Youth At-Risk of Homelessness: Foundational Analytic Plan for the Summative Evaluation of Pathways to Success

April 2023

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Introduction

To expand the evidence base on interventions to prevent homelessness among youth and young adults with foster care histories at age 14 or older (hereafter youth and young adults), the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services launched the Youth At-Risk of Homelessness (YARH) multiphase grant program. This program specifies three primary populations: (1) adolescents who enter foster care between ages 14 to 17; (2) young adults aging out of foster care; and (3) homeless youth and young adults with foster care histories up to age 21.

In 2019, ACF contracted with Mathematica for the third phase of YARH (2019 – 2028, known as YARH-3), which provides information to the field on how to better serve youth and young adults through a rigorous summative evaluation. ACF's goal for YARH-3 is to produce evidence about interventions intended to prevent homelessness and improve key outcomes among youth and young adults who have been involved in the child welfare system. The summative evaluation conducted under YARH-3 will examine the effect of Colorado's Pathways to Success (Pathways) comprehensive service model through implementation and impact studies. The Pathways service model offers intensive, coach-like case management for youth and young adults with foster care histories at age 14 or older.

The YARH team, in consultation with ACF, is releasing a series of analytic plans for the summative evaluation. This is the first – or foundational – analytic plan that describes the evaluation design in detail and presents the analytic methods to date. Additional analytic plans will be released that focus on the methods for a specific product. Future analytic plans will be brief and reference this foundational analytic plan.

Purpose

This analytic plan serves as the foundation for a summative evaluation of the Colorado Pathways to Success comprehensive service model that Mathematica and ACF are conducting as part of YARH-3 in partnership with the Colorado Department of Human Services and the Center for Policy Research. This plan describes the implementation study analytic approach, the impact study analytic approach, and the research questions guiding the studies and the data sources that will inform analyses. This is one of a series of public documents describing and documenting the summative evaluation.

Key findings and highlights

The YARH-3 summative evaluation includes an implementation study and an impact study. The implementation study will use multiple methods to collect, analyze, and report on comprehensive data to address the study's two broad objectives, supporting interpretation of Pathway's impacts on outcomes and assessing Pathways implementation. Mathematica will collect data from a range of staff using interviews and administrative data. Mathematica will take a structured approach, guided by the conceptual framework, to analyze the data across Pathways sites.

The impact study will be the first rigorous impact evaluation of Colorado's Pathways comprehensive service model. The impact study will conduct traditional inferential tests. It will examine evidence of program effectiveness on a large number of policy-relevant outcomes, including stable housing, education, employment, permanent connections to caring adults, and social-emotional well-being. It will explore the effectiveness of Pathways in short- and long-term follow-up periods and estimate the extent to which the program is more or less effective for key subgroups. Finally, the study originally proposed to explore linking features of program implementation (for example, dosage, quality, or adherence of the program delivery) to youth and young adult outcomes. However, this last analysis might no longer be feasible, given the limited variability in youth and young adult Pathways experiences and projections for the number of youth and young adults expected to enroll in Pathways by the end of the study.

I. Introduction

Preventing homelessness among youth and young adults involved in the child welfare system remains an urgent priority for child welfare policymakers and practitioners. Housing stability is essential for achieving self-sufficiency and promoting health and well-being, particularly during the transition to adulthood. Unstable housing can launch a negative cycle of poor health, limited employment, and continued housing instability (Dion et al. 2014).

The National Youth Transition Database (NYTD) gathers information on youth currently or previously in foster care, providing one view into the prevalence of homelessness in this population. One in five of the 19-year-old respondents to the NYTD (20 percent) reported experiencing homelessness in the past two years (Children's Bureau 2019). By age 21, 27 percent of NYTD respondents had recent experiences of homelessness (Children's Bureau 2019). Previous, smaller studies have produced estimates of homelessness ranging from 11 to 37 percent for this population. An even larger proportion of youth who exit care—up to 50 percent—may experience other forms of housing instability, such as couch surfing or doubling up (Dion et al. 2014).

Researchers have found that housing stability, caring adults, and relational skills are key protective factors that can improve well-being and promote longer-term success among youth and young adults with a history of foster care (Brodowski and Fischman 2013). Often these protective factors can offset other, possibly coexisting risk factors, such as experiences of trauma (Salazar et al. 2013) and barriers to economic independence that arise when youth and young adults lack the academic credentials, basic job skills, and social networks vital for finding and maintaining employment (Dworsky et al. 2012).

A. History of YARH

To expand the evidence base on interventions to prevent homelessness among youth and young adults with foster care histories at age 14 or older (hereafter youth and young adults), the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services launched the Youth At-Risk of Homelessness (YARH) multiphase grant program. This program specifies three primary populations: (1) adolescents who enter foster care between ages 14 to 17; (2) young adults aging out of foster care; and (3) homeless youth and young adults with foster care histories up to age 21. ACF contracted with Mathematica in the first two phases of YARH to provide evaluation technical assistance to grantees, support them in articulating and refining the design of their service models, assess the evaluability of each service model, and disseminate the knowledge developed. In the first phase of the grant program (2013 to 2015, known as YARH-1), 18 grantees received two-year planning grants to understand the characteristics of the three primary populations for YARH, develop partnerships and teaming structures, and begin designing comprehensive service models to prevent homelessness.

In the second phase of YARH (2015 to 2019, known as YARH-2), 6 of the 18 YARH-1 grantees received four-year implementation grants to further specify their comprehensive service models, begin delivering services, complete usability testing of key components of the service models, and conduct formative evaluations to assess program implementation and early outcomes for youth and young adults served.

Youth and young adult engagement: a key feature of YARH

Youth and young adult engagement has been a centerpiece of YARH to help ensure that the proposed interventions reflect the reality of the experiences youth and young adults have with the child welfare system. During YARH-1, grantees engaged youth and young adults in two main areas of YARH planning activities. First, grantees collected data from youth and young adults about their service needs and preferences though surveys, focus groups, and community events. Second, grantees included youth and young adults in the YARH decision making process by working with youth advisory boards to understand what youth and young adults need, what they believed was missing in current services, and who should provide those services. ACF also encouraged grantees to include and engage youth and young adults in grantee conferences by having them participate in or lead presentations and activities.[1]

During YARH-2, grantees shared their experiences, challenges, and solutions related to engaging youth and young adults as part of a peer learning event in summer 2020. The process revealed several important steps for keeping youth and young adults engaged in services:

- Engaging youth and young adults from the point of intake and building rapport by creating an inclusive and mutually respectful partnership with shared power
- Working with youth and young adults to set realistic and meaningful goals
- Using a variety of methods to measure youth and young adult engagement, recognizing that appropriate levels of engagement can vary significantly based on age, developmental stage, the program and its expectations, and the youth and young adults' experience with the child welfare system. [2]

B. Current context: YARH-3

In 2019, ACF again contracted with Mathematica for the third phase of YARH (2019 – 2028, known as YARH-3), which provides information to the field on how to better serve youth and young adults through a rigorous summative evaluation. ACF's goal for YARH-3 is to produce evidence about interventions intended to prevent homelessness and improve key outcomes among youth and young adults who have been involved in the child welfare system.

In early 2020, Mathematica recommended and ACF concurred with conducting a summative evaluation of one YARH-2 intervention, the Colorado Pathways to Success (Pathways) comprehensive service model. Pathways offers intensive, coach-like case management[3] for youth and young adults with foster care histories at age 14 or older. The model emphasizes coaching practices to engage youth and young adults and a youth-driven approach to help identify their goals, connect them with existing services, and promote positive outcomes. (We describe the Pathways model in detail below.)

The YARH-3 summative evaluation includes an implementation study and impact study. The goal of the Pathways implementation study is to identify factors that contributed to or inhibited implementing Pathways services in different hubs to support replication or improvement of future Pathways service delivery. The implementation study will systematically assess different contexts in which Pathways is

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[1] For more information on grantees' youth engagement strategies, see the Youth Engagement in Child Welfare Service Planning brief or Chapter III of the YARH-1 process study.

[2] For more on the lessons learned from youth engagement in YARH, see Lessons from the Field: Youth Engagement: Lessons Learned.

[3] Coach-like case management is designed to involve the youth and young adults in every aspect of their development. The model emphasizes coaching practices to engage youth and young adults, and a youth-driven approach to help identify their goals, connect them with existing services, and promote positive outcomes.

being implemented and the fidelity to which Pathways is being implemented. Understanding the implementation of Pathways can support the interpretation of its impacts on outcomes.

The goal of the Pathways impact study is to understand the efficacy of the comprehensive service model in promoting youth and young adult outcomes. The Pathways impact study will use a cluster quasi experimental impact study design (QED) to examine the impact of Pathways on key outcomes, including housing stability, educational attainment, employment, relational permanency, and well-being.

Some counties in Colorado have a small number of youth and young adults who need services. In these cases, adjacent counties form a hub for service provision.[4] Currently, 15 hubs, encompassing 39 counties[5], are participating in the summative evaluation.

The John H. Chafee Foster Care Program (Chafee Program) is a federal program that provides funding to states to support current and former foster care youth and young adults in achieving self-sufficiency. Colorado operates a county-administered Chafee Program across the state. For the summative evaluation, some Colorado counties continue to provide business-as-usual Chafee Program services—these are the comparison hubs. Others train their staff to implement Pathways—these are the intervention hubs.

C. Pathways comprehensive service model

The Pathways comprehensive service model engages youth and young adults with foster care histories at age 14 and older through intensive, coach-like case management. Case managers (known as Navigators) use coaching strategies and a youth-driven approach to help youth and young adults identify their goals, connect them with existing services, and promote positive outcomes. Navigators help youth and young adults identify and work toward achieving at least two goals related to the five outcome areas of (1) housing, (2) education, (3) employment, (4) permanent connections, and (5) health and well-being. Youth and young adults set the agenda and pace of their work with the Navigator by developing goals around the five outcome areas. The Pathways comprehensive service model comprises multiple components:

- **Engaging youth and young adults in a coach-like way.** Each Navigator carries a small caseload of up to 10 youth or young adults. The key feature that sets this coach-like engagement apart from typical intensive case management models is that it is youth-driven. When Navigators act as coaches, they build a supportive relationship with the youth or young adult that encourages them to set personalized goals, plan, and pace. Although regular case management may focus on achieving the same outcomes by providing services, coach-like engagement empowers youth and young adults to be their own advocates.
- **Supporting youth or young adults during periods of crisis.** Some youth and young adults, especially those who are experiencing homelessness, enroll in Pathways during a period of crisis. When this happens, the Navigator's primary focus is crisis stabilization. This involves using all other

[4] In some cases, a county provides the child welfare services to only its county; we still consider this a hub for the purposes of the implementation study. Some hubs also contract with other local organizations to provide child welfare services in the hub.

[5] Previously released publications indicated the evaluation includes 37 counties in 15 hubs. The increase is due to adding two counties during the enrollment period. The two counties were added to the evaluation in late 2022 and began enrolling youth and young adults in early 2023. It is possible that more counties may be added in the future, which will be captured in future publications.

components of the intervention to address immediate safety or housing needs before the youth or young adult develops goals.

- **Establishing goals.** All youth and young adults work with a Navigator to develop at least two goals related to one or more of the five outcome areas. The youth or young adult can set as many goals as they please, and they are free to add goals throughout the program. Progress is tracked by the Navigator, who maintains regular contact with the youth or young adult and guides them through each step.
- **Securing and maintaining safe and stable housing.** This component can take many forms, depending upon a youth or young adult's housing status. For example, Navigators might help the youth or young adult acquire housing vouchers; understand necessary documentation; and build connections with their landlords, roommates, and/or family members.
- **Case planning and assessing needs.** To assess a youth or young adult's needs and opportunities for growth, Navigators are equipped with a variety of evidence-based tools. These tools are designed to help youth and young adults understand what they need to focus on to be ready to transition to self-sufficiency after program graduation.
- **Providing small-scale financial assistance.** Access to supports is key for the youth or young adults to stay on track in achieving their goals. Each Pathways hub receives flexible funds, which can be used to provide immediate assistance to the youth or young adult when all other resources have been tapped and they have an unmet need.
- **Referring youth and young adults to appropriate service agencies.** No agency or organization is a one-stop shop for helping youth and young adults with foster care histories overcome the myriad challenges they must conquer to be equipped for independence. Because of this, Navigators have to be tapped into a wide referral network of partners in the human services field. When a youth or young adult has a particular problem or goal, a primary responsibility of the Navigator is to help find solutions and refer them to the appropriate service agencies.
- **Identifying community connections and transitioning youth and young adults to other supports.** The Pathways model is designed to be short-term and intensive, allowing the youth and young adults to graduate and transition to a less-intensive care management model for the long term. To facilitate this, Navigators must help the youth or young adult identify what areas of support exist within the community that they can rely on after graduation. This could take the form of helping youth and young adults build supportive connections or finding other community assets (referral agencies) that will help them after they are no longer eligible for Pathways.
- **Supporting youth and young adults' involvement in permanency and community roundtables.** Navigators may support youth and young adults during the planning of and participation in the county-led permanency and community roundtable. The permanency roundtable model was developed in 2008 by Casey Family Programs, in collaboration with the Georgia Department of Human Services as a means of increasing legal permanency rates for older youth and young adults in foster care (Rogg et al. 2009). It includes setting up a team of internal and external experts, developing permanency goals, brainstorming barriers to permanency, and developing an action plan. Permanency roundtables are standard practice in the county hubs. The community roundtable is a YARH adaptation of the permanency roundtable convened by the Navigator as needed based on the determination of the youth or young adult or Navigator or on the recommendation of a supervisor. Although permanency and community roundtables are not requirements of the Pathways model intervention, within some agencies they work as a natural support for the youth and young adults.

- **Advancing relational permanency.** A key indicator of long-term stability is relational permanency—ensuring that youth and young adults have at least one supportive adult they can turn to for help when needed. The Pathways model defines a supportive adult as any adult that a youth or young adult identifies as a supportive connection who is not providing professional support. Navigators can foster connections by encouraging youth and young adults to spend time building these connections or by providing a space for or hosting an event that facilitates relationship building.

D. Comparison condition

Comparison hubs in Colorado have not trained their program workers to be Pathways Navigators during the study period. Instead, these hubs have continued with business-as-usual services for youth or young adults with foster care histories at age 14 or older, which includes case management provided by a comparison program worker.

The array of services available in the comparison condition varies across comparison hubs. Comparison program workers support youth and young adults in almost all aspects of their lives to strengthen their independent living skills. Often, workers provide services that do not have a clear definition and can span different topics and components. The array of services available in the comparison condition will vary across potential comparison hubs. Some hubs may offer mentorship models as a component of their service array.

The comparison condition differs from the intervention condition in several key ways. Unlike a Pathways Navigator, comparison program workers do not focus on coach-like engagement or developing an alliance with the youth and young adults. The comparison program workers lead case management rather than the youth and young adults leading. Although comparison program workers make standard referrals to other providers in the community, Pathways Navigators directly connect the youth and young adults with other providers to address their mental health, housing, education, and other specific needs. Finally, because the youth and young adults are expected to have less frequent contact with comparison program workers than they would with Navigators, referrals from the former may not be as well matched to the youth and young adult's goals. In addition, follow-up with youth and young adults about referrals may happen less frequently than in Pathways.

E. Roadmap for this report

This analytic plan serves as the foundation for a summative evaluation of the Colorado Pathways to Success comprehensive service model. Mathematica and ACF are conducting the evaluation as part of YARH-3 in partnership with the Colorado Department of Human Services and the Center for Policy Research. Chapter II describes the implementation study analytic approach, while Chapter III describes the impact study analytic approach. Within each chapter, we provide the research questions guiding the studies and the data sources that will inform analyses. We conclude in Chapter IV.

F. Building on previous products and informing future ones

Mathematica and ACF are committed to conducting the YARH-3 summative evaluation in accordance with ACF's evaluation policy. We will keep the five principles—rigor, relevance, transparency, independence, and ethics—in mind at every stage of the evaluation. This foundational analytic plan is part of a series of publicly available documents that describe the evaluation.

To date, we have registered the impact and implementation studies on the Open Science Framework website, see the YARH project page, and associated registry pages (implementation study and impact study). ACF's Office of Planning, Research, and Evaluation (OPRE) hosts a project website where YARH reports, briefs, and other products are published. Future products will be published to the OPRE project page.

G. Future analytic plans

Mathematica and OPRE plan to release a series of analytic plans, which will allow our team to pre-specify analyses associated with specific reports for YARH-3. This report serves as the foundational analytic plan and draws heavily from content in the YARH-3 implementation (Keith et al. 2022) and impact (Cole et al. 2022) design reports. Subsequent analytic plans will elaborate on specific analyses and provide additional detail on data to be included in a given report. Subsequent plans will reference this foundational analytic plan and discuss any proposed changes to it.

II. Implementation Study Analytic Approach

The implementation study will address two broad objectives. First, it will support interpretation of Pathway's impacts on outcomes for youth and young adults. Second, it will generate information about factors that contributed to or inhibited implementation of Pathways services in different settings, to support replication or improvement of future Pathways service delivery. This section presents research questions for the implementation study and describes the methods for collecting, analyzing, and reporting on comprehensive data from a range of respondents, using interviews and administrative data. This section also discusses the conceptual frameworks that will guide the assessment of different dimensions of Pathways implementation and the analytic approach.

We selected 12 hubs (6 Pathways hubs and 6 comparison hubs) to participate in the implementation study.[6] Collecting data from hubs through visits and check-in calls will help Mathematica identify the factors that contribute to or inhibit the implementation of Pathways services in different hubs, which will help inform replication or improvement of Pathways service delivery.

A. Research questions

The implementation study explores research questions to provide information on interpreting Pathways' impacts and understanding implementation in different settings.

1. **How are services under the Pathways service model distinct from those available in the comparison condition?** This question addresses the ways in which the Pathways service model differs from services offered to youth and young adults in the comparison condition.
2. **What factors (facilitators and barriers) contribute to or hinder initial and ongoing service delivery in Pathways hubs?** This question addresses how Pathways leadership and staff put components of the Pathways service model into operation and the factors that contributed to or hindered implementation.
3. **What did the Pathways hubs do to support initial and ongoing service delivery with fidelity?** This question addresses the extent to which hubs delivered core services in the comprehensive service model as intended, and factors that might have contributed to or hindered fidelity.
4. **What services, supports, and key child welfare policies and regulations affect youth and young adults in the intervention and comparison groups in the locations where the summative evaluation occurs?** This question addresses the services generally available to youth and young adults in the evaluation sample (both treatment and comparison groups) and the child welfare policies that may affect youth and young adults in the sample.
5. **What are youth and young adults' perceptions of the Pathways services? What services are delivered to youth and young adults in Pathways? What strategies do Navigators use to promote and maintain youth and young adult engagement? How does engagement vary among youth and young adults participating in the Pathways service model?** These questions address youth and young adults' acceptance of Pathways services and their perceptions of the services.

[6] In some cases, a county provides the child welfare services only to its own county; we still consider it a hub for the purposes of the implementation study. Some hubs also contract with other local organizations to provide child welfare services in the hub.

The implementation study will use multiple methods to collect, analyze, and report on comprehensive data to address the study's research questions, supporting interpretation of Pathways' impacts on outcomes and assessing Pathways implementation.

B. Timing of data collection

We will collect information about facilitators of and barriers to implementation of the Pathways service model, including moderators of fidelity. We will collect this information from a range of consultants to assess different perspectives on Pathways services and implementation, and the extent to which services are distinct from comparison services, collecting it from a variety of data sources at different times during the study period. Data collection for the implementation study started in May 2022 and will continue for several years; it will focus on all components of the Pathways service model and comparison services, and the constructs delineated in the conceptual frameworks.

Data collection will occur in two rounds of visits to selected hubs, with each round taking place over approximately an eight-week period. In May 2022, we conducted the first round of hub visits virtually. The goal of those hub visits was to assess what the Pathways hubs were doing to support Pathways implementation and initial service delivery, and factors that hindered or contributed to initial service delivery. We learned about youth and young adults' perceptions of Pathways services and factors that contributed to or hindered their engagement in services. Finally, we documented the services available to youth and young adults receiving comparison services. During the first visit, we collected information on the services generally available to youth and young adults in the evaluation sample (both intervention and comparison groups) and the child welfare policies that affected these youth and young adults.

The study enrollment period is 30 months. We will conduct the second round of hub visits in person once the majority of anticipated youth and young adults have enrolled in the evaluation. The goal of the second visits is to assess changes in what Pathways hubs are doing to support Pathways service delivery and factors that hinder or contribute to achieving and sustaining fidelity in service delivery, including youth and young adults' perceptions of Pathways services. We also will document any changes to services available to youth and young adults receiving comparison services.

We will conduct check-in calls with hub staff approximately six months after hub visits conclude. The goal of the telephone check-ins is to collect current information about service delivery in Pathways and comparison hubs, in particular any changes to services available to youth and young adults eligible for the study. We will conduct check-in calls with all 15 hubs participating in YARH. In January 2023, we began conducting the first round of telephone check-ins with staff. Approximately six months after the first round of telephone check-ins, we plan to conduct the second round of hub visits. The second round of telephone check-ins will occur approximately six months after the second round of visits. The goal of the telephone check-ins with staff is to collect current information about service delivery in Pathways and comparison hubs, in particular, any changes to services available to youth and young adults eligible for the study.

C. Data sources

Data sources include the following:

- **Data from document reviews**. We reviewed relevant program documentation from Pathways and comparison hubs. We will review additional documents before the second round of hub visits.

- **Qualitative interview data**. We conducted the first round of hub visit interviews with program leaders, staff delivering services, and youth and young adults who participated in Pathways or comparison services.[7] We completed the first round of telephone check-in calls with program staff. The second round of hub visits and check-ins calls with hub staff will take place later in the study period.
- **Administrative data**. Throughout the study, we will collect administrative data, including from the Working Alliance Inventory (WAI) and through the Pathways Management Information System (PMIS).
- **County characteristic data**. Throughout the study, we will document the environment in each county, including but not limited to understand funding for runaway and homeless youth programs, the Chafee program, and education and training voucher programs; housing costs and available housing vouchers; youth and young adult unemployment; and available mental health services.

1. Program documents

We worked with the Center for Policy Research to obtain relevant program documentation from Pathways and comparison hubs. This information informed our understanding of Pathways and comparison services and helped us prepare for data collection during visits.

We reviewed the Pathways manual and other relevant Pathways documents, such as Navigator training session agendas. This review informed our understanding of the comprehensive service model and plans for start-up activities in Pathways hubs, including preparing for and promoting change, putting supports in place to facilitate implementation, hiring and training staff, and screening and enrolling eligible youth and young adults. We also accounted for changes in the enrollment strategies that may be necessary for a rigorous summative evaluation but were not documented in the manual.

We reviewed documents related to services provided to youth and young adults in the comparison group, including training documents or summaries of policies and procedures relevant to child welfare services. We reviewed comparison hub service documents to describe the services available to youth and young adults in the comparison group. We will review documentation again during the second round of data collection.

2. Qualitative interview data

During both rounds of hub visits, we will conduct one-on-one semi-structured interviews with key informants, including Pathways leadership, supervisors, and Navigators; hub child welfare agency leadership; and comparison program workers delivering comparison services. After each hub visit, we will conduct virtual focus groups with youth and young adults enrolled in Pathways and those receiving comparison services.[8] The questions in the interview and focus group guides will be open ended and allow for a range of responses. Hub visitors were trained to probe respondents for the appropriate depth of information needed to address the study's research questions. The interview and focus group guides are

[7] Mode of administration for the interviews and focus groups will be determined based on existing public health guidelines concerning COVID-19 at the time of data collection.

[8] During a webinar for YARH-3 consultants held on August 24, 2020, we received feedback on youth and young adult recruitment and engagement activities for evaluation activities. Consultants suggested that virtual focus groups are more effective than in-person focus groups for engaging youth and young adult participants. We will have the flexibility to conduct in-person focus groups, if necessary.

included in the YARH-3 implementation design report design report (Keith et al. 2022). Visitors will record each interview and focus group so we can confirm the notes taken during the interviews. The first round of site visits began in May 2022 and have been completed.

During the telephone check-ins, we will ask hub child welfare agency leadership a subset of questions from the interview guides. These questions will focus on changes to services offered to youth and young adults. We will record the telephone interviews to augment notes taken during the check-ins. The first round of check-ins began in January 2023.

3. Hub visit planning and scheduling

To initiate hub visit planning, the implementation study team scheduled a call with Pathways leadership to learn about the staffing structure and obtain contact information for each Pathways and comparison hub in the implementation study sample. The hub visitors scheduled an orientation call with each hub's point of contact to discuss the purpose of the visit; the topics to be covered in the interviews and focus groups; and the most effective approach for scheduling interviews, recruiting focus group respondents, and scheduling focus groups. Exhibit II.1 presents an activity list for the first round of hub visits; we tailored these activities for each hub as we learned more about staffing and supervisory and leadership structures, and determined whether individual or small group interviews were more appropriate. We used email to schedule the telephone check-ins. We scheduled each check-in for 30 minutes.

Exhibit II.1. Activities to occur during visits

Activity and respondent	Approximate length
Pathways hub	
Individual or small group interview with Pathways leadership	1.5 hours
Individual or small group interview with supervisors	1.5 hours
Individual or small group interview with Pathways Navigators	1.5 hours
Focus group with up to four youth and young adults	1.5 hours
Comparison hub	
Individual or small group interview with child welfare agency leadership	1.5 hours
Individual or small group interview with supervisors	1.5 hours
Individual or small group interview with comparison program workers	1.5 hours
Focus group with up to four youth and young adults	1.5 hours

4. Recruiting youth and young adults for focus groups

We aim to recruit enough youth and young adults for each focus group to provide a range of perspectives on their experiences with Pathways and comparison services. Recognizing the likelihood of a high no-show rate among youth and young adults recruited for the focus group, we over-recruited and offered a $40 incentive for each youth and young adult's participation. We included 4 youth and young adults in each focus group to provide a range of perspectives on their experiences with Pathways and comparison services.

5. Ensuring high-quality data

We have taken several steps to ensure consistent, high-quality data collection across implementation study hubs. Before the hub visits, we provided training to all visitors to review the implementation study's research questions and interviewing pitfalls and best practices. Training covered the following:

- Overview of the implementation study design and the role of the hub visits in data collection and addressing the research questions
- Detailed review of the components of the Pathways service model
- Detailed review of the interview and focus group guides
- Review of the best practices and pitfalls of interviewing

In addition to the training before hub visits, each visitor conducted a line-by-line review of another hub visitor's notes from the first hub visit to highlight areas for improvement and reinforce strengths.

6. Pathways Management Information System

We will regularly collect administrative data from the PMIS to assess patterns in service delivery and describe the extent to which Pathways services are delivered with fidelity. PMIS is an online management information system developed by the Center for Policy Research for Pathways to Success. PMIS serves as the online case management systems for Navigators and supports the data collection necessary for this summative evaluation. The data collected in PMIS is presented in Exhibit II.2.

Exhibit II.2. Pathways Management Information System data elements

Data element	Purpose
Screening and assessment data	
Youth and young adult eligibility screening tool[a]	Identify transition-age youth in foster care and young adults most at risk of homelessness
Working Alliance Inventory[b]	Collect information about the quality of the coaching relationship between the Navigator and youth and young adults
Youth Connections Scale[c]	Collect information about the number and nature of supportive adult connections that each youth and young adult has
Case management data	
Participation data	Enrollment and graduation dates
Youth-Navigator contact	Frequency Mode Duration Content, including topics discussed and the outcome of the contact, and services or funds provided Youth and young adult progress, including youth's development of two goals Enrollment, graduation, and length of participation in Pathways
Youth goals	Development of at least two goals grouped along one or more of the five outcome areas Progress toward achieving goals

Exhibit II.2 (*continued*)

Data element	Purpose
Graduation criteria checklist	Youth or young adult meet at least five of eight criteria: • Not in crisis • In stable housing • At least one supportive adult connection (non–child welfare professional) • Completed assessments • Achieved two linchpin goals (determined by youth or young adult and Navigator) • Has daily living skills necessary to sustain independence • Demonstrated increased ability to set goals and recognize what action steps need to be taken to achieve those goals • Demonstrated increased confidence, and ability to be assertive and self-advocate

Source: Colorado Pathways to Success Intervention Manual (Center for Policy Research 2020).

[a] The youth and young adult eligibility screening tool is an adaptation of the Transition-Age Youth (TAY) triage tool used to identify youth and young adults at highest risk for chronic homelessness. The screening tool includes 12 yes/no questions that ask about homelessness risk factors, such as parental incarceration and foster care history, youth or young adult involvement in the foster care system, drug use, conflict or abuse in the home, pregnancy, and human trafficking.

[b] Horvath 1992.

[c] Pathways uses the Youth Connections Scale (Center for Advanced Studies in Child Welfare n.d.) to quantify the number and nature of supportive adult connections in a young person's life. Navigators complete the assessment with youth and young adults 30 days after enrollment and near completion of the intervention.

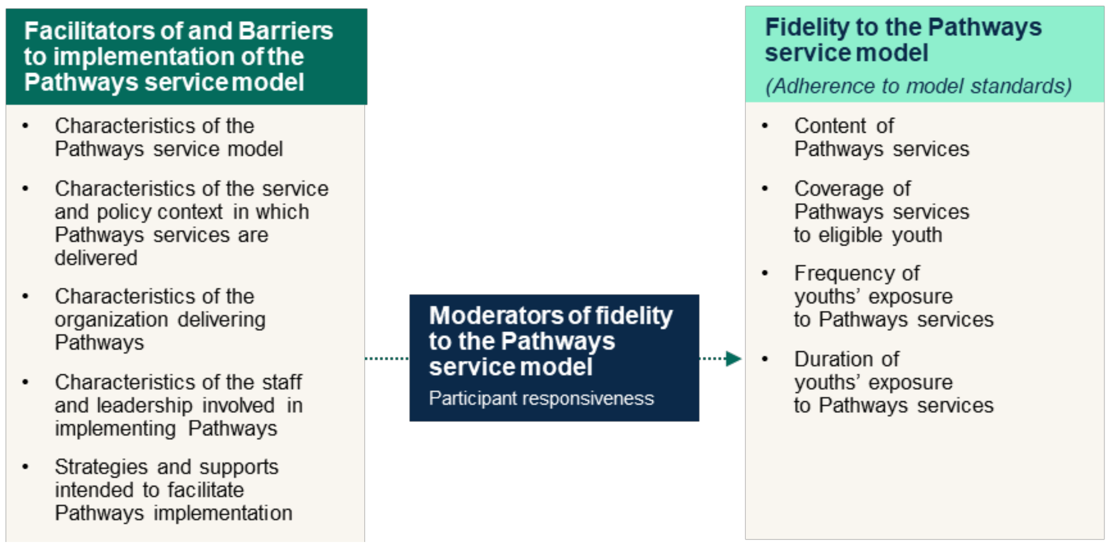
7. County characteristics

To document the service, resource, and policy environment for each intervention and comparison hub in the implementation study sample, we will use data available at the county level as well as interview data. Before and during the first round of hub visits, we documented the environment in each county to understand funding for runaway and homeless youth programs, the Chafee program, and education and training voucher programs; housing costs and available housing vouchers; youth and young adult unemployment; and available mental health services. We worked with the Center for Policy Research to obtain data on county characteristics.

D. Analytic approach to understanding implementation

To assess implementation systematically and with transparency, the implementation science literature recommends using a conceptual framework to guide implementation studies (Alexander and Hearld 2012). In this section, we describe the theoretical models from which we drew constructs to develop the conceptual framework guiding the implementation study and our approach to coding implementation data (Exhibit II.3).

Exhibit II.3. Conceptual framework for the implementation study of Pathways to Success



1. Conceptual framework for the implementation study

The Implementation study will draw on the Consolidated Framework for Implementation Research (CFIR; Damschroder et al. 2009) and the theoretical model developed by Carroll et al. (2007). We will use CFIR to measure the facilitators of and barriers to Pathways' implementation, and the theoretical model developed by Carroll et al. to measure moderators of fidelity and adherence to help us understand implementation fidelity to the Pathways model.

CFIR will enable us to use an exploratory approach to assess the range of contextual factors that may influence Pathways implementation during start-up and ongoing operation, as well as fidelity to the service model, rather than hypothesize factors that may influence Pathways implementation a priori. CFIR contains 39 constructs that reflect the evidence base of factors most likely to influence intervention implementation. However, not all constructs are necessarily relevant to the implementation of every intervention. Therefore, we will adapt CFIR to the Pathways implementation study by identifying and exploring relevant constructs as they emerge during analysis.

Using the theoretical model developed by Carroll et al. (2007), we will measure participants' responsiveness to assess the extent to which youth and young adults respond to and engage with Pathways services. We will also measure adherence to delivery of the intervention based on the standards set forth by the intervention's developers. For example, we can assess the extent to which Navigators and youth and young adults meet once a week to measure frequency of exposure.

2. Coding implementation data

We will use a grounded coding approach to identify themes in implementation as they arise in the data. After each round of visits and check-ins, we will systematically code the data using the components of the Pathways service model and CFIR. The codes we develop will organize data by individual Pathways components. Coding the individual service model components will enable us to describe the range of services offered to youth and young adults in the comparison hubs and assess the facilitators of and barriers to implementing each distinct component in the Pathways hubs. Future analytic plans will further describe how the frameworks are used to analyze qualitative data.

We will analyze quantitative data from PMIS to describe patterns in service delivery and fidelity to the Pathways model. These data will include case management data about service delivery, as well as youth and young adults' responses to the WAI, which will document the relationship between youth and their navigator or workers on a number of characteristics. We will use extracts from PMIS to present descriptive statistics on service delivery and fidelity in the Pathways hubs for the implementation study sample. We will then compare these results across the intervention hubs to assess similarities and differences.

The findings of the implementation study will support interpretation of Pathways' impacts on the outcomes included in the final impact study report. The degree to which an intervention and a comparison condition differ will lay a foundation for understanding intervention impacts. Additionally, findings, such as participants' responsiveness to the intervention and the service, resource, and policy environment, can help contextualize impact study findings and offer lessons for future implementation efforts.

III. Impact Study Analytic Approach

The impact study will be the first rigorous impact evaluation of Colorado's Pathways comprehensive service model. The goal of the study is to expand the evidence base on programs intended to prevent homelessness among youth and young adults with foster care histories at age 14 and older. It will examine evidence of program effectiveness on a large number of policy-relevant outcomes, including stable housing, education, employment, permanent connections to caring adults, and social-emotional well-being. It will explore the effectiveness of Pathways in short- and long-term follow-up periods and estimate the extent to which the program is more or less effective for key subgroups. Finally, the study originally proposed to explore linking features of program implementation (for example, dosage, quality, or adherence of the program delivery) to youth and young adult outcomes. However, this last analysis might no longer be feasible, given the limited variability in youth and young adult Pathways experiences and projections for the number of youth and young adults expected to enroll in Pathways by the end of the study.

The impact study design of Pathways has the following key design features:

- **Well-matched QED:** Twenty-three counties[9] forming nine hubs will be implementing Pathways, and sixteen counties forming six hubs will serve as a comparison group. The hubs are well matched in demographics, poverty levels, urbanicity, youth and young adult homelessness, and business-as-usual service receipt.
- **Strong effective contrast:** The Pathways program will be compared against business-as-usual services provision provided by a comparison program worker. Standard service provision is not coach like or youth driven. Referrals through Pathways will be needs driven rather than standardized, and Pathways' youth and young adults are expected to have more frequent interactions with their Navigator than those with comparison program worker.
- **Potential for a large study sample:** The study initially expected that approximately 700 youth[10] and young adults would enroll into business-as-usual services in study hubs during the impact study and would be invited to participate. Initial enrollment numbers suggest that this target may not be met; however, the study team is working proactively with Colorado staff to boost enrollment numbers to maximize the sample size for the study.
- **Comprehensive measurement of outcome domains at multiple periods:** Survey data collection will occur with youth and young adults at 6 months post enrollment (about halfway into typical Pathways duration), 12 months after entry (immediately after completing Pathways), and 24 months after entry (12 months after the end of Pathways). The survey will cover 10 outcome domains of interest. Administrative data from the Linked Information Network of Colorado will provide additional outcomes, including child welfare and other domains.

[9] Previously released publications indicated the evaluation includes 21 counties in the Pathways hubs. The increase is due to adding two counties during the enrollment period. The two counties were added to the evaluation in late 2022 and began enrolling youth and young adults in early 2023. It is possible that more counties may be added to the evaluation in either condition in the future, which will be captured in future publications.

[10] Previously released publications referenced a sample of approximately 750 youth and young adults, which represents all youth approached for the study. We anticipate 700 youth and young adults will enroll, with 50 refusing to participate or consent not being provided.

- **Bayesian interpretation of impact findings to complement frequentist presentation:** The study will supplement the traditional inferential test results from the impact study with a Bayesian presentation of the findings to offer a more nuanced interpretation.
- **Early preparation**: CB, OPRE, and Mathematica took a multistep approach to prepare and identify Pathways for a large-scale impact study, which was possible given the multiphase nature of YARH. During YARH-1 and YARH-2, grantees developed and implemented programs, using the evidence-building continuum as a framework for producing evidence. Mathematica provided evaluation TA to help grantees focus on the steps to demonstrate readiness for the summative evaluation. This time spent planning (YARH-1) and implementing (YARH-2) comprehensive service models also allowed CB, OPRE, and Mathematica to understand the strengths and challenges of a potential impact study on each grantee's comprehensive service model. CB, OPRE, and Mathematica engaged in a series of evidence-building meetings to evaluate these strengths and challenges. For more details on the summative evaluation site selection process, see the forthcoming site selection process brief (McCormick, Chesnut, and Bradley 2023).
- **On-going reflection**: CB, OPRE, and Mathematica have engaged Colorado leadership and consultants, including those with lived experience, in multiple meetings to identify potential changes to recruitment, enrollment, and data collection processes and tools.

A. Research questions

The Pathways impact study was originally designed to answer three broad research questions. Answering the first two questions will explore information about the magnitude of the effect that Pathways has on participant outcomes for the full study sample and key subgroups. Answering the third and final research question, will examine exploratory evidence that links features of implementation to participant outcomes.

1. What is the impact of Pathways on key outcomes, including but not limited to housing, educational attainment, employment, permanency, and well-being?

   a. What are the impacts after the first six months of Pathways (about halfway into the average length of participation in Pathways)?

   b. What are the impacts immediately following participation in Pathways (12 months after entry)?

   c. What are the impacts 12 months after the end of participation in Pathways (24 months after entry)?

2. Is Pathways particularly effective for key subgroups of the population served? Specifically, how do findings differ for the following:

   a. Youth approaching age 17.5 who can decide to remain in foster care or leave foster care

   b. Youth and young adults with varying foster care backgrounds (for example, age at entry, time in care, second-generation child welfare status, permanency status)

   c. Youth and young adults by gender identity

   d. Youth and young adults who have mental health or substance abuse challenges (potentially stemming from trauma)

   e. Youth and young adults by race and ethnicity

   f. Youth and young adults by sexual orientation

   g. Youth and young adults by level of connectedness at program entry
   h. Youth and young adults by the experience of the hub implementing Pathways (for example, new implementers versus seasoned implementers)

3. Do features of Pathways implementation influence youth and young adult outcomes?
   a. Does level of adherence to the intended model (for example, dosage and duration of services) have a strong relationship with youth and young adult outcomes?
   b. Do particular components of the model (for example, receiving flexible funds, the frequency or duration of contact with a Pathways Navigator) have a strong relationship with youth and young adult outcomes?

During the first 16 months of enrollment, the evaluation is enrolling fewer youth and young adults than expected. Therefore, the study will likely have reduced statistical power to estimate the effectiveness of Pathways both for the full sample (in research question 1) and for subgroups (in research question 2). Despite the reduced power, we will continue with the original plan of answering these two research questions to estimate the effectiveness of Pathways. We will acknowledge power as a limitation to our potential findings, and we will focus our interpretation on the full-sample analyses as the confirmatory test of the effectiveness of the program. Based on the final enrollment of youth and young adults in Pathways and the documented variation in implementation of Pathways, ACF may elect to not examine what features of Pathways implementation influence outcomes (in research question 3).

B. Data sources

The primary data source for the impact study is a survey administered to youth and young adults at baseline and 6-, 12-, and 24-months post baseline. The survey will enable the study to examine impacts across 10 outcome domains of interest, including the 4 original outcome domains the YARH programs were designed to influence: housing, permanent connections, education and employment, and social-emotional well-being. Mathematica consulted with OPRE, the Children's Bureau, and a group of consultants (YARH-2 grantees) at the start of the YARH-3 contract to identify 6 additional outcome domains that emerged as potentially important and relevant to policy. A survey instrument to operationalize these constructs and domains has been developed for the impact study. All 10 domains contain outcomes that will be used to test the effect of Pathways.

Exhibit III.1 below summarizes the demographic and 10 outcome domains, and the constructs the survey will measure within each of the domains.

Exhibit III.1. Survey domains and constructs to be assessed in the Pathways impact study

Domain	Construct
Demographics/background	Age
	Ethnicity
	Race
	Gender identity
	Sexual orientation
Education and employment	Education status
	Highest education level attained
	Absenteeism

Exhibit III.1 (*continued*)

Domain	Construct
Education and employment (continued)	Education goals
	Career goals
	Employment status
Stable housing	Access to safe, stable housing options
	Recent living situations (that is, housing stability)
	Perceptions of safety in current housing
	Knowledge of safe, stable housing options
	History of homelessness
	Voluntary/involuntary changes in recent housing situations
Permanent connections to caring adults	Quality/strength of adult connections
	Communication skills with adults (interpersonal relationships)
	Relational permanence among natural adult supports
Connections with youth/peers	Communication skills with youth (interpersonal relationships)
	Quality/strength of connections to other youth
Social-emotional well-being	Outlook on life/optimism
	Incidence of depression/other mental health issues
	Self-efficacy
	Self-esteem
	Resiliency
	Risk behaviors (sexual risk, substance use [alcohol, marijuana], controlled substance use, violence)
	Empowered to make decisions around service receipt
	Experience with trafficking
	Suicidal ideation/attempts
Involvement with criminal justice system or juvenile justice system	History of arrests and convictions
	Spent time in correctional facility
Access to available system resources (Temporary Assistance for Needy Families, housing, food stamps, mental and physical health services, education, employment, financial, and so on)	Ability to access system resources
	System resource service receipt
Child welfare (CW) history and status	Initial involvement with CW
	Current CW situation/placement and stability
Readiness for adulthood	Obtaining identification documents
	Financial literacy knowledge
	Economic stability
	Food insecurity
Parenting	Parenting status
	Access to child care and health care for child

To help achieve high response rates, we will offer incentives to youth and young adults including:

- a $40 gift card for youth who complete the baseline survey and a waterproof dry bag, water bottle, document portfolio, or other item of similar value along with our toll-free number and email address, where youth can provide updated contact information
- a $45 gift card for the 6-month follow-up survey
- a $50 gift card for the 12-month follow-up survey
- a $65 gift card for the 24-month follow-up survey and,
- up to $20 in gift cards for youth and young adults who provide updated contact information at 9-, 15-, 18-, and 21-months.

In addition to collecting survey data on youth and young adult outcomes, Mathematica is working with the Linked Information Network of Colorado (LINC) to obtain a large administrative data set covering a variety of outcome domains for study participants. LINC data will include child welfare records and may also include records of public assistance, such as the Supplemental Nutrition Assistance Program, employment records, juvenile justice records, and postsecondary education records. In addition, LINC is in the process of expanding the state agencies with shared/linked data and expects to include housing assistance records, and potentially others, in the future. All of the data sources available through LINC that measure outcomes aligned with the Pathways program will be included in the impact study. These data, which are available in all participating treatment and comparison hubs, will address several outcomes of interest, including participant safety, permanency, and service use.

LINC will identify study-eligible individuals in the treatment and comparison hubs by linking identifying information collected at entry (system identifiers, first name, last name, and date of birth) with comparable information in the administrative data sets. LINC will return all administrative data records associated with treatment and control group study participants, which can be linked to the survey data via a YARH-3 study identifier.

We will use these administrative data to supplement the self-reported survey data for two key purposes. First, we will use the administrative data as an alternative outcome data source for estimating impacts on the outcomes. We expect that the survey data will not capture some outcomes measured in the administrative data (in particular, long-term outcomes). For these administrative outcomes, we will use the same analytic approach that we propose to use for the survey data. Second, we will use the administrative outcome data to validate the subset of constructs measured in both the survey and administrative data (for example, by comparing youth and young adult self-reports on recent child welfare status with administrative data on recent status). We will report concordance statistics to show the degree to which the administrative data and self-report survey data for comparable outcomes corroborate/validate each other.

C. Analytic approach

The main impact study approach consists of a cluster QED that will use survey data as the primary data source for key outcomes of interest, supplemented by administrative data elements. In this hub-level QED design, treatment youth and young adults will include all of those enrolled in Pathways in treatment hubs, as well as comparison youth and young adults who will be receiving comparison services in carefully selected comparison hubs. Given that the design uses hubs as the unit of assignment, we will cluster standard errors at the hub level in all inferential analyses described below.

We propose to answer the impact study research questions (research questions 1 and 2) with a benchmark approach that estimates both the impact of the offer of Pathways (which will be an intent-to-treat [ITT] estimate) and the receipt of Pathways (the treatment-on-treated [TOT] estimate) on a sample of youth and young adults with observed outcome data. The concepts of ITT and TOT are typically discussed in the framework of randomized controlled trials (RCTs), but the same principles apply to QEDs. Pathways will be offered to all eligible youth and young adults in treatment hubs, but only some youth and young adults will enroll and actually receive services. Thus, there will be an opportunity to estimate and report on both the offer and the actual receipt of Pathways services in this non-experimental design.

The QED will examine unbiased estimates of the effect of Pathways, provided that youth and young adults in the comparison and treatment groups are equivalent at baseline on all measurable characteristics expected to influence the outcomes, as well as all unmeasurable characteristics. However, unlike a well-implemented RCT, a QED cannot ensure equivalence on unmeasurable characteristics, so the evidence from the study will have this limitation. Nonetheless, we will take several measures to establish the credibility of the impact estimates. Much of the discussion below focuses on a benchmark approach, but we also include a section that describes sensitivity analyses that can assess the extent to which findings are robust to other approaches.

1. Nonresponse rates and missing data

The primary threat to internal validity from a well-executed randomized experiment is loss of sample members. Impact findings from a randomized experiment are subject to attrition bias if outcomes from survey respondents and nonrespondents differ, or if the characteristics of respondents and nonrespondents are systematically different across the treatment and comparison groups. Unlike the case with a randomized experiment, the key criterion for a credible estimate of program effectiveness from a quasi-experiment is a demonstration of baseline equivalence. Thus, we will focus more on the baseline equivalence demonstration to establish the credibility of the analyses.

In this QED study, which has been designed to minimize the difference in observable characteristics in youth and young adults across treatment and comparison hubs, sample loss could cause youth and young adults originally located in treatment and comparison hubs to become dissimilar when the outcomes are measured. For the purposes of transparency, we will document nonresponse rates by outcome, by condition, and for the sample as a whole. This approach will help audiences understand the extent to which the analytic samples used to estimate program impacts are representative of the full study sample.

Our benchmark approach will estimate the effectiveness of Pathways with youth and young adults who did not have missing baseline characteristics (or other covariates), called a “complete case analysis.” However, to the extent that this decision could influence the findings, we will also plan to conduct a sensitivity analysis that utilizes all available data by using multiple imputation or maximum likelihood estimation for all baseline equivalence and impact analyses.

2. Baseline equivalency: Assessing match quality

As noted above, a demonstration of baseline equivalence among the analytic sample is critical to establish the credibility of an impact from a QED. We will assess the equivalence of key baseline characteristics in the analytic sample used to estimate program impacts. They will include, at a minimum, a baseline measure of the outcome and demographic characteristics, because these variables are likely to be strongly predictive of the outcomes of interest. In addition, we will plan to assess baseline equivalence of other available variables that we observe to be highly correlated with the outcome of interest, or for which there is evidence of a strong correlation in the literature. For example, if we observe that age at entry into the child welfare system is highly correlated with baseline social-emotional status, and the literature shows this linkage, we will plan to assess the equivalence in age of child at welfare system entry when analyzing social-emotional outcomes.

We will assess the baseline equivalence through descriptive and inferential statistics. We will report the baseline means and standard deviations of each variable of interest across conditions, along with the difference in means. Then we will conduct two inferential tests to examine whether baseline differences between the treatment and comparison groups are statistically significant. We will conduct regression analyses to assess the equivalence of means of each baseline characteristic across groups, as well as a joint *F*-test to assess joint significance across all baseline characteristics. In all of these analyses, we will cluster standard errors at the hub level—the unit of assignment for this design. We will report *p*-values for each test after accounting for this clustering adjustment.

Even if differences in baseline characteristics were not statistically significantly different from each other, large differences in means could lead to biased impact estimates. Therefore, we will transform raw treatment and comparison group mean differences in baseline characteristics into standardized differences (that is, differences in standard deviation units). Our benchmark approach for estimating program impacts will statistically adjust for key baseline characteristics. If the difference in these baseline means is less than 0.25 standard deviations, our analytic approach for estimating impacts should adjust appropriately for these differences. If differences on key baseline characteristics are greater than 0.25 standard deviations, however, simply conducting a regression adjustment may not adequately protect against the bias from these large differences.

If we find differences on any key baseline characteristics greater than 0.25 standard deviations, we will use propensity score matching to identify and trim outliers outside the region of common support (that is, the area where treatment and comparison members have comparable propensity scores). We will reassess baseline equivalence and potentially re-estimate propensity scores after including additional interaction terms until the treatment and comparison groups are sufficiently comparable (that is, all baseline differences are less than 0.25 standard deviations apart). As noted below, we will also conduct a sensitivity analysis in which we conduct complete case analyses without trimming sample members and simply conduct regression adjustment as a means to estimate impacts.

3. Estimation Strategy for Research Question 1

To estimate the impact of Pathways on key outcomes at different points in time (research question 1), we will estimate a regression model that includes an indicator of the Pathways treatment status, as well as all baseline characteristics used to assess balance, to improve the precision of the impact estimates and statistically adjust for any differences. Because assignment to the Pathways program is at the hub level and we will conduct our analyses at the youth/young adult level, we will adjust the estimated standard errors for clustering in all models. This approach will enable us to estimate the appropriate standard errors and *p*-values for all inferential analyses.

Assuming the analytic sample for a given outcome satisfies the baseline equivalence requirements, this general analytic approach will examine unbiased estimates of two policy-relevant effects: (1) the impact of Pathways on the primary population and (2) the impact of Pathways on program participants. The first will estimate the impact of the offer to receive Pathways, previously referred to as the ITT impact estimate. The ITT estimate could be diluted because it could include youth and young adults assigned to the treatment group (that is, in a treatment hub) who do not take up Pathways services. The second will estimate the impact for youth and young adults who do participate in Pathways—the TOT impact estimate—calculated by dividing the ITT impact by the proportion of youth and young adults who take up the program (Bloom 1984).

We will explore a variety of descriptive and inferential results for the impact estimates. We will report the simple (unadjusted) difference in treatment and comparison group means and standard deviations, as well as the regression-adjusted means (after adjusting for the baseline characteristics described above), based on ITT and TOT estimates. In addition to reporting impacts in the raw units of the outcome variables, we will convert all impact estimates into standardized effect sizes (standard deviation units) to facilitate interpretation across models and gauge the magnitude of impacts by using a common threshold. We will report the *p*-values from the ITT and TOT impact estimates, with confidence intervals around the point estimates, to appropriately guide interpretation.

4. Bayesian interpretation of impact findings

To offer a more nuanced interpretation, we will supplement the traditional inferential test results with a Bayesian presentation of the findings. We will report the Bayesian posterior probability—the probability that Pathways truly has positive (that is, favorable) impacts—given the observed impact estimates for each outcome. In doing so, we will be able to present results stating that, for example, there is a 77 percent probability that Pathways has a favorable effect on participant outcomes—even if the inferential test shows there is a nonsignificant difference in the average outcomes across conditions.

To inform the prior distribution used for the Bayesian presentation of findings, we will draw on multiple sources of credible evidence on the effectiveness of programs that attempt to improve outcomes for a broad range of at-risk youth and young adults. This approach may include programs reviewed by the Title IV-E Prevention Services Clearinghouse, dropout prevention programs from the What Works Clearinghouse, and, potentially, evidence on teen pregnancy prevention from the Teen Pregnancy Prevention Evidence Review sponsored by the U.S. Department of Health and Human Services.

We will work with a panel of consultants to select and identify the evidence most relevant to the Pathways program and its key audience. From a body of literature, the consultant panel deems appropriate, we will compile all estimates of program effectiveness from the literature and use the distribution of impact estimates as the prior distribution. We will use this distribution of impact estimates, combined with those obtained from the Pathways study, to calculate the Bayesian posterior probability. The approach we recommend is described in more detail in Deke and Finucane (2019).

5. Estimation Model for Research Question 2 (subgroup analysis)

To examine whether Pathways is particularly effective for key subgroups of the primary population, we will use the same approaches described above for the full analytic sample. We will estimate separate impacts for each key subgroup described in research question 2 and potentially explore the intersection of two or more subgroups, such as race and gender. We will assess whether impacts vary across subgroups by interacting subgroup indicators with the treatment status indicator (interaction models), then use an *F*-test to assess whether the subgroup differences are statistically significant. As with all subgroup analyses, the study will have reduced power to detect impacts as statistically significant relative to the full sample analyses examined in research question 1.

6. Estimation model for Research Question 3 (exploratory analysis)

Based on the final enrollment of youth and young adults in Pathways and the documented variation in implementation of Pathways, ACF may elect to not examine what features of Pathways implementation influence outcomes (in research question 3). Here, we describe the analyses we will conduct if there is enough power to analyze research question 3.

The goal of research question 3 is to unpack the impact findings by using naturally occurring variation in program implementation experiences as a predictor of variation in outcomes. Although the analyses would not establish a causal relationship between implementation components or features and impact findings, they would provide useful correlational evidence. Future studies could build on this correlational evidence and design impact evaluations to test whether these links are causal.

First, we would examine how the implementation of Pathways is related to outcomes. We would do so by regressing each outcome of interest on the measures of implementation of Pathways, adjusting for baseline characteristics likely to influence the outcome. In other words, this model would estimate whether youth and young adults with better or more exposure to the implementation have better outcomes (after adjusting for baseline characteristics as proxies for potential omitted variables that might produce bias in the observed relationship between implementation and outcomes). To get a reliable metric of implementation, we would start with the full set of implementation measures and use principal components analysis to identify a smaller set of measures that capture much of the variability in implementation.

Second, we would examine which individual components of implementation have the strongest relationship with outcomes of interest. This approach would be comparable to that described above. However, instead of using implementation of Pathways as a single predictor variable of interest, we would decompose the implementation into individual core components. We would have implementation data on features of Pathways, among them these key components: (1) dosage/duration of regular case management meetings, (2) the types of goals youth and young adults choose and the services offered to meet those goals, and (3) financial assistance. After creating implementation measures for each of these key components, we would use them as separate predictors of participant outcomes, following the general approach described above and in greater detail in Cole and Choi (2020). The benefit of this additional approach is that it would help us understand whether, for example, it was the case management or the financial assistance that had more influence on participant outcomes.

7. Sensitivity analyses

The foregoing discussion outlines the set of benchmark analytic decisions we will use to estimate the effectiveness of Pathways on youth and young adult outcomes for impact research questions 1 and 2. These decisions are based on assumptions about the sample population and estimation models. To assess the extent to which the impact findings are robust to these decisions, we will conduct sensitivity analyses that will vary some of the decisions.

For each outcome, the benchmark approach will explore ITT and TOT estimates, adjusting for a set of key covariates, by using a sample of youth and young adults with complete (nonmissing) information on the outcome. We will conduct the following sensitivity analyses:

- **Use a more parsimonious set of covariates.** We will compare findings from the benchmark analysis, which uses a rich covariate set, with a parsimonious set of covariates that includes only a baseline measure of the outcome of interest.
- **Conduct analyses of the original data without propensity trimming (assuming that propensity trimming is necessary to address large baseline differences).** The benchmark approach will use propensity trimming as a means to ameliorate large baseline differences in key background characteristics. For a sensitivity analysis, we will estimate impacts by using the original untrimmed sample after adjusting for the baseline differences, which could improve power in the study.
- **Use alternative methods to deal with missing data.** For each outcome, the benchmark approach estimates impacts on a sample of youth and young adults with complete (nonmissing) information on the baseline characteristics of interest and the outcome being examined. For a sensitivity analysis, we will re-estimate baseline equivalence and impact findings by using all available data, either after using multiple imputation to fill in any missing data or full information maximum likelihood as a single estimation procedure.

D. Additional analytic approach to complement the main study design for the impact study

An important benefit of the aforementioned design for the main impact study is that it can produce evidence of the effect of Pathways on the full set of outcomes of interest to OPRE, the Children's Bureau, practitioners, persons with lived experiences, and other consultants. However, a potential limitation of the main impact study is that it may not be well powered to detect program impacts on several outcomes of interest unless the observed impacts are quite large (see Cole et al. 2022 for details). We will therefore conduct an additional impact study design—a difference-in-differences matching strategy—that uses the administrative data sources to supplement the main impact study. Specifically, we will use a larger pool of potential sample members to expand the comparison group and conduct an analysis that obviates the need to do a clustering correction. This change will address the chief limitation of the main study design: statistical power. However, this approach will examine only evidence about the effect of Pathways on the subset of outcomes available in administrative data. The remainder of this chapter discusses analysis methods for this approach.

1. Data sources

This analysis will use administrative data from a range of state agencies in Colorado, which we will obtain from LINC. To boost the sample size and statistical power relative to the main study, the analysis will include additional sample members in a pre-intervention period, and we will add noneligible youth and young adults in the estimation strategy.

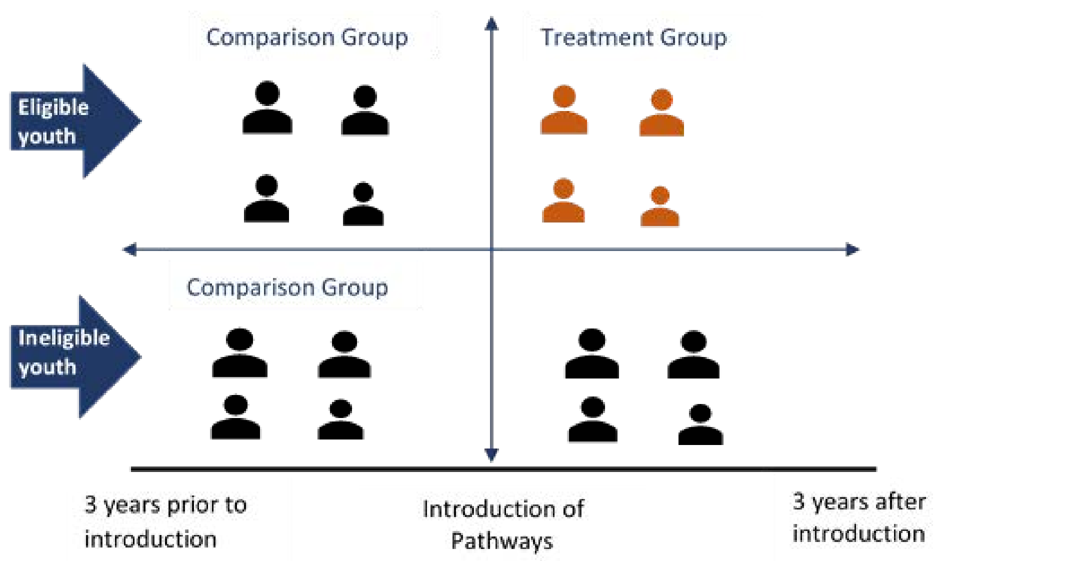
2. Difference-in-differences within a natural experiment

The timing of the introduction of Pathways in Colorado hubs created the appropriate circumstances for a natural experiment. Pathways initially was introduced in July 2016 in five hubs in Colorado as part of the YARH-2 grant. Pathways became available in additional expansion hubs starting in September 2021. Before these periods, the same youth and young adults did not have the chance to participate in Pathways. Because youth and young adults did not choose when Pathways would be introduced—analogous to an RCT in which participants cannot determine their treatment condition—the situation constituted a natural experiment. Following from the difference-in-differences approach used in Asheer and colleagues (2017), we will leverage this natural experiment to estimate the effectiveness of Pathways on a larger pool of youth and young adults than would be possible in the main impact design. We will use administrative data for three years before the introduction to Pathways in a given hub and three years afterward.

We will use two comparison groups for this difference-in-differences analysis (see Exhibit III.2 below). The treatment group will be made up of Pathways-eligible individuals in participating hubs in the period after Pathways introduction (upper right corner of Exhibit III.2). The first comparison group will comprise comparable, potentially eligible youth and young adults in Colorado hubs in the period before Pathways' introduction (upper left corner of Exhibit III.2). We will use propensity score matching to identify youth and young adults in this pre-implementation period as potential comparison group members. We will first identify youth and young adults potentially eligible for Pathways during this period (that is, youth and young adults ages 14 to 23 with foster care histories at age 14 or older with at least two risk factors for homelessness). Then we will estimate propensity scores to match youth and young adults in the treatment condition with one or more comparable youth/young adults in the pre-intervention period, with comparability based on demographic and background characteristics. In doing so, we will have a reasonably comparable set of treatment and control youth and young adults who were potentially eligible for Pathways but differed in the timing of their eligibility for the program.

To supplement this comparison, we will bring in a second comparison group comprising of ineligible youth and young adults in the pre- and post-Pathways introduction period (bottom two quadrants of Exhibit III.2). Again, we will use propensity score matching to identify comparable ineligible youth and young adults in the pre-Pathways to post-Pathways periods, with comparability based on the same set of demographic and background characteristics. In doing so, we will have a reasonably comparable set of treatment and control youth and young adults who were ineligible for Pathways and differed only in the timing of Pathways' introduction.

Exhibit III.2. Treatment and Comparison groups identified in a given Pathways hub



To estimate the impacts, we will use a three-step approach common in difference-in-differences estimation. The first step will estimate the differences in outcomes among eligible youth and young adults in the post-Pathways period relative to those in the pre-Pathways period (the difference in the upper right quadrant relative to the upper left quadrant in Exhibit III.2). This first difference will be the impact of Pathways, provided nothing else changed in treatment hubs and the environment of all youth and young adults when Pathways was introduced. However, this circumstance is unlikely, and such an estimate probably could not be attributed solely to Pathways. To address this limitation, the second difference will calculate the change in outcomes in the post-Pathways period relative to the pre-Pathways period among ineligible youth and young adults, who should not be impacted by Pathways but could be impacted by other factors (the difference in the bottom right quadrant relative to the bottom left quadrant). The third step will subtract these two differences—the change in outcomes for ineligible youth and young adults and the change for eligible youth and young adults. This step will explore the difference-in-differences estimate of the impact of Pathways on youth and young adult outcomes.

Our estimation strategy will be based on a linear regression approach, limited to those individuals who are well matched according to the propensity model. We will statistically adjust for available demographic characteristics in our regression model to account for potential changes in the characteristics of eligible youth and young adults that could bias our impact estimates. As with the main impact analysis, we will define the Pathways treatment status in two ways. We will estimate the impact of the offer of Pathways based on all eligible youth and young adults in the post-Pathways period (ITT-like effect) and the impact among youth and young adults in the post-Pathways period who enroll in Pathways (TOT-like effect), because only a subset of eligible individuals in participating hubs will be offered and will receive the program. We will estimate the TOT-like impact by using the Bloom (1984) adjustment, dividing the ITT-like impact by the take-up rate to produce a credible TOT-like impact estimate.

IV. Conclusion

By publishing analytic plans, Mathematica and OPRE aim to be transparent about YARH's goals and focus. YARH aims to produce evidence about interventions intended to prevent homelessness and improve key outcomes among youth and young adults who have been involved in the child welfare system. Our current phase, YARH-3, is conducting a summative evaluation of Colorado's Pathways to Success comprehensive service model.

The summative evaluation consists of an implementation study and an impact study. The implementation study will examine factors that contributed to or inhibited implementing Pathways services in different hubs. The impact study will use a quasi-experimental study design to examine the effects of the Pathways intervention on youth and young adult outcomes.

Future analytic reports released by Mathematica and OPRE will support our goal of transparency by detailing our plans for subsequent analyses presented in specific products.

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