



Youth At-Risk of Homelessness: Design for an Impact Study of “Pathways to Success”

A Coach-Like Case Management Program for Youth and Young Adults in Foster Care

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Overview

Preventing homelessness among young people who have been involved in the child welfare system remains an urgent issue for child welfare policymakers and practitioners. Housing stability is essential for achieving self-sufficiency and promotes health and well-being, particularly during the transition to adulthood. A combination of disadvantages places youth with a history of foster care, especially those aging out of care, at a higher risk of homelessness compared with their peers.

To expand the evidence base on interventions to prevent homelessness among youth and young adults who have been involved in the child welfare system, 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. YARH grantees received funding to develop interventions for youth and young adults with child welfare involvement who are most likely to experience homelessness. The grant program specifies three target populations: (1) adolescents who enter foster care from age 14 to 17; (2) young adults aging out of foster care; and (3) homeless youth and young adults, up to age 21, with foster care histories.

The Office of Planning, Research, and Evaluation 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. ACF is now in the third phase of YARH (or YARH-3) and is conducting a rigorous summative evaluation of a policy-relevant comprehensive service model developed and refined during the first two phases of YARH.

This summative evaluation conducted under YARH-3 will examine the effect of Colorado's Pathways to Success comprehensive service model. Pathways is an intensive, coach-like case management model for youth and young adults in foster care. A large, cluster quasi-experimental impact study design will be used to test the effectiveness of Pathways in 37 counties in Colorado.

The Pathways impact study will provide 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 show the effectiveness of Pathways at 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 will link features of program implementation (for example, dosage, quality, or adherence of the program delivery) to youth outcomes.

This report describes the design of the Pathways impact study. A separate report describes the implementation study design for the Pathways evaluation (Keith et al, 2021).

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Executive Summary

Preventing homelessness among youth and young adults who have been involved in the child welfare system is an urgent issue for child welfare policymakers and practitioners. Housing stability, so essential for achieving self-sufficiency, also promotes 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).

A combination of disadvantages places youth with a history of foster care, especially those aging out of care, at greater risk of homelessness than their peers are. Experiences of trauma are common, and research suggests these youth are more likely than those in the general population to suffer from post-traumatic stress disorder (Salazar et al. 2013). Moreover, many youth aging out of foster care encounter barriers to economic independence because they lack the academic credentials, basic job skills, and social networks vital for finding and maintaining employment (Dworsky et al. 2012). Nonetheless, there is also evidence that protective factors, such as caring adults, a stable living situation, and relational skills, can offset risk factors and contribute to improved well-being and longer term success (Brodowski and Fischman, 2013).

To expand the evidence base on interventions to prevent homelessness among youth and young adults who have been involved in the child welfare system, the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) launched the Youth At-Risk of Homelessness (YARH) multiphase grant program. YARH aligns closely with the U.S. Interagency Council on Homelessness (USICH) Framework for Ending Youth Homelessness (USICH 2013). YARH mirrors the USICH framework's focus on achieving positive outcomes related to housing, permanent connections to caring adults, education, employment, and well-being. YARH also reflects the framework's emphasis on using data to specify risk and protective factors for youth, identifying and implementing strategies to mitigate risks and enhance protective factors, and using monitoring and evaluation to improve services. The grant program specifies three target populations: (1) adolescents who enter foster care from age 14 to 17, (2) young adults aging out of foster care, and (3) homeless youth and young adults, up to age 21, with foster care histories.

A. History of YARH-1 and YARH-2

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 target 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 served. The Office of Planning, Research, and Evaluation (OPRE) contracted with Mathematica in YARH-1 and YARH-2 to provide evaluation technical assistance (TA) 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.

ACF is now in the third phase of YARH (or YARH-3), which will continue to provide important information to the field through a rigorous summative evaluation.

B. Goals of the YARH-3 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. During the first year of YARH-3, ACF and Mathematica convened two meetings in early 2020 with experts from the field to examine the specifics of candidate interventions implemented in YARH-2 and refine potential evaluation designs. On the basis of those conversations, ACF and Mathematica recommended conducting a summative evaluation of Colorado's Pathways to Success comprehensive service model.

The Pathways comprehensive service model offers intensive, coach-like case management for youth and young adults in foster care. It is designed to involve the youth in every aspect of their development. The model emphasizes coaching practices to engage youth and a youth-driven approach to help identify their goals, connect them with existing services, and promote positive outcomes. Case managers (known as Navigators) use coaching strategies to develop a working alliance with the youth by listening to them, asking powerful questions, approaching them with curiosity instead of judgment, encouraging them, helping them set achievable goals, and respectfully holding them accountable. These strategies recognize that a lack of social supports and a history of trauma can create challenges with engagement and trust between youth and service providers.

The Pathways impact study will use a cluster quasi-experimental design. Thirty-seven counties within Colorado will participate in the impact study. Some will train their Chafee Program workers (state employees who assist youth transitioning from the foster care system) to be Pathways Navigators who will use coach-like strategies to engage with youth—these will be treatment counties, and all eligible youth in these counties will be exposed to Pathways. Other counties will not train their Chafee Program workers to be Pathways Navigators during the impact study; in those counties, youth will receive business-as-usual services. These will be the comparison counties for the purposes of the impact study.

The goal of the Pathways impact study is to expand the evidence base on programs intended to prevent homelessness among youth and young adults who have been involved in the child welfare system. It will provide 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 show the effectiveness of Pathways at 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 will link features of program implementation (for example, dosage, quality, or adherence of the program delivery) to youth outcomes.

C. Overview of impact study features

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

- **Well-matched quasi-experimental design:** Twenty-one counties will implement Pathways and sixteen counties will serve as a comparison group. The counties are well matched in terms of demographics, poverty levels, urbanicity, youth homelessness, and Chafee service receipt.
- **Strong effective contrast:** The Pathways program will be compared against business-as-usual service provision provided by a Chafee worker. Standard service provision is not coach like nor is it youth driven. Referrals through Pathways will be needs driven rather than standardized, and Pathways youth will have far more frequent interactions with their Navigator than will youth in comparison counties.

- **Large study sample:** Approximately 750 youth are expected to enroll into Chafee services in study counties during the impact study and will be invited to participate.
- **Comprehensive measurement of outcome domains and at multiple periods:** Survey data collection will occur with youth 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 on child welfare, public assistance, and employment, among others.
- **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.

A separate report describes the implementation study design for the Pathways evaluation (Keith et al, 2021).

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I. Introduction

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

A combination of disadvantages places youth with a history of foster care, especially those aging out of care, at greater risk of experiencing homelessness than their peers. Experiences of trauma are common, and research suggests these youth are more likely than those in the general population to suffer from post-traumatic stress disorder (Salazar et al. 2013). Moreover, many youth aging out of foster care encounter barriers to economic independence because they lack the academic credentials, basic job skills, and social networks vital for finding and maintaining employment (Dworsky et al. 2012). Nonetheless, there is also evidence that protective factors, such as caring adults, a stable living situation, and relational skills, can offset risk factors and contribute to improved well-being and longer-term success (Brodowski and Fischman, 2013).

Studies confirm that housing instability affects a large proportion of people who exit foster care as older youth or young adults. The National Youth Transition Database (NYTD) gathers information on youth currently or previously in foster care and provides one view into the prevalence of homelessness in this population. Among 19-year-old respondents to the NYTD, 20 percent reported that they experienced homelessness within 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 among youth formerly in foster care ranging from 11 to 37 percent. 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).

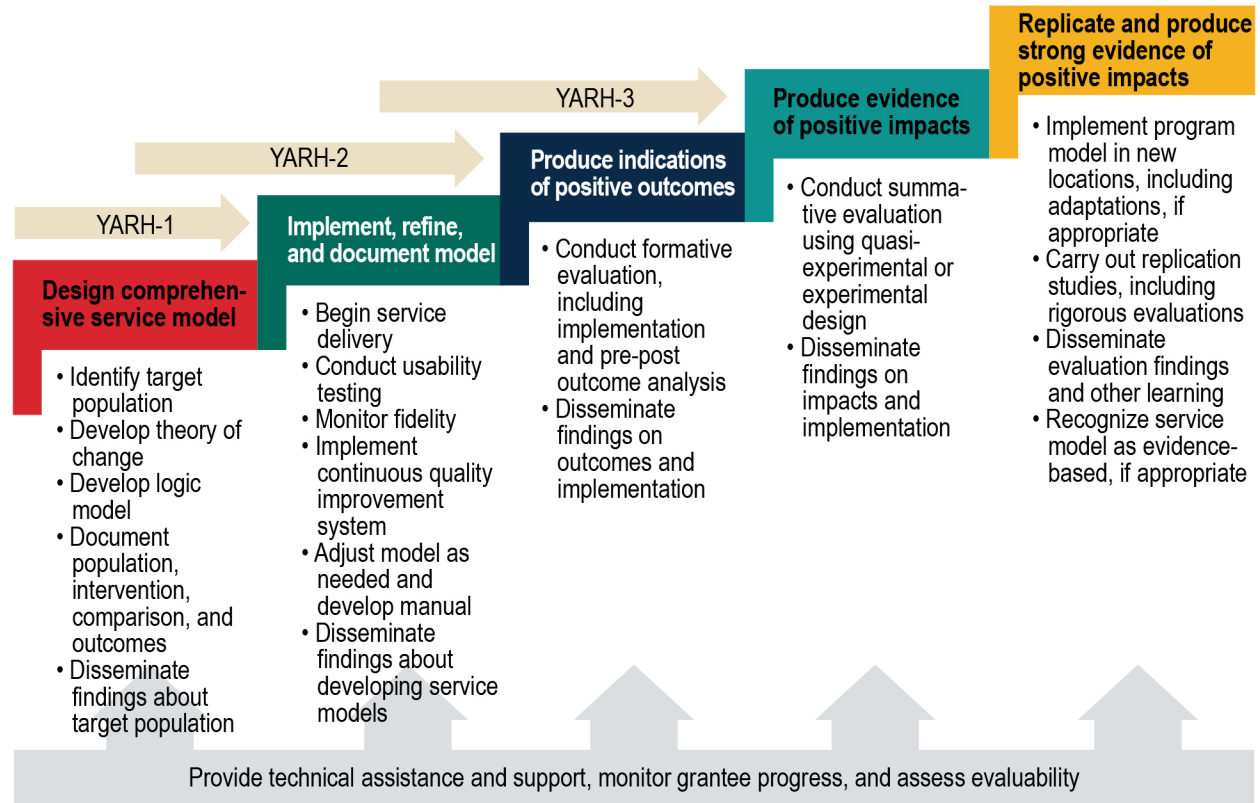
To expand the evidence base on interventions to prevent homelessness among youth and young adults involved in the child welfare system, the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) launched the Youth At-Risk of Homelessness (YARH) multiphase grant program. YARH aligns closely with the U.S. Interagency Council on Homelessness (USICH) Framework for Ending Youth Homelessness (USICH 2013). YARH mirrors the USICH framework’s focus on achieving positive outcomes related to housing, permanent connections to caring adults, education, employment, and well-being. YARH also reflects the framework’s emphasis on using data to specify risk and protective factors for youth and young adults, identifying and implementing strategies to mitigate risks and enhance protective factors, and using monitoring and evaluation to improve services. The grant program specifies three target populations: (1) adolescents who enter foster care from age 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.

A. History of YARH and current context

YARH seeks to guide grantees along an evidence-building path (Exhibit I.1). 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 target populations for YARH, develop partnerships and teaming structures, and begin designing comprehensive service models to prevent homelessness. Under 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 their service models, and conduct formative evaluations to assess program implementation and early outcomes for youth and young adults served. ACF contracted with Mathematica in YARH-1 and YARH-2 to conduct process studies, provide evaluation technical assistance (TA) to grantees, support them in articulating and refining the design of their service models, assess the evaluability of each service model, and disseminate knowledge developed.

Exhibit I.1. Evidence-building path in YARH



Note: Adapted from Langford et al. (n.d.), p. 5.

ACF is currently in the third phase of YARH (or YARH-3), which will continue to provide important information to the field through a rigorous summative evaluation. YARH-3 incorporates assessments of grantees’ readiness for summative evaluation, a federally led evaluation of one comprehensive service model (discussed more in the following section), including an implementation study and an impact study, and ongoing dissemination of knowledge gained through project activities.

1. Roadmap for this report

This design report summarizes the process used to select the candidate intervention for summative evaluation and the planned impact study. The remainder of Chapter I describes the selection of a YARH-2 intervention for the summative evaluation, the factors that informed the final recommendation for participation in the evaluation, and the components of the comprehensive service model to be evaluated. Chapter II describes the research questions and impact study design. A separate design report provides details on the implementation study to complement the impact study (Keith et al. 2021).

B. Selection of summative evaluation intervention

For the YARH-3 summative evaluation, ACF intended to select at least one YARH-2 intervention that was likely to produce useful evidence about preventing homelessness and improving key outcomes among youth and young adults who have been involved in the child welfare system. To support selection of the summative evaluation intervention, ACF and Mathematica convened two meetings in early 2020 with experts from the field. During these meetings, four factors guided discussions for recommending a YARH-2 intervention for summative evaluation:

- 1. Interest of the field in the intervention.** The policy relevance of the proposed comprehensive service model was a key consideration for the recommendation. The extent to which researchers and practitioners would be interested in the results and the likelihood that other communities would implement similar service models informed whether an intervention would make a useful contribution to the field.
- 2. Readiness of the intervention for a summative evaluation.** The clarity of the comprehensive service model and the accompanying program manual were key considerations for whether an intervention was ready for summative evaluation. In addition, the following qualities signaled readiness for the evaluation: professionalism of the site management teams, robustness of the sites' continuous quality improvement and fidelity monitoring processes, availability of administrative data for use in the analysis, and emerging findings from the formative evaluation regarding the extent to which the program was implemented with fidelity and that outcomes were improving.
- 3. Rigor of evidence that would result from the proposed design for the summative evaluation.** The potential credibility of the evidence from the proposed evaluation design was the third criterion. Only designs that would produce a credible, internally valid test of program effectiveness were considered for the summative evaluation.
- 4. Likelihood of detecting statistically significant favorable impacts.** The statistical power and likelihood of the study to detect any favorable impacts of the program was the fourth consideration. The combination of the sample size available, research design proposed, expected counterfactual condition, and expected magnitude of changes in outcomes based on the dosage and service contrast contributed to the assessment of an intervention's readiness for a summative evaluation.

Given the information presented from each site and feedback from experts, ACF and Mathematica recommended conducting a summative evaluation of one YARH-2 intervention, the Colorado Pathways to Success (Pathways) comprehensive service model. The Pathways model offers intensive, coach-like case management for youth and young adults in foster care. 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.)

Meeting participants expressed strong interest in this intervention and its target population for a summative evaluation. The experts felt that a summative evaluation that found statistically significant and favorable findings would create strong interest in expanding this intervention nationally. Notably, the proposed intervention could be used as a model for improving standard services provided through the Chafee Program in other states. Colorado's use of standard Chafee services as the counterfactual condition also provides for strong external validity. Participants noted that Colorado's well-documented comprehensive service model with robust continuous quality improvement and fidelity-monitoring protocols was a particular strength, and that its professional management teams is well-positioned to

expand services in a summative evaluation. Finally, the proposed evaluation design (described below) appeared well suited to produce credible and well-powered estimates of effectiveness.

C. Description of Pathways Comprehensive Service Model

The Pathways comprehensive service model engages youth and young adults in foster care through intensive, coach-like case management. Case managers (known as Navigators) use coaching strategies to develop a working alliance with the youth or young adult by listening to them, asking powerful questions, approaching them with curiosity instead of judgment, encouraging them, helping them set achievable goals, and respectfully holding them accountable. These strategies recognize that a lack of social supports and a history of trauma can create challenges with engagement and trust between youth and young adults and service providers.

The cornerstone of the intervention consists of a Navigator using a coach-like model of engagement to 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 for a full-time Navigator. This allows Navigators to provide intensive and consistent support to the youth and young adults on their caseload. Engaging the youth and young adults in a coach-like way is the core intervention of Pathways because it builds a framework of support through which Navigators administer all the other components. 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 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 process of setting goals might involve using a worksheet, or it might be structured as an informal interview about what a youth or young adult would like to achieve in order to transition to independent living. 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 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 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. Therefore, Navigators must be able to provide immediate resources for youth or young adults in need. Each Pathways site is given flexible funds, which can be used to provide immediate assistance to the youth or young adult when all other resources have been tapped and the youth or young adult has 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 in foster care 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 youths’ 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 (PRT/CRT). The PRT model was developed as a means of increasing legal permanency rates for older youth and young adults in foster care. It includes setting up a team of internal and external experts, developing permanency goals, brainstorming barriers to permanency, and developing an action plan. PRTs are standard practice in the county sites. The CRT is 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 PRTs and CRTs are not requirements of the Pathways model intervention, within some agencies they work as a natural support for the youth and young adults.

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II. Impact Study of Pathways

This study will be the first rigorous impact evaluation of Colorado’s Pathways comprehensive service model. The first section of this chapter describes the research questions for the impact evaluation, the expected comparison (counterfactual) condition that youth receiving Pathways will be compared with, and the main impact study design and analytic approach. The next section of the chapter describes an additional approach for using administrative data to estimate impacts, intended to supplement the main analysis. We conclude with a section that describes how we will present the findings for this impact study, answering all the study’s research questions in a series of impact study reports.

A. Research questions for the impact study

The Pathways impact study is designed to answer three broad research questions. Answering the first two research questions will provide information about the magnitude of the effect that Pathways has on participant outcomes for the full study sample and for key subgroups. Answering the third and final research question will provide 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 target population? Specifically, how do findings differ for the following:
 - a. Youth approaching age 17.5 who are able to decide to remain in foster care or leave foster care
 - b. Youth with varying foster care backgrounds (for example, age at entry, time in care, second-generation child welfare status, permanency status)
 - c. Youth by gender identity
 - d. Youth who have mental health or substance abuse challenges (potentially stemming from trauma)
 - e. Youth by race and ethnicity
 - f. Youth by sexual orientation
 - g. Youth by level of connectedness at program entry
 - h. Youth by the experience of the site implementing Pathways (for example, new implementers or seasoned implementers)
3. Do features of Pathways implementation influence youth outcomes?
 - a. Does level of adherence to the intended model (for example, dosage and duration of services) have a strong relationship with youth 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 outcomes?

B. Description of the comparison condition

Chapter I detailed the Pathways intervention condition. Here we describe the comparison condition and outline the implied effective contrast in services being tested. The business-as-usual condition for youth currently in foster care includes case management provided by a child welfare caseworker or a Chafee worker. Typical Chafee service provision in Colorado spans several categories and content areas. Colorado has indicated that, in most counties, it may cover legal permanency and lifelong connections, well-being, safe and stable housing, secondary educational attainment, postsecondary training and educational attainment, adequate employment, financial stability, and successful transition to adulthood from foster care. The array of services available in the comparison condition will vary across potential comparison sites. Some candidate comparison sites may offer mentorship models as a component of their service array.

The comparison condition differs from the intervention condition in several key ways. First, unlike a Pathways Navigator, the caseworker does not focus on coach-like engagement or on developing an alliance with the youth. Second, case management in the comparison condition is led by the caseworker rather than by the youth. For example, in the comparison condition, independent living plans may be filed away after development and not reviewed with the youth to ensure that their goals are achieved. Third, unlike the comparison caseworkers, who make standard referrals to other providers in the community, Pathways Navigators directly connect the youth to other providers to address their mental health, housing, education, and other specific needs. Finally, because the youth are expected to have less frequent contact with child welfare workers than they would with Navigators, referrals from child welfare workers may not be as well matched to the youth's goals. In addition, follow-up with youth about referrals may happen less frequently than it does in Pathways.¹

C. Main design for the impact study

1. Level at which treatment assignment varies

In the YARH-3 impact study of Pathways, treatment status will vary at the county level. Some counties will train their Chafee workers to be Pathways Navigators who will use coach-like strategies to engage with youth—these will be treatment counties, and all eligible youth in these counties will be exposed to Pathways. Other counties will not train their Chafee workers to be Pathways Navigators during the impact study; in those counties, youth will receive business-as-usual services. These will be the comparison counties for the purposes of the impact study.² A design in which county boundaries define the treatment condition for all youth within the county is a cluster design; because the counties are not randomized to a condition, this is a quasi-experimental design (QED).

¹ An increase in federal funding being provided to Colorado in 2021 through the Consolidated Appropriations Act, 2021, P.L. 116- 260, is unlikely to substantively affect the business-as-usual services provided in comparison counties. After discussions with Colorado about the potential uses of the new funds, we expect that it is possible that additional, light-touch services may be available to some youth in comparison counties, but that this should not make a large difference in the effective contrast being tested.

² We acknowledge the possibility that a Chafee worker trained in Pathways (a Navigator) may move and take up employment as a Chafee worker in a comparison county. In such a situation, the worker would likely provide aspects of Pathways, even though they would be considered a comparison group Chafee worker, potentially attenuating the observed impact estimates of program effectiveness. This situation will be addressed through a treatment-on-treated analysis, which is discussed in the analytic methods section later this chapter.

In practice, some of the small counties (serving only a handful of youth) participating in the study (notably, the small rural counties in the Northeast of Colorado) will have their youth served by Chafee workers from a neighboring county. This is because a single, larger county and its Chafee worker(s) serve as an implementation “hub” for adjacent counties with small numbers of youth in child welfare. In these situations, treatment assignment level is actually defined by the implementation hub rather than by county, and as such, clustering corrections will occur at the implementation hub level rather than by the county for youth in these small counties.

2. Assignment approach

Colorado began providing Pathways in five counties during YARH-2: Boulder, Denver, Logan, Morgan, and Washington. These counties were prioritized because Colorado wanted to implement in one urban site (Denver), one suburban site (Boulder), and one rural site (which was accomplished by working with a hub/collaborative that covered Logan, Morgan, and Washington counties). In addition, these sites were prioritized during YARH-2 because Colorado believed that these counties would be willing to (1) implement a new intervention and (2) potentially participate in a rigorous impact study. These counties will continue to serve as treatment counties under the YARH-3 impact study.

To enable a well-powered impact study, Colorado will (1) expand Pathways implementation into additional counties and (2) recruit a large number of well-matched counties to serve as a business-as-usual comparison group. A total of 21 counties will implement Pathways in the YARH-3 impact study, and 16 counties will serve as the comparison group.³

Colorado’s recruitment efforts aim to have these 37 counties participating in the impact study starting in summer 2021. Even if a subset of counties cannot begin Pathways or serve as a comparison site until after summer 2021, the study will still be able to produce a credible test of Pathways, although having fewer counties in the study would potentially limit the youth sample size.

The recruitment effort attempted to balance two goals: (1) identify treatment and comparison counties that are well matched in terms of background characteristics and the variables expected to influence youth outcomes (for example, a baseline assessment of the outcomes of interest), and (2) identify comparison counties that provide services substantively different from Pathways.

If the treatment and control groups are well matched at the outset of the intervention—that is, participants’ background characteristics are similar, as are the variables expected to influence youth outcomes—the study can credibly argue that any post-treatment differences in outcomes are attributable to the comprehensive service model being tested. Although a demonstration of equivalence at the start of an intervention is a necessary condition for a credible estimate of a program’s effectiveness, it is not sufficient for an unbiased estimate. A QED cannot provide evidence of equivalence on unmeasured characteristics. If the treatment and control counties differ systematically on an unmeasured variable (for example, willingness to implement a program like Pathways), then the observed impact estimate will confound the effect of Pathways with this unmeasured difference in willingness to implement the program. This issue is unlikely to be a problem, however, given the approach used to select treatment and comparison counties—demographic balance was a key consideration in the allocation of counties to a condition.

³ It is possible that additional counties may be added to the study over time. Due to newly available federal funds issued to Colorado in 2021, it may be possible to expand the study, and include additional Pathways or comparison counties in the evaluation. These changes would potentially bolster study power.

A second requirement for inclusion as a comparison county was that the business-as-usual services being offered to eligible youth had to be substantively different from what Pathways offers. For the study to detect a difference in youth outcomes across treatment and comparison groups, there must be a substantive difference in the experiences of the youth across conditions. If the comparison counties offer case management that closely resembles what Pathways offers, the effective contrast in service experiences would be minimal, leaving little opportunity for differences in outcomes to be observed. Counties were considered viable for the impact study only if the business-as-usual case management was not substantively similar to or stronger than Pathways in terms of dosage, intensity, and duration.

Table II.1 presents the proposed Pathways and comparison counties that will be included in the impact study. Table II.2 summarizes the average characteristics of youth receiving Chafee services in the proposed Pathways and comparison counties, compiled from available administrative data from the past year. Table II.3 summarizes the average characteristics of Pathways and comparison counties, drawn from census data and recent administrative data. This preliminary information suggests that the characteristics of youth in the potential Pathways and comparison counties will be relatively comparable on key demographic characteristics and on available proxies for key outcomes. We will conduct a more formal assessment of baseline equivalence for the evaluation, using the baseline survey and administrative data for the analytic sample to show the effectiveness of Pathways.

Table II.1. Pathways and comparison counties

Pathways counties (N = 21)	Comparison counties (N = 16)
Arapahoe ¹	Adams
<i>Boulder</i>	Archuleta ⁵
Broomfield	Cheyenne ⁶
Crowley ²	Clear Creek ⁷
Delta	Dolores ⁵
<i>Denver</i>	El Paso ⁶
Douglas ¹	Elbert ⁶
Huerfano ²	Garfield
Jackson ³	Gilpin ⁷
Kit Carson ⁴	Jefferson ⁷
Larimer ³	Kiowa ⁶
Lincoln ⁴	La Plata ⁵
<i>Logan</i> ⁴	Montezuma ⁵
Mesa	San Juan ⁵
Montrose	Teller ⁶
<i>Morgan</i> ⁴	Weld
Otero ²	
Phillips ⁴	
Pueblo ²	
Sedgewick ⁴	
<i>Washington</i> ⁴	

Note: YARH-2 implementation sites are in italics. Counties with the same superscript number (i.e., ^{1,2,3}) represent a single unit of assignment. There are 10 units of assignment for the Pathways condition, and 6 units of assignment for the comparison condition. The La Plata site will also serve youth from two tribal reservations.

Table II.2. Comparison of Pathways and comparison counties for youth receiving Chafee services

	Youth receiving Chafee services in Pathways counties (N = 401)	Youth receiving Chafee services in comparison counties (N = 354)
Race/ethnicity		
Hispanic or Latino	26.7%	30.8%
White	46.3%	42.1%
Black or African American	19.0%	15.0%
Other	8.1%	12.1%
Average age at intake	18.9	18.4
At least one parent with prior child welfare involvement	79.7%	72.5%

Source: 2018 Trails data for the state of Colorado.

Table II.3. Comparison of county characteristics, weighted by expected enrollment

	Pathways counties	Comparison counties
Poverty^a		
Total population in poverty	14.3%	10.8%
Children younger than age 18 in poverty	18.6%	13.8%
Students qualifying for free or reduced-price lunch	49.0%	39.8%
Urbanicity^b		
Large central or fringe metro	48.3%	37.9%
Medium or small metro	51.7%	60.7%
Nonmetropolitan	< 0.1%	1.3%
Population without health insurance^a	9.6%	9.1%
Proportion of homeless students^c	1.8%	1.7%
Proportion of youth receiving Chafee services^d	< .1%	< .1%

^a From U.S. Census 2017 ACS 5-Year Estimates (<https://data.census.gov/cedsci/>).

^b From NCHS Urban-Rural Classification Scheme for Counties (2013) (https://www.cdc.gov/nchs/data_access/urban_rural.htm).

^c From the Annie E. Casey Foundation Kids Count Data Center (2018) (<https://datacenter.kidscount.org>).

^d 2018 Trails data for the state of Colorado.

3. Enrollment into the sample

The Pathways Intervention Manual (Center for Policy Research 2019) describes the identification, recruitment, and enrollment processes for youth. It includes the Pathways Screening Assessment, which is used to identify risk factors for homelessness and to determine eligibility among youth ages 14 to 20 who are currently in foster care. A version of this screening assessment will be administered in the treatment and comparison counties to determine whether potentially eligible youth have at least one risk factor for homelessness.

For the purposes of the YARH-3 impact study, we will build on this Pathways eligibility screening process to identify potential sample members in both treatment and comparison counties. Chafee workers in treatment and comparison counties will be trained to conduct this screening assessment with all potentially eligible youth. The same instrument will be used in all participating counties, and the same approaches will be used by Chafee workers. This consistency in approach and instrumentation will help minimize the threat of differential screening results across conditions.

After screening, if youth are found to be eligible—that is, they are ages 14 to 20, currently in foster care, and have at least one risk factor for homelessness—they will be invited to participate in the impact study. Their assigned Chafee worker will describe the study opportunity and the benefits of participation and assure the youth that they will receive services even if they choose not to participate in the study. Among the key benefits to participation in the study are (1) being part of an important national effort to provide much-needed, current evidence on programs for youth in child welfare who are aging out of care, and (2) compensation for participating in the survey data collection. If the youth are interested in participating in the study, they will sign an assent or consent form and move to the first stage of data collection.⁴ If the youth decline to participate in the study—essentially refusing to participate in data collection, because the type of service is determined at the county level, not by the study—they will, as noted, continue to receive the services available in their county.

Although requiring consent for survey data collection has the potential to create sample loss (and possibly non-equivalence among the survey consenters across counties), conversations with the Colorado team lead us to expect that consent rates to enable survey data collection will be quite high (upward of 90 percent). In addition, we believe that we may be able to obtain administrative data elements from all youth in the county even if they do not consent to survey data collection (see the discussion below on outcome data collection), thus providing an opportunity to assess impacts among the entire study sample. After completion of the assent or consent form, the youth will be asked to complete the baseline survey assessment (administered electronically through a system developed by Mathematica). The start of service delivery will begin when the surveys are completed in both treatment and comparison counties. This enrollment, consent, and baseline data collection assignment process will be identical in all participating counties.

The number of youth who could be enrolled in this study is largely a function of (1) the number of youth that Chafee workers in the treatment and comparison counties are able to serve each month and (2) the length of the enrollment period. Colorado estimates, on the basis of three years of administrative data, that about 25 youth will enroll into Chafee services each month. Therefore, during the proposed 30-month study enrollment period (summer 2021 through December 2023), we expect about 750 youth will be screened for eligibility. Assuming that 85 percent of these youth are eligible for the study (based on information from the formative evaluation), and that 90 percent of them consent for survey data collection, the total enrollment sample size could be as high as 638 youth, with 574 youth consenting to survey data collection. As noted above, for the impact analysis of administrative data outcomes, we expect to include all 638 eligible youth.

4. Outcome data collection

A youth survey will enable the study to examine impacts across 10 outcome domains of interest. These include the 4 original outcome domains that the YARH programs were designed to influence: housing,

⁴For the purposes of this design, we assume that the child welfare agency will provide consent for all youth in state custody (rather than assuming that parental consent would be required if the youth is younger than 18).

permanent connections, education and employment, and social-emotional well-being. Mathematica consulted with OPRE, the Children’s Bureau, and a group of stakeholders (YARH-2 grantees) to identify 6 additional outcome domains that emerged as potentially important and relevant to policy at the start of the YARH-3 contract. A survey instrument to operationalize these constructs and domains has been developed for the impact study. All 10 domains will contain outcomes that will be used to test the effect of Pathways.

Table II.4 below summarizes the demographic and 10 outcome domains and the constructs that will be measured within each of the domains.

Table II.4. Survey domains and constructs 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
	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	

Domain	Construct
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

a. Survey data collection approaches

To achieve high response rates, Mathematica will use a multimode data collection approach coupled with incentives for survey participation. We have planned for the baseline survey to be administered to youth via the web, using smartphones or tablets provided by Mathematica. Mathematica will train program staff to administer the survey to youth on-site during their intake process. The follow-up surveys will be administered by using a multimode approach. Surveys will be administered via the web, with phone and field follow-up as needed. Between rounds of survey administration, we will contact youth via text every three months to obtain updated contact information. The periodic contact will also help to familiarize the youth with the study.

To help achieve high response rates at all survey data collection administrations, we will offer incentives similar to those approved by the Office of Management and Budget for previous studies on other hard-to-reach populations. The incentives include a \$35 gift card for youth who complete the baseline survey, along with a waterproof dry bag that contains our toll-free number and email address, where youth can provide updated contact information. We will also provide a \$40 gift card for the 6-month follow-up survey, a \$50 gift card for the 12-month follow-up survey, and a \$75 gift card for the 24-month follow-up survey.

b. Timing of the Colorado-specific data collection

Survey data on youth outcomes will be collected regularly to enable multiple snapshots of the program’s effects. The first data collection, at study entry (baseline), will describe the target population and allow for a demonstration of baseline equivalence (that is, an assessment that the selection process for comparison counties worked as intended). The second data collection period will take place about 6 months after baseline, halfway through the expected duration of Pathways. This period will represent an interim impact assessment and will enable the study to maintain contact with (and collect data from) youth in both the treatment and comparison conditions. The third data collection period, which will begin 12 months after baseline (the expected duration of the Pathways intervention), will serve as an immediate post-test for understanding Pathways’ effects. The fourth and final data collection period, to take place 24 months after enrollment, will capture long-term (12-month) follow-up data after the end of the program.

c. Use of administrative data as a supplemental data source

In addition to collecting survey data on the youth's outcomes, we will work with the Linked Information Network of Colorado (LINC) to obtain a large administrative dataset covering a variety of outcome domains for study participants. LINC data include child welfare records, records of public assistance (Temporary Assistance for Needy Families; Supplemental Nutrition Assistance Program; Special Supplemental Nutrition Program for Women, Infants, and Children), employment records (workforce training, unemployment insurance assistance), juvenile justice records, and some 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 these data sources available through LINC can be included in the Pathways impact study. These data, which are available in all participating treatment and comparison counties, will address several outcomes of interest, including participant safety, permanency, and service use.

We will ask LINC to identify study-eligible individuals in the treatment and comparison counties by linking identifying information collected at entry (name, date of birth, race, ethnicity, and so on) with comparable information in the administrative data sets. LINC can return all administrative implementation and outcome data records associated with treatment and control group study participants, which can be linked to the survey data via a YARH-3 study identifier.

These LINC administrative data will be used 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 some outcomes measured in the administrative data will not be captured in the survey 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 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.

5. Analytic methods for the main impact study design

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 county-level QED design, treatment youth will include all those enrolled in Pathways in treatment counties, and comparison youth will be those receiving Chafee services in carefully selected comparison counties (Table II.1). Given that the design uses counties as the unit of assignment, in all inferential analyses described below we will cluster standard errors at the county level.

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-like, or ITT-like, estimate) and the receipt of Pathways on a sample of youth with observed outcome data (the treatment-on-treated, or TOT, estimate). 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 in treatment counties, but only some youth 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 provide unbiased estimates of the effect of Pathways, provided that youth in the comparison and treatment groups are equivalent at baseline on all measurable characteristics expected to influence the outcomes, as well as on 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.

a. 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 across treatment and comparison counties, sample loss could cause youth originally located in treatment and comparison counties 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 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 who did not have missing baseline characteristics (or other covariates), referred to as a complete case analysis. However, to the extent that this decision could influence the findings, we will also plan on conducting a sensitivity analysis that utilizes all available data, by using multiple imputation or maximum likelihood estimation for all baseline equivalence and impact analyses.

b. 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 baseline equivalence of key baseline characteristics in the analytic sample used to estimate program impacts. These 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 observed that age at entry into the child welfare system was highly correlated with baseline social-emotional status and the literature showed this linkage, we would 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, and a joint F -test to assess joint significance across all baseline characteristics. In all of these analyses, we will cluster standard errors at the county 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 appropriately adjust 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.

c. 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 county level and our analyses will be conducted at the youth level, we will adjust the estimated standard errors for clustering in all models. This 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 provide unbiased estimates of two policy-relevant effects: (1) the impact of Pathways on the target population and (2) the impact of Pathways on program participants. The first estimates 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 assigned to the treatment group (that is, in a treatment county) who did not actually take up Pathways services. The second estimates the impact for youth who actually participate in Pathways—the TOT impact estimate—which is calculated by dividing the ITT impact by the proportion of youth who take up the program (Bloom 1984).

We will provide 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 terms of 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.

d. Bayesian interpretation of impact findings

To offer a more nuanced interpretation, we propose to 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 that say, for example, there is a 77 percent probability that Pathways has a favorable effect on participant outcomes—even if the inferential test shows that 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. This may include programs reviewed by the new 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 experts to select and identify the evidence most relevant to the Pathways program and its target audience. From a body of literature deemed to be appropriate by the expert panel, 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 the impact estimates 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).

e. Estimation model for Research Question 2 (subgroup analysis)

To examine whether Pathways is particularly effective for key subgroups of the target 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 we will potentially explore the intersection of two or more subgroups, such as race and sexual identity. 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.

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

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 will not establish a causal relationship between implementation components or features and impact findings, they will 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 will examine how the implementation of Pathways is related to outcomes. We will estimate this relationship by regressing each outcome of interest on the measures of implementation of Pathways, adjusting for baseline characteristics that are likely to influence the outcome. In other words, this model

will estimate whether youth 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 will start with the full set of implementation measures and use principal components analysis to identify a smaller set of implementation measures that capture much of the variability in implementation.

Second, we will examine which individual components of implementation have the strongest relationship with outcomes of interest. This approach will be comparable to the approach described above. However, instead of using implementation of Pathways as a single predictor variable of interest, we will decompose the implementation of Pathways into individual core components. We will 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 that youth choose and the services offered to meet those goals, and (3) financial assistance. After creating implementation measures for each of these key components, we will 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 will help us understand whether, for example, it was the case management or the financial assistance that had more influence on participant outcomes.

g. Sensitivity analyses

The foregoing discussion outlines the set of benchmark analytic decisions that we will use to estimate the effectiveness of Pathways on youth 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 provide ITT and TOT estimates, adjusting for a set of key covariates, by using a sample of youth 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 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 by using full information maximum likelihood as a single estimation procedure.

6. Power analysis: Sample size and minimum detectable impacts

One of the goals of the YARH-3 impact study is to detect statistically significant impacts on youth outcomes, assuming that the comprehensive service model being tested is truly effective. We calculated the minimum detectable impact (MDI) and the minimum detectable effect size (MDES) for the proposed study, assuming the goal is to have 80 percent power and a two-tailed hypothesis test with $\alpha = 0.05$.

We present MDIs and MDESs for two outcome categories: (1) a continuous outcome such as readiness for independence, based on ratings obtained from a survey; and (2) a dichotomous indicator of the incidence of an outcome, such as an episode of homelessness or a diagnosis of clinical depression, based on either survey or administrative data. See Table II.5 for examples of MDIs and MDESs for these two outcome measures at the immediate post-test and at the long-term follow-up.

a. Colorado inputs and MDIs

As inputs for this calculation, we assumed an expected sample enrollment of 638 youth, with 574 youth providing consent for survey data collection. Among these 574 youth, we expected an 80 percent response rate from baseline to the immediate post-test follow-up (an effective sample size of 459 youth). In addition, we expected a 70 percent response rate for the longer-term follow-up, for an effective sample of 402 youth. Therefore, we will primarily focus our power calculations on the immediate post-test estimates of program effectiveness at 12 months, because this will be our largest and most powerful test of the full dose of Pathways.

Focusing on the immediate post-test, the MDES is 0.27 standard deviations for continuous variables and 0.31 standard deviations for dichotomous outcomes. This means that for the impacts to be found statistically significant, in most cases the treatment group would need to have outcomes that are at least a quarter of a standard deviation better than the outcomes of the comparison group. For dichotomous outcomes, MDIs are 12 percentage points (PP) relative to a 20 percent (or 80 percent) comparison group prevalence rate, or 15 PP relative to a 40 percent (or 60 percent) comparison group prevalence rate. Stated another way, if 40 percent of the comparison group had an episode of homelessness, we would need the treatment group's prevalence rate to be 15 PP lower (that is, less than 25 percent of the youth in the treatment condition would have an episode of homelessness) in order for the study to show that the impact on homelessness prevalence was statistically significant.

Table II.5. Minimum detectable impact and effect size calculations for proposed QED of Pathways

	Immediate post-test (group assignment N = 16; response rate among youth with survey consent = 80%; effective sample size = 459 youth)		Long-term follow-up post-test (group assignment N = 16; response rate among youth with survey consent = 70%; effective sample size = 402 youth)	
	Continuous outcome	Binary outcome	Continuous outcome	Binary outcome
MDES	0.27	0.31	0.28	0.32
MDI for a 20/80% prevalence rate		12 PP		13 PP
MDI for a 40/60% prevalence rate		15 PP		16 PP

Note: For continuous outcomes, we assumed an individual-level R^2 of 0.40. For dichotomous outcomes, we assumed an individual-level R^2 of 0.15. These assumptions were based on a draft analysis of impact data from a cross-site evaluation of youth in the child welfare system whose parents or caregivers had a substance use disorder. We also assumed a group-level R^2 of 0.50 for outcomes in both categories and an intraclass correlation coefficient of 0.02 across counties or implementation hubs, as appropriate.

MDES = minimum detectable effect size; MDI = minimum detectable impact; PP = percentage points; QED = quasi-experimental design.

The MDIs that we present are appropriate for the TOT analyses, effectively comparing those who took up the program with those who did not take up the program. However, as acknowledged above, a subset of youth who will be offered Pathways will not take up the program—Colorado expects an 80 percent take-up rate among those who are offered the program during the impact study. This is comparable to the rate observed in the formative evaluation. In addition, the impact study will provide monetary incentives to all youth in the Pathways program to encourage participation in the study.

With an 80 percent take-up rate, it is possible to estimate ITT-like MDIs relative to the TOT MDIs. The ITT MDIs will be 1.25 times larger than the TOT MDI, using the Bloom (1984) adjustment. That is, by dividing the TOT MDI by the take-up rate (80 percent), the ITT MDI is equivalently 1.25 times that of the TOT MDI. These TOT impacts (an MDES of approximately one-quarter of a standard deviation and an MDI of at least 12 PP) are relatively large, but they are within the range of impacts found in comparable studies. However, the study may be underpowered to detect ITT impacts, given the noncompliance described above.

b. Effectiveness findings from comparable interventions

Few rigorous studies have evaluated the effectiveness of a coach-like, strength-based intervention for homeless youth or youth who are in or transitioning out of foster care (see Morton et al. 2020 for a systematic review of a broad set of interventions to address youth homelessness). We identified five studies with comparable service models and/or populations that we could use to anchor our estimates of MDI. Judging from our review of these studies, we believe that the proposed QED impact study of Pathways may be sufficiently powered to produce statistically significant effects for some but not all outcomes, if recruitment and response rate targets are achieved.

The first study, Power and colleagues (2012), examined the impact of TAKE CHARGE!, an intervention focused on coaching and mentorship for foster care youth to support them in applying self-determination

skills and achieving self-identified goals. The intervention, which was 12 months long on average, focused on youth between the ages of 16.5 and 17.5 who were in foster care and receiving special education services. The authors conducted a randomized controlled trial with 60 youth, including 31 youth in the comparison group who participated in the standard, state-provided, foster care independent living program. Across outcome measures of self-determination, quality of life, and utilization of transition services, we calculated program impacts ranging between 0.18 and 0.83 standard deviations, with an average effect size of 0.45. Descriptively, the authors also noted that 38 percent of the intervention group and 25 percent of the control group had graduated or obtained a GED (general equivalence diploma) at immediate post-test (a 13 PP difference). Despite the random assignment study design, youth in the intervention and control groups were quite dissimilar on a number of key baseline characteristics such as disability classification and length of time in foster care. Therefore, even with the relatively large effect sizes the authors observed, this study, with a sample size of only 60 youth, cannot provide definitive evidence that the Pathways study is sufficiently powered. The four other studies, discussed next, were better powered and potentially provide more credible evidence from randomized impact evaluations.

The second study, which had a larger sample (482 youth who were age 17 and in out-of-home care) and balanced intervention and control groups, was a two-year randomized impact evaluation of the Life Skills Training Program in Los Angeles County, California, by the U.S. Department of Health and Human Services, Administration for Children and Families (2008). The Life Skills Training Program included a five-week curriculum based on skills in a variety of areas, such as education, employment, and social interaction. It had an extensive outreach component and short-term case management, and it allowed youth to be served in their local communities. This short intervention may not be a reasonable comparison for the more intensive, yearlong Pathways program, but the internal validity of the findings helps address a limitation of the previous study. Many of the interpretable findings from this Los Angeles study focused on dichotomous outcomes, including whether the youth completed high school, enrolled in college, experienced homelessness, became pregnant, or obtained key documents (such as a Social Security card, driver's license, and so on). The magnitude of the observed impacts from these dichotomous impacts was never larger than 11.5 PP, and often was markedly lower. Given that the Pathways study is powered to detect impacts as small as 12 PP, depending on the prevalence of the outcome, this finding suggests that the Pathways study may not be as well powered for several dichotomous outcomes.

The third study, Valentine and colleagues (2015), evaluated the Transitional Living program, a nine-month independent living program designed to help 1,322 youth (ages 18 to 24, who had ever been in foster care) make the transition to adulthood. This is accomplished through intensive case management and counseling. The program is spearheaded by a transitional life specialist who meets with the youth weekly and supports them in setting goals in the areas of education, housing, life skills, and mental health. Youth with a history of trauma also received 12 to 20 weeks of cognitive behavioral therapy. After one year of service receipt, the authors observed statistically significant improvements in earnings, housing stability, and mental health—outcomes that are of interest to the Pathways program. There were no statistically significant impacts on education. The magnitude of these impacts (regardless of statistical significance), however, never exceeded 0.16 standard deviations or 6 PP—which suggests that the Pathways study may be well powered only for a small set of outcomes. Moreover, a fourth follow-up study indicates that the program did not have statistically significant impacts in the long term (after two years) on education, earnings, or criminal involvement (Skemer and Valentine 2016).

The final study evaluated changes in academic success, employment success, and healthy behaviors for at-risk youth ages 16–24 participating in a coach-like, case management program similar to Pathways (Theodos et al. 2016). The Promotor Pathway Program of the Latin American Youth Center (LAYC), which serves the Washington, D.C., and Maryland area, is an intensive case management program that helps at-risk youth ages 16–24 have a successful transition to adulthood. The program targets obstacles such as homelessness, lack of education, substance use disorder, and court involvement. Like Pathways, LAYC’s program is led by a caring “promotor” who provides mentorship, case management, and advocacy to youth with risk factors. Only youth with multiple risk factors—their housing situation, education, criminal justice involvement, and substance use disorder and mental health issues, for example—are eligible for the program. At the start of the program, youth complete a needs assessment which promoters use to develop a case plan. In accordance with youths’ needs, promoters can provide referrals to both internal and external services. Promoters, whose average caseload is about 11 youth, receive 30 hours of training per year. Promoters are expected to meet at least twice a month with their youth and must be available 24/7 by phone. Theodos and colleagues conducted an RCT to evaluate the program’s impact on 476 youth who participated in the program for 18 months. There were no statistically significant effects on receiving a high school diploma (or GED), attending college, or being employed (magnitudes that ranged from 1 to 5 PP). However, youth in the intervention group were 14 PP more likely to remain in school, 7 PP less likely to have a child, and 9 PP more likely to have a caring adult in their lives. There is also some evidence, at the 10 percent significance level, that youth in the intervention group were 6 PP less likely to sleep in a shelter. The program had an adverse impact on intervention youth’s likelihood of engaging in delinquent behavior (2 to 6 PP more likely get in fights or sell drugs). With impacts ranging from 2 to 14 PP, this study provides additional evidence suggesting that the proposed impact study of Pathways has sufficient power to detect some statistically significant impacts.

In sum, the proposed cluster-assignment QED study may be adequately powered for some outcomes, particularly for the TOT analyses. However, it may be insufficient for detecting impacts for dichotomous outcomes, and it is most likely insufficient for many ITT analyses. At the end of this chapter, we outline an option for a supplemental impact study design that we will conduct to address this potential limitation.

7. Timeline for the impact study

The impact study of Pathways will follow this timeline:

- **Preparation for data collection.** All system development—instrument development, survey programming, and pilot testing; site recruitment; training; and pre-testing, for example—is ongoing and will be completed by early 2021.
- **Enrollment.** Study enrollment will begin in summer 2021 and end in December 2023.
- **Outcome data collection.** Baseline survey data collection will begin in summer 2021; follow-up data collection will continue through December 2025 to enable all youth to complete a 24 month follow-up assessment.
- **Monitoring.** We will monitor sample enrollment and features of program delivery, including dosage delivered, duration and intensity of services provided in all participating sites. We will also regularly monitor survey data collection efforts to ensure that response rates are aligned with expectations. When necessary, we will intervene with sites when enrollment lags relative to expectations, or when service delivery is lacking, and may conduct more intensive outreach if necessary to achieve target

response rates. We will also actively monitor the effective contrast in services occurring across counties implementing Pathways and counties serving as control sites – this will include monitoring the amount of funding available in all counties, and different services being offered over time.

- **Analysis and reporting.** Beginning in summer 2022, the evaluation team will submit annual status reports summarizing the status of the study and presenting emerging and interim findings. The final report will be completed in summer 2026.

D. Additional analytic approach to complement the main 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, and other stakeholders. However, as noted, a potential limitation of the main impact study is that the study may not be well powered to detect program impacts on several outcomes of interest, unless the observed impacts are quite large. We will therefore conduct an additional impact study design that uses the administrative data sources to more fully 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 only provide evidence about the effect of Pathways on the subset of outcomes that are available in administrative data.

We will use a supplemental QED to estimate program impacts—a difference-in-differences matching strategy. The remainder of this chapter discusses analysis methods for this approach. This additional approach for estimating impacts will be presented as a separate, stand-alone study, given the different analytic approach, sample, and data sources to be used.

1. Data source

This analysis will use LINC administrative data. 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 noneligible youth will be added in the estimation strategy.

2. Difference-in-differences within a natural experiment

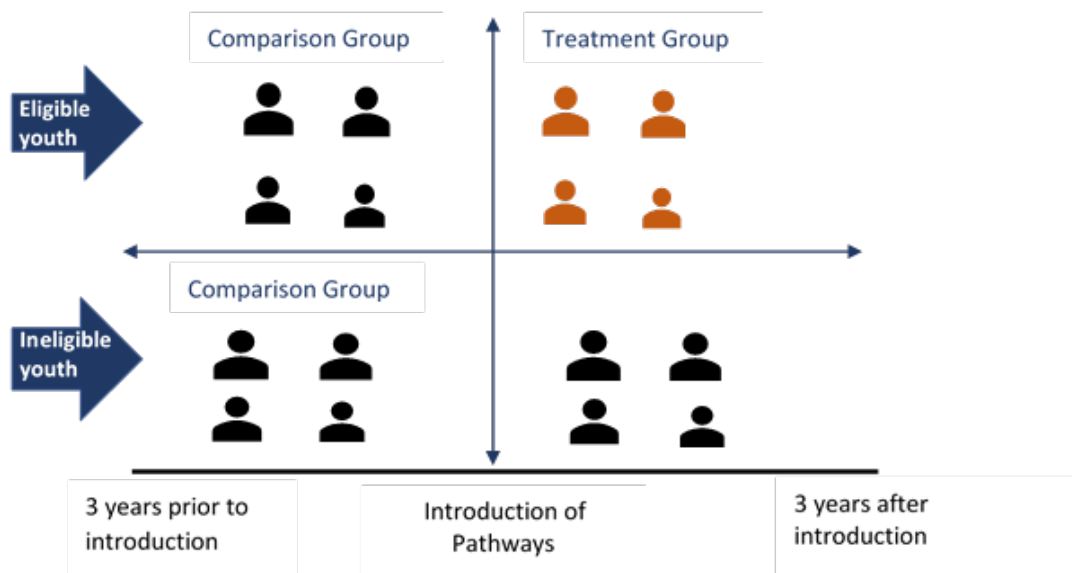
The timing of the introduction of Pathways in Colorado counties creates the appropriate circumstances for a natural experiment. Pathways was initially introduced in five counties in Colorado as part of the YARH-2 grant, in July 2016. We expect that Pathways will become available in additional expansion counties, starting in summer 2021 and continuing throughout the study period. Prior to these periods, the same youth did not have the chance to participate in Pathways. Because youth did not choose when Pathways would be introduced—analogue to an RCT in which youth cannot determine their treatment condition—the situation constitutes 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 than possible in the main impact design. We will use administrative data for three years before the introduction to Pathways in a given county and three years after the introduction.

We will use two comparison groups for this difference-in-differences analysis (see Exhibit II.1 below). The treatment group will be made up of Pathways-eligible individuals in participating counties in the period after Pathways introduction (upper right corner of Exhibit II.1). The first comparison group will

comprise comparable, potentially eligible youth in Colorado counties in the period prior to the introduction of Pathways (upper left corner of Exhibit II.1). We will use propensity score matching to identify youth in this pre-implementation period as potential comparison group members. We will first identify youth who are potentially eligible for Pathways during this period (that is, youth ages 14 to 20 in foster care with at least two risk factors for homelessness). Then we will estimate propensity scores to match youth in the treatment condition with one or more comparable youth 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 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. This comparison group will be ineligible youth in the pre- and post-Pathways introduction period (bottom two quadrants of Exhibit II.1). We will again use propensity score matching to identify comparable ineligible youth in the pre-Pathways period to the post-Pathways period, 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 who were both ineligible for Pathways and differ only in terms of the timing of Pathways' introduction.

Exhibit II.1. Treatment and comparison groups identified in a given Pathways county



To estimate the impacts, we will use a three-step approach common in difference-in-differences estimation. The first step estimates the differences in outcomes among eligible youth in the post-Pathways period relative to those for youth in the pre-Pathways period (the difference in the upper right quadrant relative to the upper left-hand quadrant in Exhibit II.1). This first difference would be the impact of Pathways, provided nothing else changed in treatment counties and in the environment of all youth when Pathways was introduced. However, this circumstance is unlikely, and such an estimate probably cannot be attributed solely to Pathways. To address this limitation, the second difference calculates the change in outcomes in the post-Pathways period relative to the pre-Pathways period among ineligible youth, 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 subtracts these two differences, the

change in outcomes for ineligible youth and the change for eligible youth. This will be the difference-in-differences estimate of the impact of Pathways on youth 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 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 in the post-Pathways period (ITT-like effect) and the impact among youth in the post-Pathways period who actually enroll in Pathways (TOT-like effect), because only a subset of eligible individuals in participating counties will actually be offered and 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.

E. Impact study reporting approach

Given the large number of impacts to be estimated in this impact study, it is important to specify a plan for reporting and interpreting these impact findings. The main study design includes three follow-up survey assessment points; ten outcome domains (with multiple outcomes of interest within each domain); a plan to estimate both ITT and TOT impacts in the main study approach (and to conduct impact analyses using a difference-in-difference technique); and analyses to explore the heterogeneity of impacts across key subgroups. A prespecified reporting approach to distill the key findings and summarize conclusions from this large number of impact estimates will enable a focused interpretation of findings and mitigate concerns with multiple hypothesis tests.

The first aspect of our proposed reporting approach is to separate findings by assessment period and analytic approach. We propose to write three separate study reports showing the impacts of Pathways after 6, 12, and 24 months of enrollment, using the survey and complementary administrative data associated with these assessment periods. These reports will summarize short-, medium-, and long-term impact findings, and constitute a first step toward limiting the number of hypothesis tests associated with a given dissemination product. We propose that the difference-in-differences analysis of the administrative data be a separate, stand-alone report. This latter report will use a different analytic sample, a different estimation technique, and a more limited number of outcomes, and therefore merits its own dissemination product (potentially targeting a more technical audience interested in how the impact findings vary according to different analytic approaches).

The second aspect of our approach is to prespecify a relatively small number of impact estimates as confirmatory tests of the effect of Pathways for each report. We will register this study and will prespecify these key outcomes in our registry. We will highlight those confirmatory tests in the main body of the report and use those test results to guide interpretation and conclusions about the effectiveness of Pathways. For the purposes of the impact study, we will use the full-sample, ITT analyses of one or two key outcomes per domain as the confirmatory tests.⁵ The results of this relatively small number of confirmatory hypothesis tests, along with the Bayesian interpretation of the findings, will guide the summary of the evidence of Pathways for a given report. We will integrate the information from both the

⁵ If there are multiple key outcomes of interest in a domain, and selecting one or two is infeasible, we will develop a composite outcome that pools information across all measures within the domain to be used as the confirmatory test.

traditional hypothesis tests and the Bayesian posterior probabilities associated with these tests when summarizing and interpreting the evidence for these confirmatory findings.

We will complement the reporting of the confirmatory tests by summarizing the TOT impact estimates and subgroup findings in the main body of each report. These findings will help illustrate the populations for whom Pathways appears to work best, and the extent to which program take-up influences results. We will also summarize in each report the results of the exploratory analyses for research question 3, which link features of implementation to participant outcomes. Importantly, we will not use nonconfirmatory results (the TOT or subgroup or exploratory findings linking implementation to outcomes) to draw conclusions about the effectiveness of Pathways, unless confirmatory tests corroborate the findings.

We will ensure a fully transparent presentation of all impact findings by including all nonconfirmatory test results in appendices to the reports. In doing so, each of the main reports will fully answer research questions 1, 2, and 3 for a given time period. However, the main body of the report, as well as the conclusions that guide interpretation for the report, will be based on the small set of confirmatory tests outlined above.

Throughout the development of reports, we will engage experts and stakeholders in conversation regarding dissemination planning and initial findings. Based on these discussions, our plans regarding reporting are subject to change to address dissemination needs in the field.

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