

CONNECTICUT YOUTH HOMELESSNESS SIMULATION MODEL

KEY DATA AND MODEL ASSUMPTIONS

Supplement to: Using a System Dynamics Simulation Model to Identify Leverage Points for Ending Youth Homelessness in Connecticut by Hirsch and Mosher

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Introduction

The structure and numbers in the Youth Homelessness Model came from extensive discussions with the Core Modeling and Data Team (CMDT), state government and other organizational data sources, and the youth homelessness literature. CMDT members represented a range of state agencies and non-profit organizations and, therefore, a diversity of perspectives on youth homelessness. Some members of the team had, themselves, experienced homelessness as young people. (See Appendix A for CMDT membership.) Importantly, the work was also informed by a previous phase that created a set of diagrams describing the factors and relationships that lead to youth homelessness and cause it to remain a serious problem. (Available online at: https://www.youthactionhub.org/wp-content/uploads/2018/05/CT-HY-SDM-Phase-1-Exec-Summary_Final.pdf.)

The first task in this phase was to articulate the flow structure that describes how minors and young adults become at risk for housing instability, encounter various degrees of housing instability (Unstable Housing, Experiencing Homelessness, and Repeated Homelessness), and resolve housing instability through various programs. The CMDT went through several drafts of proposed structural diagrams, called stock-and-flow diagrams in the language of System Dynamics, before settling on a final set that formed the “backbone” of the model.

The team then discussed the various causal factors that affect the flows of minors and young adults from one status to the next (e.g., from Young Adults At Risk of Housing Instability to Young Adults Unstably Housed) and the variety of interventions that could be used to prevent housing instability and respond to unstable housing and homelessness when it occurs. Additional insights came from the youth homelessness literature and the causal diagramming performed in the previous phase.

The next task was to quantify the relationships in the model so that it could be used to simulate the impact of various interventions, by themselves and in various combinations. There are several types of data and assumptions used to quantify the Youth Homelessness Model:

1. Initial populations in various statuses, called “stocks” in System Dynamics parlance. These come from various data sources or estimation procedures carried out by respected authorities. Some of these are further adjusted based on estimates derived from the Youth Homelessness literature, for example, dividing the initial population of homeless young adults into groups of those experiencing homelessness for the first time and those that endure repeated homelessness. These are presented in Table S1.
2. Assumptions based on the Youth Homelessness literature and discussions of our Core Management and Data Team that assign numerical values to concepts that the literature and discussions indicate are important in determining the causes and consequences of youth homelessness. Some of these numerical assumptions are not based on particular values derived from the literature as much as a sense of the relative strength of the causal relationships they represent. These are presented in Tables S2A-F.
3. An additional set of model parameters came from calibrating the model to produce what we believed was a reasonable baseline simulation, one that projects current trends and assumes no major new initiatives to prevent or remediate youth homelessness. We considered a number of trends in unstable housing and homelessness in youth, both locally and nationally. Some were growing, others declining. There was no definitive trend apparent. Therefore, we decided to settle on a baseline simulation that projected constant levels of unstable housing and homelessness for youth. The calibration process then consisted of calculating the fractions of minors and young adults flowing from one status to the next (e.g., from At Risk to Unstably Housed) over a given time period that would maintain (relatively) stable numbers in each status as the simulation progressed over a ten-year period. These are presented in Table S3. Table S3 also contains data derived from the CT CAN (Coordinated Access Network) Data Dashboards (ctcandata.org) on Temporary and Supportive Housing programs, the average lengths of time youth spend in those programs, and the fractions of various outcomes upon leaving those programs.
4. Assumptions about the impact of various interventions. These, again, were not based on single quantities derived from the literature since there were usually multiple studies that indicated different impacts. Instead, they were estimates based on a sense of the relative impacts suggested by multiple studies. These are described in the document “Intervention Descriptions” (Appendix B).

5. Data on the costs of homelessness and of various interventions to reduce homelessness taken from various studies and used to calculate social costs and program costs, both on a monthly and cumulative basis. These are presented in Table S4.

Simulating the Effects of Different Combinations of Interventions

In order to understand how different interventions have their effects, it is important to know how the model produces a simulation.

Step 1: The model begins with the initial values of people in various statuses in Table 1 (stocks—the rectangles in Appendix B’s diagrams) and calculates the numbers that will flow from one status to the next during the first month. Those rates of flow typically depend on a fraction in the first stock that would “normally” flow to the second each month (if nothing else changed) and a set of causal factors that raise or lower the fraction depending on what else is happening in the model. The causal factors affecting each rate of flow are cataloged in Table 2.

Step 2: The model updates the values of the stocks to reflect the flows in and out during the first month.

Step 3: New values of the stocks then become the basis for calculating flows that will then occur in the second month.

Step 4+: The model calculates values for the stocks each month for the 120 months covered by the simulation.

Causal Factors That Determine Rates of Flow from One Status to Another in the Youth Homelessness Model

Table S2A-F presents the causal factors that determine rates of flow from one status (stock) to another at each point in time in the Youth Homelessness Model. The way the table is arranged is that the rate of flow is listed first, followed by the factors that directly affect it, and, under each factor, its causes. The first causal factor is usually the “normal” or baseline fraction of people in the first stock flowing to the second each month if nothing else were to change. The other causal factors raise or lower the rate of flow depending on what is happening to those variables as the model progresses through a simulation, as described earlier. Quantitative data

and/or assumptions are listed for each variable and a third column shows the source of the data or assumption or sources supporting the selection of that variable as an important causal effect determining that particular rate of flow.

The values of some of the causal factors come directly from the youth homelessness literature

or calculations performed on data from the studies contained in the literature. Other variables are scales created to reflect changes in important causal factors. Some of these variables appear in multiple studies and selecting any one value did not make sense. Composite scales were developed to represent each of those variables’ general effects.

Table 2 Layout Explained

Flow	Without Intervention	Rate value/impact	Calculation details/source
Flow A	Normal (baseline) fraction, assuming no changes over time	*Normal rate value*	*Source of data*
	<i>With Intervention</i>	<i>Impact on Flow Rate</i>	<i>Source(s)</i>
	Intervention A	*How intervention A impacts the rate*	*Assumptions in model based on literature sources*
	Intervention B	*How intervention B impacts the rate*	*Assumptions in model based on literature sources*

Causal variables selected for the model were the ones that appeared most often in the literature and in CMDT discussions. The model is not meant to be a definitive catalog of all the causes and consequences of youth homelessness. There are many other important variables as well. Including too many others would have made the model overly complicated and difficult to communicate to stakeholders and policymakers. Many of those other variables move in the same direction as those included in the model. Reducing their prevalence or severity will reduce the risk and/or consequences of youth homelessness. The important insight to be

derived from the model is the nature of the impacts from intervening at particular points in the system. For example, preventive programs aimed at risk factors not included in the model will have overall effects similar to those that are included. This will mean extrapolating from the model's results to other programs that could also prevent or respond to youth homelessness.

Table S1: Initial Values of Statuses (Stocks) in the Model

Variable	Value	Source
Total Number of Minors 14-17	191,056	Connecticut State Data Center, Projections to 2015, http://ctdata.org/census/
Total Number of Young Adults 18-24	348,167	Connecticut State Data Center, Projections to 2015, http://ctdata.org/census/
Percentage Deemed at Risk for Unstable Housing and Homelessness ¹	17.7%	Adverse Childhood Experiences (ACES), Child Trends' National Survey of Children's Health 2011-2016, Turner et al: The Prevalence of Safe, Stable, Nurturing Relationships Among Children and Adolescents 2017 ² .
Minors Not at Risk	157,239	Percentage Deemed at Risk for Unstable Housing and Homelessness, CT State Data Center ³ .
Minors At Risk (At Home with Family)	33,817	Percentage Deemed at Risk for Unstable Housing and Homelessness, CT State Data Center ³ .
Young Adults Not At Risk	276,209	Percentage Deemed at Risk for Unstable Housing and Homelessness, CT State Data Center ³ .
Young Adults At Risk	59,404	Percentage Deemed at Risk for Unstable Housing and Homelessness, CT State Data Center ³ .
Minors at Risk in Systems of Care (SOC): Department of Children and Families	6,483	CT Department of Children and Families, Selected Facts Re: Adolescents Served by CT Department of Children and Families SFY15 – 19, Report Date 10/17/19 (includes active cases under Department supervision) (based on active cases having an assumed 5-month duration).
Minors at Risk in SOC: Juvenile Justice	1,997	Total derived from selected data reported by CT Department of Corrections SFY14-18 (received on 7/9/19) and by the Court Support Services Division (received on 10/25/19) (includes under supervision as well as incarcerated).
Young Adults At Risk in SOC: Department of Children and Families	634	CT Department of Children and Families, Selected Facts Re: Adolescents Served by CT Department of Children and Families SFY15 – 19, Report Date 10/17/19 (includes active cases under Department supervision).
Young Adults At Risk in SOC: Criminal Justice	3,331	Total derived from selected data reported by CT Department of Corrections SFY14-18 (received on 7/9/19) and by the Court Support Services Division (received on 10/25/19) (includes under supervision as well as incarcerated).
Young Adults At Risk in SOC: Department of Labor	1,658	Selected data reported by CT Department of Labor on the number of young adults (18-24 years old) served by Jobs First Employment Services (JFES) SFY15-19 (includes data on demographics, regions, average length of time in program, and % of young adults employed while participating in JFES).
Young Adults At Risk in SOC: Department of Mental Health and Addiction Services	343	Selected data reported by CT Department of Mental Health and Addiction Services - Young Adult Services (YAS).
Number of Minors 14-17 Unstably Housed (at any time on average)	2,308	Estimate developed by Dr. Stephen Adair, Central Connecticut State University, in conjunction with the 2019 Youth Count ⁴ .
Number of Minors 14-17 Experiencing Homelessness (")	245	Estimate developed by Dr. Stephen Adair, Central Connecticut State University, in conjunction with the 2019 Youth Count ⁴ .

Number of Young Adults 18-24 Unstably Housed (“)	4,320	Estimate developed by Dr. Stephen Adair, Central Connecticut State University, in conjunction with the 2019 Youth Count ⁴ .
Total Number of Young Adults 18-24 Experiencing Homelessness (“)	2,430	Estimate developed by Dr. Stephen Adair in conjunction with the 2019 Youth Count, ⁴ and 5.2% of young adults reported explicit homelessness in Chapin Hall Voices of Youth Count study ⁵ .
Percentage of Young Adults 18-24 Experiencing Homelessness Who Have Been Repeatedly Homeless	42%	Morton, M. H., Dworsky, A., Matjasko, J. L., Curry, S. R., Schlueter, D., Chávez, R., & Farrell, A. F. (2018). Prevalence and correlates of youth homelessness in the United States. <i>Journal of Adolescent Health</i> , 62(1), 14-21.
Young Adults Experiencing Homelessness for a Single Time	1,409	Percentage of Youth 18-24 Experiencing Homelessness Who Have Been Repeatedly Homeless ⁶ .
Young Adults Experiencing Repeated Episodes of Homelessness	1,021	Percentage of Youth 18-24 Experiencing Homelessness Who Have Been Repeatedly Homeless ⁶ .
Young Adults 18-24 in Supportive Housing	40	Connecticut Coordinated Access Network (CAN) Dashboard (ctcandata.org). Retrieved September 2019.
Young Adults 18-24 in Temporary Housing	215	Connecticut Coordinated Access Network (CAN) Dashboards September 2019. ⁷ Retrieved September 2019.
<p>Notes.</p> <ol style="list-style-type: none"> 1. This percentage enabled us to divide the populations of minors and young adults into those not at risk and those at risk of unstable housing and homelessness. 2. Defining “at risk for unstable housing and homelessness” is difficult since there are multiple risk factors, each has its own prevalence, and they overlap with each other. We looked for a single indicator that would serve as a surrogate and settled on Adverse Childhood Experiences (ACES). The connection between ACES and homelessness is supported by a number of citations from the literature. This percentage is based on the % of the youth population in Connecticut that had three or more Adverse Childhood Experiences (ACES), derived from Child Trends’ original analyses using data from the National Survey of Children’s Health, 2011-2016. A similar % of youth at risk is suggested by Turner et al: The Prevalence of Safe, Stable, Nurturing Relationships Among Children and Adolescents, 2017 based on an average percentage of youth scoring low on those three types of relationships. Support for the relationship between ACES and homelessness in, for example, Roos et al, Relationship Between Adverse Childhood Experiences and Homelessness, the Impact of Axis I and II Disorders, 2013. Sources include: (1) Roos, L. E., Mota, N., Afifi, T. O., Katz, L. Y., Distasio, J., & Sareen, J. (2013). Relationship between adverse childhood experiences and homelessness and the impact of axis I and II disorders. <i>American Journal of Public Health</i>, 103(S2), S275-S281. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3969113/; (2) Sacks, V., & Murphey, D. (2018). The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity. Child Trends. https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity; and (3) Turner, H. A., Merrick, M. T., Finkelhor, D., Hamby, S. L., Shattuck, A., & Henly, M. (2017). The Prevalence of Safe, Stable, Nurturing Relationships Among Children and Adolescents. US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention. https://pdfs.semanticscholar.org/4a27/1685d0ea76daf7efaa5629c8ad7b111fb682.pdf. 3. Calculations based on CT State Data Center and ACES sources: Applied 17.7% to the total numbers of minors and young adults in CT 4. Dr. Adair explains his methodology on Pages 79-84 in the report: Connecticut Counts: Annual Point-in-Time Count and Youth Outreach & Count (2019). Connecticut Coalition to End Homelessness. Available online at: https://cceh.org/wp-content/uploads/2019/06/PIT_2019.pdf. 		

5. To verify this estimate, we began by using the Chapin Hall, Voices of Youth Count Study finding that 5.2% of 18-24 year-olds experience homelessness at some point during a year to estimate that 17,450 18-24 year-olds in Connecticut are homeless at some point during the year. Adair's estimate of 2,430 would suggest that, at any point during the year, 14% are homeless. This is quite plausible, since the Chapin Hall study also found that 73% of all homeless episodes last longer than a month and 42% experience two or more episodes. Please see: (1) Morton, M. H., Dworsky, A., Matjasko, J. L., Curry, S. R., Schlueter, D., Chávez, R., & Farrell, A. F. (2018). Prevalence and correlates of youth homelessness in the United States. *Journal of Adolescent Health*, 62(1), 14-21; and (2) Morton, M. H., Dworsky, A., & Samuels, G. M. (2017). Missed opportunities: Youth homelessness in America. National estimates. Chicago, IL: Chapin Hall at the University of Chicago. <http://voicesofyouthcount.org/wpcontent/uploads/2017/11/VoYC-National-Estimates-Brief-Chapin-Hall-2017.pdf>.
6. The percentage of 42% from the Chapin Hall study was used to divide the Youth Experiencing Homelessness into two groups: Those experiencing it for a single time and those with repeated episodes of homelessness.
7. The initial value combines data for Rapid Rehousing (RRH) and Temporary Housing (TH) since both are time-limited; average occupancy is based on numbers served and lengths of stay.

Table S2A: Minors at Risk (Including in SOC's)

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors Becoming At Risk/Not At Risk	Baseline Fraction At Risk	17.7%	This is based on the % having 3+ ACES (Adverse Childhood Experiences) as an indicator of risk of homelessness (Table 1).
	Factor/Intervention(s)¹ Affecting Flow	Impact on Flow Rate	Source(s)
	Diagnostic and Behavioral Programs (Intervention)	Reduces Fraction At Risk by 20% when selected	These interventions address major predictors of youth homelessness such as lack of high school diploma or GED and pregnancy. For example: Lack of high school or GED (346% higher risk than peers); Unmarried with children of their own (200% higher risk); Annual household income of less than \$24K (162% higher risk). Nearly 1/3 had experiences with foster care and nearly half had been in juvenile detention, jail or prison. ¹
	School Counseling and Academic Support (Intervention)	Reduces Fraction At Risk by 20%	
	Family Mediation and Counseling (Intervention)	Reduces Fraction At Risk by 20%	
	Pregnancy Prevention (Intervention)	Reduce Fraction At Risk by 20%	
	Juvenile Justice Diversion (Intervention)	Reduces Fraction Entering JJ SOC's by 50%	
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors At Risk Becoming	Average Fraction of Minors At Risk Becoming Unstably Housed	9.0%	Calculated based on the ratio of Minors At Risk to Minors estimated to be unstably housed.

Unstably Housed or Homeless <i>A product of average fractions becoming unstably housed or homeless during a year and a Severity Effect based on the Average Time Minors Are At Risk.</i>	Average Fraction of Minors At Risk Becoming Homeless	0.4%	Calculated based on the ratio of Minors At Risk to Minors estimated to be homeless.
	Severity Effect on Minors Becoming Unstably Housed or Homeless	Multiplier going from 1 to 1.5 as the average time at risk goes from 12 to 72 months	Estimate Reviewed by Core Modeling and Data Team (CMDT)
	Average Time Minors Are at Risk (Months) (Not in an SOC)	18 Months	Calculated by dividing the Minors At Risk by the rate of new Minors becoming At Risk each month. Incoming rate includes those aging in at 14 who were previously at risk—14.2% with 3+ ACES in the next younger age group.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors At Risk Coming Under SOC Supervision	Fraction of Minors At Risk Coming Under SOC Supervision (per Month)	DCF: 5.0% JJ: 2.5%	Calculated separately for DCF and JJ (CSSD+DOC). Estimated based on the fraction required to maintain stable populations in those SOC's when the model produces baseline simulation.
	Average Time At Risk in an SOC (months)	9 Months	Calculated for each SOC (DCF and JJ) by dividing number of Minors in that SOC by the rate of new Minors entering the SOC per month. Minors entering an SOC includes those aging in who were in the SOC at a younger age, those At Risk who were stably housed and had not previously been in an SOC, and those Unstably Housed who come to the attention of the SOC.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Screening and Referral for At Risk Minors and Families (<i>Intervention</i>)	Increases flow by 20%	Intervention that increases flow to SOC's when selected, shortening the average time Minors are at risk without being in an SOC.
Flow(s)	Without Intervention	Flow Rate / Value	Calculation details / source
Minors Becoming Not At Risk After SOC Involvement	Fraction Becoming Not At Risk After Agency Involvement	20%	Calculation based on model calibration.
Minors Under SOC Supervision Aging Out to YA Programs	Fraction Out to YA Programs (Can Increase from 5% to 20% with Transition Planning Programs)	5%	Estimate based on literature indicating that transitions from SOC's, such as foster care and juvenile justice, are not well prepared for and managed, thereby increasing the risks of future homelessness. ²

Minors Under SOC Supervision Aging Out with No Follow Up	Fraction of Minors Under SOC Supervision Aging Out with Follow Up Programs	75%	Remaining fraction after subtracting fraction becoming not at risk after SOC and fraction aging out to YA programs.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Transition/Permanency Planning Programs (Intervention)	Assumed to increase fraction aging into YA programs from 5% to 20%	Estimate based on literature indicating that transitions from SOC's such as foster care and juvenile justice are not well prepared for and managed, thereby increasing the risks of future homelessness. ²
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors in SOC Becoming Unstably Housed or Homeless	Fraction of Minors in SOC Becoming Unstably Housed	4.0%	Calculated based on ratio of Minors At Risk in SOC's to estimates of Minors Unstably Housed.
	Fraction of Minors in SOC Becoming Homeless	0.3%	Calculated based on ratio of Minors At Risk in SOC's to Minors estimated to be homeless.
<p>Notes:</p> <p>(1) Morton, M. H., Dworsky, A., Matjasko, J. L., Curry, S. R., Schlueter, D., Chávez, R., & Farrell, A. F. (2018). Prevalence and correlates of youth homelessness in the United States. <i>Journal of Adolescent Health</i>, 62(1), 14-21</p> <p>(2) See for example Metraux, S, Roman, C, and Cho, R, (2007) Incarceration and Homelessness, National Symposium on Homelessness Research and Dworsky, A, Dillman, K, Dion, M, Borden, B, and Rosenau, M (2012) Housing for Youth Aging Out of Foster Care, Mathematica Policy Research</p>			

Table S2B: Young Adults at Risk (Including in SOC's)

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Young Adults (YA's) Becoming At Risk/Not At Risk Product of average fraction of YA's becoming at risk and the three multipliers listed below it that raise	Average Fraction of YA's Becoming At Risk	17.7%	YA's with 3+ ACES (same as Minors). A future refinement of the model could determine and use a higher % for YA's. This would not change the behavior of the model since other flows would be adjusted to produce simulations with the same estimated numbers of unstably housed and homeless YA's.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Pregnancy Prevention (Intervention)	Reduces Fraction At Risk by 20% when selected	Literature indicates there is a 200% greater risk of homelessness for unmarried YA's with children.

or lower the fraction and number at risk	Employment and Earning Potential of YA's (Intervention)	Multiplier going from 1.5 (increases fraction at risk by 50%) to 0.5 as an index of employment and earning potential goes from low to high.	The index is a product of the following three variables and one set of interventions.
	Remedial Education and Job Training (Intervention)	Increase YA Employment and Earning Potential by up to 50% if a sufficient number of new jobs are created.	Estimate reviewed by CMDT.
	Job Creation (Intervention)	Users can create up to 6,000 jobs to get the full effect of the Remedial Education and Job Training	Estimate reviewed by CMDT.
	Criminal Justice Diversion (Intervention)	Reduces the likelihood of Criminal Justice involvement and fraction entering CJ SOC by 50%; increases YA's Ability to Remain with Family by 25%	Estimate based on general sense from the literature and group discussions that trouble with the CJ system is an important cause of distress within families.
	Factors Affecting the Effectiveness of Interventions Above		
	Delayed Effect of Family Conflict on Minors' School Performance	Delayed effect of average time Minors are at risk: (1) Increases YA Employment and Earning Potential by 50% for relatively short average times that Minors are at risk; (2) Reduces YA Employment and Earning Potential by 50% for times at risk up to 72 months.	This effect can be increased by 20% if the intervention School Counseling and Academic Support is selected.
	Cumulative Effect of Conflict on Minors' Health and Development	Delayed effect of average time Minors are at risk reduces YA Employment and Earning Potential by 1/3 for average times at risk reaching 72 months.	Reflects health, mental health, substance abuse and abilities to relate to people and function independently.
	Likelihood of YA's CJ Involvement	Reduces YA Employment and Earning Potential by up to 50%	Factors that affect the Likelihood of YA's CJ involvement: <ul style="list-style-type: none"> The delayed effect of JJ involvement as a minor affecting the Likelihood of YAs CJ involvement can be reduced by 50% if the intervention Diversion Programs for YA's is selected.

			<ul style="list-style-type: none"> Likelihood of JJ involvement as a Minor is a function of the effect of Family Conflict on School Performance and can be reduced by 50% if the intervention Diversion Programs for Minors is selected.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Young Adults At Risk Becoming Unstably Housed or Homeless	Fraction of Young Adults At Risk Becoming Unstably Housed or Homeless	8.2%	Based on the ratio of Young Adults At Risk to YA's Unstably Housed or Homeless. This fraction can increase from 8.2% to 10% if the average cumulative time at risk (including time at risk as Minors) goes from 60 to 120 months.
	Factor/Intervention Affecting Flow	Impact on Flow Rate	Calculation details / source
	Young Adults Ability to Remain with Family	Can increase or decrease fraction of YA's becoming unstably housed by 50%	Impact depends on the following two factors listed below.
	Factors Affecting Young Adults Ability to Remain with Family		
	Delayed Effect of Severity of Family Conflict for Minors	Can 1/2 or double YA's Ability to Remain with Family	Impact depends on length of time Minors were at risk.
	Likelihood of YA's CJ involvement	Can 1/2 or double YA's Ability to Remain with Family	Impact depends on length of time Minors were at risk.
	Family Mediation and Counseling (<i>Intervention</i>)	Can increase YA's Ability to Remain with Family by 25%	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Young Adults' Entering SOC's	Initial Fraction of YA's At Risk Coming to the Attention of SOC's	10.0%	Estimate based on fraction necessary to maintain stable populations in SOC's. May be modified in the future when more complete data from the SOC's becomes available. The fraction of YA's at risk coming to the attention of SOC's changes based on the average severity of YA's risk, and an intervention that can increase the fraction entering SOC's.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source

	Average Severity of Risk for YA's	Can double the fraction of At Risk YA's entering an SOC as the average cumulative time at risk for YA's goes up to 96 months.	Average cumulative time is a weighted average that also reflects the fraction of YA's who had been at risk as Minors.
	Screening and Referral of YA's to SOC's <i>(Intervention)</i>	Increases the fraction of YA's entering an SOC by 50%	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Becoming Unstably Housed from SOC	Fraction of YA's Becoming Unstably Housed from SOC	20%	Based on ratio of Young Adults At Risk in SOC's to YA's unstably housed and greater likelihood of future housing instability of YA's leaving SOC's.
Becoming Homeless from SOC	Fraction of YA's Becoming Homeless from SOC	10–25%	Based on ratio of Young Adults at Risk in SOC's to homeless YA's and greater likelihood of future homelessness of YA's leaving SOC's. Varies by SOC.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Discharge Planning from YA SOC's <i>(Intervention)</i>	Can reduce the fraction of YA's leaving SOC's and becoming unstably housed or homeless by half.	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Becoming Stably Housed, Not At Risk After Leaving SOC	Average Fraction Becoming Not At Risk After Leaving SOC	30%	Estimate of fraction per year becoming not at risk over the course of a year.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Average Severity of Young Adults	Can reduce the fraction successfully leaving SOC's by half as average cumulative time at risk (including time as Minor) approaches 96 months.	Estimate reviewed by CMDT.

Table S2C: Minors Unstably Housed or Homeless

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Movement Between	Fraction of Minors Unstably Housed and	9.6%	Based on Dr. Adair's estimates of 245 homeless Minors and 2308 Minors who are unstably housed. (See footnote 4 on Table 1.)

Unstably Housed and Homeless	Homeless Who Are Literally Homeless		
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Effect of Cumulative Trauma Due to Homelessness	Can double the fraction of unstably housed and homeless Minors who are literally homeless as the average time Minors are homeless goes as high as 24 months.	Estimate reviewed by CMDT.
	Average Severity Effect of Minors At Risk	Can increase the fraction of Minors literally homeless by up to 50% as the average time Minors are at risk (before becoming unstably housed) goes up to 72 months.	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors At Risk Returning Home After Being Unstably Housed	Fraction of Minors Returning Home After Being Unstably Housed	20%	Calculated from model calibration.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Average Severity Effect on Minors Returning Home After Being Unstably Housed	Reduces the fraction returning home by up to a third as the average length of time unstably housed for Minors goes up to 24 months.	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors Unstably Housed Coming to the Attention of SOC's	Fraction of Unstably Housed Minors Coming to the Attention of SOC's	5%	Estimate reviewed by CMDT.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	SOC Outreach to Unstably Housed Minors (Intervention)	Increases the fraction of unstably housed Minors coming to the attention of SOC's by 50%	Estimate reviewed by CMDT.
Unstably Housed Minors Becoming Stably Housed	Fraction of Unstably Housed Minors Becoming Stably Housed	25%	Estimate. This is the percentage of unstably housed Minors who become stably housed while Minors, rather than aging out to become unstably housed Young Adults.

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Homeless Minors Becoming Stably Housed	Fraction of Homeless Minors Becoming Unstably Housed	67%	Estimate. Again, this is the percentage that become stably housed while Minors rather than aging out to become homeless Young Adults
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Outreach to Homeless Minors (Intervention)	The fraction of homeless Minors who become stably housed increases by 50% if this intervention is selected.	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Minors Moving Between Homelessness and Temporary Housing	Fraction of Homeless Minors Eligible for Each SOC's Temporary Housing	25%	Estimate. Awaiting more complete data from SOC's serving Minors that may provide temporary housing.
Minors Temporarily Housed Becoming Stably Housed	Fraction of Minors Temporarily Housed Becoming Stably Housed	55%	Estimate. Awaiting more complete data. The remaining percent leaving temporary housing are assumed to be without a permanent placement and again become unstably housed.

Table S2D: Young Adults Unstably Housed or Homeless

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Young Adults Moving Between Unstably Housed and Homeless	Fraction of All Unstably Housed Young Adults Who Become Homeless	36%	Denominator includes Unstably Housed and Homeless. This percentage is calculated based on Dr. Adair's estimates that there are 2430 homeless Young Adults and 4320 who are unstably housed. Chapin Hall Voices of Youth Count study found that close to two-thirds of homeless youth (13-25) also house-hopped, staying with friends/family.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Homeless Diversion Programs (Intervention)	Reduces the percentage of unstably housed Young Adults becoming homeless by 20% if this intervention is selected.	CT CAN Dashboard indicates that around 40% of attended appointments currently result in diversion.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source

Young Adults Becoming Repeatedly Homeless	Fraction of Homeless Young Adults Who Become Repeatedly Homeless	42%	Chapin Hall Voices of Youth study indicated that 42% of homeless youth experienced two or more episodes of homelessness.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Cumulative Trauma Due to Homelessness	A scale that can increase the fraction of homeless who become repeatedly homeless by up to double.	The impact depends on the three factors described below.
	Factors Affecting Cumulative Trauma Due to Homelessness		
	Effective Length of Time Homeless	Full doubling of the fraction experiencing repeated homelessness if the effective time homeless reaches 72 months.	The effective time homeless is the product of the actual average time homeless computed by the model and a cumulative trauma effect of previous unstable housing.
	Cumulative Trauma Due to Unstable Housing	The trauma of previously experiencing unstable housing will increase the effective length of time by up to double as the average length of time unstably housed reaches 72 months.	The assumption here is that cumulative trauma leading to repeated homelessness reflects the total duration of being unstably housed.
	Mental Health and Substance Abuse Services for Homeless Young Adults <i>(Intervention)</i>	This intervention will reduce the effect of cumulative trauma by half.	The Voices of Youth Count Follow Up Study indicated that 29% of youth experiencing homelessness had substance abuse problems and 69% had mental health problems.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Unstably Housed Young Adults Becoming Temporarily Housed	Fraction of Unstably Housed Young Adults Who Become Temporarily Housed	5%	Calculated based on data from CT CAN Program Performance Dashboards. Temporary housing includes both Rapid Rehousing and Transitional Housing.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Cumulative Trauma Due to Unstable Housing	Reduces the fraction of unstably housed Young Adults going to temporary housing by half as the average length of time unstably housed goes up to 72 months.	Estimate reviewed by CMDT.

	Capacity Effect of Temporary Housing <i>(Intervention)</i>	Reduces and eventually shuts down the flow to temporary housing if capacity is exceeded.	Comparing housing inventory data to actual utilization from the CAN Program Performance Dashboards (for people of all ages) suggests that capacity is currently a constraint. The model interface contains a “slider” that enables users to increase projected capacity.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Young Adults Returning to Unstable Housing After Temporary Housing	Fraction Returning to Unstable Housing After Temporary Housing	14%	Calculated from CT CAN Program Performance Dashboard for Rapid Rehousing and Transitional Housing.
Homeless Young Adults Becoming Temporarily Housed	Fraction of Homeless Young Adults Becoming Temporarily Housed	8.7%	Calculated from CT CAN Program Performance Dashboard for Rapid Rehousing and Transitional Housing.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Capacity Effect of Temporary Housing <i>(Intervention)</i>	Reduces and eventually shuts down the flow to temporary housing if capacity is exceeded.	Comparing housing inventory data to actual utilization from the CAN Program Performance Dashboards (for people of all ages) suggests that capacity is currently a constraint. The model interface contains a “slider” that enables users to increase projected capacity.
	Expanded Access to Emergency Shelters and Services <i>(Intervention)</i>	This intervention, operated by the user through a slider with a range from one to four, increases the access to temporary housing and other services.	The CT CAN Dashboard indicates that only 13% of completed CAN appointments result in “enrollment” while 41% are put on a waiting list. This intervention can shift those percentages so that more Young Adults are enrolled, but only if the user also creates sufficient additional temporary housing capacity.
	Outreach to Homeless Young Adults <i>(Intervention)</i>	This intervention, when selected, shortens the time a Young Adult is homeless by one-third.	Estimate reviewed by CMDT.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Repeatedly Homeless Young Adults Becoming	Fraction Getting Temporary Housing After Repeated Homelessness	8.7%	Calculated from CT CAN Program Performance Dashboard for Rapid Rehousing and Transitional Housing. Those data do not differentiate between repeatedly homeless and those homeless one time.

Temporarily Housed	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Capacity Effect of Temporary Housing (<i>Intervention</i>)	Reduces and eventually shuts down the flow to temporary housing if capacity is exceeded.	Comparing housing inventory data to actual utilization from the CAN Program Performance Dashboards (for people of all ages) suggests that capacity is currently a constraint. The model interface contains a “slider” that enables users to increase projected capacity.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Unstably Housed Young Adults Entering Supportive Housing	Fraction of Unstably Housed Young Adults Requiring Supportive Housing	1%–4%	This fraction varies from 1% to 4% as the Cumulative Trauma of Unstable Housing goes from its minimum to maximum value of two.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Cumulative Trauma of Unstable Housing	Reduces the fraction of YA entering Supportive Housing by half, due to the trauma making it more difficult to reach those who require Supportive Housing.	Cumulative trauma goes from 1 to 2 as the average length Young Adults are unstably housed goes up to 72 months.
	Capacity Effect of Supportive Housing (<i>Intervention</i>)	This effect will slow and then shut down the flow to Supportive Housing if capacity is exceeded.	Comparing the housing inventory to actual utilization (by all ages) from the CAN Program Performance Dashboard suggests that capacity is tight and Supportive Housing would have to be expanded to accommodate more Young Adults. Users have the option of using a slider to expand projected capacity.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Homeless Young Adults Entering Supportive Housing	Fraction of Homeless Young Adults Requiring Supportive Housing	2%–6%	This fraction varies from 2–6% as the Cumulative Trauma Due to Homelessness reaches its maximum value of 3.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Cumulative Trauma Due to Homelessness	Doubles the effective average length of time homeless.	This variable can go up to its maximum value of 3 as effective average time homeless goes up to 72 months. The effective average time homeless is the product of the average time homeless calculated by the model and the effect of the Cumulative Trauma Due to Unstable Housing (that may have preceded

			homelessness). The effective average time can also be reduced by up to half if the Mental Health and Substance Abuse Services for Homeless Young Adults intervention is selected.
	Capacity Effect of Supportive Housing <i>(Intervention)</i>	This effect will slow and then shut down the flow to Supportive Housing if capacity is exceeded.	Comparing the housing inventory to actual utilization (by all ages) from the CAN Program Performance Dashboard suggests that capacity is tight and Supportive Housing would have to be expanded to accommodate more Young Adults. Users have the option of using a slider to expand projected capacity.
	Outreach to Homeless Young Adults <i>(Intervention)</i>	Selecting this intervention will increase the flow of homeless Young Adults to Supportive Housing by 50%.	Estimate reviewed by CMDT
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Young Adults with Repeated Homelessness Entering Supportive Housing	Fraction of Homeless Young Adults Requiring Supportive Housing	2%–6%	This fraction varies from 2% to 6% as the Cumulative Trauma Due to Homelessness reaches its maximum value of three.
	<i>Factor/Intervention(s) Affecting Flow</i>	<i>Impact on Flow Rate</i>	<i>Calculation details / source</i>
	Cumulative Trauma Due to Homelessness	Doubles the effective average length of time homeless.	This variable can go up to its maximum value of 3 as the effective average time homeless goes up to 72 months. The effective average time homeless is the product of the average time homeless calculated by the model and the effect of the Cumulative Trauma Due to Unstable Housing (that may have preceded homelessness). The effective average time can also be reduced by up to half if the Mental Health and Substance Abuse Services for Homeless Young Adults intervention is selected.
	Capacity Effect of Supportive Housing <i>(Intervention)</i>	This effect will slow and then shut down the flow to Supportive Housing if capacity is exceeded.	Comparing the housing inventory to actual utilization (by all ages) from the CAN Program Performance Dashboard suggests that capacity is tight and Supportive Housing would have to be expanded to accommodate more Young Adults. Users have the

			option of using a slider to expand projected capacity.
	Outreach to Repeatedly Homeless Young Adults <i>(Intervention)</i>	Selecting this intervention will increase the flow of repeatedly homeless Young Adults to Supportive Housing by 50%.	Estimate reviewed by CMDT.

Table S2E: Formerly Homeless Stably Housed Minors

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Formerly Homeless Stably Housed Minors Aging Into Stable Housing as YA's	Fraction of Formerly Homeless Minors Aging Into Stable Housing as YAs	50%	Flow rate is an estimate which is based on phase 1 of SDM findings that highlighted this developmental period (18 years old) to be a critical period where instability is more likely to occur.
	Fraction of Formerly Homeless Minors Aging Into Unstable Housing as YAs	50%	Same as above.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Constrained by the available capacity for stable housing for YAs		

Table S2F: Formerly Homeless Stably Housed Young Adults

Flow	Without Intervention	Flow Rate / Value	Calculation details / source
3 separate flows: Young Adults Becoming Stably Housed after Housing Instability, Homelessness, and Repeated Homelessness	Fraction of Young Adults Becoming Stably Housed after Housing Instability, Homelessness, and Repeated Homelessness	47%	Flow rate calculated with equation that takes into account the fractions of populations that are unstably housed, homeless, repeatedly homeless, the capacity for stable housing and the time to become stably housed.
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Time to become stably housed after unstably housed, homeless or repeatedly homeless	9.67 months	Calculated from model calibration.

	Cumulative Trauma Due to Unstable Housing	Doubles the effective average length of time homeless.	This variable can go up to its maximum value of 3 as effective average time homeless goes up to 72 months. The effective average time homeless is the product of the average time homeless calculated by the model and the effect of the Cumulative Trauma Due to Unstable Housing (that may have preceded homelessness). The effective average time can also be reduced by up to half if the Mental Health and Substance Abuse Services for Homeless Young Adults intervention is selected.
Flow	Without Intervention	Flow Rate / Value	Calculation details / source
Formerly Homeless Stably Housed Young Adults Returning to Housing Instability	Fraction of Formerly Homeless YA Returning to Unstable Housing After Becoming Stably Housed	5% per year	Calculated from model calibration
	Factor/Intervention(s) Affecting Flow	Impact on Flow Rate	Calculation details / source
	Time to Revert to Unstable Housing	24 months	Based on tracking returns to homelessness/housing instability for two years.
	Strategies to Prevent Return to Instability (Intervention)	50% reduction in the 5% per year returning to housing instability	Estimate reviewed by CMDT.

Table S3: Flow Variables Developed by Model Calibration or from Data Dashboards

Variable	Value	Source
Percentage of Minors No Longer At-Risk After Being in System of Care (SOC)	20.0%	Calculated from model calibration
Percentage of Minors Leaving an SOC with Follow Up Programs	25.0%	Model calculation. This low a percentage supported by references such as Dworsky et al, Housing for Youth Aging Out of Foster Care: A Review of the Literature and Program Typology, 2016 and Metraux et al, Incarceration and Homelessness, 2007.
Percentage of At-Risk Minors Becoming Unstably Housed per Year	9.0%	Model calculation (calibration of the model determined that this would be the percentage to yield the right number of unstably housed minors.)
Percentage of At-Risk Minors Becoming Homeless per Year	0.4%	Model calculation (calibration of the model determined that this would be the percentage to yield the right number of homeless minors).

Percentage of At-Risk Minors Under SOC Supervision Becoming Unstably Housed per Year	4.0%	Calculated from model calibration.
Percentage of At-Risk Minors in SOC's Becoming Homeless per Year	0.3%	Calculated from model calibration.
Percentage of Young Adults Leaving an SOC No Longer at Risk per Year	15.0%	Calculated from model calibration.
Percentage of At-Risk Young Adults Becoming Unstably Housed per Year	7.5%	Calculated from model calibration.
Percentage of At-Risk Young Adults in SOC Programs Becoming Unstably Housed per Year	10.0%	Calculated from model calibration.
Percentage of At-Risk Young Adults in SOC Programs Becoming Homeless per Year	10.0%	Calculated from model calibration.
Percentage of Unstably Housed Young Adults Who Eventually Become Homeless	56.0%	Model calculation. Derived from Adair estimates of unstably housed and homeless young adults. Significant overlap of unstable housing and homelessness supported by Chapin Hall study which found that 72% of those who were homeless had also couch surfed.
Percentage of Homeless Young Adults Sheltered and/or Enrolled in Programs	11.4%	Connecticut Coordinated Access Network (CAN) Dashboard.
Percentage of Homeless Young Adults Going to Supportive Housing	1.6%	Connecticut Coordinated Access Network (CAN) Dashboard.
Percentage of Homeless Young Adults Going to Permanent Housing	43.0%	Connecticut Coordinated Access Network (CAN) Dashboard.
Percentage of Unstably Housed Young Adults Going to Temporary Housing	5.0%	Connecticut Coordinated Access Network (CAN) Dashboard.
Percentage of Young Adults Returning to Housing instability After Temporary Housing	14.0%	Connecticut Coordinated Access Network (CAN) Dashboard.
Percentage of Homeless Young Adults Going to Temporary Housing	8.7%	Connecticut Coordinated Access Network (CAN) Dashboard.
Percentage of Young Adults in Temporary Housing Going to Permanent Housing	79.0%	Connecticut Coordinated Access Network (CAN) Dashboard.

Table S4: Cost Data Used in the Youth Homelessness Model

Variable	Value	Source
Cost per Person per Year for Temporary Housing	\$10,560	The Family Options Study ¹ .

Cost per Person for Diversion Programs	\$1,500	Average of CECHI 2016 study, ² 2016 and FY 2013-2015 New London County study (CCEH) ³ .
Cost per Person in Emergency Shelters	\$20,392	CECHI 2016 study, ² average of 88 young adults in shelters based on CAN Dashboard data ⁴ .
Cost per Person per Year for Supportive Housing	\$19,710	Reaching Home Fact Sheet, 2019 ⁵ .
Social Cost of Homelessness per Person per Year	\$33,360	CECHI 2016 study ² .
Notes: (1) https://www.huduser.gov/portal/family_options_study.html (2) CECHI: Connecticut Estimating Costs of Child Homelessness Initiative. Presentation to Partnership for Strong Communities Policy iForum, April 26, 2016. http://www.pschohousing.org/files/CECHI_4_21_16-2final.pdf (3) Shelter Diversion for Homeless Families: New London County, Connecticut (FY2013-2015). Connecticut Coalition to End Homelessness Report. https://cceh.org/wp-content/uploads/2015/04/NL-Shelter-Diversion-Brief-FINAL.pdf (4) https://ctcandata.org/ (5) http://ww2.pschohousing.org/files/RH_SupportiveHousing.pdf		