

The Children's Data Network: Harnessing the scientific potential of linked administrative data to inform children's programs and policies

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Abstract

The Children's Data Network (CDN) is a data and research collaborative focused on the linkage and analysis of administrative records. In partnership with public agencies, philanthropic funders, affiliated researchers, and community stakeholders, we seek to generate knowledge and advance evidence-rich policies that improve the health, safety, and well-being of the children of California. Given our experience negotiating access to and working with existing administrative data (and importantly, data stewards), the CDN has demonstrated its ability to perform cost-effective and rigorous record linkage, answer time-sensitive policy- and program-related questions, and build the public sector's capacity to do the same. Owing to steadfast and generous infrastructure and project support, close collaboration with public partners, and strategic analyses and engagements, the CDN has promoted a person-level and longitudinal understanding of children and families in California and in so doing, informed policy and program development nationwide. We sincerely hope that our experience—and lessons learned—can advance and inform work in other fields and jurisdictions.

Keywords

linked administrative records; university-based data and research center; data integration; program and policy development

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Introduction

Background

Each year, governments, foundations, and private agencies across California invest significant resources in programs serving children and youth who experience adversities. Targeted interventions, community-based initiatives, federal and state public benefit systems, and other services together form a patchwork of formal and informal supports for vulnerable children and families. Key to the successful (and continued) operation of each constituent program is data collection. Although each program captures data concerning a given child's experience in a given timeframe, absent is information about that child's experiences and circumstances with other programs, agencies, or supports in the years before being served, outcomes in the years that follow, and data for similar children who were not served. Information contained in each discrete data system is, by design, at a system level—it is incomplete from the perspective of the child or youth.

The absence of child- and youth-focused data severely limits informed policy and program planning. It prevents an accurate assessment and weighting of root causes of child and youth outcomes, limits the identification of children who are at greatest risk and stand to benefit most from targeted services, and restricts our ability to track changes in youth outcomes over time. These challenges also complicate efforts to monitor the impact of policy changes and the effectiveness of program improvements, more equitably prioritise future service investments, and assess the robustness of the safety net overall.

The Children's Data Network

The Children's Data Network (CDN) was established to fill that gap. The CDN is a data and research collaborative focused on the linkage and analysis of administrative data concerning children and youth. In partnership with public agencies, philanthropic funders, affiliated researchers, and community stakeholders, we configure records in different agency "silos" longitudinally, at a child level, for entire cohorts of children born in California. The resulting population-based, cross-sector data to which we have access can be leveraged to better characterise the public service trajectories, experiences, and outcomes of California's children over time; develop applied and actionable research; support cost-effective program evaluations; and inform policy-relevant questions. Our goal is to generate knowledge about and advance evidence-rich policies and practice changes that improve the health, safety, and well-being of our children.

Originally the brainchild of First 5 Los Angeles, the CDN was established in 2014 at the University of Southern California Suzanne Dworak-Peck School of Social Work by co-principal investigators Dr. Jacquelyn McCroskey and Dr. Emily Putnam-Hornstein with a dual focus on children and families in Los Angeles County and the state of California. It was developed in partnership with the California Child Welfare Indicators Project at the University of California, Berkeley, where Dr. Putnam-Hornstein maintained a joint appointment and with whom the California Department of Social Services shared statewide child protection records, the foundational data in this venture. The

goal of the CDN was, as it is now, to build and maintain a "village well"—an environment for generating knowledge more efficiently about children and youth in California to be used for evidence-informed program and policy development (Figure 1).

Funding and data partners

The CDN operates in partnership with funding and data partners. The CDN receives generous infrastructure support from First 5 Los Angeles, the Conrad N. Hilton Foundation, and the Heising-Simons Foundation. We also receive strategic, project-specific support from First 5 commissions and organisations, private foundations, and state and federal entities (Table 1). To develop a child-centred, longitudinal understanding of health, well-being, public service interactions, and outcomes, we maintain active data-use agreements with a wide range of public agencies and partners at the state and county levels that serve—and thus, collect administrative information about—children, youth, and their families (Table 2).

Team

Our small team is diverse in terms of skills, geography, and professional experience. Specifically, some CDN team members have doctoral and master's degrees in social work, social welfare, public health, psychology, education, and computer and data science, whereas others have bachelor's degrees in fine arts, communications, business administration, accounting, biomedical engineering, neuroscience, and applied mathematics. Our team features tenured and tenure-track faculty members; associate, assistant, and research assistant professors; and administrative staff, including an executive director, chief operating officer, research programmers, data scientists, system and research administrators, and research associates; and a cadre of graduate and undergraduate student research assistants. The cross-disciplinary nature of our work necessitates the maintenance of a network of affiliated researchers. Beyond researchers whose primary appointment is with the University of Southern California, this network includes researchers at the University of North Carolina; University of California, Berkeley; University of California, Los Angeles; University of California, San Diego; California State University, Los Angeles; University of Pennsylvania; Pennsylvania State University; University of Washington; and Auckland University of Technology, in addition to researchers at other universities nationally and abroad [1] (Table 2).

Principal activities and approach

Our work can be distilled to three distinct yet interrelated activities: data analysis, record linkage, and technical assistance and capacity building. Each is critical to the mission of the CDN.

Analysis The CDN can be conceptualised as a large-scale, population-based longitudinal cohort project. Although diverse in their foci, methodology, and discipline, all CDN research projects aim to better elucidate the health, well-being, public service trajectories, and outcomes of California's children throughout their life course. We seek to rigorously,

Table 1: Children’s Data Network funding partners, by type

	Funding	
	Infrastructure	Project
First 5 Los Angeles	X	
Conrad N. Hilton Foundation	X	
Heising-Simons Foundation	X	X
First 5 Orange County		X
First 5 Center for Children’s Policy		X
Reissa Foundation		X
Bill and Melinda Gates Foundation		X
Robert Wood Johnson Foundation		X
Blue Shield of California Foundation		X
Annie E. Casey Foundation		X
Ralph M. Parsons Foundation		X
Silver Giving Foundation		X
Ballmer Group		X
Our Children Our Families Council of San Francisco		X
Laura and John Arnold Foundation		X
Administration for Children and Families’ Office of Planning Research and Evaluation		X
California Department of Social Services Office of Child Abuse Prevention		X

Table 2: Children’s Data Network data and research partners

First 5 Los Angeles
Conrad N. Hilton Foundation
Heising-Simons Foundation
First 5 Orange County
California Child Welfare Indicators Project at University of California, Berkeley
California Department of Corrections and Rehabilitation
California Department of Developmental Services
California Department of Education
California Department of Health Care Services
California Department of Justice
California Department of Public Health
California Department of Social Services
California’s California Department of Health Care Access and Information
California Department of Health and Human Services Agency
California Center for Data Insights and Innovation
Los Angeles County Chief Executive Office’s Service Integration Branch
Los Angeles Homeless Services Authority
Los Angeles County Department of Mental Health
Los Angeles County Department of Public Social Services
Los Angeles County Department of Children and Family Services
Los Angeles County Office of Child Protection
Los Angeles County Probation Department
San Francisco County’s Human Services Agency
Child Care Resource Center
Rady Children’s Hospital – San Diego
Antelope County Partners for Health
Auckland University of Technology Centre for Social Data Analytics
Actionable Intelligence for Social Policy
First 5 Association of California
Children’s Law Center
School of Criminal Justice & Criminalistics at California State University, Los Angeles
Mathematica

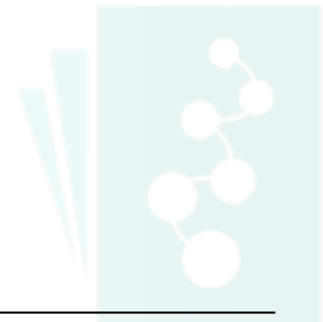
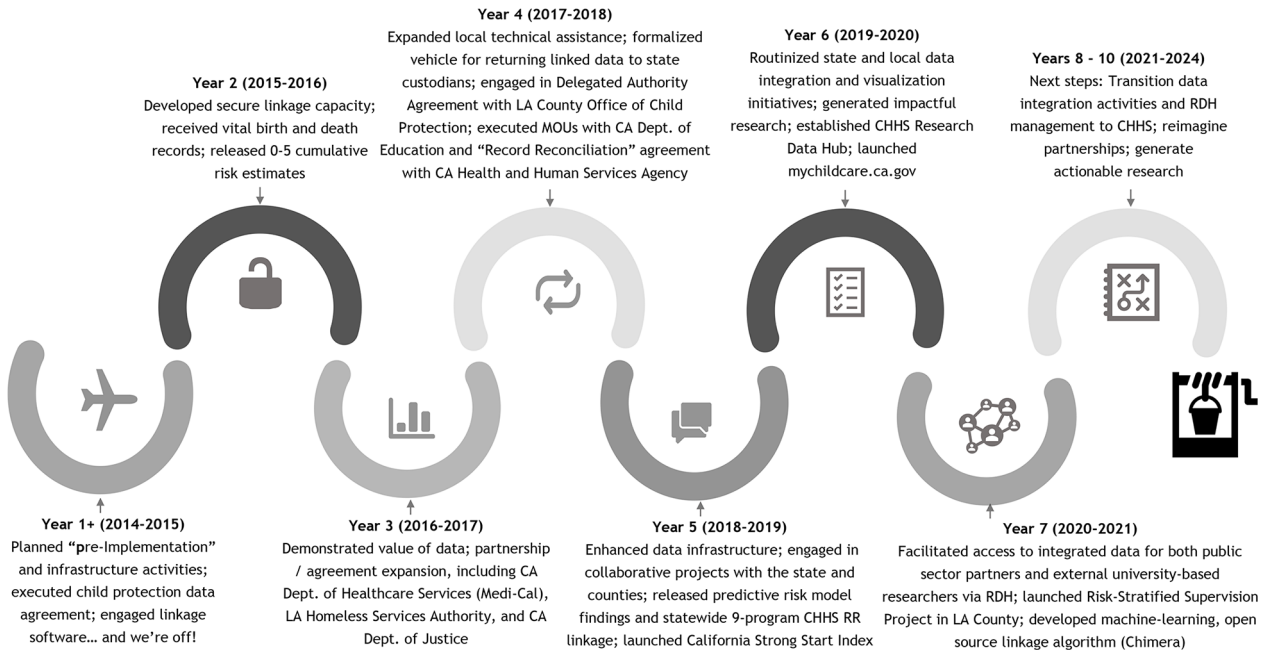


Figure 1: CDN milestones



quickly, and cost-effectively generate data for program and policy development. For that reason, we are strategic in our project selection and framing. Specifically, we gravitate toward projects that showcase the power and promise of linked administrative records to enhance services and supports for children and families. We welcome opportunities to support and monitor the resulting program improvement work of our government partners. We choose projects that would benefit from our unique analytic expertise and can leverage our existing linkage infrastructure to produce timely, actionable results. We also challenge ourselves to create research products in a variety of formats, each strategically crafted to make the results compelling, accurate, and policy relevant. CDN products run the gamut from academic articles, research briefs, visualisations, and standalone websites to videos, formal and informal convenings, short videos, and animations [2] (Table 3).

Linkage Flexible and continuous infrastructure support has allowed the CDN to invest heavily in the project’s technological capacity to efficiently, securely, and rigorously link and analyse administrative records—an investment that, although substantial, is foundational to its functioning. Linkage activities include securely onboarding, cleaning, and standardising administrative records for linkage and analysis; iteratively developing and refining data linkage algorithms for matching administrative records; maintaining a physically and technologically secure, non-networked and “air-gapped” server on which linkage of personally identifiable information occurs; maintaining a project server with private computing nodes designated for the CDN’s exclusive use; developing metadata documentation; and drafting technical documentation concerning data security and record linkages that inform other projects [3–5]. These practices not only mitigate risk of exposure of sensitive information, but also help ensure that data are used responsibly. Since its inception,

the CDN has committed to using only open-source software so that all code can be not only independently validated, but also shared with other research teams and public agencies for the express purpose of adoption and optimisation.

Technical assistance and capacity building Finally, the CDN engages in various and sustained relationship-building and infrastructure development activities relevant to enhancing the use and linkage of administrative data regarding children, youth, and families. Owing to our reputation as knowledgeable, resourceful, and engaged collaborators who are willing to get “in the trenches” to get things done, the CDN co-directors, executive director, and staff are embedded in state and county government. For example, Dr. Putnam-Hornstein was named the first California Health and Human Services (CalHHS) researcher-in-residence, and Dr. McCroskey is a commissioner for the Los Angeles County Commission on Children and Families. In addition, CDN representatives are consistent fixtures in myriad state and local workgroups, committees, and advisory boards, including the California Cradle-to-Career Data System Workgroup, CalHHS Agency Data Exchange (ADE) Workgroup, California Vital Statistics Advisory Committee, California Continuum of Care Reform Workgroup, Los Angeles County Office of Child Protection, Los Angeles County Families First Prevention Services Act Advisory Committee, Los Angeles County Youth Justice Reimagined, Los Angeles County Dual Status Youth Workgroup, Los Angeles County Office of Child Protection Permanency Workgroup, Los Angeles County Children’s Planning Council, Los Angeles County Policy Roundtable for Child Care and Development, and the Assembly Speaker’s Blue Ribbon Commission on Early Childhood Education.

Table 3: Children’s Data Network projects, by content area and product type

	Overview	Academic article	Research brief or memo	Slide deck	Interactive visualisation	Video, podcast animation	Blog	Stand-alone website
Statewide Public Service Data Integration <i>CalHHS Record Reconciliations and ADE</i>	[21]	[25] [27]	[3]	[29] [34] [35]	[24]	[36] [37] [38]	[39] [40] [41] [42] [43]	
Distribution of Assets at Birth <i>The California Strong Start Index: A Tool Developed to Inform and Monitor Program Investments and Policy Development for Children and Families in California</i>	[44]	[45]	[32]	[46]	[47] [48] [49] [50] [51]	[52] [53]	[41] [54] [55] [56] [57]	[22]
<i>Leveraging Birth Records to Examine Regional Differences in Births and Healthy Birth Indicators across L.A. County</i>	[58]		[59] [60] [61] [62]				[63] [64]	
<i>Neighborhood Poverty, Intergenerational Mobility, and Early Developmental Health in a Population Birth Cohort</i>		[184]						
Education and Child Protection <i>Exploring Resilience Among Vulnerable Students in California</i>	[65]	[185]						
<i>At the Intersection of Two Systems: Child Welfare and Early Care and Education in Los Angeles County</i>	[66]		[67]	[68]				
<i>Child Welfare Involvement Among Children in Subsidized Early Care and Education Programs</i>	[69]		[70] [71] [72]				[73]	
Intimate Partner Violence or Injury and Child Protection <i>An Exploration of Family Violence through the Lens of Linked Administrative Records</i>	[74]	[75]						
Suicide and Child Protection Involvement <i>Extending our Understanding of the Relationship between Adolescent Suicide and Child Protection System Involvement</i>	[76]	[77] [78]						
Child Injury or Death and Child Protection <i>Population-based, Birth Cohort Studies of Child Deaths Before Age 5</i>	[79]	[80] [81] [82]				[83] [84]	[85]	
Prenatal Substance Exposure and Child Protection <i>Prenatal Substance Exposure and Reporting of Child Maltreatment by Race and Ethnicity</i>	[86]	[87]	[88]	[89]			[90]	
<i>Prenatal Substance Exposure Diagnosed at Birth and Infant Involvement with Child Protective Services</i>	[91]	[92]						
Mental Health and Child Protection <i>An Analysis of Children’s Characteristics and Service Trajectories Using Linked Medi-Cal Data</i>	[93]			[94]				
<i>Maternal Mental Health Disorders and Reports to Child Protective Services: A Birth Cohort Study</i>	[95]	[96]						
Home Visiting and Child Protection <i>Better Characterizing Home Visiting Clients: A Proof-of-Concept Data Matching Project</i>	[97]		[98]					
<i>Helping Los Angeles County Chart a Course Toward Universal and Targeted Home Visiting</i>	[99]		[100]	[101]			[102]	
Homelessness and Child Protection <i>An Exploration into the Characteristics, Service Needs, and Child Protection Involvement of Families Accessing Services through the Los Angeles County Homeless Services Authority</i>	[103]	[104]	[105]	[106]			[16] [107]	

Continued

Table 3: Continued

	Overview	Academic article	Research brief or memo	Slide deck	Interactive visualisation	Video, podcast animation	Blog	Stand-alone website
<i>Child Protection Involvement Among Homeless Young Adults in San Francisco County</i>	[108]	[109]	[110]				[111]	
Justice and Child Protection <i>A Descriptive Analysis of the Maltreatment Histories of Youth and Young Adults Arrested in California</i>	[112]	[113]					[114]	
<i>Dually-Involved Youth: Investigating Intersections Between the Child Welfare and Juvenile Justice Systems in Los Angeles County</i>	[115]	[116]	[117]					
<i>Crossover Youth: Los Angeles County Probation Youth with Previous Referrals to Child Protective Services</i>	[118]	[119]	[120]	[121]		[122]	[123] [124]	
<i>A Population-Level Examination of Incarcerated Women and Mothers Before and After the California Public Safety Realignment Act</i>		[186]						
Risk Stratification in Child Protection <i>Los Angeles County Risk-Stratified Supervision Model</i>	[17]			[18]				
<i>Leveraging Hospital Records to Examine Child Maltreatment Risk</i>	[125]			[126]				
<i>Assessing Children's Risk Using Administrative Records: A Proof of Concept Predictive Risk Modeling (PRM) Project</i>	[127]	[128]	[129]	[130]			[131]	
<i>Injury and Mortality Among Children Identified as at High Risk of Maltreatment</i>		[132]						
Child Protection-Involved Populations <i>One Third of American Children are Investigated for Maltreatment by Age 18: A Convening to Discuss Implications for the Child Welfare System in Los Angeles</i>				[133]			[134]	
<i>Exploring Methods to Estimate the Community Incidence of Child Maltreatment</i>	[135]	[136] [137] [138]		[139]				
<i>Cumulative Risk of Child Protective Service Involvement before Age 5: A Population-Based Examination</i>	[140]		[140]					
<i>Transition Age Youth and the Child Protection System: Demographic and Case Characteristics</i>	[141]		[142] [143]					
<i>Disparities in Reported and Substantiated Infant Maltreatment by Maternal Hispanic Origin and Nativity: A Birth Cohort Study</i>	[144]	[145]						
<i>Black-White differences in child maltreatment reports and foster care placements: A statistical decomposition using linked administrative data</i>		[146]						
<i>Ethnic Disparities in Childhood Prevalence of Maltreatment: Evidence from a New Zealand Birth Cohort</i>		[147]						
<i>A Birth Cohort Study of Asian and Pacific Islander Children Reported for Abuse or Neglect by Maternal Nativity and Ethnic Origin</i>	[148]	[149]		[150]				
<i>Child Protective Services Involvement among Children of Mothers in Foster Care</i>	[151]	[152] [153] [154]					[155] [156]	
<i>California's Extension of Foster Care through Age 21: An Opportunity for Pregnancy Prevention and Parenting Support</i>	[157]	[158]	[159]					
<i>California's Most Vulnerable Parents: When Maltreated Children have Children</i>	[160]	[161] [162] [163] [164]	[165] [166] [167] [168] [169] [170] [171]			[172]		

Continued

Table 3: Continued

	Overview	Academic article	Research brief or memo	Slide deck	Interactive visualisation	Video, podcast animation	Blog	Stand-alone website
<i>Los Angeles County Family-Centered Services: Using Administrative Data to Understand the Landscape of Community-Based Child Welfare Supports</i>	[173]		[174] [175]					
<i>A Latent Class Analysis of Infants Reported for Maltreatment</i>	[176]		[177] [178]					
<i>Infants Remaining at Home after an Allegation of Maltreatment: A Five-Year Analysis of California and Los Angeles County Data</i>	[179]	[180]	[181] [182]					
<i>Correlates of Entry into Congregate Care among a Cohort of California Foster Youth</i>		[183]						
<i>Engaging Families in Voluntary Prevention Services to Reduce Future Child Abuse and Neglect: A Randomized Controlled Trial</i>		[187]						
Early Care and Education <i>MyChildCare.ca.gov</i>							[20] [39]	[19]

Noteworthy accomplishments

CDN data and technical assistance directly influences policy and practice. CDN data facilitated the enactment and implementation of state laws and legislative acts, namely, AB-82 and SB-85: The Emergency Child Care Bridge Program [6–8] and SB-528: Pregnant and Parenting Youth in Foster Care [9]. Several Los Angeles County Board of Supervisors motions and plans have cited CDN research, including the Foster Youth Pregnancy Prevention Plan [10], Dual Status Youth: Prevention and Coordinated Care Plan [11], Strengthening Home Visiting in Los Angeles County: A Plan to Improve Child, Family, and Community Well-Being [12], Paving the Road to Safety for Our Children: A Prevention Plan for Los Angeles County [13, 14], and Decarceration of Girls and Young Women: Addressing the Incarcerated Youth Population in the Los Angeles County Camps and Halls [15]. Organisations such as the Housing Authority of the City and County of Los Angeles have used CDN data to advocate for additional resources for their clients (e.g., family unification housing vouchers from the U.S. Department of Housing and Urban Development [16]).

Given our unique position as a partner to state and local government with deep experience working with and making meaning from linked administrative data, we also are frequently tapped to supply critically urgent assistance to solve real-world problems. For example, the CDN, in partnership with the Los Angeles County Department of Children and Family Services and analytic, philanthropic, and community partners, is working to support quality child protection investigations through the development of a pilot risk-stratified supervision model to be applied in the context of several associated management applications [17, 18]. In addition, in the early days of the COVID-19 pandemic, we collaborated with CalHHS and OpenLattice to operationalise and launch MyChildCare.ca.gov [19], a searchable, web-based interface that connects essential frontline workers across California to timely, accurate information about the availability of local childcare slots. Aside from helping California’s essential workers find childcare, the data also informed the equitable

allocation of \$50 million in support to local resource and referral agencies [20].

Two other accomplishments stand as illustrative examples of the CDN’s position as a valued data partner with expertise in California data and its direct and powerful impact on policy and practice: The CalHHS Record Reconciliations and ADE [21] and the California Strong Start Index [22].

CalHHS record reconciliations and ADE

Between 2016 and 2018, CalHHS collaborated with the CDN to develop the first “record reconciliation” that linked, organised, and analysed administrative, client-level records across major CalHHS programs. The first record reconciliation (2018) involved 2016 data from eight programs representing four CalHHS departments: the California departments of Health Care Services for Medi-Cal (California’s Medicaid program) and Family Planning, Access, Care, and Treatment; Developmental Services; Public Health for Women, Infants, and Children; and Social Services for CalFresh (or the Supplemental Nutrition Assistance Program), CalWORKs (or Temporary Assistance for Needy Families), child protection, and in-home supportive services. The second record reconciliation (2019) expanded this effort to 2015–2018 data from the same agencies and added the California Department of Public Health’s vital statistics birth and death records. The third reconciliation (2020) expanded the range from 2015 through 2019 and added emergency department, ambulatory surgery, and hospital discharge records from the California Department of Health Care Access and Information, and the fourth (2021) expanded the range through 2020 [3].

Resulting in the creation of encrypted cross-program linkage keys assigned to clients served by the largest programs administered by these departments, this data integration effort facilitates the exchange of statistical information concerning common clients as separately governed by the CalHHS Intra-Agency Global Data Sharing Agreement [23]. In addition, this effort allows CalHHS and the departments to more efficiently conduct cross-departmental data analyses and facilitates the construction of base files for display on the CalHHS Open Data

Dashboard [24], an effort that is essential to enhancing public-sector transparency. Data integration also helps CalHHS and the departments avoid inefficiencies that inevitably arise from ad hoc record linkage efforts. Additionally, this work advances rigorous evaluation and research reproducibility by facilitating the development of well-documented and routinised processes for inventorying, cleansing, standardising, and linking client-level records across programs and allows for the development of a strategy to organise CalHHS data into family or household units—a critical context for CalHHS clients and service experiences [25, 26]. But most importantly, this work supports CalHHS and departmental efforts to achieve better outcomes for all Californians through richer evaluation of policy options, improved stewardship of taxpayer dollars, and more coordinated design and delivery of public services [27].

CalHHS and its Center for Data Insights and Innovation leaders also collaborated with the CDN to develop a pilot research data hub, which later became known as the ADE, a secure sharing platform for hosting, organising, and analysing confidential data organised around clients rather than programs or systems. A natural outgrowth of the record reconciliation efforts, this secure analytic platform provides a cloud-based infrastructure for hosting restricted research, client-level datasets, and linkage keys generated by the record reconciliation efforts—information that can be accessed by analysts in CalHHS and university- or community-based researchers. The linkage keys generated by the agency-wide record reconciliations and ADE are currently being leveraged for both internal [28] and external [29, 30] research projects, but much of this work is currently being facilitated by the CDN. The goal, however, has always been for CalHHS, rather than the CDN, to lead these efforts. We are proud to report that as a result of intensive knowledge exchange and consistent and ongoing technical support, the Center for Data Insights and Innovation will assume full ownership of the operational technical infrastructure, linkage code, processes, and day-to-day operation of this organisational asset in 2022 and leverage the CDN's linkage algorithm developed and optimised using CalHHS administrative records. From our perspective, this transition is not only a validation of our work to support our public-sector partners to use integrated data to improve programs and policies, but also signifies a significant, internal, organisational achievement. The institutionalisation and operationalisation of data integration at CalHHS is a huge accomplishment for the CDN, state government, and Californians overall.

California strong start index

Nearly 500,000 infants are born each year in California. Ideally, each one would grow up healthy, in a nurturing family, and in the context of a safe and supportive community. The reality, however, is that the conditions into which children are born vary widely across families and communities in California. Research has shown that material, family, and community assets present at birth often lay the foundation for outcomes and experiences during childhood and beyond [31]. Therefore, communities with children who are born with fewer assets should, ideally, be prioritised for additional and intentional investment to ensure equity with their peers; a

straightforward index that could identify those communities is of great interest to those working on behalf of children in California.

The CDN, Heising-Simons Foundation, First 5 Association, and First 5 Center for Children's Policy collaborated to develop the California Strong Start Index, an innovative index that makes better use of data routinely collected at birth to summarise, in a standardised way, the assets that exist across and in California communities. Composed of 12 health, family, and financial indicators, the index offers a strengths-based, cost-effective, holistic, and validated [32] characterisation of the conditions into which newborns are born.

The index was developed as a tool to help identify communities that may be in greater need of additional investment so that supports and services can be allocated more equitably and earlier in children's lives. As such, we are proud that the index has been used to monitor disparities and community needs (California Governor's Office, California Department of Public Health, First 5 commissions, and the Los Angeles County Office of Child Protection); identify areas of highest priority for investment (First 5 Center for Children's Policy, Los Angeles County Child Care Planning Committee, and Office for the Advancement of Early Care and Education); identify resilient communities (First 5 Orange County); facilitate budgeting and strategic planning for universal home visiting allocations in the California state budget; validate and augment other community-level information (First 5 commissions and Advancement Project); and as a benchmark for impact (First 5 California Statewide Home Visiting Workforce Study) [33]. We also have worked with other states and jurisdictions that wish to develop their own local indexes—work that is imminently achievable given the standardisation of birth records nationally and could generate new insights through cross-state comparisons.

Discussion

The CDN is a highly regarded, fully functioning data and research collaborative. During the past eight years, the CDN has developed the single largest set of linked administrative records concerning children and youth in the United States and worked as an analytic and thought partner of state and local government, philanthropy, and the wider academic field. In so doing, we have achieved many of our organisational (and personal) goals and are excited for the next to come. The journey has been exciting, full of surprises and discoveries, and not always easy. We credit our initial successes, in large part, to the strategic investment of our visionary infrastructure funders and our deep engagement in public agency and policy spheres, but we also recognise challenges and risks to this approach.

Infrastructure support

The CDN receives infrastructure support from our generous funders. This type of support is more flexible than traditional deliverable-based grants and is absolutely crucial to our work. It funds the physical and technological infrastructure necessary for secure linkage and analysis. It allowed us to develop

and continually optimise our own open-source, machine-learning record linkage algorithm. It supports the time, travel, and supplies needed to facilitate technical assistance and strategic partnership with public agencies and policy makers. It covers the ongoing maintenance of legal agreements, research protocols, and grant administration. In short, infrastructure support ensures that the CDN is uniquely well-positioned to collaborate on data integration and analysis projects and quickly turn around policy-relevant projects.

Despite this ongoing—and substantial—investment, the increasing cost of university-maintained and secure office space and exponentially rising rate of technological obsolescence have necessitated the development of innovative strategies for infrastructure maintenance, including collaborating, cost-sharing, and exploring changes to the specifications and functionality of our computing environment to maintain current capacity for secure linkage and analysis. These challenges make infrastructure support grants even more valuable at a time when, unfortunately, they are seemingly becoming fewer and further between.

Integration in public agency and policy spheres

The CDN collaborates with state and county government agencies and governing bodies on a regular basis. We are represented in ongoing commissions, committees, and workgroups and provide expert input to program staff members and policy makers when asked. As such, we may be the only academics in the room for critical policy- and program-planning conversations. We credit our consistent engagement and integration in program and policy spheres to our belief in building lasting partnerships with government and allied program and policy experts. We have grown through providing technical assistance and learning from our program partners; understanding the historical, policy, and political contexts of decision making; and working closely with a broad range of partners. We remain committed to collaborative capacity building and therefore, prefer to work behind the scenes to get things done whenever possible. We strive to be trusted partners, with the goal of never overstepping, overpromising, competing, or duplicating efforts. We believe this collaborative, participatory, and humble approach has allowed us to garner key insights into the questions that need to be answered and thus, opportunities for our work to directly inform policy and practice.

This strategy, however, is heavily dependent on the strength and effectiveness of leadership to strategically communicate, carry out, and sustain this work. Data integration and analysis efforts can be complicated, time consuming, legally and logistically challenging, and politically fraught. We have found that our public-sector partners (by and large) are well equipped to face and overcome these challenges. They have been very effective leaders and communicators, adept at both the nuts and bolts of project facilitation and socialising the power and promise of administrative records. We recognise, though, that this may not always be the case. The CDN's success is heavily reliant on our ability to successfully navigate changing political tides, balance diverse stakeholder agendas, and empower our public-sector and policy partners to use our data responsibly, all of which require keen political sensitivity, empathy, humility, respect, unflin-

patience, and at times, pure grit. But just like our public-sector partners, we believe this work is important and are up for the challenge.

Conclusion

At the CDN, our goal is to actively harness the scientific potential of linked administrative data to inform children's programs and policies in partnership with the research, public sector, and funding communities. We are proud of our role in promoting a person-level and longitudinal understanding of children and families in California and in so doing, informing policy and program development in the United States and beyond.

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Declarations

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Statement on conflicts of interest

The authors do not have any conflicts of interest to report.

Ethics statement

The linkage and analysis of data reported in the current paper falls under protocols approved by California's Committee for the Protection of Human Subjects and the University of Southern California's Institutional Review Board.

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