Multidimensional Trajectories of Family Adversity in Childhood and Outcomes in Adolescence and Early Adulthood: Population-Based Evidence from Rural South Africa

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Abstract

Increasing evidence suggests that adverse events in childhood can have lasting impacts along the life course. We examine the accumulation and interrelation of different dimensions of family adversity in childhood in rural South Africa. We used population-based, longitudinal data from a household census from the Agincourt Health and socio-Demographic Surveillance site in rural South Africa, including children born from 1992 to 2009. We distinguished between three dimensions of family adversity: household vulnerability, loss within the family, and family dynamics. We used a group-based multi-trajectory model to define groups of children aged 0-12 years. In preliminary models we identified four distinct trajectories of family adversity in childhood. Initial models suggested that, compared to low adversity children, mortality risks were particularly elevated for children with multiple adversities within all dimensions and throughout childhood. Subsequent models will examine outcomes in late adolescence and early adulthood. Our preliminary results highlight how the accumulation and interrelation of these dimensions of family adversity are important in understanding child development and wellbeing.

Extended summary

Theoretical focus

Childhood adversity, such as bereavement and poverty, has increasingly been linked to premature mortality and disadvantage later in life.[1-5] However, less is known how these risks may interact over the life course,[6] particularly in low- and middle-income settings where data with detailed, prospective information on multiple adversities throughout childhood are rare. We aim to describe distinct trajectories of family adversity in childhood using population-based data on over 30,000 children in rural South Africa. We further plan to relate these trajectories to premature mortality and outcomes in late adolescence and early adulthood.

Data

We used data from the Agincourt Health and socio-Demographic Surveillance System (AHDSS).[7] AHDSS monitors a geographically defined population over time and conducts a household census to collect prospective information, including demographic indicators,

household-level information, and social indicators. AHDSS is located in rural, northeastern South Africa near Mozambique—in 2011 the population under surveillance was approximately 90,000. HIV/AIDS has had a significant impact on the population, with child and adult mortality increasing until recently with the rollout of antiretroviral therapy.[8]

We included all children born between 1992 and 2009 to ensure coverage of children for their entire childhood (0-12 years of age). Using data up to 2022, we were able to follow-up the oldest children for 30 years, while the follow-up time is shorter for children born later in the time period. In our preliminary analysis, we included 10 family adversities categorised into three dimensions: household vulnerability (e.g., household headed by female); loss within the family (i.e., death of a parent); and family dynamics (i.e., lack of parents and other relatives in the household).

Research methods

We used a group-based multi-trajectory model to determine trajectory groups based on the three dimensions of family adversity in childhood.[9] We fit models with 2-8 trajectory groups using zero-inflated Poisson regressions with a cubic trajectory function. We selected the preliminary number of trajectory groups based on model fit criteria, separation and size of the groups, and visual inspection of the groups for substantive differences. As an initial exploration of differential mortality, we then fit a distal outcome model to predict child mortality during the first 12 years of life.

Expected findings

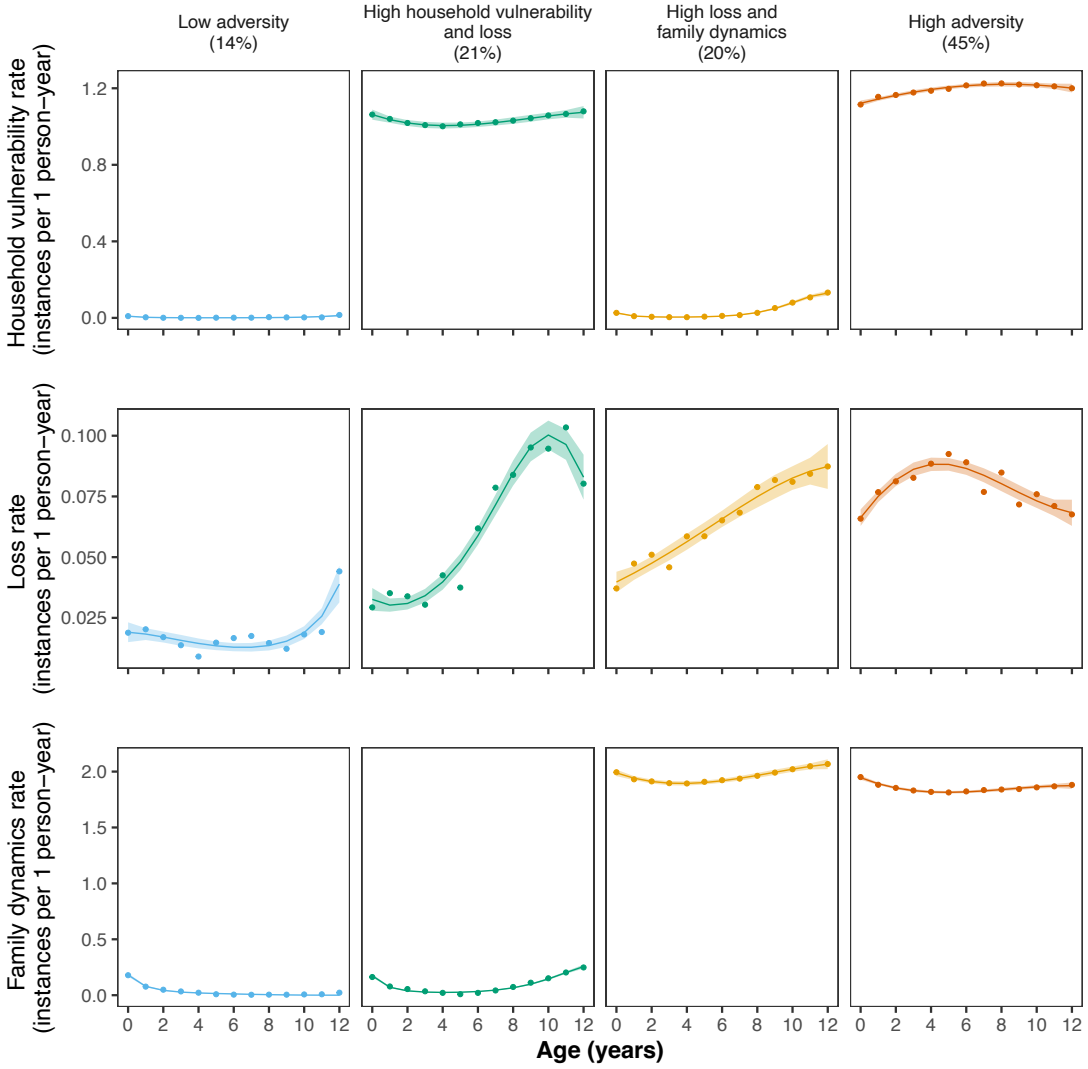
In our preliminary results we identified four distinct trajectory groups based on combinations of the three sub-trajectory dimensions (Figure 1). Initial model fit statistics are presented in Table 1.

Table 1. Model fit statistics for group-based multi-trajectory models from 2-8 classes. Bayesian Information Criterion (BIC); Entropy statistic (S).

Number of groups	BIC	S
2	-665031.65	0.72
3	-640002.23	0.729
4	-603676.72	0.89
5	-595786.62	0.557
6	-592399.52	0.515
7	-589991.08	0.533
8	-589350.96	0.349

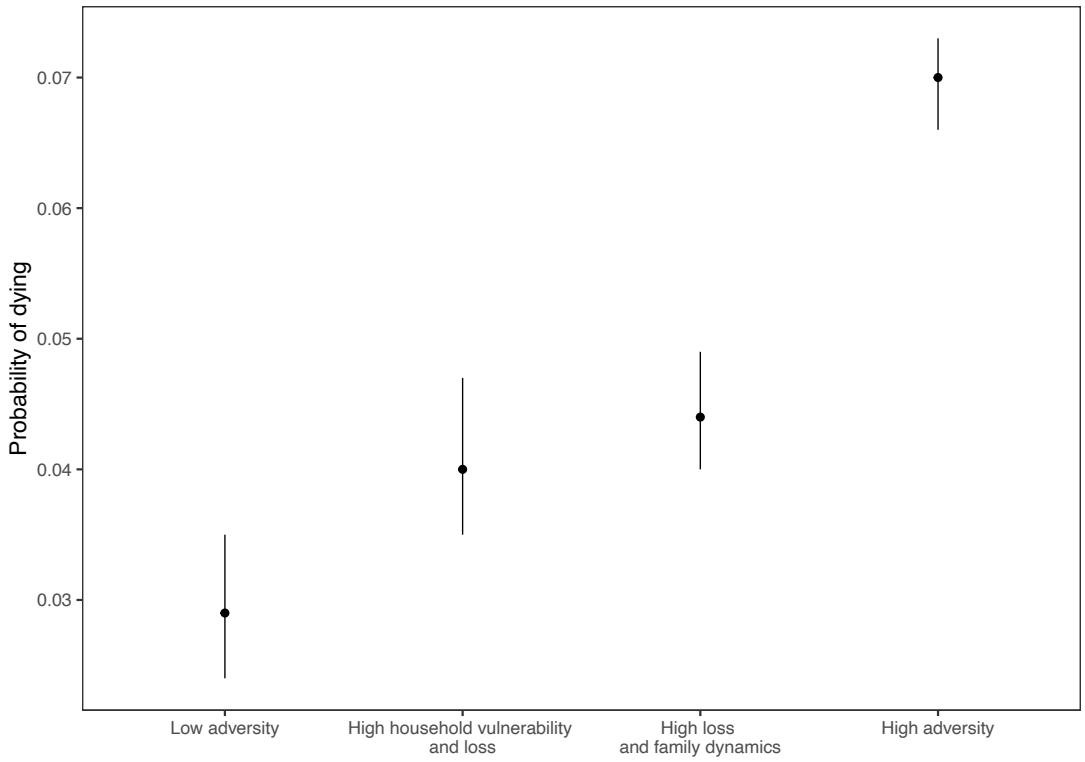
The low adversity group (14%) was characterised by a low annual rate across all three dimensions (Figure 1). The high household vulnerability and loss group (21%) was characterised by a consistently high rate of household vulnerability and increasing rate of loss after the first 4 years of life. The high loss and family dynamics group (20%) was characterised by a consistently high rate of family dynamics, and increasing rate of loss as children aged. Finally, the high adversity group (45%) was characterised by high annual rates of adversities in all three dimensions.

Figure 1. Estimated trajectory groups of family adversities among rural South African children.



The distal outcome model showed elevated probabilities of dying for all groups compared to the children in the low adversity group (Figure 2). Mortality was particularly elevated for children in the high adversity group (7%; 95% CI 6.6-7.3). We will continue to explore other approaches to accounting for mortality in the first 12 years of life before the conference. We will also examine outcomes in late adolescence and early adulthood, including completed school, and adolescent fertility and mortality.

Figure 2. Predicted probability of dying by trajectory group among rural South African children.



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