as well as feedback from other community stakeholders throughout the process of developing the Revised Triage Tool, we have become aware that a variety of groups may need to be engaged in a similar process as we have done with our work, focussed primarily on the issues of Black people experiencing homelessness. As discussed above, we believe we have created a method that can be applied to many other community groups.

Work on any New Tool should follow the community-based method we created, which we describe in the executive summary. In short:

- ⌘ Engage community collaborators in the creation of an outcome definition, that can be observed in existing data, that is specific to the impacted system or population
- ⌘ Conduct data science work to assess the accuracy and fairness of the currently used tool for that system or population.
- ⌘ Conduct data science work to revise the question number and weighting to address making improvements in fairness.
- ⌘ Engage a CAB (with expertise in the system or population) to identify problematic questions and reword those questions
- ⌘ Interview stake holders (both clients and providers) to understand needs for tool administration process changes.
- ⌘ Embed new tool administration best practices into the revised tool as was done with the our Revised Triage Tool
- ⌘ Pilot test new processes to ensure that likely good practices will result
- ⌘ **Future Work 6:** Explore optimization approaches to matching policies, which could create data-driven recommendation systems to improve the fairness of allocation of resources when using the Revised Triage Tool.
- ⌘ We provide proof-of-concept analyses to show the potential for such efforts in Chapter 9, which we believe could improve system performance and ensure fairness, in ways which simple cut scores cannot.

As we describe in Chapter 9, matching algorithms and vulnerability assessments are not one and the same. There has been much confusion of this issue in communities over the past decade. Creating systems that fairly identify those in greatest need of services is different than creating systems that fairly allocate resources to those persons. Additional work, that centers on community values must be done to create allocation systems that are fair and which meet the desired outcomes for communities in their efforts to house persons experiencing homelessness.

### 19 Question Tool

#### Checklist

- Ensure that you're able to administer the tool in a private place.
- Assess for:
  - Exhaustion: does the client appear to be falling asleep or demonstrate signs of exhaustion?
  - Mental health concerns: does the client seem coherent or do you think the client will be able to complete the exam in the current mental state?
  - Immediate concerns: medical concerns, hunger, exhaustion, shower, or food.
- If available or applicable, ask the client if they would like water or a snack.
- If available, check to see if the client has previously completed an assessment.
- If yes and available, please use this assessment to compare notes throughout the current session.
- If you cannot access the assessment, please ask the client if they have visited any other service provider in the last <insert time period>. If the client says, yes, please ask them where, when, and with whom (if they remember).
- If the client says no, please proceed with the assessment.

#### Tool Administration

*Thank you so much for taking this time to talk to me. My name is <your name> and my pronouns are she/her. What name and pronouns would you like me to use?*

#### **After participant responds:**

*Okay, great. Hi <insert participant name>. Nice to meet you.*

*I'm a <insert role here> with <insert organization here>.*

*As a <insert role here>, I <briefly explain your role and responsibilities>.*

*Today, we're going to spend some more time getting to know each other. Before we get started, I'd like to tell you a bit about what we're going to be doing today. Then, if you don't mind, I'd like to learn about your health and housing needs. Does that sound okay?*

**If the client says "yes,"** continue with administration.

**Interviewer to read aloud:** *Great. Here are a few things I'd like to note:*

*We strive to maintain the highest level of confidentiality and any written or electronic information is secure with software and locked storage files, and the information you disclose with me is treated with the highest security protocol. The purpose of this assessment is to help us better understand your health and housing needs. This is not a housing application but it may help us better match you to resources. This assessment will take approximately 60 minutes to complete. Your answers to these questions will be stored in the Homeless Management Information System (HMIS), a system used to monitor housing allocation and resources for families and persons experiencing or at risk of homelessness.*

**Interviewer:** “Does that sound okay?”

- **If yes**, ask the client, “Are you okay with me asking you the series of questions we discussed or would you like someone who shares your race, gender, or sexual orientation?”

- **If yes**, proceed to administration.

- **If no**, listen to their response, assess if there's anything you can do to immediately help, if not, re-explain the purpose of the tool, and assure them that there are no right or wrong answers, and they will not get in trouble for any of their answers.

### **History of Homelessness**

Interviewer note (do not read aloud): Please be aware, the following questions may cause discomfort or elicit an emotional response. If the client begins to cry or hesitates to answer a question, please validate, affirm, and assure them. For example, you can acknowledge with body language (head nod or eye contact):

- “Thank you for being vulnerable.”
- “I value your willingness to spend this time with me.”
- “Let's figure this out together.”
- “There are no right or wrong answers. I just want to better understand your needs.”

**Interviewer to read aloud:** *In this section, I will ask you some questions about your time unsheltered. The term “unsheltered” refers to **living on the streets, tents, cars, or abandoned buildings**. The purpose of these questions is to help us better understand your history of housing loss. There are no right or wrong answers. If any of these questions make you uncomfortable or you would like some time to think about them, please let me know. Additionally, if a question is unclear, let me know and we will figure it out together.*

<p>1. Where do you sleep most frequently? a. Which park or shelter or overpass are you living in?</p>	<p><b>If outside: 1 point</b></p>	<p>_____</p>
<p>2. Has it been over three months since you last lived in permanent stable housing?</p>	<p><b>If yes: 3 points</b></p>	<p>_____</p>
<p>3. Have you been unsheltered two or more times in the last three years?  *“Unsheltered” may mean you slept outdoors, in a tent, in abandoned buildings, train stations, camping grounds, a garage, shed, or other location outside of a housing structure.*</p>	<p><b>If yes: 1 point</b></p>	<p>_____</p>
<p><i>Before we move on, do you have any questions for me?</i></p> <p><b><u>Risks</u></b></p> <p>4a. In the past six months, have you been to an Emergency Room for any type of service?</p> <p>4b. In the past six months, have you taken an ambulance to the hospital?</p>		
<p>5. In the past six months, have you been hospitalized as an in-patient (this means an overnight stay and may include mental health reasons)?</p>	<p><b>If yes: 1 point</b></p>	<p>_____</p>
	<p><b>Subtotal:</b></p>	<p>_____</p>



<p>6. In the past six months, have you used a crisis service, including sexual assault crisis, family/intimate violence, distress centers, and suicide prevention hotlines?</p> <p><b>Interviewer note (do not read aloud):</b> *If a client says, “I don’t know,” please list some examples of providers to help.*</p>	<p><b>If yes: 1 point</b></p>	<p>_____</p>
<p>7. In the past six months, have you been detained (held, kept) for more than 24 hours by law enforcement?</p>	<p><b>If yes: 5 points</b></p>	<p>_____</p>
<p>8a. Have you threatened or tried to harm yourself in the last year?</p> <p>8b. Have you threatened or tried to harm anyone else in the last year?</p> <p>● <b>If the client responds with “yes,” to either question,</b> respond with, <i>“Thank you for sharing that with me. It sounds like it’s been a really difficult year for you. I’m glad you’re here. Are you okay to keep going?”</i></p> <p>○ <b>If the client says “yes,”</b> move to the next question.</p> <p>○ <b>If the client says “no” or “I don’t know,”</b> offer a break or water/snacks if available. If you offered this above, you do not have to offer it again.</p>	<p><b>If 1 yes or both yes: 1 point</b></p>	<p>_____</p>
<p>9. Do you have any past or current legal affairs that may hurt your ability to obtain housing? For example, you owe money to:</p> <p>public housing authority, bankruptcy, eviction, identity fraud, other</p>	<p><b>If yes: 1 point</b></p>	<p>_____</p>
	<p><b>Subtotal:</b></p>	<p>_____</p>

<p><b>10.</b> Is there any person who thinks you owe them money?  past landlord,  business,  bookie,  dealer,  government group (IRS)</p>	<p><b>If yes:  1 point</b></p>	<p>_____</p>
<p><b>11.</b> In the last year has anybody forced you or tricked you to do things that you do not want to do? Answering yes to this question will not result in punishment or any negative consequences for you.</p> <ul style="list-style-type: none"> <li>• If the client says “yes,” respond with, “Thank you for sharing this with me.”</li> </ul>	<p><b>If yes:  1 point</b></p>	<p>_____</p>
<p><b>12.</b> Are you 60 years old or older?</p> <ul style="list-style-type: none"> <li>• If the client says “yes,” do not ask, “are you currently pregnant?” Mark no.</li> </ul>	<p><b>If yes:  1 point</b></p>	<p>_____</p>
<p><b>13.</b> If the client is less than 60 years old: Are you currently pregnant?</p>	<p><b>If yes:  1 point</b></p>	<p>_____</p>
<p><b>Interviewer to read aloud:</b> <i>Before we move on, do you have any questions for me?</i></p> <p><b><u>Wellness</u></b></p> <p><b>Interviewer to read aloud:</b> In this section, I will ask you some questions to learn more about your experiences and your unique needs. This is for informational purposes only and sharing your story will help me direct you to the appropriate available resources. In case you feel uncomfortable, you can skip the question and we can come back to it later. I wanted to let you know that we have 6 questions left.</p>	<p><b>Subtotal:</b></p>	<p>_____</p>

<p><b>14.</b> Is your current homelessness in any way caused by the following? Choose all that apply.</p> <ul style="list-style-type: none"> <li>● Relationship that broke down</li> <li>● Unhealthy or abusive relationship</li> <li>● Family or friends caused you to become evicted</li> <li>● Evicted because of other lease violations</li> <li>● Other</li> <li>● None of the above</li> </ul>	<p><b>If yes: 1 point</b></p>	<p>_____</p>
<p><b>15.</b> Has your physical health ever hindered your ability to take care of yourself resulting in having to leave an apartment, shelter program, or other place you were staying. Or would you say that your physical health makes it difficult to live self-sufficiently on your own? If yes, are you:</p> <ol style="list-style-type: none"> <li>a. Are you visually impaired</li> <li>b. Are you immobile?</li> <li>c. Do you have hearing loss?</li> <li>d. Do you have a chronic health condition? If so, what?</li> <li>e. Are you an amputee?</li> <li>f. Do you use a walker?</li> <li>g. Other (ask the client if they'd like to expand)</li> </ol>	<p><b>If yes 1 point</b></p>	<p>_____</p>
<p><b>Interviewer to read aloud:</b> Alright, let's do another check in. Thank you for being patient. How are you doing? Are you okay to continue on?</p> <ul style="list-style-type: none"> <li>● <b>If the client says, "yes,"</b> move forward.</li> <li>● <b>If the client says, "no,"</b> ask, "How can I help?"</li> <li>● <b>If the client says, "I don't know,"</b> consider offering: <ul style="list-style-type: none"> <li>- A break</li> <li>- Water and snacks</li> <li>-Additional support if you have the background to do so.</li> </ul> </li> </ul>		
<p><b>16.</b> Would you be interested in housing resources that assist people who live with HIV or AIDS?</p>	<p><b>If yes 2 points</b></p>	<p>_____</p>
	<p><b>Subtotal:</b></p>	<p>_____</p>

<p><b>Interviewer to read aloud:</b> Answering “yes” to the following questions will not result in punishment or negative consequences for you.</p> <p><b>17.</b> Do you feel or believe that in the past drinking or drugs may have created barriers to secure and maintain housing?</p>	<p><b>If yes: 1 point</b></p>	<p>_____</p>
<p><b>18. Ask only if the client said yes to #17:</b> Will drinking or drug use make it difficult for you to stay housed or afford your housing? Answering “yes” to this question will not result in punishment or negative consequences for you.</p>	<p><b>If yes 2 points</b></p>	<p>_____</p>
<p><b>19.</b> Do you have medication that you choose to sell instead of taking to help support yourself financially? Answering “yes” to this question will not result in punishment or negative consequences for you.</p>	<p><b>If yes 1 point</b></p>	<p>_____</p>
<p><b>Interviewer to read aloud:</b> <i>Alright &lt;insert client name&gt;, thank you so much for spending time with me today and sharing your story. Before we wrap up, do you have any questions for me?</i></p> <p><i>Provide any resources for the client at this time.</i></p>	<p><b>Subtotal:</b></p>	<p>_____</p>
	<p><b>TOTAL SCORE:</b></p>	<p>_____</p>

### CESTRR Tool Mapping

**Legend:**

Removed

Reworded

Remained the same as current  
VISPDAT (March 2018 document)

Are you seeking services today because you are concerned about your immediate safety related to abuse?

If you experienced domestic or intimate partner violence, was this within the past month?

Are you currently fleeing because you are in danger?

Where do you sleep most frequently?

How long has it been since you lived in permanent, stable housing?

Has it been over three months since you lived in permanent, stable housing?

In the last three years, how many times have you been homeless?

**CAB REWORDED: Have you been homeless two or more times in the last three years?**

In the past six months, how many times have you...

7a. Received health care at an emergency department / room?

7b. Taken an ambulance to the hospital?

7c. Been hospitalized as an in-patient?

7d. Used a crisis service, including sexual assault crisis, mental health crisis, family/intimate violence, distress centers and suicide prevention hotlines?

7e. Talked to police because you witnessed a crime, were the victim of a crime, or the alleged perpetrator of a crime or because the police told you that you must move along?

7f. Stayed one or more nights in a holding cell, jail or prison, whether that was a short-term stay like the drunk tank, a longer stay for a more serious offence, or anything in between?

# CESTRR Tool Mapping

## Legend:

Removed

Reworded

Remained the same as current  
VISPDAT (March 2018 document)

Original Question: Have you taken an ambulance to hospital in the last six months?

**CAB Suggestion: In the past six months, did you go to an Emergency Room for any type of service?**

In the past six months, have you: Used a crisis service, including sexual assault crisis, mental health crisis, family/intimate partner violence, distress centers, and suicide prevention hotlines?

**CAB Suggestion: Have you attempted to or received support from a crisis service for: Any sexual activity or act that happened without your consent. Have you called or reached out because of suicidal thoughts? Have you experienced violence from a family member or intimate partner?**

In the past six months, have you: Stayed one or more nights in a holding cell, jail or prison, whether that was a short-term stay like the drunk tank, a longer stay for a more serious offense, or anything in between?

**CAB Suggestion: In the past six months, have you been detained for more than 48 hours by law enforcement?**

8. Have you been attacked or beaten up since you've become homeless?

9. Have you threatened to or tried to harm yourself or anyone else in the last year?

**CAB Suggestion: Have you threatened or tried to harm yourself in the last year?**

**CAB Suggestion: Have you threatened or tried to harm anyone else in the last year?**

10. Do you have any legal stuff going on right now that may result in you being locked up, having to pay fines, or that make it more difficult to rent a place to live?

**CAB Suggestion: Do you have any past or current legal affairs? Do you have any legal affairs that may result in detainment? Do you have legal affairs that may or have obstructed housing opportunities? Are you aware of any unpaid fines?**



## CESTRR Tool Mapping

### Legend:

Removed

Reworded

Remained the same as current  
VISPDAT (March 2018 document)

11. Does anybody force or trick you to do things that you do not want to do?

**CAB Suggestion: In the last year has anybody forced you or tricked you to do things that you do not want to do? Answering yes to this question will not result in punishment or any negative consequences for you.**

12. Do you ever do things that may be considered to be risky like exchange sex for money, run drugs for someone, have unprotected sex with someone you don't know, share a needle, or anything like that?

13. Is there any person, past landlord, business, bookie, dealer, or government group like the IRS that thinks you owe them money?

14. Do you get any money from the government, a pension, an inheritance, working under the table, a regular job, or anything like that?

15. Do you have planned activities, other than just surviving, that make you feel happy and fulfilled?

16. Are you currently able to take care of basic needs like bathing, changing clothes, using a restroom, getting food and clean water and other things like that?

17. Is your current homelessness in any way caused by a relationship that broke down, an unhealthy or abusive relationship, or because family or friends caused you to become evicted?

**CAB Suggestion: Is your current homelessness in any way caused by the following? Choose all that apply. List the following as options: Relationship that broke down, Unhealthy or abusive relationship, Family or friends caused you to become evicted, Evicted because of other lease violations**

# CESTRR Tool Mapping

## Legend:

Removed

Reworded

Remained the same as current  
VISPDAT (March 2018 document)

18. Have you ever had to leave an apartment, shelter program, or other place you were staying because of your physical health?

**CAB Suggestion: Has your physical health ever hindered your ability to take care of yourself resulting in having to leave an apartment, shelter program, or other place you were staying. Or Would you say that your physical health makes it difficult to live self-sufficiently on your own?**

19. Do you have any chronic health issues with your liver, kidneys, stomach, lungs or heart?

20. If there was space available in a program, housing, or resources that specifically assists people that live with HIV or AIDS, would that be of interest to you?

**CAB Suggestion: Would you be interested in housing resources that assist people who live with HIV or AIDS?**

21. Do you have any physical disabilities that would limit the type of housing you could access, or would make it hard to live independently because you'd need help?

22. When you are sick or not feeling well, do you avoid getting help?

23. Are you currently pregnant?

24. Has your drinking or drug use led you to being kicked out of an apartment or program where you were staying in the past?

**We strive to maintain the highest level of confidentiality and any written or electronic information is secure with software and locked storage files, and the information you disclose with me is treated with the highest security protocol. Sharing your story, it will help me to direct you to the appropriate available resources. Do you feel or believe that drinking or drugs may have created barriers to secure and maintain housing?**

# CESTRR Tool Mapping

## Legend:

Removed

Reworded

Remained the same as current  
VISPDAT (March 2018 document)

25. Will drinking or drug use make it difficult for you to stay housed or afford your housing?

26. Have you ever had trouble maintaining your housing, or been kicked out of an apartment, shelter program or other place you were staying, because of:

26a. A mental health issue or concern?

26b. A past head injury?

26c. A learning disability, developmental disability, or other impairment?

27. Do you have any mental health or brain issues that would make it hard for you to live independently because you'd need help?

28. Are there any medications that a doctor said you should be taking that, for whatever reason, you are not taking?

29. Are there any medications like painkillers that you don't take the way the doctor prescribed or where you sell the medication?

**CAB Suggestion: Do you have medication that you choose to sell instead of taking to help support yourself financially? Answering yes to this question will not result in punishment or negative consequences for you.**

30. YES OR NO: Has your current period of homelessness been caused by an experience of emotional, physical, psychological, sexual, or other type of abuse, or by any other trauma you have experienced?

## Appendix 3 Data Science Methods for Tool Improvement

**To create a revised tool that improved the accuracy, equity, and efficiency of a triage tool for Los Angeles, we did the following:**

- (1) We constructed an analytical dataset of historical VI-SPDAT assessments between 2015 and 2018, incorporating the adverse outcome definition chosen in consultation with the community and simplifying the encoding of the questions (see the section Adverse Outcome Definitions Considered and Data Sources and Modeling Pipeline).
- (2) We imputed counterfactual outcomes for participants in the dataset who received permanent housing to ensure that the improved tool is not biased against similar participants in the future (see the section Imputing Counterfactual Outcomes for Participants who Received Permanent Housing).
- (3) We trained and evaluated the predictive model in an iterative process, applying an equity adjustment to the training data in order to minimize the bias of the improved tool, and also adjusting outlier points values to ensure the improved tool's interpretability and face validity. We repeated the iterative model training process until accuracy and equity goals were met (see the sections Data Sources and Modeling Pipeline and Methodology for Improving the Equity of the Tool).

**The below sections of this Technical Appendix contain a detailed description of each of the above steps.**

### Adverse Outcome Definitions Considered

Figure 10 presents the outcomes that were considered for prediction. These outcomes were developed by the research team and presented to the community through the CPG and CAB for feedback. General Vulnerability Proxy was the final selected outcome.

## Adverse Outcome Definitions presented for Community Consideration

Adverse Outcome	Data Source	Definition and Notes
<b>General Vulnerability Proxy</b>	Los Angeles County Administrative Data (Infohub)	Occurance of one or more of the following events in Los Angeles County facilities after the date of assessment
<b>Chronic Homelessness Proxy<sup>1</sup></b>	Homeless Management Information System (HMIS)	Enrollment in one or more of the following homeless services 180 days or later than the date of assessment: <ul style="list-style-type: none"> <li>⌘ Street outreach</li> <li>⌘ Emergency shelter, day shelter, or safe haven</li> <li>⌘ Hygiene projects</li> <li>⌘ Access centers</li> <li>⌘ Housing Navigation</li> <li>⌘ Safe Parking</li> <li>⌘ Problem Solving for literally homeless</li> </ul>
<b>Street Outreach</b>	Homeless Management Information System (HMIS)	Any new enrollment in street outreach after the assessment date.  <b>Issues:</b> <ul style="list-style-type: none"> <li>⌘ Doesn't capture full range of housing instability</li> </ul>
<b>System Regression</b>	HMIS	Housing instability measured in each participant's context and enrollment trajectory. For example, an individual receiving a permanent housing solution (e.g. RRH or PSH) then later receives Street Outreach or Interim Housing services. Or, an individual receiving interim housing services (e.g. Transitional Housing) and later receiving Street Outreach services.  <b>Issues:</b> <ul style="list-style-type: none"> <li>⌘ Requires complex business rules to define system regressions.</li> </ul>
<b>Mortality</b>	Los Angeles County Administrative Data (Infohub) and HMIS	Death as recorded in Coroner or HMIS data  <b>Issues:</b> <ul style="list-style-type: none"> <li>⌘ Only captures subset of deaths, demographics very different to current CES clients (much more likely to be White)</li> </ul>

Fig.10

<sup>1</sup> This definition is a simplified proxy for the concept of chronic or 'sustained' homelessness, which cannot be precisely observed in the Los Angeles HMIS data according to the HUD definition due to high rates of missingness for critical data elements representing frequency and duration of homelessness.

## Data Sources and Modeling Pipeline

The source data for the CESTTR project consists of data from LAHSA's Homeless Management Information System (HMIS), linked to service utilization records from the Los Angeles County Chief Information Officer Infohub, which contains data from eight county agencies, including Department of Health Services, Department of Mental Health, Department of Public and Social Services, LAHSA, Sheriff's, Probation, and the Medical-Examiner Coroner).

## VI-SPDAT Data and Modeling

The data used for evaluating and improving the VI-SPDAT consists of 71,747 assessments completed between July 2015 through October 2018, representing 54,543 unique persons. Adverse outcomes were coded as binary indicators set to 1 if the outcome was experienced over a two-year period following the assessment date.

For training and evaluating the predictive models, the data were randomly split into three partitions. Two of the three partitions (N=47,349) were used during the model development and community collaborative phases in 2021-2022, with two-fold cross-validation metrics being presented during interim presentations. The third data partition (N=24,398) was held out in reserve from the outset of the project and has not been used in the project until the generation of final evaluation metrics for this report in August 2022.

Because the improved tool was intended to have a similar form to the VI-SPDAT— a human-readable tool with positive integer points values — we trained and evaluated a simple linear model (LASSO with coefficients constrained to be positive), where the coefficients in the fitted model were multiplied by 100 and rounded to integers to obtain question points values<sup>2</sup>. Most questions on the VI-SPDAT have multiple response options for frequency (e.g. 0 times, 1 times, 2 times, and so on). We transformed these questions into yes/no format before training and evaluating the model<sup>3</sup>.

The research team initially presented an improved tool to the community which contained 9 of the original 35 VI-SPDAT questions. In response to community feedback that more than 9 questions were required for the face validity of the tool, we selected a larger number of potential questions by bootstrapping the modeling process (1,000 iterations) and presenting to

---

<sup>2</sup> We used the Lasso model in the Python scikit-learn library with `fit_intercept=True` (to restrict coefficients to be positive) and minimal penalization (`alpha=0.0001`).

<sup>3</sup> We found that there was no meaningful loss of predictive accuracy compared with an encoding scheme which preserved the frequency options (AUC 0.635 for an accuracy-optimized model with a binary encoding scheme vs. AUC 0.636 for an accuracy-optimized model with a continuous encoding scheme).



the community the full list of questions that had a nonzero coefficient in at least one bootstrap iteration. The purpose of using the bootstrap procedure was meant to identify policy-relevant variables that may have potentially been dropped from the modeling due to multicollinearity. The final revised tool consists of this more inclusive list of 19 questions, with integer points values rounded to a minimum of 1 for all questions.

## **Imputing Counterfactual Outcomes for Participants who Received Permanent Housing**

A primary challenge to using existing VI-SPDAT responses and individual outcomes to improve the tool is that they include the effects of the system. Specifically, if the VI-SPDAT scores were correlated with a target outcome and were also used to assign resources in the CES, then the scores would relate to available resources. Further, if receiving resources had impacts on later outcomes, then ignoring the receipt of that resource would result in bias for any model that tried to relate the underlying variables to the target outcomes. These challenges are discussed in reviews by Lin et al. (2021) and van Geloven et al. (2020).

To provide a concrete example of this challenge, assume that receiving permanent housing services lowers a participants' risk of homelessness and related adverse outcomes. Because of this, participants who received permanent housing in the past will tend to have lower rates of adverse outcomes in the data because they received a beneficial intervention. If the historical data is unadjusted during model training, a risk prediction tool will learn those lower rates of adverse outcomes for those participants. However, these lower rates of adverse outcomes do not reflect the true baseline risk levels of those participants; they are only lower in virtue of the beneficial interventions they received<sup>4</sup>. This can have significant implications for equity. For example, in the HMIS data, Black participants are assigned to permanent housing at higher rates than non-Black participants. If this is unaccounted for in the modeling process, a risk prediction tool may underestimate risk for Black participants.

---

<sup>4</sup> This is only an issue if the risk prediction tool is potentially going to be used in the process of assigning those resources. For other interventions not directly affected by the risk prediction tool, we generally want the data to represent the business-as-usual scenario (see van Geloven et al. 2020).

---

A number of different approaches to this problem have been proposed in the literature. We have chosen a method that is simple, interpretable, and easily integrated into existing modeling pipelines<sup>5</sup>. For each participant in the training data who received permanent housing, we impute a counterfactual outcome representing what would have happened to them if they had not received permanent housing. These counterfactual outcomes are then used to train and evaluate the risk prediction tools<sup>6</sup>.

It should be noted that because this method deals in counterfactuals — that is, scenarios that could have happened, but did not happen — we are entering the territory of causal inference, in which we attempt to make claims about causation based on observational data. In causal inference problems, there is always a potential problem of confounding: observed and unobserved factors that influence both adverse outcomes and the assignment of interventions and potentially bias our estimates of counterfactual scenarios. For example, it could be that permanent housing does not, in reality, have a beneficial impact, but participants who were prioritized for permanent housing had a lower risk level due to factors that we cannot observe in the data (e.g., being more highly motivated, or being assigned to a more skilled caseworker). This scenario is unlikely, but cannot be ruled out without more extensive empirical evidence.

Estimating the true causal impacts of permanent housing programs would be a multi-year research project outside the scope of CESTTRR. For our purposes, we decided to make assumptions about the most plausible counterfactual scenario given the data that we have, and test the robustness of the improved tool to potential deviations from that assumption. Our estimation of the most plausible counterfactual scenario relies on a selection-on-observables assumption — the assumption that the combination of the HMIS and Infohub administrative data captures all relevant confounding factors. We trained and evaluated the tool according to this most plausible scenario, and against two other possible, although less likely, scenarios: (i) a scenario in which permanent housing has no impact (leaving the data unchanged); and (ii) a scenario in which permanent housing has a much larger estimated impact<sup>7</sup>. We found

---

<sup>5</sup> A frequently used alternative approach is to use propensity-score weighting to weight the untreated observations to be more similar to the treated observations, and then train the model on the weighted untreated observations, excluding the treated observations. We decided against this approach for the following reasons: (i) it involves dropping a large number of observations from the sample; (ii) it is unclear how to present and interpret model accuracy and equity results for the weighted sample; and (iii) the approach becomes complicated when dealing with multiple time-varying treatments, and when additional weighting or other adjustments to the training data are required for equity purposes.

<sup>6</sup> For a similar approach in the literature, see Coston et al. (2021) who propose an approach of directly imputing counterfactual outcomes. We combine counterfactual outcome imputation with a strategy inspired by Sperrin et al. (2018) to deal with time-varying treatments.

that accuracy and equity metrics for both the VI-SPDAT and the improved tool were almost unchanged across all three scenarios.

## Counterfactual Imputation Algorithm

The algorithm can be considered as a version of a matching strategy where we impute counterfactual outcomes for each observation using similar observations. Instead of using traditional propensity score matching techniques, however, we use entropy balancing to optimize for balance on observed confounders. This has the advantage of optimizing directly for covariate balance, which is not guaranteed when using propensity score matching techniques<sup>8</sup>.

Since the assignment of permanent housing is time-varying, and can happen at any point after assessment, we split the outcome window into quarters, and only impute counterfactual outcomes for those quarters affected by the assignment of permanent housing. Observed confounders are measured up to the point in time where permanent housing is received.

1. Within each cross-validation fold:

a. For each assessment where the individual received permanent housing (RRH, PSH, or both):

i. Find the weighted mean of adverse outcomes for assessments in the same SPA and quarter for individuals who did not receive permanent housing, where weights are generated using entropy balancing on observed confounders (demographics, VI-SPDAT score, and prior HMIS and county service utilization)

ii. Convert the weighted mean of matched outcomes into a binary outcome using a binomial draw.

---

<sup>7</sup> This scenario was constructed by excluding the possibility of negative impacts of permanent housing--i.e., by restricting the imputations to individuals who did not experience an adverse outcome after being assigned to permanent housing.

<sup>8</sup>See Hainmuller (2012) for an introduction to entropy balancing, which generates weights between 0 and 1 that directly optimize for balance on covariate means and higher-order moments.

## Robustness of Improved Tool to Estimated Impacts Across Scenarios

Figure 11 below shows how the Improved Tool improves on the accuracy and equity compared to the VI-SPDAT in all three counterfactual scenarios.

Robustness of Improved Tool to Estimated Impacts across Scenarios		
Scenario	VI-SPDAT	Improved Tool
<b>No Impact (37.7% base rate among permanent housing recipients)</b>		
AUC	0.538	0.603
Black-White GFNR Difference	5.8%	0.7%
<b>Small Impact (-1.4%)</b>		
AUC	0.541	0.603
Black-White GFNR Difference	5.9%	0.7%
<b>Large Impact (12.8%)</b>		
AUC	0.535	0.595
Black-White GFNR Difference	6.1%	0.8%

Fig.11

## Methodology for Improving the Equity of the Tool

### Adult Tool (the VI-SPDAT)

Would it have been possible to improve the equity of the VI-SPDAT simply by applying standard predictive modeling techniques which re-weight questions on the tool to maximize accuracy only? We found that an accuracy-only approach that does not explicitly adjust for equity is not only insufficient to minimize the existing GFNR disparities on the VI-SPDAT, but also introduces new disparities that did not exist previously.

By optimizing the VI-SPDAT for accuracy only, it is possible to improve the AUC metric for the general vulnerability proxy outcome from 0.54 to 0.64. As shown in Figure 12, however, while the magnitude of GFNR differences was reduced when optimizing for accuracy alone, statistically significant GFNR differences greater than 1% still exist, and are larger for Black participants. In addition, the reweighting process introduced new, statistically significant disparities for White women and for adults aged 60+.

## Disparities in Generalized False Negative Rate (GFNR) for the VI-SPDAT, and for the VI-SPDAT reweighted to improve accuracy only

Group	#Asmts	%Asmts	VI-SPDAT		VI-SPDAT reweighted for accuracy only	
			GFNR	vs Reference Group	GFNR	vs Reference Group
<b>Race/Ethnicity (reference: White)</b>						
White	5,440	22.7	54.41		55.4	
Black	11,595	47.5	60.0	5.9 **	57.6	2.2 **
Latinx	6,050	24.8	57.3	3.2 **	55.1	-0.4
Native Hawaiian, other Pacific Islander	127	0.5	62.6	8.5 **	56.5	1.1
<b>Gender (reference: Men)</b>						
Men	15,898	65.2	58.4		55.9	
Women	8,318	34.1	56.5	-1.9 **	57.3	1.3 **
Trans Women	147	0.6	49.5	-8.9 **	53.5	-2.5
<b>Age (reference: Age Under 60)</b>						
Age 0 - 59	20,229	82.9	58.0		55.9	
Age 60+	4,169	17.11	55.9	-2.2 **	59.7	3.8 **
<b>Intersectional (reference: White Men)</b>						
White Men	3,759	15.4	54.2		55.0	
Black Women	4,046	16.6	58.3	4.1 **	58.8	3.8 **
Black Men	3,940	16.1	60.8	6.6 **	57.1	2.1 **
Latinx Men	127	0.5	58.1	3.9 **	54.8	-0.2
White Women	1,742	7.1	53.7	-0.5	56.4	1.4 **

Fig.12

\* =  $p < 0.05$ ; \*\* =  $p < 0.01$  (1,000 bootstrap iterations)

Table shows groups with a minimum of 100 participants and a significant GFNR difference with the reference group.



In order to minimize these GFNR disparities, we applied an algorithm from Kamiran and Calders (2012) which modifies the training data in order to improve equity by sacrificing some predictive accuracy. The basic idea is to alter the training outcomes for some percentage of low-risk privileged participants and high-risk non-privileged participants. Specifically, we did the following:

**1. Within each cross-validation fold:**

- a. Train a model without an equity adjustment on the training data, and use it to generate risk scores on the training data
- b. Find the  $n$  lowest-risk observations from the privileged group where outcome variable  $Y = 1$ , and change their outcome variable  $Y$  to 0
- c. Find the  $n$  highest-risk observations from the non-privileged group where outcome variable  $Y = 0$ , and change their outcome variable  $Y$  to 1
- d. Train the final model on the adjusted data
- e. Generate out-of-sample predictions on the other cross-validation fold

**2. Evaluate the out-of-sample predictions on the unmodified data for accuracy and equity**

**3. Repeat the process for different values of  $n$  until desired accuracy and equity goals are obtained (AUC > 0.60 and differences in GFNRs < 1%).<sup>9</sup>**

The AUC and GFNR thresholds were selected by the research team to reflect a practical option that reflects a joint goal of meaningfully improving both the accuracy and equity. That said, the research team believed that community feedback on these decisions from the CPG and CAB were needed before the tool could be finalized. Therefore, findings that highlighted the trade-offs were presented and incorporated into the final decision.

---

<sup>9</sup> The modeling process originally assigned a points value of 14 to the question “In the past six months, have you been detained (held, kept) for more than 24 hours by law enforcement?”, which would make it an extreme outlier by comparison with other questions which had points values between 1 and 3. In order to improve the face validity and interpretability of the tool, we revised the points value for this question downward to be in conformance with the points values for other questions on the tool. We reviewed the accuracy and equity of potential revised values from 0 to 14, and found an optimal value of 5 for this question, maintaining an AUC above 0.6 with GFNR disparities below 1%.

---

By applying this equity adjustment algorithm, we were able to produce an AUC of 0.603 while reducing differences in GFNRs to under 1% for all groups in comparison to the following reference groups: White participants for race/ethnicity; men for gender; Age under 60 for age; and, White men for intersectional groups by race and gender. Figure 13 provides a full list of GFNRs for the VI-SPDAT and the revised tool (filtered to groups with at least 100 participants where there is a statistically significant disparity between a group and the reference group for the original VI-SPDAT).

Disparities in Generalized False Negative Rate (GFNR) for the VI-SPDAT, and for the final improved tool						
Group	#Asmts	%Asmts	VI-SPDAT		Improved Tool	
			GFNR	vs Reference Group	GFNR	vs Reference Group
<b>Race/Ethnicity (reference: White)</b>						
White	5,440	22.7	54.41		60.6	
Black	11,595	47.5	60.0	5.9	61.3	0.7
Latinx	6,050	24.8	57.3	3.2	60.8	0.2
Native Hawaiian, other Pacific Islander	127	0.5	62.6	8.5	61.4	0.7
<b>Gender (reference: Men)</b>						
Men	15,898	65.2	58.4		60.1	
Women	8,318	34.1	56.5	-1.9	60.1	0.0
Trans Women	147	0.6	49.5	-8.9	59.8	-1.2
<b>Age (reference: Age Under 60)</b>						
Age 0 - 59	20,229	82.9	58.0		61.0	
Age 60+	4,169	17.11	55.9	-2.2	61.1	0.1
<b>Intersectional (reference: White Men)</b>						
White Men	3,759	15.4	54.2		60.6	
Black Women	4,046	16.6	58.3	4.1	61.4	0.8
Black Men	7,446	30.6	60.8	6.6	61.3	0.7
Latinx Men	3,940	16.1	58.1	3.9	60.9	-0.3

Fig.13

\* =  $p < 0.05$ ; \*\* =  $p < 0.01$  (1,000 bootstrap iterations)

Table shows groups with a minimum of 100 participants and a significant GFNR difference with the reference group.

## Technical Appendix for identifying a threshold for the revised tool

To assess the use of the revised tool for prioritization purposes, we assessed measures of equity once a threshold to the score was applied. Figure 14 shows the percentage point difference in false negative rates for race/ethnicity groups in comparison with a White baseline at score thresholds from 20 to 14. (Although scores up to 24 are possible with the tool, scores above 20 represent less than 1% of total assessments and are excluded from the figure). The figure shows that our recommended threshold of 17 minimizes disparities in false negative rates between race/ethnicity groups in comparison with a White baseline, and that lower thresholds would result in larger disparities.

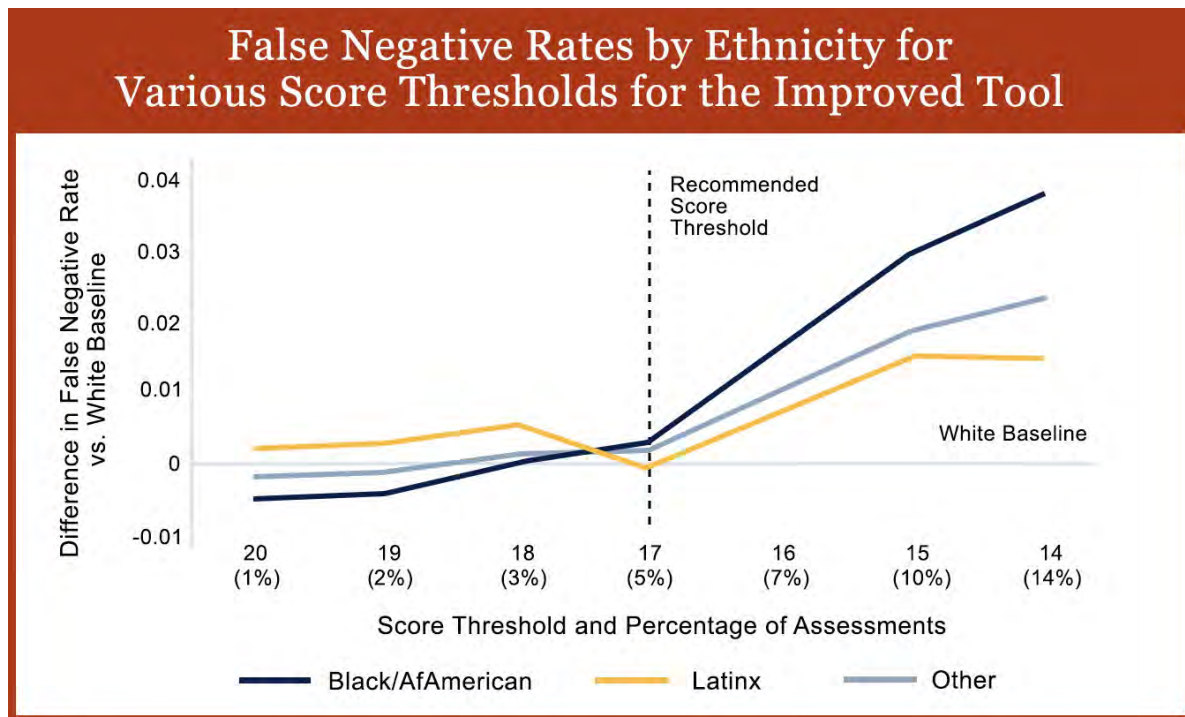


Fig.14

## Appendix 4 Technical Appendix for Proof of Concept: Fair Matching Using Proof of Concept Optimization and Data-Driven Algorithms

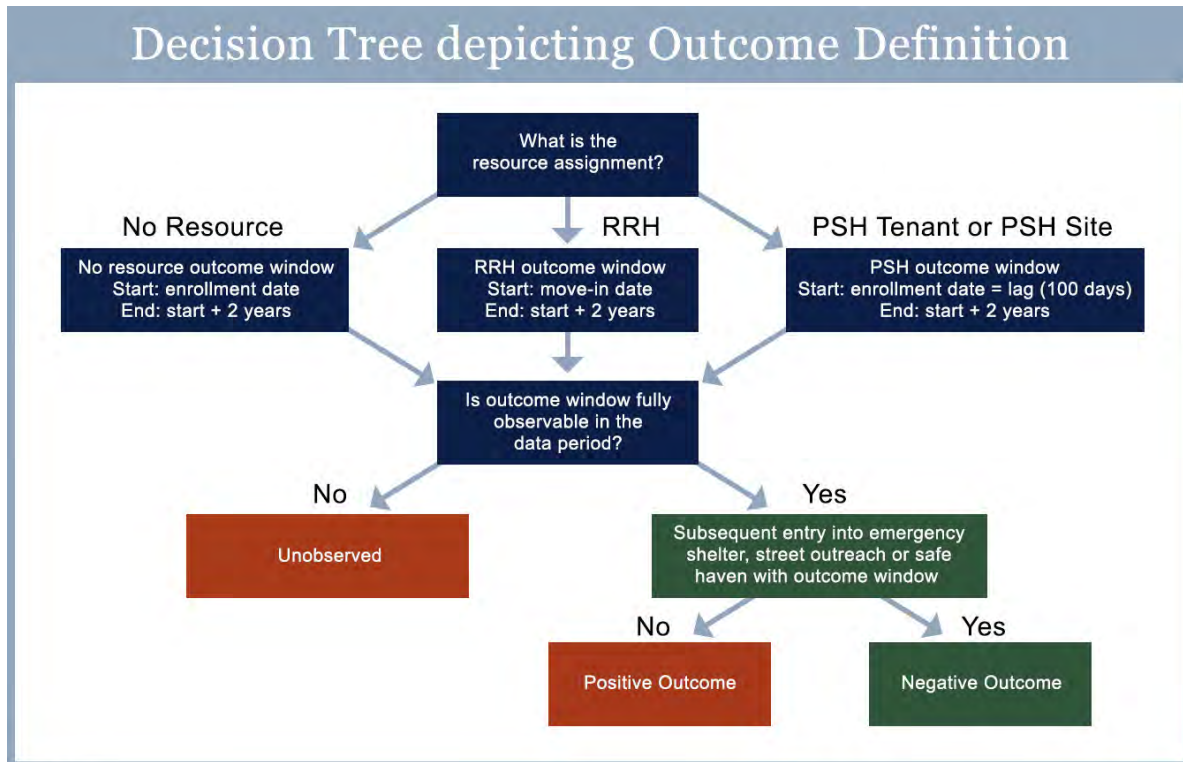
This section outlines technical details for Ch 9. Proof of Concept: Fair Matching Using Proof of Concept Optimization and Data-Driven Algorithms. Full details on the mathematics and data science in this section can be found in the work of Tang et al. (2023).

### Data Preparation

For proof of concept of an optimization tool for matching, we use VI-SPDAT assessments dated from 1/12/2015 to 12/31/2019 and match each assessed client with their respective HMIS data, which includes a sequence of enrollments following assessment. For the 11 enrollment types in HMIS, we consider RRH and PSH as permanent interventions/resources and the other enrollments as not receiving a resource either due to their temporary nature, or specific nature of service provided. Furthermore, within the “Housing Type” field within the HMIS data, we find further information on whether a PSH resource was site-based, in which individuals live in a single-site with some support services available, or tenant-based, in which individuals live in different units across a community and case managers provide support services. We make this distinction in the analysis since the two types of PSH are differing enough to be considered separate interventions. Distinguishing between the two interventions will allow for more accurate modeling of client outcomes. Finally we use “Street Outreach,” “Emergency Shelter,” and “Safe Haven” to be proxies for a client experiencing homelessness. This categorization of the enrollment types was based on discussions with matchers and exploration of the historical data. For each client we then have their assessment date, assigned resource if any, and assessment information.

To determine an outcome variable, we define a two-year observation window depending on the resource received. For RRH, we use their move-in date found in the HMIS data as the start of the two-year observation window. For PSH, we use the move-in date as well, but add a 100-day lag to account for data inconsistencies found between move-in date found within the HMIS data and the Resource Management System (RMS) data, which contains specific information on PSH units such as eligibility requirements and current matching status. After discussions with matchers, the move-in date in HMIS is likely not accurate and the 100-day lag was determined based on RMS data. For those receiving no resource, we consider their first interaction/enrollment of any type to be the start of the observation window. If we observe a subsequent enrollment into “emergency shelter,” “safe haven,” or “street outreach” within the two-year window, we consider an individual to have experienced a negative outcome. Otherwise, it is a positive outcome. Finally, since our data had a fixed end date of 11/30/2020, this means there are individuals for whom we cannot observe their full two-year observation window if the observation period ends after 11/30/2020. If an individual has not experienced

a negative outcome in our data, we cannot label this as a positive outcome because we do not know what happened in the unobserved portion of the window. In this case, we cannot use these individuals as part of the counterfactual estimation modeling process (see section Counterfactual Estimation for Testing Evaluation). See Figure 15 for a visual depiction of the outcome definition as a decision tree. While other time windows could have been chosen, there is a trade off in the length of the window. Shorter windows are potentially biased since we do not have enough time to observe potential post-intervention events, while longer windows would leave us with fewer individuals with an observable window.



Fig,15

## Counterfactual Estimation for Testing Evaluation

In order to evaluate the potential effectiveness of an algorithmic matching tool from the historical data, we need counterfactuals, or what would have happened if a client received a different resource than what they did in the data. Since we cannot know this, we train machine learning models to model the relationship between a client’s assessment information and their outcome for each resource group. Finally, we noticed that clients who did not identify as having any disabilities were unlikely to receive PSH, where disability is captured by responses on the VI-SPDAT. Given this systematic difference, we also modeled clients with no disabilities and clients with disabilities as separate groups.

To measure how well our models represent reality, we choose “calibration” as the evaluation metric. “Calibration” requires the model’s predicted probability of a good outcome for any



individual to match their observed probability of a good outcome within the data. For example, for all clients predicted to have 90% probability of a positive outcome, we should see about 90% of those clients to actually have a positive outcome in the data. Intuitively, we want our predicted probabilities of an outcome to reflect the true probability of an outcome, and we use the actual observed outcomes as a proxy for the true probability. To determine if our model is “well-calibrated,” we plot calibration curves for a given resource group and a given model. For example, in Figure 16, we take all individuals who did not receive a resource and had a disability and generate their predicted probability of positive outcome under three different models. Then we group all those predicted probabilities into 10 buckets, where each bucket is a decile of the predicted probability, i.e., the first bucket are all probabilities belonging to the bottom 10 percentile. Each bucket is represented by a point on the blue, grey, yellow lines below, where the x-axis value is the average predicted probability for all individuals in that bucket and the y-axis value is the proportion of actual positive outcomes for all individuals in that bucket. Each of the solid colored lines represents the 10 buckets for a different model where the blue line is for logistic regression, grey line is for random forest, and yellow line is for xgboost. While we show these three models for illustration purposes of a calibration plot, we clarify more in the following paragraph the five models we chose. For each dot, if the x-axis value of average predicted probability and the y-axis value of proportion of actual positive outcomes are very close to each other, this means our predicted probabilities represent the real probabilities very well. This means our predictions are well calibrated, and the dot should be close to the dotted diagonal line, which is the line where the predicted and actual probabilities are exactly the same.

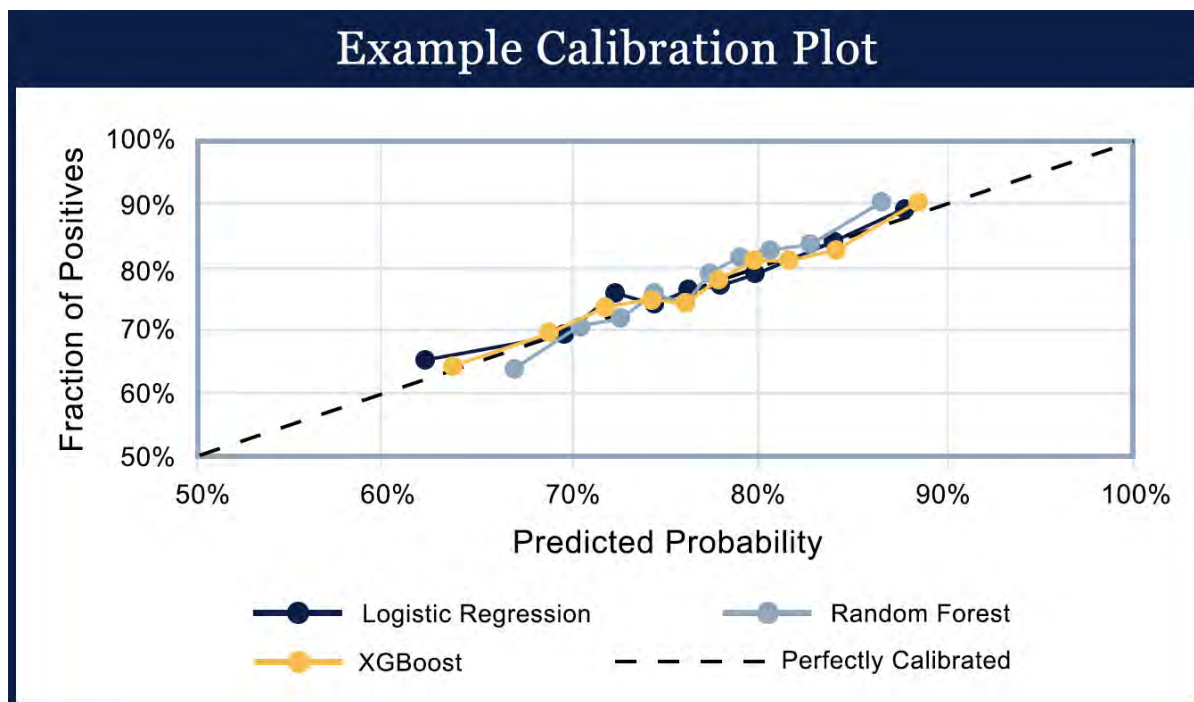
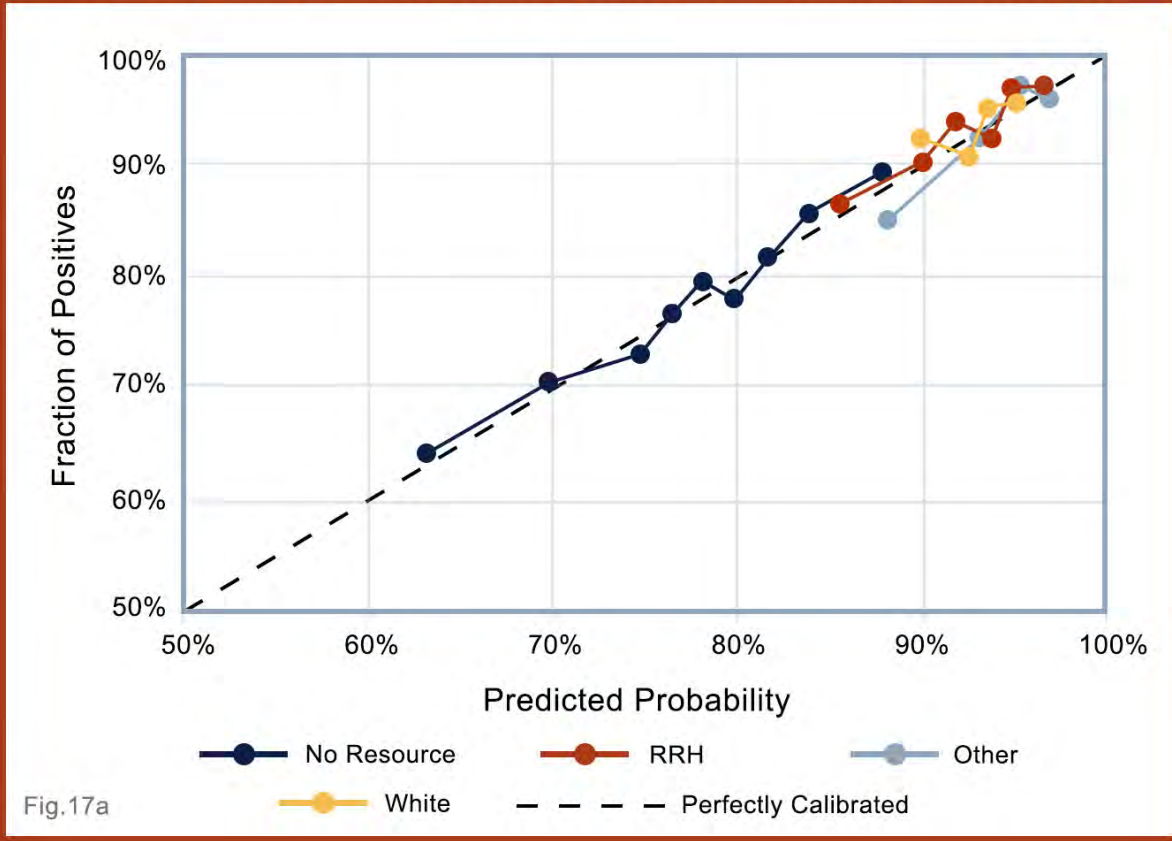


Fig.16

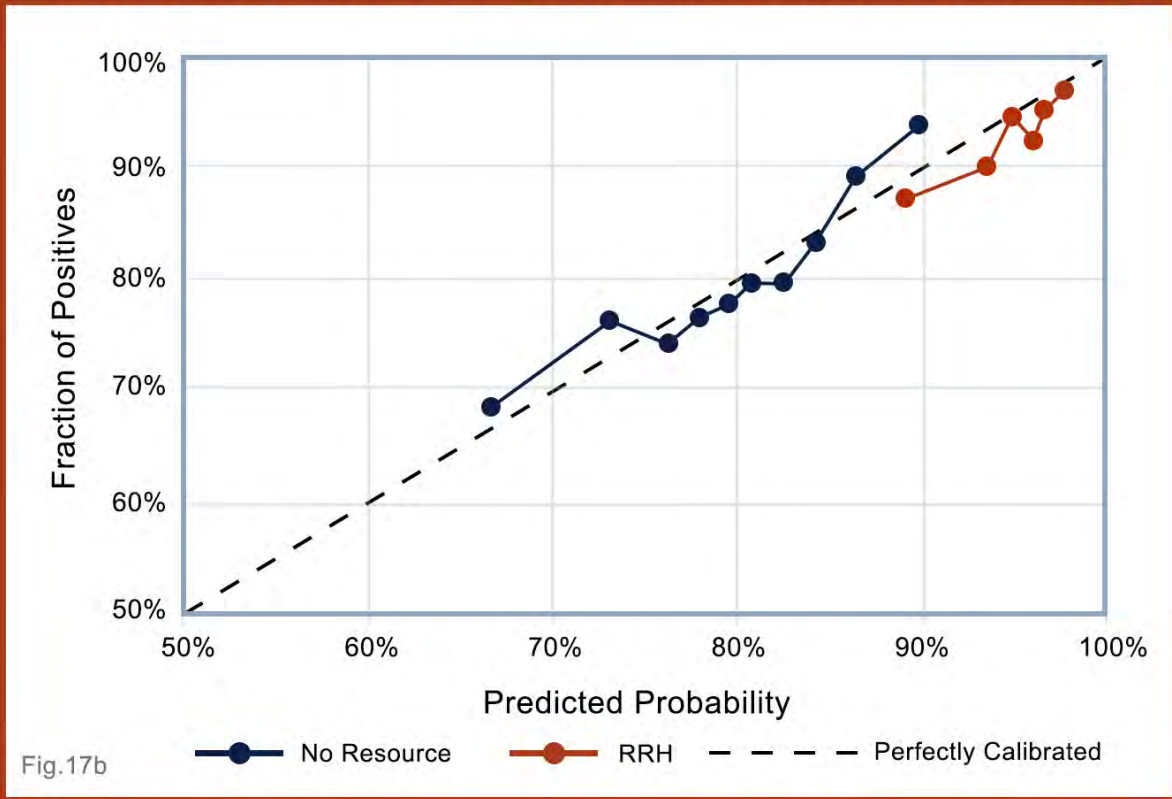


We tried five different model classes to find the one that best fit each resource group: logistic regression, decision trees, random forests, gradient boosted trees, and xgboosttrees. We chose these five models as they are commonly used for tabular data and range from simple models like logistic regression to complex non-linear models like xgboosttrees, which can capture interactions between variables and have shown good performance across many applications. If there are no significant performance differences between the models, then it makes sense to choose an interpretable model like logistic regression. On the other hand, more complicated models like random forests, gradient boosted trees, and xgboosttrees may give performance improvements because they can capture complex relations in the data. To ensure we do not overfit the data, and our chosen models could generalize beyond the data we have, we take a standard approach of splitting our data into three parts: training, validation, and testing. We use the training set to tune for the best parameters of each model class. Then we use the validation set to create the calibration curves described above to select the model class. We chose the best model class based on the closest fit to the diagonal line of “well-calibration”, and in the case where there is no noticeable difference, we default to the most simple model, which often turned out to be logistic regression. Finally, we use the test set to actually evaluate the quality of our chosen model, which we plot below. We see that for the individuals with a reported disability, our test set calibration curves are generally well calibrated, though for resource groups with fewer data points such as PSH-Tenant, the gray line deviates a bit more from the dotted diagonal line. Also note that the RRH, PSH-Tenant, and PSH-Site lines skew towards the upper right side of the graph since outcomes are generally better for individuals who have received a resource compared to those who did not receive a resource. For individuals without a reported disability, our test set calibration curves deviate a bit further from the dotted diagonal line likely due to the limited amount of data available. Also there are no PSH lines for individuals with no disability since very few individuals with no disability received PSH, making it difficult to fit a reasonable model to predict those outcomes. Since we cannot reasonably model the case where individuals with no disability receive PSH, we chose to remove them from the analysis and assume we can only allocate PSH to clients with disabilities since almost all PSH recipients reported having a disability of some kind.

## Test Data Calibration (Individuals with Disability)



## Test Data Calibration (Individuals with no Disability)



## Fairness of Estimates

Since issues of racial bias are of concern, an additional problem for our counterfactual models was potential bias by race, where bias means the model is less well-calibrated for certain racial groups. Since we use the generated counterfactuals as reflections of reality, any calibration bias would mean our evaluation results would also be potentially biased. Below we plot the calibration curves for our final models for each resource group across racial groups to see if there is a difference. The calibration groups across racial groups are largely similar to each other for each resource, with the exception of the “Other” group being slightly less well-calibrated. This is likely because the “Other” group is a smaller portion of the data, and therefore more difficult to model well. For the same reason, our calibration curves for PSH resources are generally worse than for no resource and RRH.

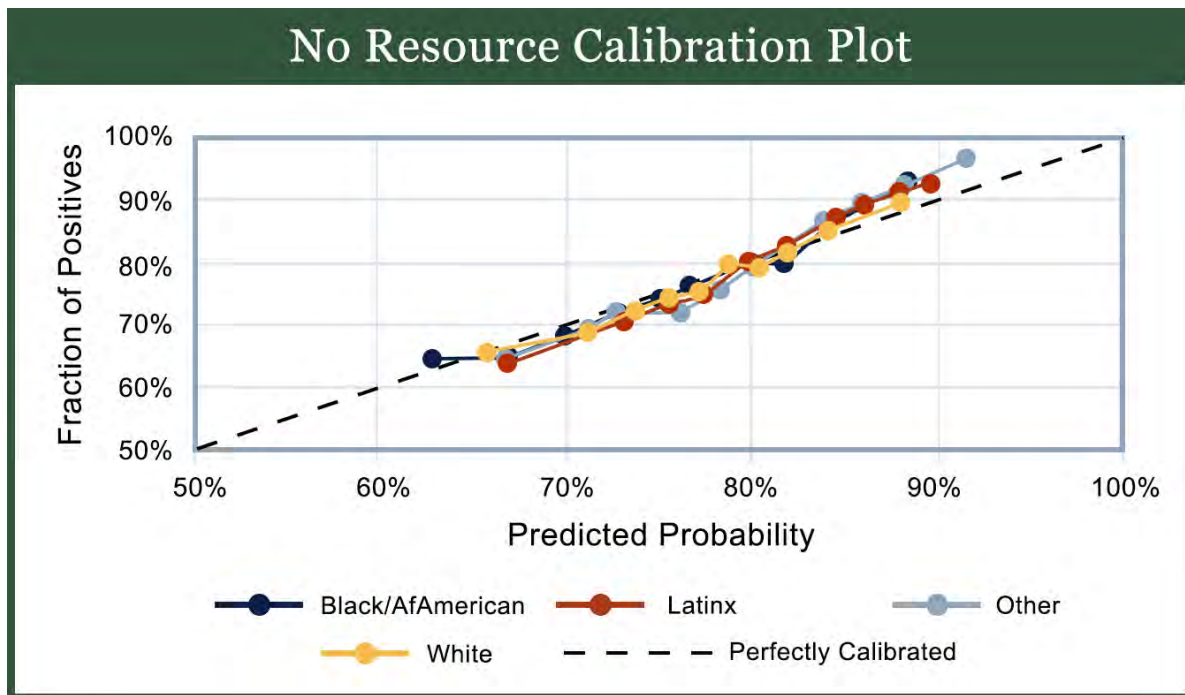


Fig.18a

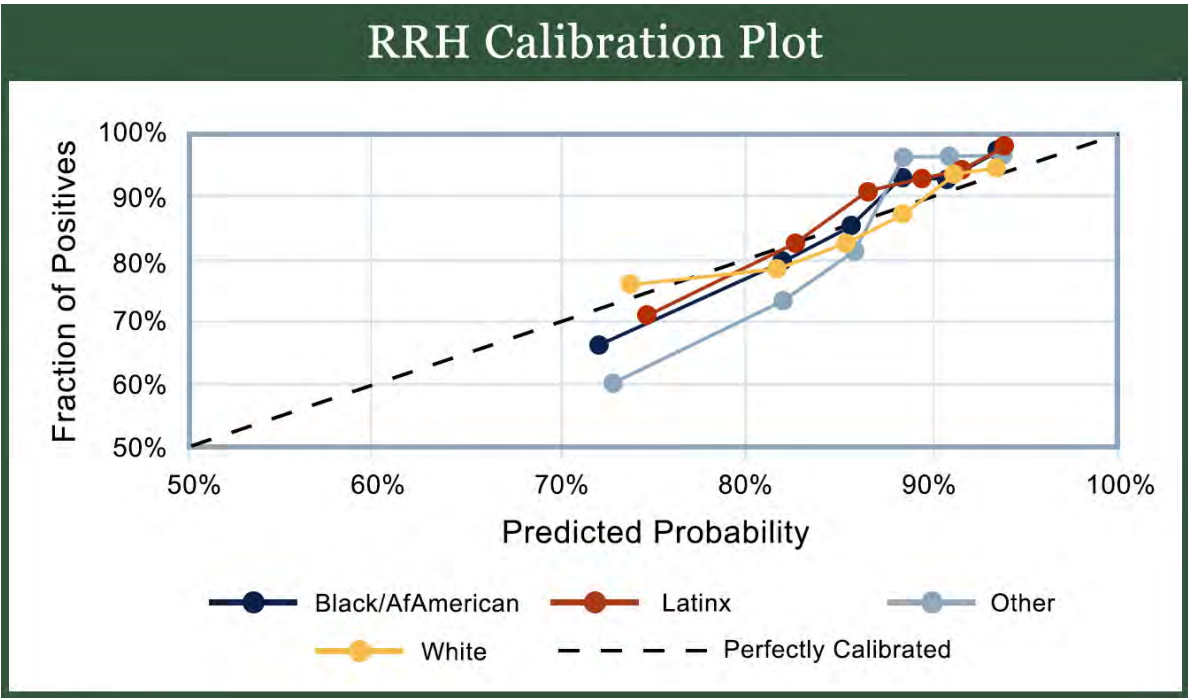


Fig. 18b

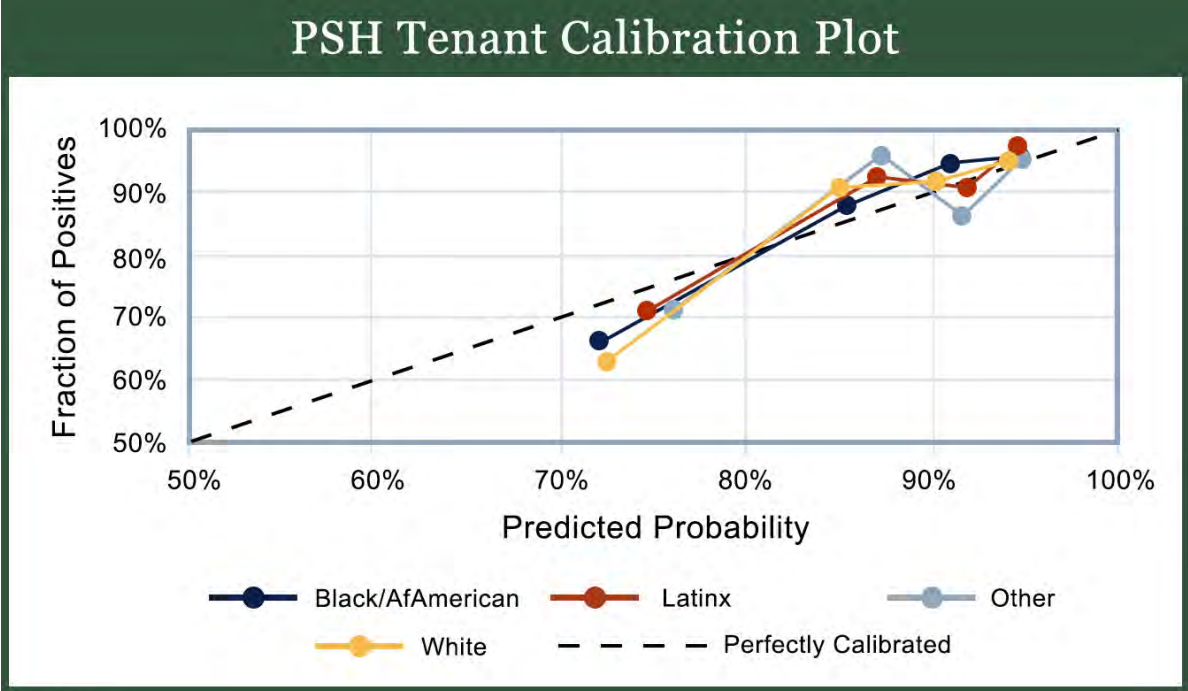


Fig. 18c

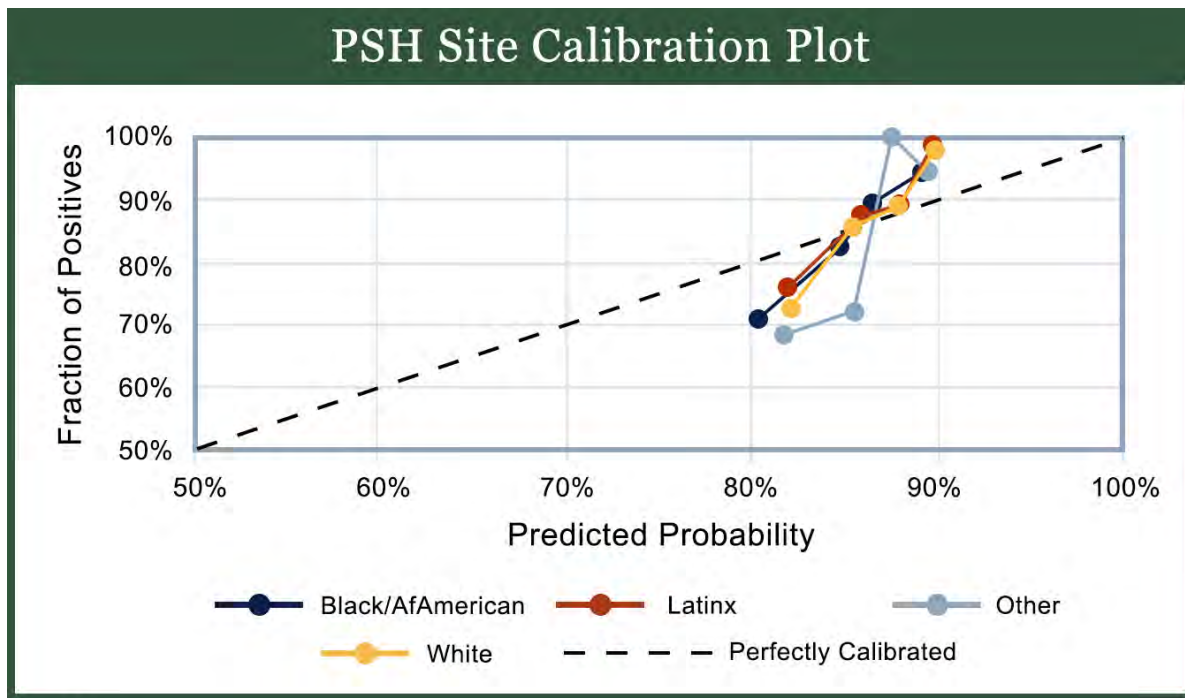


Fig.18d

## Data Splitting

Once we have generated the counterfactual outcomes, we can appropriately design and evaluate an allocation recommendation tool using optimization methods. Full details on how the data is used to design an allocation policy using optimization can be found in the work of Tang et al. (2023). To understand how well our tool would do when used on unseen data, we split the data into a training and testing set. For the training set, we used all individuals who were first assessed between 1/12/2015 and 12/31/2017 and their associated assessment information and observed outcomes to construct the allocation tool. For the testing set, we used all individuals whose first assessment was between 1/1/2018 and 12/31/2019 to evaluate how well the allocation tool performed on unseen data. Since the allocation tool may assign resources differently than what was historically allocated and some individual's full observation period was unobservable in the data, we use the counterfactuals estimated (using the procedure outlined in the last section) as the ground truth for evaluating individual outcomes.



## Appendix 5 History of the VI-SPDAT and CES for Context

### A History of the VI-SPDAT (Adults) in a National and Los Angeles Context

In order to better understand how Triage Tools, in particular the VI-SPDAT, have been used in Los Angeles, it is important to understand the larger national context. Across the nation over the past decade there has been a marked shift toward more centralized, systematic allocation of housing resources toward those persons experiencing homelessness who are perceived to be the most vulnerable and thus in greatest need of housing assistance. Triage Tools like the VI-SPDAT developed by OrgCode have become a critical part of this process. In this chapter we review this larger national context in order to contextualize the research we have conducted here in Los Angeles County.

### Coordinated Entry Systems (CES) in Continuums of Care (CoCs) Nationally

On any given night, an estimated 428,859 single adults ages 25 and older experience homelessness in the United States (HUD, 2021). These individuals represent the largest segment of the population experiencing homelessness and face a complex array of economic, health, and social issues, including intergenerational poverty, chronic health conditions, mental illness, substance use disorders, victimization, and discrimination (Caton et al., 2005; Lee, Tyler, and Wright, 2010; Tsai, 2017). In response, regional or local planning bodies known as Continuums of Care (CoCs) are responsible for coordinating U.S. Department of Housing and Urban Development (HUD) funding for housing and support services. To improve the allocation of limited housing resources to persons experiencing homelessness, HUD requires CoCs to implement a coordinated entry system (CES) (HUD, 2014). In the implementation of coordinated entry, communities prioritize individuals for housing and services based on an assessment of mental, physical, and social vulnerabilities. Many communities have adopted the Vulnerability Index-Service Prioritization Decision Assistance Tool (the VI-SPDAT) developed by OrgCode Consulting, Inc. and Community Solutions to this end.

As rises in homelessness continue to outpace investments in permanent and affordable housing, CoCs struggle to resolve the housing crises facing their communities. Since 2014, the population of single adults experiencing homelessness has increased by 18.5 percent, and the rate of individual chronic homelessness—defined as long-term homelessness coupled with a chronic health condition—has increased by 31.5 percent (HUD, 2019a). In the same time period, investments in permanent housing interventions have increased but continue to fall short of meeting demonstrated need. The national inventory of permanent supportive housing (PSH), a permanently subsidized housing program with intensive support services attached, includes more than 320,000 beds specifically designated for single adults. More



than 44,000 such beds are available in rapid re-housing (RRH), a time-limited rental assistance program with temporary support services (HUD, 2019a).

Homelessness in Los Angeles County has reached crisis levels. The 2022 Greater Los Angeles Homeless Count estimated that Los Angeles County has 69,144 homeless persons on any given day. Much of the crisis is driven by the lack of affordable housing in Los Angeles County. Recent estimates suggest that 499,430 low-income renter households do not have access to an affordable home. More alarming, 78% of extremely low income households are paying more than half of their income on housing costs (California Housing Partnership, 2021). A renter needs to earn \$38.23 per hour (2.5 times minimum wage) to afford the average rental of \$1,988 (California Housing Partnership, 2021).

Los Angeles County, however, is not alone in its inability to meet the demand for housing. Across the nation, unable to meet the housing needs of all persons experiencing homelessness, communities must determine how to fairly and equitably allocate limited resources. Since 2012, HUD has required each CoC to implement coordinated entry by standardizing assessment practices and prioritizing the most vulnerable persons to receive available housing resources. Although HUD issues a number of guidelines and requirements for the design and implementation of coordinated entry, CoCs may tailor elements of coordinated entry to the unique needs and characteristics of their communities (HUD, 2014; 2015a; 2015b; 2017; 2019b).

Coordinated Entry Systems (CESs) vary across communities with respect to their overall design, the size and composition of their service provider networks, and their housing stock. Individual CoCs may even opt to develop distinct systems focused on specific populations, each with their own designated points of entry, assessment tools, and protocols. These specialized CESs are tailored to the unique needs of and resources available to a given subpopulation and may function to specifically serve single adults, families, unaccompanied youth and young adults, veterans, individuals exiting the criminal justice system, and others (HUD, 2015b).

In general, however, single adults experiencing homelessness formally enter the CES upon completing a vulnerability assessment (HUD, 2017). Following initial contact with a local service provider or through a resource hotline, an individual is triaged and assessed to determine recommendations for housing and services. The exact timing of the assessment may vary, with some CoCs administering the tool during the very first service interaction or as part of standard program intake procedures. Otherwise, vulnerability assessments are generally administered by direct service providers or community volunteers through street outreach, at designated service locations such as drop-in centers or emergency shelters, or by phone (HUD, 2017).

Assessment data are subsequently entered into the local HMIS and reviewed by a team

of case managers or housing navigators. Individuals recommended to receive a housing intervention are placed on a waiting list until an appropriate housing opportunity arises (HUD, 2017). Placement and rank on the waiting list are largely determined by the level of vulnerability measured by the assessment, although service providers may consider additional factors or extenuating circumstances beyond the scope of the assessment. Individuals determined to have a low level of vulnerability are referred only to support services (HUD, 2017).

## The Development of the VI-SPDAT

The origins of the VI-SPDAT trace back to the 100,000 Homes Campaign, a nationwide effort

to house 100,000 vulnerable and chronically homeless individuals between 2010 and 2014 (Montgomery et al., 2016). Led by the non-profit organization Community Solutions, the campaign employed the Vulnerability Index (VI) to identify and measure the risk for premature death faced by individuals experiencing homelessness (Leopold and Ho, 2015). Based on research conducted among individuals accessing services through Boston Health Care for the Homeless (Hwang et al., 1997), risk criteria measured by the VI include age; the number of hospitalizations or emergency room visits; HIV/AIDS status; liver or kidney disease; a history of either frostbite, immersion foot, or hypothermia; and co-occurring behavioral health and chronic medical conditions (Cronley et al., 2013).

To extend the function of the VI from measuring vulnerability to recommending individuals for housing resources, Community Solutions collaborated with OrgCode Consulting to develop the VI-SPDAT in July 2013 (Leopold and Ho, 2015). The VI-SPDAT combines elements from the VI and the Service Prioritization Decision Assistance Tool (SPDAT), the latter of which was also created by OrgCode Consulting, Inc. Although the SPDAT was designed to make specific housing and service recommendations, the VI-SPDAT was conceived to provide communities a method for quickly determining levels of vulnerability and prioritizing individuals for further assessment (OrgCode Consulting, Inc. and Community Solutions, 2015).

The initial version of the VI-SPDAT was predominantly used as part of the 100,000 Homes Campaign, and in response to community feedback on assessing health conditions and past trauma or abuse, the tool was revised and version 2.0 was released in 2015 (OrgCode Consulting, Inc., 2020). Of approximately 400 CoCs in the United States, more than 1 in 4 report implementing the VI-SPDAT (OrgCode Consulting, Inc. and Community Solutions, 2015). However, the authors believe this proportion to be understated, given that usage is voluntarily reported and the VI-SPDAT remains the only tool specifically cited by HUD for coordinated assessment (HUD, 2015a).

## VI-SPDAT Design and Implementation

The VI-SPDAT consists of 34 predominantly yes-or-no items intended to measure an individual's level of vulnerability across four domains: their history of housing and homelessness, individual risk factors, socialization and daily functions, and wellness. Cumulative scores on the VI-SPDAT range from 0 to 16 and correspond with recommendations to assess for specific housing interventions. Scores of 0 to 3 suggest “low” vulnerability and typically result in diverting individuals from subsidized housing programs, although support services may still be offered. Scores of 4 to 7 suggest “moderate” vulnerability and recommend assessment for RRH, while scores of 8 and above suggest “high” vulnerability and recommend assessment for PSH (OrgCode Consulting, Inc. and Community Solutions, 2015).

The extent to which communities follow or modify these score bands for Adults is largely unknown. In the case of youth and young adults experiencing homelessness, previous studies by Petry et al. (2021) and Rice et al. (2018) each reported that the distribution of housing resources aligned closely with scoring recommendations. Also, some evidence suggests that some communities adjust the scoring thresholds to prioritize high-intensity interventions for high-vulnerability individuals given the scarcity of housing resources (LAHSA, 2020).

## Exploration of HMIS Data: Administration of the VI-SPDAT in Los Angeles

The VI-SPDAT score is one of a number of factors that is used to assign housing resources in the Los Angeles County CES. The clearest signal of this is that only 51% of individuals in the CES do not have a VI-SPDAT score during the study period (July 2019 to June 2020). Further, the rate of having a VI-SPDAT score varies across CES resources (Figure 1). At 43%, those identified for Street Outreach services are the least likely to have a score, while RRH and PSH recipients are much more likely to have a VI-SPDAT score at 78% and 86%, respectively. This is expected since Street Outreach involves interactions to build rapport while RRH and PSH have prioritization policies that rely on the VI-SPDAT score. Even still, it is important to note that some participants access RRH and PSH with no score.

---

<sup>10</sup> Other factors include project eligibility criteria, participant preferences, caseworker or provider-specific judgment of acuity level, and the scarcity of housing in Los Angeles.

Number of single adults enrolled in CES projects from 7/1/2019 through 6/30/2020 and the percentage of them with a VI-SPDAT assessment in parentheses, by project type

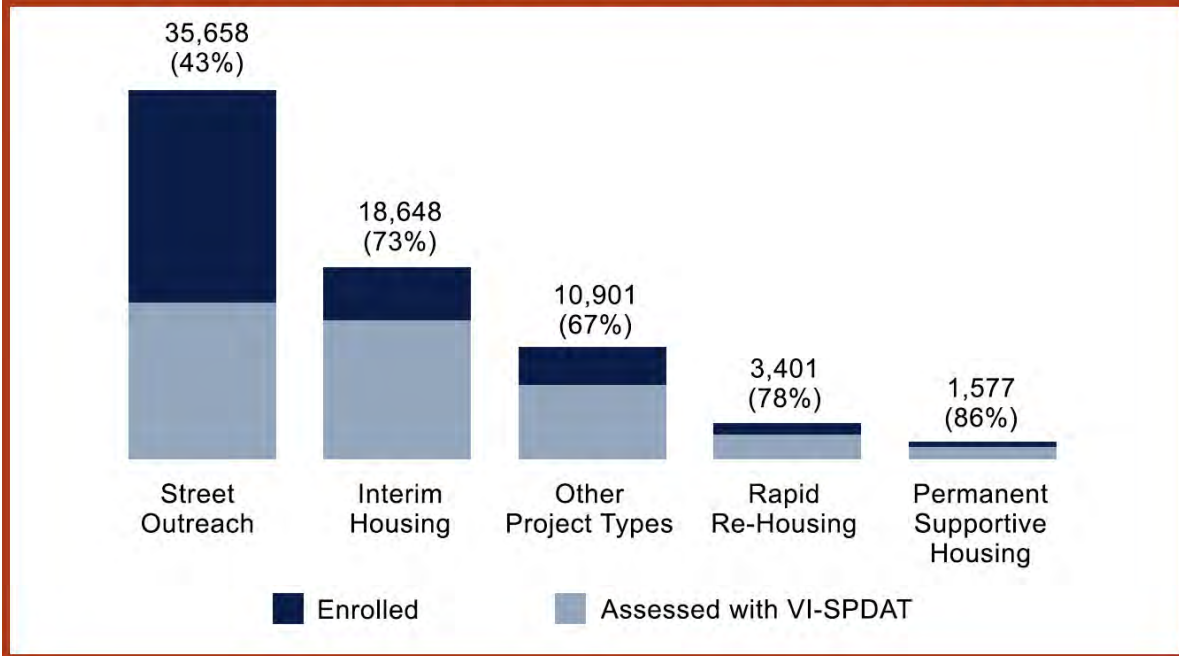


Fig.19

Although local prioritization policies for the assignment of RRH and PSH are tied to VI-SPDAT scores, the scores of recipients often fall outside of these ranges. RRH prioritization is given to individuals with scores of 11 and lower while PSH prioritization is given to individuals with scores of 8 or higher. These overlapping ranges highlight the fact that other criteria are considered when assigning these resources, and Figure 2 shows how this plays out in practice. Specifically, the top panel of the figure shows assessment availability and scores for RRH participants and the bottom panel shows assessment availability and scores for PSH participants. For RRH, 22% of participants do not have an assessment and 19% have a score of 12 or higher. For PSH, 14% of participants do not have an assessment and 5% have a score of 7 or lower.

Number of single adults enrolled in CES projects from 7/1/2019 through 6/30/2020 and the percentage of them with a VI-SPDAT assessment in parentheses, by project type

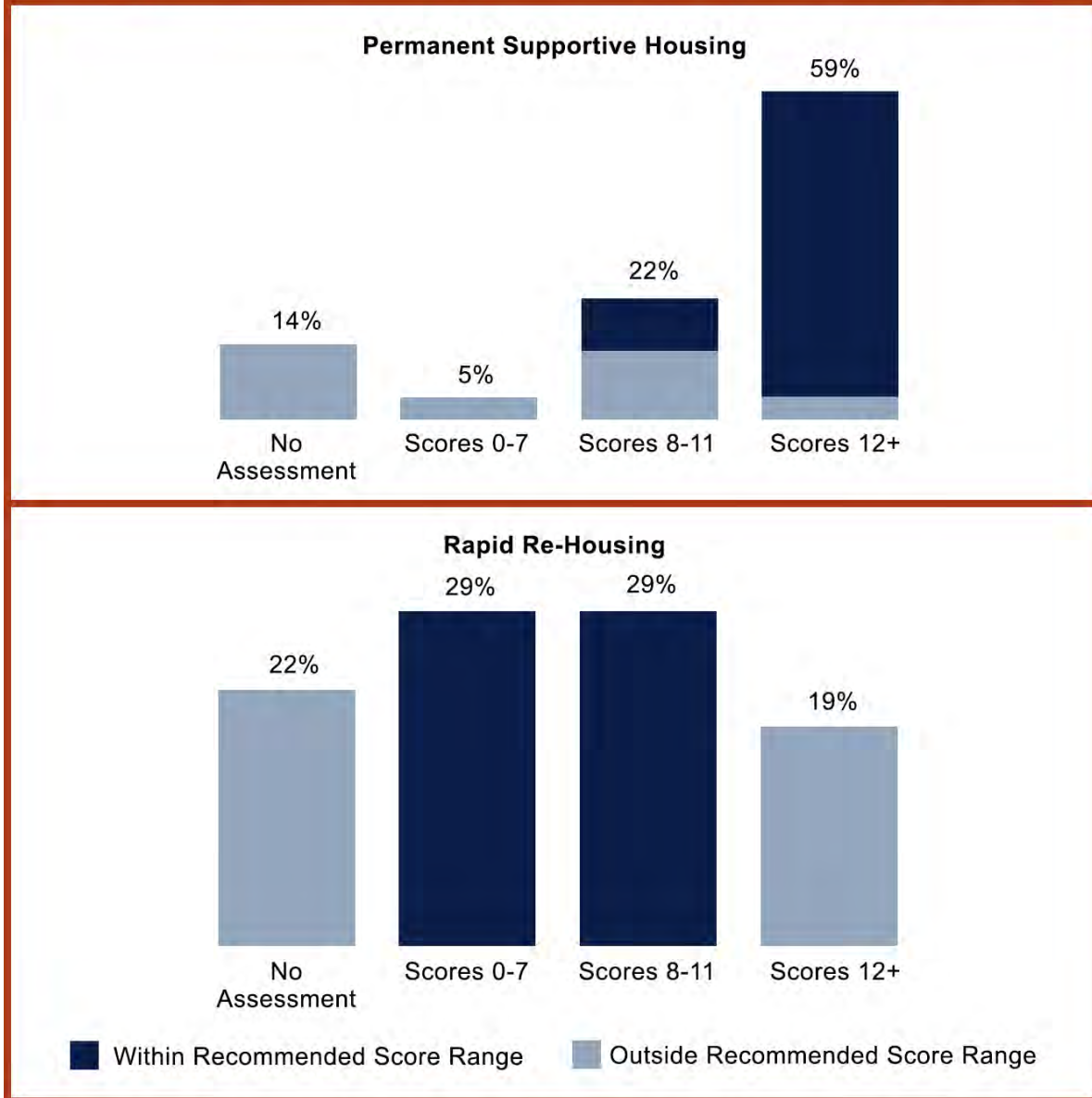


Fig.20

VI-SPDAT scores for PSH and RRH enrollments from 7/1/2019 through 6/30/2020 <sup>11</sup>

## How the VI-SPDAT Has Been Used in Other Communities

Across the United States, the relationship between the VI-SPDAT score and receiving a housing intervention also remains largely uncertain. In a study of the tool as implemented in Travis County, Texas, VI-SPDAT scores were not associated with selection for a housing intervention or with housing destination type (King, 2018). In San Diego County, California,

<sup>11</sup> For persons with multiple VI-SPDAT assessments, the highest score on file is used.

moderate and high VI-SPDAT scores were significantly associated with establishing eligibility for permanent housing; however, veterans established eligibility at a faster and more frequent rate than non-veterans, regardless of their score (Balagot et al., 2019). In part, these disparate findings point toward variations in how the VI-SPDAT is implemented across individual communities and the complex processes involved in moving individuals from assessment to housing.

Although VI-SPDAT score bands provide a uniform metric by which service providers may initially prioritize individuals for limited housing resources, scoring thresholds are not intended to be rigidly applied in matching individuals with specific housing interventions. OrgCode Consulting, Inc. states that the VI-SPDAT serves as a pre-screening triage tool and an antecedent to more in-depth assessment (OrgCode Consulting, Inc. and Community Solutions, 2015). However, this distinction between triage and assessment may be blurred—if not altogether lost—in practice, as a number of communities seemingly rely on VI-SPDAT scores to prioritize individuals for housing (De Jong, 2017; Rice et al., 2018).

## Validity and Reliability of the VI-SPDAT

In developing the VI-SPDAT, OrgCode Consulting, Inc. (2020) cites extensive consultation and field testing with hundreds of people with lived experience of homelessness in addition to frontline staff. The firm also describes a thorough review of the literature and counsel received from academic researchers, but the tool has not undergone any rigorous psychometric testing. In referencing the VI-SPDAT for coordinated entry systems, HUD emphasizes that the tool is evidence-informed rather than evidence-based (HUD, 2015a).

As part of a mixed methods study in North Carolina, Thomas et al. (2019) analyzed responses to the VI-SPDAT and validated measures for post-traumatic stress disorder (PTSD), physical health, mental health, and substance abuse among 197 chronically homeless adults. The resulting weak correlations observed suggested poor construct validity, echoing concerns from providers that the tool did not adequately capture client vulnerabilities.

In a single Midwestern CoC, Brown et al. (2018a) analyzed HMIS data featuring 1,495 Adults assessed with the VI-SPDAT between 2014 and 2016. Examining variations in scores and measure items among individuals with multiple assessments, Brown et al. report-ed poor test-

retest and interrater reliability. Regarding its predictive validity, higher scores trended with a greater risk of returning to the homeless services system within a two-year period, but the association was not significant. However, when controlling for score and vulnerability, individuals with short-term rental subsidies were at a significantly greater risk of system re-entry compared with those receiving permanent housing subsidies and with those in private market



housing. Brown et al. hypothesized that scoring and measure discrepancies observed across multiple tool administrations could be the consequence of inadequate training for tool administrators, social desirability bias among respondents, or service providers misreporting scores to help secure housing for their clients.

## Racial and Ethnic Disparities In Los Angeles and in a National Context

As mentioned previously, systemic racism continues to impact homelessness in Los Angeles. In Los Angeles, 9% of the overall population is Black, but Black people represent 30% of those experiencing homelessness (Greater Los Angeles Homeless Count, 2022). Some key goals of the CESTTRR project therefore are to explore how race and ethnicity impact how the CES triage tools are administered; how different racial and ethnic groups, particularly Black people, experience the CES triage tools; how accurate are the tools and does the accuracy vary by race, particularly for Black people.

These concerns have been echoed by others outside of Los Angeles County. Service providers administering the VI-SPDAT have expressed concerns regarding its ability to accurately capture the vulnerabilities of specific groups, including individuals fleeing domestic violence and intimate partner abuse, recent immigrants, tribal communities, individuals identifying as lesbian, gay, bisexual, transgender, and queer, or with other sexual minority or gender-diverse groups (LGBTQ+), and people of color (Fritsch et al., 2017; LAHSA, 2018; McCauley and Reid, 2020; Wilkey et al., 2019). Communities note that these vulnerable sub-populations tend to receive low scores discordant with their actual situation, ultimately affecting their ability to access housing resources and achieve housing stability (Fritsch et al., 2017; Wilkey et al., 2019). Service providers partially attribute the disconnect between measured and observed vulnerability to their ability to establish trust and build rapport with respondents, question wording, and the comfort level of both the administrator and respondent with questions about sensitive topics. Further concerns have been raised about potential racial and ethnic disparities embedded within the tool itself that may contribute to disparities in the allocation of permanent housing resources (Fritsch et al., 2017; Wilkey et al., 2019).

Currently, in the most extensive exploration of racial disparities in the VI-SPDAT, Wilkey et al. (2019) examined coordinated entry data from four CoCs: Portland-Gresham-Multnomah County in Oregon, Roanoke City and County/Salem in Virginia, Seattle/King County in Washington, and Tacoma/Lakewood/Pierce County in Washington. Overall, study authors observed that people of color received significantly lower prioritization scores than White people and were 32 percent less likely to receive a high score. White individuals received an assessment for PSH at higher rates than people of color, and most scales indicated a bias toward vulnerabilities White people were more likely to endorse (including sleeping on the streets, inability to meet basic needs, and substance use). In Travis County, Texas, King (2018) also reported higher scores and higher rates of recommendation for and placement into PSH relative to RRH among White people.

Moreover, the VI-SPDAT may obscure the effects of intersectionality—the ways in which people experience advantage and disadvantage as a result of a combination of their social and political identities, including race, gender, sexuality, and class (Crenshaw, 1991). Through this lens, Cronley (2020) investigated how the intersection of race and gender impacted VI-SPDAT scores among women reporting trauma or abuse as the cause of their homelessness. Previous trauma or abuse significantly predicted higher scores, yet White women regularly reported higher scores than Black women despite both indicating similarly higher odds of experiencing trauma or abuse.

## References

- Balagot, Caroline, Hector Lemus, Megan Hartrick, Tamera Kohler, and Suzanne P. Lindsay. 2019. "The Homeless Coordinated Entry System: The VI-SPDAT and Other Predictors of Establishing Eligibility for Services for Single Homeless Adults," *Journal of Social Distress and the Homeless* 28 (2): 149-157. <https://doi.org/10.1080/10530789.2019.1622858>
- Brown, Molly, Camilla Cummings, Jennifer Lyons, Andrés Carrion, and Dennis P. Watson. 2018a. "Reliability and Validity of the Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT) in Real-world Implementation," *Journal of Social Distress and Homelessness* 27 (2): 110-117. <https://doi.org/10.1080/10530789.2018.1482991>
- Coston, Amanda, Edward Kennedy, and Alexandra Chouldechova. "Counterfactual predictions under runtime confounding." *Advances in Neural Information Processing Systems* 33 (2020): 4150-4162.
- Crenshaw, Kimberle. 1991. "Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color," *Stanford Law Review* 43 (6): 1241-1299. <https://doi.org/10.2307/1229039>
- Cronley, Courtney. 2020. "Invisible Intersectionality in Measuring Vulnerability among Individuals Experiencing Homelessness – Critically Appraising the VI-SPDAT," *Journal of Social Distress and Homelessness*. <https://doi.org/10.1080/10530789.2020.1852502>
- Cronley, Courtney, James Petrovich, Emily Spenc-Almaguer, and Kathleen Preble. 2013. "Do Official Hospitalizations Predict Medical Vulnerability among Homeless?: A Postdictive Validity Study of the Vulnerability Index," *Journal of Health Care for the Poor and Underserved* 24 (2): 469-486. <http://dx.doi.org/10.1353/hpu.2013.0083>
- De Jong, Iain. 2017. "VI-SPDAT: 14 Things That Irk Me." OrgCode Consulting, Inc. Blog post, June 26. Retrieved from <https://www.orgcode.com/14things>
- Fritsch, Aimee, Hattie Hiler, Betsy Mueller, Menglin Wu, and Jennifer Wustmann. 2017. *The Vulnerability of Assessments: A Qualitative Analysis of Housing Professionals' Experiences with the VI-SPDAT in Minnesota and a Comparative Review of Alternative Housing Triage Assessments*. Master's thesis, University of Minnesota. University of Minnesota Digital Conservancy. <http://hdl.handle.net/11299/190794>
- Hainmueller, Jens. "Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational data." *Political Analysis* 20, no. 1 (2012): 25-46.
- Hedden, Brian. "On statistical criteria of algorithmic fairness." *Philosophy and Public Affairs* 49, no. 2 (2021).

Hwang, Stephen W., John Orav, and James J. O’Connell, Joan M. Lebow, and Troyen A. Brennan. 1997. “Causes of Death in Homeless Adults in Boston,” *Annals of Internal Medicine* 126 (8): 625-628. <https://doi.org/10.7326/0003-4819-126-8-199704150-00007>

Jo, Nathan, Bill Tang, Kathryn Dullerud, Sina Aghaei, Eric Rice, Phebe Vayanos. “Fairness in contextual resource allocation systems: metrics and incompatibility results.” Under review at 37th AAAI Conference on Artificial Intelligence (2023).

Kamiran, Faisal, and Toon Calders. “Data preprocessing techniques for classification without discrimination.” *Knowledge and information systems* 33, no. 1 (2012): 1-33.

King, Benjamin T. 2018. *Assessment and Findings of the Vulnerability Index (VI-SPDAT) Survey of Individuals Experiencing Homelessness in Travis County, TX*. Doctoral dissertation, University of Texas, Austin. UT School of Public Health Dissertations. [https://digitalcommons.library.tmc.edu/uthsph\\_dissertsopen/11/](https://digitalcommons.library.tmc.edu/uthsph_dissertsopen/11/)

Leopold, Josh, and Helen Ho. 2015. *Evaluation of the 100,000 Homes Campaign*. Washington, DC: Urban Institute. Retrieved from <https://www.urban.org/sites/default/files/publication/44391/2000148-Evaluation-of-the-100000-Homes-Campaign.pdf>

Lin, Lijing, Matthew Sperrin, David A. Jenkins, Glen P. Martin, and Niels Peek. “A scoping review of causal methods enabling predictions under hypothetical interventions.” *Diagnostic and prognostic research* 5, no. 1 (2021): 1-16.

Los Angeles Homeless Services Authority (LAHSA). 2018. *Report and Recommendations of the Ad Hoc Committee on Black People Experiencing Homelessness*. Retrieved from <https://www.lahsa.org/documents?id=2823-report-and-recommendations-of-the-ad-hoc-committee-on-black-people-experiencing-homelessness>

McCauley, Heather L., and Taylor Reid. 2020. *Assessing Vulnerability, Prioritizing Risk: The Limitations of the VI-SPDAT for Survivors of Domestic and Sexual Violence*. Washington, DC: Safe Housing Partnerships and National Resource Center on Domestic Violence. Retrieved September 3, 2020, from [https://safehousingpartnerships.org/sites/default/files/2020-08/CoordinatedEntry-Assessing%20Vulnerability-Risk\\_0.pdf](https://safehousingpartnerships.org/sites/default/files/2020-08/CoordinatedEntry-Assessing%20Vulnerability-Risk_0.pdf)

Montgomery, Ann Elizabeth, Dorota Szymkowiak, Jessica Marcus, Paul Howard, and Dennis P. Culhane. (2016). “Homelessness, Unsheltered Status, and Risk Factors for Mortality: Findings from the 100,000 Homes Campaign,” *Public Health Reports* 131 (6): 765-772. <https://doi.org/10.1177/0033354916667501>

OrgCode Consulting Inc. (2020). *Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT) Version 3 Workbook*. Retrieved from [https://www.kshomeless.com/uploads/1/2/9/8/129825788/single\\_adults\\_vi-spdats\\_v3\\_workbook.pdf](https://www.kshomeless.com/uploads/1/2/9/8/129825788/single_adults_vi-spdats_v3_workbook.pdf)

OrgCode Consulting, Inc., & Community Solutions. (2015). Vulnerability Index – Service Prioritization Decision Assistance Tool (VI-SPDAT) Prescreen Triage Tool for Single Adults, American Version 2.01. Retrieved from <http://pehgc.org/wp-content/uploads/2016/09/VI-SP-DAT-v2.01-Single-US-Fillable.pdf>

Petry, L., Hill, C., Vayanos, P., Rice, E., Hsu, H. T., & Morton, M. (2021). Associations between the Vulnerability Index-Service Prioritization Decision Assistance Tool and returns to homelessness among single adults in the United States. *Cityscape*, 23(2), 293-324.

Rice, E., & Rosales, A. (2015). TAY Triage Tool Pilots Report. [http://www.csh.org/wp-content/uploads/2015/06/TAY-Triage-Tool-Pilots-Report\\_FINAL.pdf](http://www.csh.org/wp-content/uploads/2015/06/TAY-Triage-Tool-Pilots-Report_FINAL.pdf)

Rice, E. (2014). “The TAY Triage Tool: A Tool to Identify Homeless Transition Age Youth Most in Need of Permanent Supportive Housing.” [http://www.csh.org/wp-content/uploads/2014/02/TAY\\_TriageTool\\_2014.pdf](http://www.csh.org/wp-content/uploads/2014/02/TAY_TriageTool_2014.pdf)

Rice, E. (2013). Creating a TAY Triage Tool: Prioritizing Transition Age Youth (TAY) for Permanent Supportive Housing. [http://www.csh.org/wp-content/uploads/2013/06/TAY-PSH-Targeting-Tool\\_061313.pdf](http://www.csh.org/wp-content/uploads/2013/06/TAY-PSH-Targeting-Tool_061313.pdf)

Rice, Eric, Monique Holguin, Hsun-Ta Hsu, Matthew Morton, Phebe Vayanos, Milind Tambe, and Hau Chan. 2018. “Linking Homelessness Vulnerability Assessments to Housing Placements and Outcomes for Youth,” *Cityscape* 20 (3): 69-86. <https://www.jstor.org/stable/26524872>

Sperrin, Matthew, Glen P. Martin, Alexander Pate, Tjeerd Van Staa, Niels Peek, and Iain Buchan. “Using marginal structural models to adjust for treatment drop-out when developing clinical prediction models.” *Statistics in medicine* 37, no. 28 (2018): 4142-4154.

Tang, Bill, Cagil Kocyigit, Eric Rice, and Phebe Vayanos. “Learning Optimal Policies for Online Allocation of Scarce Societal Resources from Data Collected in Deployment.” In preparation for submission to *Management Science*.

Thomas, Lori, Mary Ann Priester, Justin Lane, Jenny Hutchison, and Chloe Vercruyse. 2019. Examining the Use and Measurement Validity of the VI-SPDAT as a Housing Prioritization Tool for Chronically Homeless Adults. Conference presentation abstract, January 12. Society for Social Work and Research 23rd Annual Conference, San Francisco, CA. <https://sswr.confex.com/sswr/2019/webprogram/Paper36530.html>

U.S. Department of Housing and Urban Development (HUD). (2014). Notice on Prioritizing Persons Experiencing Chronic Homelessness and Other Vulnerable Homeless Persons in Permanent Supportive Housing and Recordkeeping Requirements for Documenting Chronic Homeless Status. Retrieved from <http://portal.hud.gov/hudportal/documents/hud-doc?id=14-12cpdn.pdf>

—-. (2015a). Assessment Tools for Allocating Homelessness Assistance: State of the Evidence. Retrieved from [https://www.huduser.gov/portal/publications/pdf/assessment\\_tools\\_Convening\\_Report2015.pdf](https://www.huduser.gov/portal/publications/pdf/assessment_tools_Convening_Report2015.pdf)

—-. (2015b). Coordinated Entry Policy Brief. Retrieved from <http://www.hudexchange.info/resources/documents/Coordinated-Entry-Policy-Brief.pdf>

—-. (2017). Coordinated Entry Core Elements. Retrieved from <https://files.hudexchange.info/resources/documents/Coordinated-Entry-Core-Elements.pdf>

—-. (2022a). System Performance Measures Programming Specifications. Retrieved from <https://files.hudexchange.info/resources/documents/System-Performance-Measures-HMIS-Programming-Specifications.pdf>

—-. (2022b). The 2022 Annual Homelessness Assessment Report (AHAR) to Congress, Part 1: Point-in-time estimates of homelessness. Retrieved from <https://www.huduser.gov/portal/sites/default/files/pdf/2022-AHAR-Part-1.pdf>

—-. (2022c). HUD 2022 Continuum of Care Homeless Assistance Programs Housing Inventory Count Report. Retrieved from [https://files.hudexchange.info/reports/published/CoC\\_HIC\\_NatITerrDC\\_2022.pdf](https://files.hudexchange.info/reports/published/CoC_HIC_NatITerrDC_2022.pdf)

van Geloven, Nan, Sonja A. Swanson, Chava L. Ramspek, Kim Luijken, Merel van Diepen, Tim P. Morris, Rolf HH Groenwold, Hans C. van Houwelingen, Hein Putter, and Saskia le Cessie. “Prediction meets causal inference: the role of treatment in clinical prediction models.” *European journal of epidemiology* 35, no. 7 (2020): 619-630.

Wilkey, Catriona, Rosie Donegan, Svetlana Yampolskaya, and Regina Cannon. 2019. Coordinated Entry Systems: Racial Equity Analysis of Assessment Data. Seattle, Washington: Building Changes. Retrieved from [https://c4innovates.com/wp-content/uploads/2019/10/CES\\_Racial\\_Equity\\_Analysis\\_2019-.pdf](https://c4innovates.com/wp-content/uploads/2019/10/CES_Racial_Equity_Analysis_2019-.pdf)