



Improving Child Health and Healthcare Use Outcomes: How Risk and Resilience Intersect in Pediatric Care

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Abstract

More nuanced and comprehensive approaches are needed in preventive healthcare to have a larger impact on the social determinants of health that influence health and well-being over the life course. Using data from a nine-site study of pediatric health care innovations focused on screening, referring, and linking families of infants to services for social needs, we examined the clustering of risk and resilience reported by 888 parents at infant age birth to 6 months using latent profile analysis (LPA). We then examined how risk and resilience profiles were associated with children's health status and family unmet need for social supports 1 year later. The study was conducted in three states in 2018–2020 with recruitment in pediatric clinics serving low-income families. Results found four distinct family profiles of risk and resilience, and families in one profile (high household/relational risk and lower strengths) reported worse health outcomes compared to the low-risk, high strengths profile. Public benefits need—income assistance, health insurance, housing, and food assistance—at 1 year continued to be heightened among all groups compared with the low risk, high-strength group, highlighting the importance of screening for social needs early in life as risk and resilience profiles are predictive of future need. Study findings point to the need to include risk and resilience screening in the strategies used by pediatric healthcare to predict health outcomes and design preventive approaches.

Keywords Resilience · Risk · Healthcare · Social determinants of health

Introduction

Background

Social Determinants of Health in Childhood

The social conditions in which people live, or social determinants of health (SDoH; Sokol et al., 2019), have a strong influence on health starting early in life. Children living in families that lack steady employment, access to quality education, or are marginalized due to discriminatory or exclusionary policies, face increased exposure to environmental

stressors such as unsanitary living conditions, unsafe communities, and substandard housing (Artiga & Hinton, 2018; Hall & Greenman, 2013). As a result of these environmental exposures and adversities, children and families often see heightened physical health morbidity (e.g. heart disease and diabetes), premature death (Sokol et al., 2019; Artiga & Hinton, 2018), and behavioral issues (Rose-Jacobs et al., 2008; Zaslow et al., 2009). Without well-designed mechanisms to identify and address social challenges that families and children face as early as possible, health and development disparities compound across the life course (Andermann, 2016; Artiga & Hinson, 2018).

Family Risk and Resiliency

This well-established literature of the long-term impacts of social risk conditions contrasts with a paucity of studies that account for the role of resiliency in relation to SDoH and the effects these factors have on health outcomes. Resiliency encompasses the idea that people are able to heal and take charge of their lives despite trauma they endured and

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leverage those strengths to address SDoH (Walsh, 2016). This idea is underscored by the protective factors framework, introduced by the Center for the Study of Social Policy (n.d.) in 2003. The protective factors framework promotes family protective factors as a pathway to child and family well-being, particularly in the face of persistent environmental stressors. Protective factors comprising this framework include parental resilience, social connections, knowledge of parenting and child development, social and emotional competence of children, and concrete support. Furthermore, this framework is comprised of underlying perspectives, including two-generation approaches, the biology of stress, the strengths perspective, and cultural competence and humility (Harper Browne, 2016). By applying these principles in support of established protective factors, parents are more able to care for their children in ways that promote healthy development and well-being, thus demonstrating resilience.

Often times, protective factors that help buffer adversity play a major role in health outcomes, especially over time. Werner (2013) details a dozen longitudinal studies measuring risk and positive adaptation to risk among children experiencing many social risks in various regions of the USA. These studies demonstrate together that the balance between risk and resilience factors can shift over time and that developmental competence and consistent and supportive care increase likelihood of coping and positive adaptation later in life. However, only a few of these large-scale studies have investigated connections between health outcomes and resiliency. For example, the Kauai Longitudinal Study illustrates how individual sources of support and stress are linked from childhood to predict the quality of one's ability to adapt to stress in adulthood (Werner & Smith, 2001). Specifically, when measuring outside sources of support and risk and individual dispositions in response to stress, those who were successful as adults relied on sources of support within their family and community. The Minnesota Mother–Child Project followed low-income women and their first-born child from the last trimester through 25-years, finding that an early history of parental positive adaptation and supportive care is an enduring influence in a child's life and increases the likelihood that they will access formal and informal sources of support (Sroufe et al., 2005; Yates et al., 2003). The ability to reach out for help and find support to work through hardship increased competency and decreased the number of stressful life events participants encountered throughout the rest of their lives (Sroufe et al., 2005; Yates et al., 2003).

What is not well-documented are the sources of resiliency and how resilience interacts with adversity to determine health outcomes, which has implications for the healthcare field since pediatric primary care encounters are often universal and multi-generational touchpoints for families with young children. Ensuring that pediatric healthcare is inclusive of SDoH screening for social needs

ensures supports that may contribute to risk and resilience are identified and offered before events escalate to crises, mitigating risks associated with SDoH. Increased screening can bolster family resilience and mitigate stress by increasing the likelihood that a family will access services that are beneficial for child health and development (East, 2018; Hill et al., 2019; Hoynes et al., 2016).

The field of pediatric healthcare increasingly recognizes the imperative to screen, intervene, and refer in areas not traditionally considered “healthcare” for families. For example, the Safe Environment for Every Kid (SEEK) model (Dubowitz, 2009) is a universal intervention delivered through pediatric primary care that identifies psychosocial risk factors, including parental depression and stress, substance use, intimate partner violence, food insecurity, and harsh punishment. However, providers are not universally trained and prepared to address behavioral health and other environmental factors, and systemic barriers such as time and payment eligibility can impede uptake of healthcare innovations such as these (Sala-Hamrick et al., 2021). And despite gains in this area, instruments and models such as the SEEK do not measure components of resilience – only risk.

Research Aims

In this study, we investigate whether parent experiences of environmental and psychological risk and resilience are predictive of child and family outcomes. Specifically, we hypothesized that distinct profiles would emerge from the data, characterizing family experiences of risk and resilience, and that the profiles would be associated with public benefit need and receipt, healthcare utilization, and child health. We further hypothesized that differential outcomes would demonstrate that family experiences characterized by protective factors supporting resiliency in the face of environmental stressors would be associated with more positive long-term health and well-being outcomes than those characterized by complex stress and few protective factors. We used LPA, a person-centered analytic approach, to account for heterogeneity in family experiences of risk and resilience as described by the protective factors framework (CSSP, n.d.), recognizing that concurrent resilience characteristics may enable families to cope with even high levels of challenging life circumstances. In addition to expanding our understanding of how risk and resilience influence parents' help-seeking for their infants in the first year of life, this study also has implications for understanding the important role primary care clinics can play to mitigate adversity and promote family strengths by engaging intentionally in prevention-based practices that build resilience to SDoH.

Methods

Procedures

Families in this study were recruited from nine pediatric clinics in three US states: Vermont, Florida, and California. Clinics were recruited to the study because they implemented a pediatric healthcare innovation focused on screening and referring families to address social needs and included Federally Qualified Health Centers (FQHC), patient-centered medical homes, pediatric clinics, and family practices. See NORC (2020) for an in-depth description of participating clinic sites. Eligibility criteria included: (1) having a child age birth through six months, (2) receiving pediatric services for the child at the clinic, (3) caregiver age 18 years or older, and (4) English, Spanish, or Haitian Creole as the caregiver's primary language. We recruited and interviewed caregivers from February 2018 through January 2020. Families were approached during well-child appointments for participation by trained field interviewers who were bilingual, bicultural, and local to the study communities. All field interviewers were employees of the research institution and embedded within their assigned clinics according to the preferences and needs of the practice to streamline the process and minimize disruption for families, staff, and clinic business (Garza, Brown, & Finno-Velasquez, 2022). While some field interviewers received warm handoffs where medical staff introduced parents to interviewers through the course of their activities during the medical appointment, others approached families in clinic waiting rooms to offer the opportunity for study participation. We collected three waves of survey data: baseline (infant 0–6 months), midpoint (infant 7–11 months), and final (infant 12–15 months). Our analyses use data from baseline and final interview waves only.

Sample

Of the 908 families who consented to the study, 888 (97.7%) completed the baseline survey and were included in the LPA analysis. For outcomes analyses, we included families who completed all three survey waves. We achieved high follow-up retention with 752 families (85% of baseline sample) completing the survey at midpoint; of those, 653 families (73.5% of baseline sample) completed the final survey. Attrition analyses of missing data trends revealed that missingness on housing variables during the baseline timepoint was predictive of missingness in future waves – likely a product of housing instability leading to study dropout. However, no significant differences in attrition by demographics or by clinic location emerged. Families reporting Latino ethnicity were somewhat more likely to be retained

in the sample over time in comparison to White participants; however this difference was not significant. The sample was largely Latino (69.7%) and mothers (97%), with an average family size of five. On average, annual household income was \$39,083, with variability across sites.

Measures

Demographic Measures

Demographic indicators included age, race, ethnicity, employment status, and relationship status, income, proxies for acculturation (nativity to the USA and years spent in the USA), and a dichotomous indicator of family participation in health care innovation.

Resilience Measures

Connor Davidson Resilience Scale (CD-RISC) The CD-RISC (Connor & Davidson, 2003) is a 25-item measure of resilience widely used across service systems and populations with established test–retest and internal consistency reliability and convergent and divergent validity with many established measures (Connor & Davidson, 2015).

Healthy Families Parenting Inventory–Mobilizing Resources Subscale (HFPI-MR) The mobilizing resources subscale of the HFPI (LeCroy & Milligan Associates Inc., 2004) captures parents' ability to identify and access community resources using a 5-item Likert scale. The full HFPI, a 63-item measure of 9 parenting domains, has well-established psychometric properties, including construct and internal consistency reliability and evidence of sensitivity to change (Krysiak & Lecroy, 2012).

Pearlin Mastery Scale (PMS) The PMS (Pearlin & Schooler, 1978) is a 7-item Likert self-report scale assessing individual mastery. Mastery is conceptualized as the extent to which individuals perceive their life as under their own control and is a protective factor in relation to persistent stress (Pudrovska et al., 2005). This scale has established internal consistency and test–retest reliability and correlations with other scales and variables (Pearlin et al., 1981; Turner & Noh, 1988).

DULCE Social Connectedness (DULCE) The DULCE Social Connectedness Scale (Sege et al., 2015) consists of two dichotomous items assessing caregiver social support, specifically whether caregivers have people to: (1) call on in the case of emergency to help care for their baby; (2) comfortably leave their baby with for a short time when needed. Responses fewer than three are considered lacking social support. Psychometric properties of the scale were not previously established.

Risk Measures

Housing Insecurity Scale (HIS) The Housing Insecurity Scale is a 23-item scale compiled from two existing measures (Fauth et al., 2004; Rollins et al., 2012) for this study to provide a comprehensive measure of key aspects of housing insecurity, including: housing quality (HQS), housing instability (HII), neighborhood disorder (NDS), and neighborhood danger (NDAN). In pilot and follow-up psychometric tests, the HIS and individual subscales demonstrated initial evidence of reliability and construct validity. For this analysis, we used HIS subscales (HII, HQS, NDS, and NDANS) to parse the various components of family living environments.

Functional Impact of Toxic Stress on Parents (FITS-P) The FITS-P (Moreno et al., 2021) is a four-item binary self-report scale developed for this study to assess caregiver functional impact resulting from exposure to stress. Pilot and study psychometric tests demonstrated initial evidence of construct validity and reliability.

Safe Environment for Every Kid (SEEK) The SEEK is a 14-item dichotomous parent-report screening tool designed for pediatric health care to identify family psychosocial risk factors such as food insecurity; feeling down, depressed, hopeless, or fear of domestic partner (Dubowitz et al., 2009). The SEEK has been validated among pediatric populations (Dubowitz et al., 2007).

Adapted National Survey of Children's Health We used select items from the National Survey of Children's Health to measure family service needs and healthcare utilization (Blumberg et al., 2012). Families indicated (yes/no) whether they needed five social welfare services in the past 12 months: (1) cash assistance from temporary assistance for needy families (TANF); (2) food stamps or supplemental nutrition assistance program benefits (SNAP); (3) benefits from the women, infants, and children (WIC) program; (4) rent or housing assistance; (5) public health insurance program (Medicaid). Four items inquired about children's health and healthcare utilization. Parents indicated their child's overall health as (5) excellent, (4) very good, (3) good, (2) fair, or (1) poor. Parents reported the number of times in the past 12 months their child visited: (1) a doctor, nurse, or other healthcare professional to receive a preventive check-up, (2) a doctor, nurse, or other healthcare professional to receive another health care visit for illness or injury, and (3) a hospital emergency room.

Analysis

We approached analyses in three distinct steps. First, we applied latent profile analysis to establish whether latent

profiles characterized by experiences of risk and resilience were present in the study sample. LPA is a tool for person-centered exploratory inquiry, identifying latent classes or groups. Latent constructs can then be used for further analysis. Survey weights were calculated to account for study attrition, and weights were applied to all analyses (details available from authors upon request). Next, we conducted descriptive analyses to examine how the covariates, outcomes, and moderating variables differed by latent class assignment (Step 2). Then, we used the profiles established in step one to examine how class membership predicted outcomes while accounting for clinic nesting. We achieved this by conducting longitudinal multi-level modeling (Step 3). While identifying treatment effects is not the goal of the current study, participation in the innovation is accounted for in all models.

Step 1: LPA

We conducted exploratory LPA to determine the optimal number of classes supported by the data; beginning with testing a one-class solution and continuing iteratively to a five-class solution. Statistical indices to compare models for the best latent class solution included: the log-likelihood value; Akaike information criterion (AIC), Bayesian information criterion (BIC), adjusted BIC, and the Lo–Mendell–Rubin likelihood ratio (LMR LRT). The final latent class solution was determined by the agreement between the statistical indices, substantive theory, interpretability, parsimony, and empirical evidence. Initial LPA analyses used multiply imputed data, then reanalyzed the data using listwise deletion to address missing data and compared pre- and post-imputation means and obtained LMR LRTs for all models. Raw and imputed means were similar; we retained and report the raw means with missing data in order to include LMR LRT statistics, which are not available when analyzing imputed data.

Step 2: Descriptive Statistics

Once profiles were established, we examined profile distributions for each clinic. This analysis included examining descriptive and bivariate analyses to determine how the profiles varied according to family demographic characteristics and outcomes of interest.

Step 3: Longitudinal Multi-level Modeling

For longitudinal analyses, we applied multi-level modeling to leverage the longitudinal dataset and account for the nesting of families within clinics. We used baseline class membership established in the LPA as a predictor in all analyses. Specifically, we calculated mixed-effects models to include both fixed effects (direct estimations of associations between

Table 1 LPA model fit indices

	AIC	BIC	Adj BIC	Entropy	LMR LRT	<i>p</i>
1 class	24,908.317	25,004.208	24,940.692	–	–	–
2 class	23,749.519	23,898.151	23,799.701	0.856	1165.210	0.009
3 class	23,188.268	23,389.641	23,256.257	0.885	575.550	0.019
4 class	22,832.882	23,086.933	22,918.615	0.900	372.464	0.221
5 class	22,541.790	22,848.640	22,645.390	0.911	308.899	0.158

predictor and outcome variables) and random effects (indirect estimates of second-level clinic effects after controlling for explanatory variables), allowing examination of variation in outcomes accounted for by clinic context (random effect). We also included the following covariates in all models as they are likely related to both predictors and outcomes: age of caregiver and child, gender of caregiver, number of children in the home, race, ethnicity, employment status, relationship status, indicator of renting or owning home, income, US nativity, number of years in the US, caregiver insurance status, and participation in the healthcare innovation. All longitudinal analyses used multiply imputed data, which were comparable to non-imputed datasets.

Results

Latent Profile Assignments

Results indicated that a four-class model was the best fit and most clearly distinguished between groups compared

to other models. However, the four-class solution also resulted in a nonsignificant LMR-LRT, suggesting that the fourth class may not be necessary. Examining other criteria (e.g., entropy, latent class counts and proportions, and class plot), the four-class solution demonstrated low misclassification error. The distribution of the sample across the four classes was sufficient, with one small but distinct class. Table 1 shows model fit statistics for all possible solutions. Figure 1 illustrates mean patterns (vertical axis) for the four-class solution according to scale scores for the LPA measures. Figure 2 details class distribution by clinic. Next, we interpret the resulting profiles.

As illustrated in Fig. 1, profile 1—the high exposure to household and relational risk, lower strength profile—represents approximately 19% of the sample and is primarily distinguished by the overall high mean levels of household risk reported by the SEEK (e.g., parental depression, stress, substance abuse, family violence, food insecurity, and harsh punishment), and high reports of the functional impact of daily stressors as measured by the FITS-P. Additionally, profile 1 is characterized by the lowest reported mean strengths, including constructs of resilience, mobilizing resources, mastery, and social connectedness.

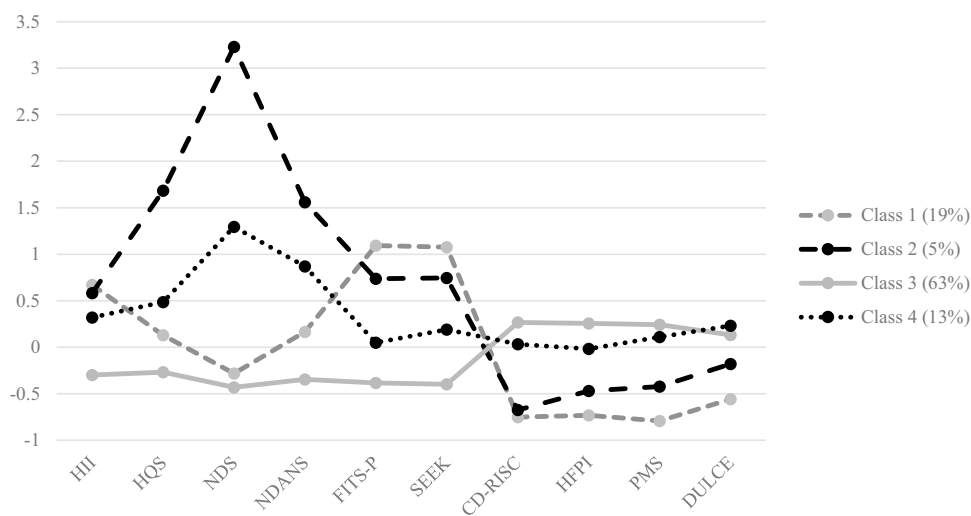


Fig. 1 Survey measure means by latent profile. Note: Class 1 (*n*=166.83)=high exposure to household and relational risk, lower strengths; class 2 (*n*=43.95)=complex risk exposure, lower strengths; class 3 (*n*=566.85)=lower exposure to risk, higher strengths; class 4 (*n*=115.38): high exposure to neighborhood risk, lower strengths. HII=Housing Instability Index; HQS=Housing Quality

Scale; NDS=Neighborhood Disorder Scale; NDANS=Neighborhood Danger Scale; FITS-P=Functional Impact of Toxic Stress – Parent Scale; SEEK=Safe Environment for Every Kid; CD-RISC=Connor–Davidson Resilience Scale; HFPI=Healthy Families Parenting Inventory – Mobilizing Resources subscale; PMS=Pearlin Mastery scale; DULCE=DULCE Social Connectedness Scale

Profile 2, representing 5% of the sample, is characterized as complex risk exposure, lower strengths, and reported higher exposure to risk and lower reported strengths, similar to profile 1. These participants reported higher average exposure to poor physical housing quality, elevated neighborhood danger, household-level risk measured by the SEEK, and the highest rates of neighborhood disorder. This group also reported lower average scores related to constructs of resilience, mobilizing resources, mastery and social connectedness.

Profile 3 is the largest class, representing 63% of the sample, and is characterized as low exposure to risk, higher strengths. This group reports low exposure to housing, neighborhood, and household risk, measured by the HIS subscales and the SEEK, and low exposure to relational risk as measured by the FITS-P and the SEEK. This group reports the highest levels of reported strengths in the areas of resilience, mobilizing resources, mastery, and social connectedness.

Profile 4—or the high exposure to neighborhood risk, higher strengths profile—represents 13% of the study sample; participants report living in neighborhoods characterized by a higher level of disorder and danger. However, this group also reports higher levels of resilience, mobilizing resources, mastery, and social connectedness.

Descriptive Findings

An examination of classes across the nine clinics found that some clinics are more heterogeneous than others, with considerable differences in clinic practices and populations, including different risk and resilience experiences among families served (NORC, 2020). Importantly, family profiles 1, 3, and 4 are distributed to some degree across all clinics, but profile 2 is not represented in three clinics. This uneven distribution may be an artifact of the small size of profile 2. However, this may also reflect a concentration of families experiencing higher needs in particular types of clinics (e.g. FQHC versus private pediatric clinic). These findings suggest that clinic is an important factor to include in longitudinal models as these classes are disproportionately distributed across sites, thus providing support for use of multi-level methods to account for the nesting of classes within clinics.

Table 2 presents the means for all covariates and outcome measures within each latent profile assignment, and the results of a bivariate analysis of differences across the classes, revealing many significant differences in demographic characteristics and outcome measures by class. Families in Profile 3 are more likely to be White than Latino, and they are also more likely to be employed. Families in profile 3 are more likely to own a home and have an annual

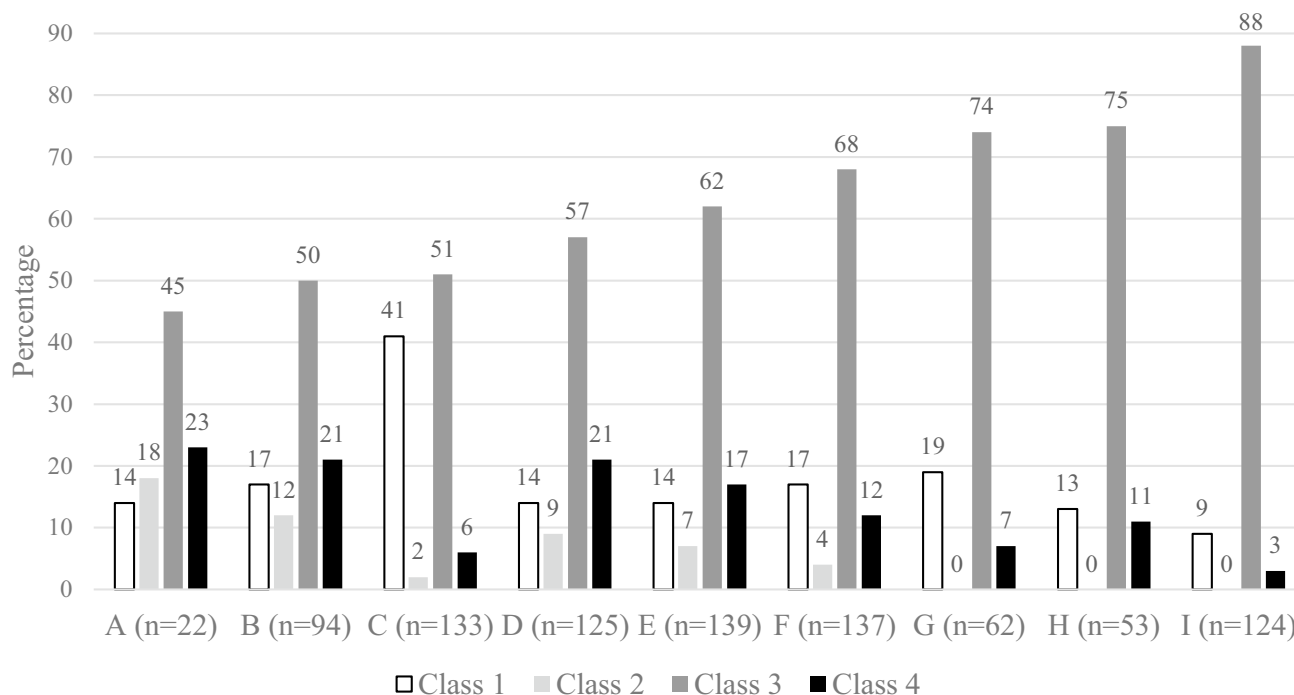


Fig. 2 Distribution of profiles by clinic (%)

Table 2 Post-imputation mean differences in demographic characteristics and study measures by latent class assignment

	Means (standard errors)				T-tests					
	Class 1	Class 2	Class 3	Class 4	1 v 2	1 v 3	1 v 4	2 v 3	2 v 4	3 v 4
Demographic characteristics (baseline)										
Age	28.41 (0.62)	29.09 (1.01)	29.80 (0.30)	29.28 (0.72)		*				
Baseline infant age (months)	2.61 (0.15)	2.88 (0.31)	2.67 (0.08)	2.44 (0.17)						
White	0.08 (0.02)	0.00 (.)	0.18 (0.02)	0.03 (0.02)	**	***		***		***
Black	0.15 (0.04)	0.12 (0.06)	0.11 (0.02)	0.13 (0.04)						
Latino	0.74 (0.04)	0.85 (0.07)	0.65 (0.02)	0.78 (0.05)				**		*
Other race	0.02 (0.01)	0.00 (.)	0.04 (0.01)	0.03 (0.02)				***		
Mixed race	0.00 (.)	0.03 (0.03)	0.01 (0.01)	0.03 (0.02)						
Employed	0.17 (0.04)	0.23 (0.08)	0.36 (0.02)	0.35 (0.05)		***	**			
Student	0.02 (0.02)	0.00 (.)	0.03 (0.01)	0.00 (.)				**	***	**
Unemployed	0.79 (0.04)	0.77 (0.08)	0.60 (0.02)	0.65 (0.05)		***	*	*		
Mother	0.93 (0.03)	1.00 (.)	0.98 (0.01)	0.98 (0.01)	*			**		
Father, other relationship	0.06 (0.03)	0.00 (.)	0.02 (0.01)	0.02 (0.01)	*			**		
Number of children in household	2.98 (0.19)	2.46 (0.21)	2.38 (0.06)	2.50 (0.16)		**				
Partnered	0.69 (0.05)	0.75 (0.08)	0.70 (0.02)	0.59 (0.06)						
Single	0.31 (0.05)	0.25 (0.08)	0.29 (0.02)	0.40 (0.05)						
Own	0.05 (0.02)	0.03 (0.03)	0.17 (0.02)	0.01 (0.01)		***	*	***		***
Rent	0.69 (0.04)	0.93 (0.05)	0.70 (0.02)	0.92 (0.03)	***		***	***		***
Sharing or homeless	0.25 (0.04)	0.04 (0.04)	0.13 (0.02)	0.08 (0.03)	***	*	***			
Income < 15 k	0.25 (0.06)	0.24 (0.08)	0.20 (0.02)	0.30 (0.05)						
15 k < = income < 25 k	0.38 (0.05)	0.30 (0.08)	0.30 (0.02)	0.28 (0.05)						
25 k < = income < 50 k	0.27 (0.05)	0.31 (0.09)	0.27 (0.02)	0.26 (0.05)						
50 k < = income < 100 k	0.07 (0.03)	0.14 (0.07)	0.11 (0.02)	0.13 (0.04)						
100 k < = income	0.03 (0.02)	0.00 (.)	0.14 (0.02)	0.03 (0.02)		***		**		***
Born in USA	0.32	0.40	0.50	0.50		***	*			

Table 2 (continued)

	Means (standard errors)				T-tests					
	Class 1	Class 2	Class 3	Class 4	1 v 2	1 v 3	1 v 4	2 v 3	2 v 4	3 v 4
Years spent in USA	(0.04) 14.63 (1.10)	(0.09) 17.89 (1.70)	(0.02) 20.64 (0.54)	(0.06) 19.90 (1.22)		***	**			
Caregiver is insured	0.55 (0.05)	0.94 (0.04)	0.76 (0.02)	0.87 (0.04)	***	***	***	***	*	***
Innovation participation	0.59 (0.05)	0.68 (0.08)	0.53 (0.02)	0.68 (0.05)						**
Outcome measures (longitudinal)										
Service need										
Need TANF	0.25 (0.04)	0.32 (0.09)	0.14 (0.02)	0.32 (0.05)		*		*		***
Need SNAP	0.58 (0.05)	0.54 (0.09)	0.38 (0.02)	0.54 (0.06)		***				**
Need WIC	0.90 (0.03)	0.94 (0.04)	0.66 (0.02)	0.81 (0.04)		***		***	*	**
Need housing assistance	0.22 (0.04)	0.21 (0.08)	0.07 (0.01)	0.21 (0.05)		***				**
Need medicaid	0.72 (0.04)	0.69 (0.08)	0.58 (0.02)	0.65 (0.05)		**				
Child health and healthcare utilization										
Child's overall health	4.03 (0.09)	4.27 (0.15)	4.44 (0.04)	4.31 (0.10)		***	*			
Number of preventive health visits	4.46 (0.09)	4.00 (0.24)	4.40 (0.05)	4.14 (0.14)						
Number of illness or injury visits	2.21 (0.18)	1.55 (0.27)	1.84 (0.08)	1.91 (0.18)	*					
Number of hospital or emergency room visits	1.16 (0.13)	0.76 (0.16)	0.79 (0.05)	0.99 (0.12)	*	**				
N	115	31	424	83	146	539	198	455	114	507

Standard errors in parentheses; $p < 0.05$, $p < 0.01$, $p < 0.001$

household income greater than \$100,000. In contrast, families in profile 1 are less likely to be employed, more likely to share housing or experience homelessness, and are less likely to be born in the USA or have health insurance. Profile 2 is comprised of the most Latino families (85%), higher rates of unemployment than profiles 3 and 4, and higher rates of renting than profiles 1 and 3. Families in profile 4 have similar employment rates compared to families in profile 3 and similar renting rates compared to profile 2. Table 2 also shows a bivariate comparison of needs for public benefit programs by latent profile. Profiles 1, 2, and 4 are more likely to need TANF, SNAP, WIC, and housing assistance compared with profile 3. Profile 1 is more likely to need Medicaid compared with profile 3. Regarding health and healthcare utilization, families in profile 1 report significantly lower overall child health compared to profiles 3 and

4. Families in profile 1 also report more illness and injury visits and emergency department (ED) visits.

Longitudinal Findings

Multi-level Models

Table 3 shows the results of multi-level models predicting service need and child health and healthcare utilization. In model 1, belonging to any of the higher risk profiles (i.e., profile 1, 2, and 4) is associated with significantly more TANF, SNAP, WIC, and housing needs compared to profile 3. In contrast, in model 2, only one profile was differentially predictive of child health and healthcare utilization outcomes. Families in profile 1 report significantly lower overall child health, more illness and injury visits, and more

Table 3 Random effects models predicting need for public assistance and healthcare outcomes

<i>Model 1: Need for public assistance</i>					
	Need TANF	Need SNAP	Need WIC	Need housing	Need Medicaid
Class assignment (ref = class 3)					
Class 1	0.11** (0.04)	0.08* (0.04)	0.11*** (0.03)	0.14** (0.04)	-0.02 (0.04)
Class 2	0.18** (0.06)	0.16* (0.07)	0.21*** (0.04)	0.13 + (0.08)	0.07** (0.02)
Class 4	0.16** (0.05)	0.12* (0.05)	0.08* (0.04)	0.11* (0.05)	-0.01 (0.03)
Constant	0.28** (0.08)	0.44*** (0.13)	0.81*** (0.14)	0.24*** (0.04)	0.46** (0.16)
Observations	653	653	653	653	653
Number of groups	9	9	9	9	9
ICC of clinic effects	0.030*	0.064*	0.036*	0.055*	0.251*
<i>Model 2: Health and healthcare utilization</i>					
	Overall child health	# preventive health visits	# illness or injury visits	# ED visits	
Class assignment (ref = class 3)					
Class 1	-0.35** (0.12)	0.05 (0.08)	0.46** (0.16)	0.19* (0.08)	
Class 2	-0.11 (0.14)	-0.19 (0.29)	-0.02 (0.16)	-0.13 (0.15)	
Class 4	-0.10 (0.07)	-0.16 (0.15)	0.24 + (0.14)	0.08 (0.08)	
Constant	4.75*** (0.44)	4.82*** (0.38)	3.24*** (0.32)	1.17* (0.47)	
Observations	653	653	653	653	
Number of groups	9	9	9	9	
ICC of clinic effects	0.029*	0.114*	0.016*	0.062*	

All models included the following covariates: age of caregiver and child, gender of caregiver, number of children in the home, race, ethnicity, employment status, relationship status, indicator of renting or owning home, income, nativity to the US, number of years lived in the USA, caregiver insurance status, and participation in the healthcare innovation. Robust standard errors in parentheses *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$; ICC, intraclass correlation coefficient

ED visits compared to families in profile 3. Profiles 2 and 4 do not show any notable differences in health and healthcare utilization compared to profile 3.

Regarding the nesting effects of clinics, random effects parameters show the effect of clinics varies across outcomes. For example, clinics explain around 1.6% of the variation in ED visits but explain up to 11% of the variation in prevention visits. All random-effects parameters are significant. This suggests differences across clinics explain significant variation in health and healthcare utilization, and accounting for these clinic-level differences is important for reducing bias in the results.

Associations between covariates and outcomes are not shown in Table 3, but almost all coefficients were in the expected direction (e.g., single families are more likely to indicate service need than partnered families). One finding worth noting is that Latino families are significantly less likely to need TANF and housing assistance and are less likely to have an unmet housing need than White families. In sum, after accounting for a variety of contextual factors that likely play a role in service need, baseline experiences of risk and resiliency have a significant association with service need and unmet need, showing that families with greater risk exposure and fewer strengths are more likely to need assistance.

Discussion

This paper explored whether profiles of parents' experiences with environmental and psychosocial risks and resilience during their child's infancy is associated with later public benefit services, healthcare services, and child health. Using a person-centered analytic approach provided a useful avenue to disaggregate the sample, enabling simultaneous examination of experiences of risk and resilience and public service needs, child health, and healthcare utilization. This highlights opportunities for providing more precise preventive healthcare services in infancy that accounts for family social needs and resiliency, useful in developing precision medicine approaches (Parikh et al., 2019). As expected, one lowest-risk profile, profile 3, emerged along with three other profiles that represent variations of risk and resilience characteristics. Most illuminating in our findings is the story about risk and resilience evident, when examining and comparing the "in-risk" profiles 1, 2, and 4 in this context. The various ways in which risk and resilience intermingle with demographic life experiences reveals areas of strength and protection (e.g. parental resilience, social connections, etc.) and opportunity for enhanced screening and service delivery to meet families' needs more adequately and shore up these protective factors.

Of the three higher risk profiles, profile 1 – high exposure to household and relational risk, lower strengths, is

characterized by both household and environmental risk and low reported strengths, including resilience, mobilizing resources, mastery, and social connectedness. As a group, this profile reports compromised parental well-being, low levels of mastery, and resilience, and 1 year later, families who comprise this profile report the most frequent ED visits for child health care and more visits to the doctor for child illness or injury. Importantly, these families are also largely newer immigrants with fewer years in the USA. These families reported higher rates of house-sharing and homelessness and lower rates of being insured than all other groups (25%). They also experience high unemployment (79%). Though these characteristics may represent strength in that families are accessing care for their children when needs arise, these characteristics also demonstrate a clear need for more support to resolve personal and structural challenges to accessing preventative pediatric health and other services that could build protective factors and mitigate children's exposure to stress during a critical developmental period.

Profile 1 findings are not surprising given the demographic makeup of this profile, as children with parents born outside the USA are often uninsured, further exacerbated by recent changes to the public charge rule (Bernstein et al., 2020; Stimpson & Wilson, 2018). Immigrants tend to use health services less often in general (Sarria-Santamera et al., 2016) and may wait to seek care for their children until health issues are acute (Beniflah et al., 2013). Although immigrants to the USA typically demonstrate initial resilience in health outcomes compared to native-born counterparts, poor health is still often observed among some, such as Latino children of immigrant parents (Singh et al., 2013).

Like profile 1, profile 2 caregivers also reported high psychosocial impairment, household risks, and low resilience. This includes functional challenges and household-based stressors, such as domestic violence and depression. However, families in profile 2 differ from families in profile 1 in that their elevated risk also includes higher average exposure to poor physical housing quality and elevated neighborhood danger. These families also report a high rate of unemployment (77%) and were more likely to report being insured than any other group. This may reflect the ability of families to qualify and access public health insurance at higher rates, which could explain why some health utilization outcomes did not differ between families in profile 2 with complex risk and those in other, lower risk profiles.

Interestingly, profile 4 – high exposure to neighborhood risk, higher strengths – is a more moderate risk profile and resembles profile 3, the lowest risk profile on several dimensions. Profile 4 is comprised of families who experienced high environmental risk but also possess strengths in coping, mastery, and social support, thus making stress more tolerable. Caregivers within this moderate risk profile reported elevated risks in neighborhood and housing, but unlike the

complex (profile 2) and household and relational stress (profile 1) profiles, child health, and healthcare utilization outcomes did not differ significantly from that of the lowest risk profile. Profile 4 is also distinct from the other higher-risk groups in that families demonstrated resilience levels comparable to the lowest risk profile. This highlights that family resilience in the face of exposure to environmental risk positively impacts child health and healthcare utilization. Greater resilience, mastery, ability to mobilize resources, and more social connectedness may allow this group to communicate needs and access resources, subsequently coping and recovering more easily from stressful experiences. These findings also suggest the important role of identifying cumulative and multi-source stressors in combination with resilience characteristics, given the significant variation in associations between the higher-risk profiles and public service needs and child health trajectories. The results of this study highlight the role of caregiver risk and resilience in child health outcomes and continued service needs, and suggest the continued investment in two-generation approaches to strengthening families that decrease child distress and foster the development of competence in children (Bronfenbrenner & Evans, 2000; Moreno et al., 2021).

In sum, there is evidence that experiencing greater risks and fewer strengths when infants are newly born increases families' needs for public benefits assistance and increases the likelihood of families reporting poor child health outcomes over time compared to families reporting more strengths. These findings offer further evidence of the importance of addressing families' needs early in life, particularly among families experiencing greater adversity and fewer protective factors. By expanding our understanding of how risk and resilience in the SDoH may influence parents' help-seeking and infant health across the first year of life, this study has implications for understanding the role that primary care can play to mitigate adversity and promote strengths to support enhanced outcomes for high-risk families.

Limitations

This study is strengthened by a longitudinal design with a high retention rate, but there are a few limitations. First, all of our measures rely on caregiver self-report. Measurement error can be significant in self-reported income and social service receipt (Angel et al., 2019), but by creating indicators of income level and service receipt rather than relying on families' reports of the numerical amount, we hoped to reduce measurement error. Second, families were excluded from this analysis due to non-response in any of the three survey waves. Missing data analyses were used to identify any systematic reasons for missing an interview wave, and there were no concerning patterns in attrition. Additionally, survey weights were applied to all multi-level models to account

for attrition bias. Finally, we did not measure caregiver education level in our survey and missing this covariate may contribute to omitted variable bias. However, evidence also shows income to be highly correlated with education (Coady & Dizioli, 2018), so by accounting for income, we are likely also measuring the effects of education level.

Implications for Prevention Science

Though healthcare practitioners generally agree that SDoH greatly impacts the health and development of children and families, practitioners report challenges in integrating screening and SDoH into workflow (Berry et al., 2020). Some practitioners report being hesitant to screen due to a lack of knowledge about resources or training to discuss these issues with families (Andermann, 2016). Healthcare systems also vary in the level of collaboration and communication with community social service providers, impacting practitioners' knowledge of available resources (Spain et al., 2020). Despite these challenges, our study shows that early identification of SDoH needs and parent resilience through screening during medical visits can be an important mechanism of primary prevention, leaving pediatric providers well-situated to tailor services and supports to the specific needs of a family. Applying approaches that mitigate SDoH and increase protective factors such as parent resilience impact future health, development, and the likelihood of maltreatment (Andermann, 2016; Horton, 2011; Sege et al., 2015).

Programs designed to address SDoH in pediatric settings have shown promising results (Garg et al., 2015; Sege et al., 2015). Evidence suggests that identifying family needs and strengths early in the pediatric relationship and connecting families to resources may have implications for long-term positive health effects. Findings from the present study highlight the potential benefit of incorporating resilience screening into prevention-based pediatric screening practices, suggesting directions for future research examining these practices as a mechanism for prevention. Some SDoH may seem intractable and require substantial time, resources, and effort to address, highlighting the potential benefit of applying a two-pronged protective factor approach that identifies risks and resilience characteristics through screening to address cumulative disadvantage, tempering the effects of risk through connections to services while bolstering protective factors. Evidence of this type of prevention screening is largely absent as current SDoH screening initiatives focus on the identification and mitigation of risk only.

Our findings also identified poor health outcomes among families in profile 1, compared to other profiles. Profile 1 is largely composed of immigrant families with fewer years in the USA. This finding reinforces a need for greater focus

on addressing inequitable and exclusionary policies, such as those related to immigration, in any intervention focused on prevention and SDoH (Abraido-Lanza et al., 2016; Castaneda et al., 2015; Perrera & Pedroza, 2019). Immigrant families are more vulnerable to adverse social conditions that impact child health, such as substandard housing, neighborhood quality, and food insecurity (Cort et al., 2014; Weil, 2009). Absent comprehensive and inclusive policy solutions to address access issues and equitably provide for the health of all immigrant groups, innovations in healthcare settings that address basic needs of families by connecting families to local resources may improve the health of this population (Nandi et al., 2008). Future research should measure inequities in policy and discriminatory conditions within the SDoH framework to identify opportunities to improve prevention efforts and promote health equity for Latino and immigrant families.

In sum, this study identified four distinct profiles of families based on risk and resilience experiences during the first months of their child's life. Grouping families based on these shared experiences was a useful method for identifying how these early experiences shape future needs and child health. Notably, even among the higher-risk profiles, there was important variation in the associations between baseline experiences of risk and resilience and future public benefit need and child health and healthcare utilization. As such, the findings from this study highlight the importance of identifying family characteristics of risk and resilience to more precisely design and deliver prevention programs intended to address social care needs and mitigate the impact of SDoH on future family needs and child health.

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Declarations

Ethics Approval This study was approved by the Institutional Review Board of the School of Social Service Administration at the University of Chicago and was conducted in accordance with tenets of the Declaration of Helsinki.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare that they have no conflict of interest.

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