Building Resilience: The Effects of Conflict and Drought on Parental Investments and Early Childhood Development

Preliminary and Incomplete.

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Abstract

How does hazard exposure affect young children's cognitive and non-cognitive skills? We link detailed DHS data from Africa and the Middle East to geo-referenced armed conflict and drought data. Exploiting only highly local and short-term variation in armed conflict and drought exposure, we document an overall negative impact of exposure to these two hazards while in utero on child development. Differently, when exposed in early childhood (age 0-4) there is no effect of either hazard on cognitive skills, and the effects on non-cognitive skills diverge. Conflict increases non-cognitive skills while drought decreases them. The positive conflict effect is sizeable: a one standard deviation increase in conflict exposure increases non-cognitive skills by about 0.12 standard deviations or 11 percent. Investigating the mechanisms, we find that the effect is driven by parents who invest more in their children when living close to fatal events. Drought exposure, on the other hand, decreases parental investments. Furthermore, the positive effect of conflict on non-cognitive skills and parents' investments is entirely driven by more gender equal countries and non-existing in countries with low gender equality. The positive effects also disappear for households from ethnic groups directly associated with the fighting dyad, and turn significantly negative for ethnic minorities engaged in co-ethnic conflict.

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1 Introduction

The climate crisis puts close to 1 billion children at extremely high risk of exposure to climate and environmental shocks and stressors. Roughly 470 million children face high or very high drought risk (UNICEF et al., 2023). In 2022, just as many children lived in a conflict zone (Østby et al., 2023). These hazards have countless ruinous consequences for children, especially for those under the age of five (Black et al., 2017). Armed conflict increases child mortality, morbidity, and mental stress; while natural hazards, such as drought, increase undernutrition (Dimitrova, 2021) and derogate cognitive development. In general, adverse shocks, such as those driven by weather extremes (Maccini and Yang, 2009) and violence Shemyakina (2011) have negative long-term impacts on children, particularly affecting cognitive skills (i.e., mental abilities used in thinking activities, including reading, writing, numeracy (Green, 2011)), and schooling. In turn, a loss of these capacities impacts children's long-term earnings (Carneiro et al., 2007; Heckman et al., 2006) and reduces the resilience of communities, i.e., their ability to rebuild, recover, and protect themselves from future shocks.

In this paper we study the effects of conflict and drought on children's cognitive and non-cognitive skills. Although the negative impacts of adverse shocks on children's development are well established (Shonkoff et al., 2012), there is very limited research on how conflict and environmental shocks affect child cognitive and non-cognitive skills (i.e., personal traits, attitudes and motivations (Borghans et al., 2008). The few papers that look at these outcomes related to drought exposure in utero (Leight, Glewwe, and Park, Leight et al.) and the early years of life (Leight, Glewwe, and Park, Leight et al.; Hyland and Russ, 2019) find that it harms cognitive skills as a child and reduces education and wealth in adulthood (Hyland and Russ, 2019). For conflict, the literature is extremely scarce. We are only aware of one paper that analyzes the effects of conflict on cognitive and non-cognitive skills, with mixed results (Duque, 2017).

From a theoretical perspective, resilience, and in particular the ability to protect children's development trajectories, is closely connected to material and psychological resources (Oberg et al., 2021). In this paper, we hypothesize that the impacts of drought and conflict on child development will depend on the different social psychological effects that these two hazards

have on communities' ability to bind together and protect their resources. Resources, which in turn impact parents' ability to care for their children in times of crisis. More specifically, conflict generally increases prosocial behavior and collective action (Bauer et al., 2016) – required components for collaboration and protective factors for psychological well-being (Muldoon et al., 2021) – while this is not true for drought. We thus expect the effects of conflict and drought on children's skills and their parents' ability to protect them to clearly differ.

To answer our questions, we match recent DHS data on early childhood development and parental investments to geo-coded conflict event data and high-resolution drought data. Our sample covers 10 countries from Africa and the Middle East. Given a set of fixed effects, our empirical strategy exploits the arguably random timing of births together with highly local within DHS cluster variation to estimate the effect of conflict and drought exposure on children's developmental skills. We measure exposure as the incidence of armed conflict or drought within 50 kilometers of a DHS cluster for a child's time in utero and its time during early childhood (up to 4 years).

We first document an overall negative impact of exposure to these two hazards while in utero on child development. This finding is expected and consistent with a large body of literature in both economics (Chang et al., 2022a; De Rooij et al., 2010; Almond and Currie, 2011) and psychology (Punamäki et al., 2018). Differently though, when exposed in early childhood there is no effect of either hazard on cognitive skills, and the effects on non-cognitive skills clearly diverge. Conflict increases non-cognitive skills while drought decreases them. The positive conflict effect is sizeable: a one standard deviation increase in conflict exposure increases non-cognitive skills by about 0.12 standard deviations or 11 percent.

After establishing our main result, we next zoom into the mechanisms for our findings. First, the diverging effects we find for non-cognitive skills is consistent with our social psychological argument. To provide further support for it, we show that the positive effects of conflict on non-cognitive skills turn significantly negative for households belonging to a local ethnic minority group whenever their co-ethnics are in conflict – a situation when a group is considerably weak. Thus, when they are not protected by the community's ability to bind together and improve psychological and material resources, the effects turn negative. However, importantly,

belonging to an ethnic group associated with a fighting dyad eliminates the positive findings also for majority groups.

Our argument continues that parents should be the main drivers of their children's skill set. Using data on parents we next show that the effects of our two hazards on parental investments (spending time with their children in various ways) perfectly mirror our findings from above. In particular, when their children are exposed to conflict in early childhood, parental investments increase significantly. Drought exposure, on the other hand, decreases parental investments.

Our proposed theory further implies that the community binding effect should increase with the level of experienced threat (up to a certain point when the threat is too strong). To investigate whether child development and parenting react to different threat levels, we dummy out our two conflict exposure measures. Consistently, we find that the positive marginal effects of conflict exposure in early childhood on non-cognitive skills increase as the number of fatalities close gradually increase. Importantly, the effects on parental investments follow the exact same pattern, providing strong additional support that parents are driving these results. However, as the number of fatalities in the vicinity of a household becomes too large, the effect on non-cognitive skills turn negative, despite parents intense efforts to protect them.

Responses to shocks and parental investments tend to vary dependent on factors such as education, gender and age (Almond et al., 2018). In the final part of the paper, we dig deeper into differences based on these prerequisites for resilience. In particular, the positive effects of conflict exposure during early childhood on non-cognitive skills are driven by more gender equal countries. For less gender equal countries the effect disappears and turns insignificant. Again, consistent with parents driving non-cognitive skills, these findings are perfectly mirrored in parents investments. Interestingly, it is not mothers that invest more into their children in gender-equal countries (their investments stay constant) but fathers and other household members.

To the best of our knowledge, we are the first to look at the differential effects of conflict and drought in this context. Our findings further our understanding of potential differences in resilience and vulnerability that can inform effective policy. Most importantly, we present novel evidence that conflict can induce parents to overcome the adversities of conflict, increasing their

children's non-cognitive skills and therefore future prospects. Paying attention to cases where we find better outcomes than expected can help identify local practices that mitigate risk and inform culturally harmonious intervention strategies (Oberg et al., 2021).

2 Previous literature

There is very limited literature investigating the impacts of environmental shocks and armed conflict on the development of children's cognitive and non-cognitive skills. The existing evidence suggests that drought exposure in utero and the early years of life (Hyland and Russ, 2019) harms children's cognitive skills, reduces education and wealth in adulthood (Hyland and Russ, 2019). However, the literature on the effects of non-cognitive skills is virtually non-existent, with only a few very recent papers addressing the question (Krutikova and Lilleør, 2015; Chang et al., 2022b; Shoji, 2021; SÃ¡nchez, 2017). In addition, the existing papers often have a very specialized focus, given data availability, for instance (Shoji, 2021) use the "locus of control" (Rotter, 1966) to proxy for non-cognitive skills. Moreover, they focus on skills in adolescents and adults and cannot inform our understanding of skill formation in young children. The effects of conflict on cognitive and non-cognitive skills are even less understood. To the best of our knowledge, the only existing study of these outcomes is Duque (2017), who looks at the effects of violence on the cognitive and non-cognitive skills of children in Colombia. She finds strong negative effects on cognitive skills and no effects on non-cognitive skills.

Parents can either magnify or mitigate the impacts of shocks on their children, with an effect that varies according to their education, income, gender, and ethnicity (Almond et al., 2018). Specifically, previous research within economics (Shah and Steinberg, 2017; Wu et al., 2023; Almond and Mazumder, 2011) and psychology (Punamäki et al., 2017; Diab et al., 2018; Scharpf et al., 2021) suggests that children's development and resilience in the face of environmental shocks or conflicts is shaped by parents' material and psychological resources.

For instance, Wu et al. (2023) show that positive rainfall shocks impact girls' school performance (but not boys'), since mothers can spend the time subtracted from agricultural work to breastfeeding their daughters. Shah and Steinberg (2017) find that drought shocks increase

investments in children's schooling, which is perceived as more profitable than agriculture during prolonged dry conditions. Similarly, the ability of parents to preserve their children's development trajectory in conflict areas is undermined by their own mental stress (Diab et al., 2018; Punamäki et al., 2017), which in turn may lead to maltreatment and insecure attachment (Scharpf et al., 2021). However, the impacts of conflicts on child development are reduced if mothers manage to process and reconstruct the experienced trauma (Diab et al., 2018) or if they have a strong sense of belonging to a group (Qouta et al., 2008), and are thereby able to protect their children's stress regulation.

3 Theory

3.1 Environmental and conflict shocks and children's cognitive and non-cognitive skills

Children who reach their development potential possess the required skills for academic, economic, socio-emotional, and behavioral accomplishments (Black et al., 2017). Both cognitive and non-cognitive skills are important determinants for these outcomes (Carneiro et al., 2007; Heckman et al., 2006). While both categories of skills are highly correlated between parents and their children and likely genetically transmitted to some degree (Carneiro et al., 2007; Chowdhury et al., 2022), they are also shaped by the environment in early childhood (Black et al., 2017; Carneiro et al., 2007; Doepke et al., 2019; Walker et al., 2007; Heckman et al., 2006). The epidemiologist David J. Barker coined the fetal origin hypothesis, proposing that in-utero and early-life conditions can have long-term impacts on adult health (Barker, 1990). The neurological explanation for this is that malnutrition during the prenatal period negatively affects the brain structure and neural development (De Rooij et al., 2010). Adverse food shocks caused by weather extremes during the in-utero period (Chang et al., 2022a) or early childhood are, therefore, particularly likely to hamper the development of cognitive and non-cognitive skills (Chang et al., 2022a). Even if conflict likewise may lead to food insecurities and thereby impact child health, this direct connection to children's development of cognitive and non-cognitive skills has yet to be established. However, the stress induced by conflict exposure is

associated with an overdose of cortisol which may hamper optimal development, either directly, or during pregnancy when it enters the fetal circulation (Punamäki et al., 2018).

3.2 The varying impact of shocks on material and psychological resources

Drawing from research in social psychology, we hypothesize that the two types of shocks – environmental shocks and conflict – will have different effects on children's outcomes.

Drought can be considered a slow-onset hazard that evolves slowly and with uncertainty, impacting different population subgroups at different times, starting with farmers and the agricultural sector before striking other parts of the workforce or generating food insecurity (Zamani et al., 2006). The immediate impact of drought threatens people's economic situation, followed by a gradual effect on living conditions that eventually may lead to anxiety and depression (Vins et al., 2015).

Conflict, on the other hand, is a fast-onset hazard that hits immediately, directly, and with clear visibility (Zamani et al., 2006). The impacts of conflict have deteriorating effects on physical and mental health, leading for instance to posttraumatic stress. However, its sudden and clearly visible onset makes conflict, compared to drought, more likely to immediately evoke community support (Zamani et al., 2006). Theories of genetic evolution (Bowles, 2006) and those that suggest an interaction with cultural evolution (Henrich and Boyd, 2001) argue that the threat of intergroup competition and conflict may foster ingroup prosociality and altruism that promote group's success. Consistently, we expect that exposure to conflict (but not to drought) may increase collaboration within communities and bind the group together in a way that is beneficial for mental health (Muldoon et al., 2021), thus fostering collective resilience and compensating for the loss of material resources (Oberg et al., 2021). This would suggest that conflict negatively impacts a child's skills less than drought, in particular for non-cognitive skills as these are more adaptable to parental influences.

3.3 The mediating potential in parental investments

Very young children depend highly on their parents and other adult family members. Important aspects of parenting for children's cognitive and non-cognitive skill development include cog-

nitive stimulation, caregiver sensitivity and responsiveness, as well as emotional warmth (Black et al., 2017). To help children threatened by adversity, adults make every effort to protect them. However, their ability to do so may be undermined or promoted by their own resilience (Oberg et al., 2021). Two factors are arguably determining the relationship between parenting and children's outcomes, the amount of time parents invest (quantity) and the style of parenting (quality) they use (Doepke et al., 2019). Based on the previous literature on conflict we can see that parental mental health mediates the quality of parenting (Punamäki et al., 2017; Qouta et al., 2008; Diab et al., 2018), while findings on environmental shocks suggest that when more time needs to be allocated to for instance agricultural work, this reduces investments in children (Wu et al., 2023).

In conclusion, this leaves us with a number of expectations. First, the clear visibility and the inter-group component of conflict is more likely than drought to generate early response and community cohesion, a protective factor for mental health and prerequisite for cooperation to mitigate the negative impact on material and economic resources as people help and support each other. Thus, the diverging consequences of these two hazards could lead to less damaging effects of conflict, compared to drought, on child development, most likely with the most significant differences for the more environmentally formable non-cognitive skills. However, if driven by within group cohesion, children from ethnic minority families should be worse off than those from the majority, especially if their ethnic group is associated with either of the fighting parties.

Second, these differences should have different implications for parents' investments in their children, the most important mechanism behind child development. If within group cohesion protects mental health and rebuilds material resources, it also increases parents ability to protect their children's emotional processes and leaves more time to invest in their children. We would thereby expect, that conflict, more than drought, preserve higher quality and quantity of parental investments in their children.

Third, if the within group cohesion stemming from the visibility and inter-group component of conflict has a diverging impact on children's outcomes and parental investments compared to drought, these effects should be more and more salient with increased threat from higher

conflict intensity.

Finally, since resilience also tend to vary with socioeconomic and demographic factors such as gender, education and age. We would expect that child resilience is better preserved in countries with higher gender equality and in families with older and more educated mothers.

4 Methods

4.1 Data

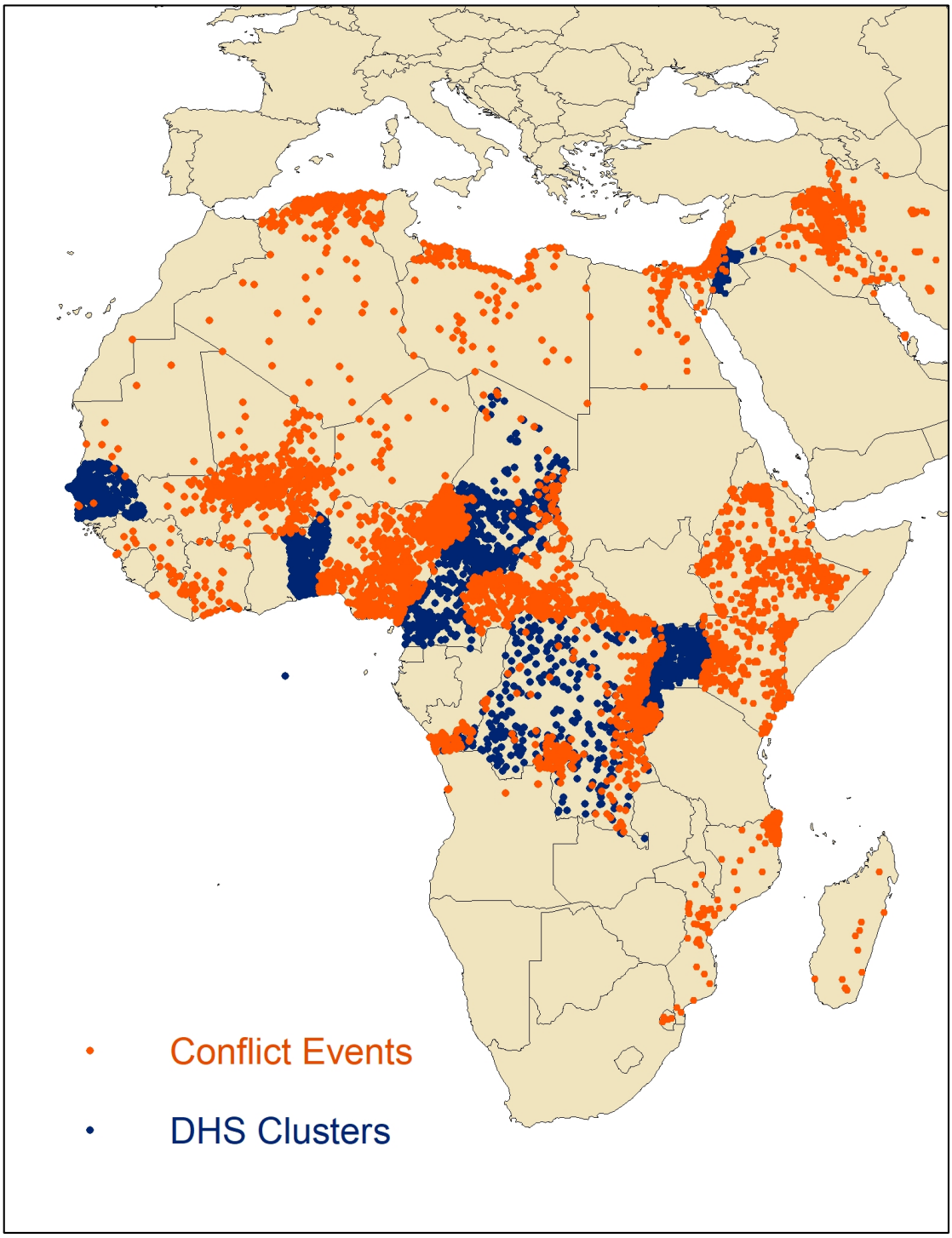
Data description Our dataset uses UCDP GED event conflict data and SPEI drought data, together with DHS surveys from 10 countries for the years from 2006 to 2020, for a total of around 50,000 observations. Summary statistics for each dependent and independent variable are presented in Table 1. The DHS clusters in our sample and the local conflict events are shown in Figure 1.

Dependent Variables As our main outcome variables, we employ DHS data from all recent rounds that include a child development module. We restrict the sample to Africa and the Middle East. The DHS child development module contains detailed questions on the cognitive and non-cognitive skills of young children under 5. In particular, mothers are asked whether their child can read simple words, knows the numbers from 1 to 10, and can identify letters and whether it can follow simple instructions, concentrate on a task, get along with other children, or is likely to act aggressively. We group the former three into cognitive skills and the remaining ones into non-cognitive skills.

We complement these variables with information on whether and how parents (or other household members) invested into the child. Investment hereby refers to reading to the child, singing with them, telling them stories, taking them outside, playing with them, or counting and drawing with them. We can separate between investments by the mother, father, and others.

Independent Variables Our main independent variable is the incidence of armed conflict within 50 kilometers of a DHS cluster for a child's time in utero (9 months before birth) and

Figure 1: Data



Notes: The map shows the location of the DHS clusters in our sample and UCDP GED conflict events for the time period from 2005-2020.

its time during early childhood (from birth to day of DHS interview). A child experienced on average 25.77 fatalities in a 50 kilometer vicinity while in utero and 83.40 during its early childhood. Armed conflict data are drawn from the geo-referenced version of the UCDP GED

Table 1: Summary Statistics

	Mean	Min	Max	Std. Dev.	Obs.
A. Dependent Variables					
Cognitive skills, index	0.47	0.00	3.00	0.87	53563
Non-cognitive skills, index	1.32	−2.00	3.00	1.25	52482
Total investment	3.11	0.00	6.00	2.02	54038
Mother's investment	1.76	0.00	6.00	1.83	54038
Father's investment	0.66	0.00	6.00	1.25	54038
B. Independent Variables					
Conflict exposure in utero, 50km	25.77	0.00	4033.00	181.13	55924
Conflict exposure in early childhood, 50km	83.40	0.00	14781.00	579.58	55924
Drought exposure in utero	0.60	0.00	6.00	1.00	53080
Drought exposure in early childhood	2.43	0.00	17.00	3.05	53080
C. Control Variables					
Child's age	2.38	0.00	4.00	1.44	54364
Child's month of birth	6.51	1.00	12.00	3.42	55924
Mother's year of schooling	3.86	0.00	20.00	4.33	55912
Mother's age	30.44	15.00	49.00	6.34	55924
Household wealth index	2.71	1.00	5.00	1.39	55924
Household head's sex	1.16	1.00	2.00	0.37	55924
Household head's age	39.65	17.00	98.00	12.03	55922
Household size	2.41	0.00	24.00	1.26	55924

Notes:

dataset. We include all types of violence coded by UCDP: state-based conflict, involving at least one governmental actor, non-state conflict where two or more organized groups, such as rebel groups, fight each other, and one-sided violence, or the indiscriminate use of armed force by the government against civilians. The UCDP GED includes detailed information about the time, location, type, and fatalities of conflict events from 1989 to 2022. We chose UCDP data for two main reasons. First, the application of an immutable and rigorous definition of conflict, and the strict reliance on a set of transparent coding rules make UCDP data comparable across countries and over time. Second, the UCDP data collection is highly standardized and relies on information from news sources, non-governmental organisation reports, case studies, truth commission reports, historical archives, and other sources of information, thus reducing the risk of media bias.

Our second set of independent variables uses drought data during the growing season. We calculate the number of months a child was exposed to drought while in utero or during early childhood. On average a child experienced 0.60 months of drought while in utero and 2.43 months in early childhood.

To measure drought we use the Standardized Precipitation Evapotranspiration Index (SPEI) index (Vicente-Serrano et al., 2010). The SPEI is an extension of the Standardized Precipitation Index, which takes into account precipitation, temperature, and potential evapotranspiration to determine drought. Given the scarce use of irrigation in most of Sub-Saharan Africa the rain patterns during planting and growing seasons are the most critical to determine farmers' livelihoods. The SPEI data is available at the prio-grid level and we spatially match it to the DHS clusters.

Control Variables The DHS data provides numerous control variables. The children in our sample are between 0 and 4 years old with an average age of 2.38. They live in households with mostly male heads (84%) and on average 2.41 members. Their mothers are on average 30.44 years old and accumulated on average 3.86 years of schooling.

4.2 Estimation Framework

Our empirical strategy exploits the arguably random timing of births and highly local within-DHS cluster variation to estimate the effects of conflict exposure on child development outcomes.[1] Our second main independent variable of interest, drought shocks, is arguably random by construction (i.e., focusing on weather shocks). We employ standard OLS fixed effects regressions:

$$(1) \qquad Y_{ilcmt} = \sum_{j=C,D} \beta_1^j U_{ilcmt}^j + \sum_{j=C,D} \beta_2^j EC_{ilcmt}^j + \mathbf{X}_{ilmct}\pi + \gamma_{lc} + \eta_{cm} + \tau_t + \varepsilon_{ilmct}$$

where Y_{ilcmt} is the development outcome of child i in location cluster l in country c, born in month m and year t. The four main independent variables are U_{ilcmt}^C and EC_{ilcmt}^C – the number of fatalities within 50 kilometers of a DHS cluster while the child was in utero or during early childhood, respectively – and U_{ilcmt}^D and EC_{ilcmt}^D – the number of months with drought during the growing season while in utero and during early childhood, respectively. We take the natural logarithm of our two conflict measures.

[1] In the spirit of a classic balance test, Table 5 in the appendix shows that our pre-determined control variables do not significantly differ in high violence vs low violence households.

To ensure that we only exploit the highly granular variation mentioned above, we need to control for several fixed effects. To account for general local conditions we include location-country fixed effects (γ_{lc}). This guarantees that general geographic conditions such as altitude, distance from the equator, distance to the main road or capital city as well as mountainous terrain, all of which could affect both a child's development conditions and armed conflict risk, are controlled for. Other time-invariant characteristics, such as a location's political conditions are also controlled for by these fixed effects. We further include country-month η_{cm} and age τ_t fixed effects. For example, children born right after the growing season might have different developmental outcomes than those born during hunger. Naturally, this agricultural season differs from country to country. Next, age fixed effects ensure that we only compare children of the same age.

In $\mathbf{X}_{ilmct}$ we collect mother and household level controls. These include age and sex of the household head, household size, and the household wealth score as well as the sex of the child. At the mother level we include the years of education and age fixed effects.

Given the inherent spatial structure of our data we allow standard errors to be correlated within 50km of a DHS cluster. The 50km cutoff coincides with our fatality threshold. However, our results are robust to clustering standard errors at the country-location level and alternative cutoff distances.

5 Results

Children Our main results for the effects of hazards on cognitive and non-cognitive skills in young children are reported in Table 2. Both conflict and drought exposure while in utero have significant negative effect on cognitive development with point estimates of -0.022 (std error 0.009) and -0.009 (std error 0.004) in our preferred specification (regression 3) with our full set of controls and fixed effects.

We find no effect for either of the two during early childhood, point estimates are close to zero and insignificant (again regression 3).

For non-cognitive skills we find significant negative effects for conflict exposure while in

Table 2: Effects of Hazards on Children's Skills

Dependent variable:	Cognitive Skills			Non-Cognitive Skills		
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict in utero, 50km	−0.022	−0.022	−0.022	−0.018	−0.018	−0.019
	(0.008)***	(0.008)***	(0.009)**	(0.009)**	(0.008)**	(0.008)**
Conflict in early childhood, 50km	−0.006	−0.005	−0.003	0.022	0.023	0.025
	(0.007)	(0.007)	(0.006)	(0.009)**	(0.008)***	(0.009)***
Drought in utero	−0.009	−0.010	−0.009	−0.007	−0.008	−0.008
	(0.004)**	(0.004)**	(0.004)**	(0.005)	(0.005)	(0.005)
Drought in early childhood	0.002	0.000	0.000	−0.007	−0.008	−0.008
	(0.004)	(0.004)	(0.004)	(0.003)**	(0.003)**	(0.003)***
Country-Cluster Effects	yes	yes	yes	yes	yes	yes
Child Age Effects	yes	yes	yes	yes	yes	yes
Mother Controls	no	no	yes	no	no	yes
Household Controls	no	no	yes	no	no	yes
R^2	0.01	0.01	0.04	0.00	0.00	0.01
N	49431	49431	49421	48451	48451	48441

Notes: Mother Controls include age fixed effects and years of schooling. Household Controls are age and sex of the household head, household size, and wealth score. **Standard errors** allow for arbitrary correlation within 50km.

Table 3: Effects on Non-Cognitive Skills by Ethnicity and Minority

Dependent variable:	Non-Cognitive Skills				
	(1)	(2)	(3)	(4)	(5)
Conflict in utero, 50km	−0.018	−0.019	−0.019	−0.019	−0.019
	(0.008)**	(0.008)**	(0.008)**	(0.008)**	(0.008)**
Drought in utero	−0.008	−0.008	−0.008	−0.008	−0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Conflict in early childhood, 50km	0.027	0.025	0.025	0.025	0.025
	(0.009)***	(0.009)***	(0.009)***	(0.009)***	(0.009)***
... x Co-Ethnic Conflict	−0.045				
	(0.028)				
... x Co-Ethnic Conflict & Local Minority		−0.103		−0.088	
		(0.056)*		(0.043)**	
... x Co-Ethnic Conflict & Local Majority			−0.006		
			(0.022)		
... x Local Minority					−0.001
					(0.023)
Drought in early childhood	−0.008	−0.008	−0.008	−0.008	−0.008
	(0.003)***	(0.003)**	(0.003)***	(0.003)**	(0.003)***
... x Local Minority				−0.016	
				(0.021)	
Country-Cluster Effects	yes	yes	yes	yes	yes
Child Age Effects	yes	yes	yes	yes	yes
Mother Controls	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes
R^2	0.01	0.01	0.01	0.01	0.01
N	48441	48441	48441	48441	48441

Notes: Co-Ethnic Conflict is a dummy that takes on the value of one if a household shares the same ethnicity with one of the fighting groups within 50km. Local Minority is a dummy equal to one if a household's ethnicity is not the majority within their local cluster. Mother Controls include age fixed effects and years of schooling. Household Controls are age and sex of the household head, household size, and wealth score. **Standard errors** allow for arbitrary correlation within 50km.

utero and significantly positive effects for conflict exposure during early childhood. In terms of magnitudes, our positive point estimate for non-cognitive skills (0.025, std error 0.009) suggest that a one-standard deviation increase in violence experienced during early childhood increases non-cognitive skills by about 11 percent (regression 6).

On the other hand, drought exposure in early childhood strongly decreases non-cognitive skills (-0.008, std error 0.003) while drought experienced in utero has no significant effects on non-cognitive skills although the point estimates are negative and in the same order of magnitude as the ones for exposure during early childhood (-0.008).

In general, all the results are highly robust across three different specifications with varying fixed effects and controls.

The Social Psychology of Conflict After establishing the main effects, we next zoom into our proposed mechanisms outlined in the theory section above. Recall from above that we expect conflict exposure to increase collaboration within communities and bind the group together in a way that is beneficial for mental health (Muldoon et al., 2021), thus fostering collective resilience and compensating for the loss of material resources. However, this mechanism should be absent for small communities so strongly affected by conflict that they cannot compensate for its negative effects on their resources. In practice this should include local (ethnic) minorities whose groups are actively engaged in fighting. In Table 3 we test this by interacting conflict exposure during early childhood with whether a household belongs to a local ethnic minority and whether it's co-ethnics are engaged in fighting. Regression 1 suggests that the positive effect of conflict exposure n non-cognitive skills in facts disappears for co-ethnic conflict, however the point estimate (although double in absolute magnitude) is insignificant. However, when we also take the ethnic minority status of a group into account, the interaction effects increases and turn significant (regression 2). The resulting point estimate of -0.103 (std error 0.056) clearly outweighs the positive main effect (0.025). As a placebo check we show that co-ethnic conflict does not matter whenever a local majority is involved (regression 3). Furthermore, the results are robust to also controlling for an interaction of drought exposure and a local ethnic minority (regression 4). Finally, we show that co-ethnic conflict exposure matters, simply being a local ethnic minority does not (regression 5).

Table 4: Effects of Hazards on Household Members' Investment

Dependent variable:	Investment by							
	All HH Members		Mother		Father		Others	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conflict in utero, 50km	0.001	0.000	0.004	0.003	−0.012	−0.011	−0.005	−0.005
	(0.013)	(0.012)	(0.010)	(0.008)	(0.010)	(0.009)	(0.009)	(0.008)
Conflict in early childhood, 50km	0.064	0.068	0.044	0.046	0.022	0.024	0.024	0.025
	(0.021)***	(0.021)***	(0.016)***	(0.016)***	(0.010)**	(0.010)**	(0.012)**	(0.011)**
Drought in utero	−0.027	−0.027	−0.002	−0.002	−0.005	−0.004	−0.018	−0.018
	(0.009)***	(0.009)***	(0.007)	(0.007)	(0.006)	(0.006)	(0.008)**	(0.008)**
Drought in early childhood	−0.018	−0.018	−0.005	−0.005	−0.004	−0.004	−0.008	−0.008
	(0.008)**	(0.008)**	(0.006)	(0.006)	(0.004)	(0.004)	(0.005)	(0.005)*
Country-Cluster Effects	yes	yes	yes	yes	yes	yes	yes	yes
Child Age Effects	yes	yes	yes	yes	yes	yes	yes	yes
Mother Controls	no	yes	no	yes	no	yes	no	yes
Household Controls	no	yes	no	yes	no	yes	no	yes
R^2	0.00	0.03	0.00	0.03	0.00	0.05	0.00	0.02
N	49874	49865	49874	49865	49874	49865	49874	49865

Notes: Control variables are defined in Table 2. **Standard errors** allow for arbitrary correlation within 50km.

Parental Investment After providing evidence for our social psychological argument at the ethnic group level, we next investigate parent's investments into their children.

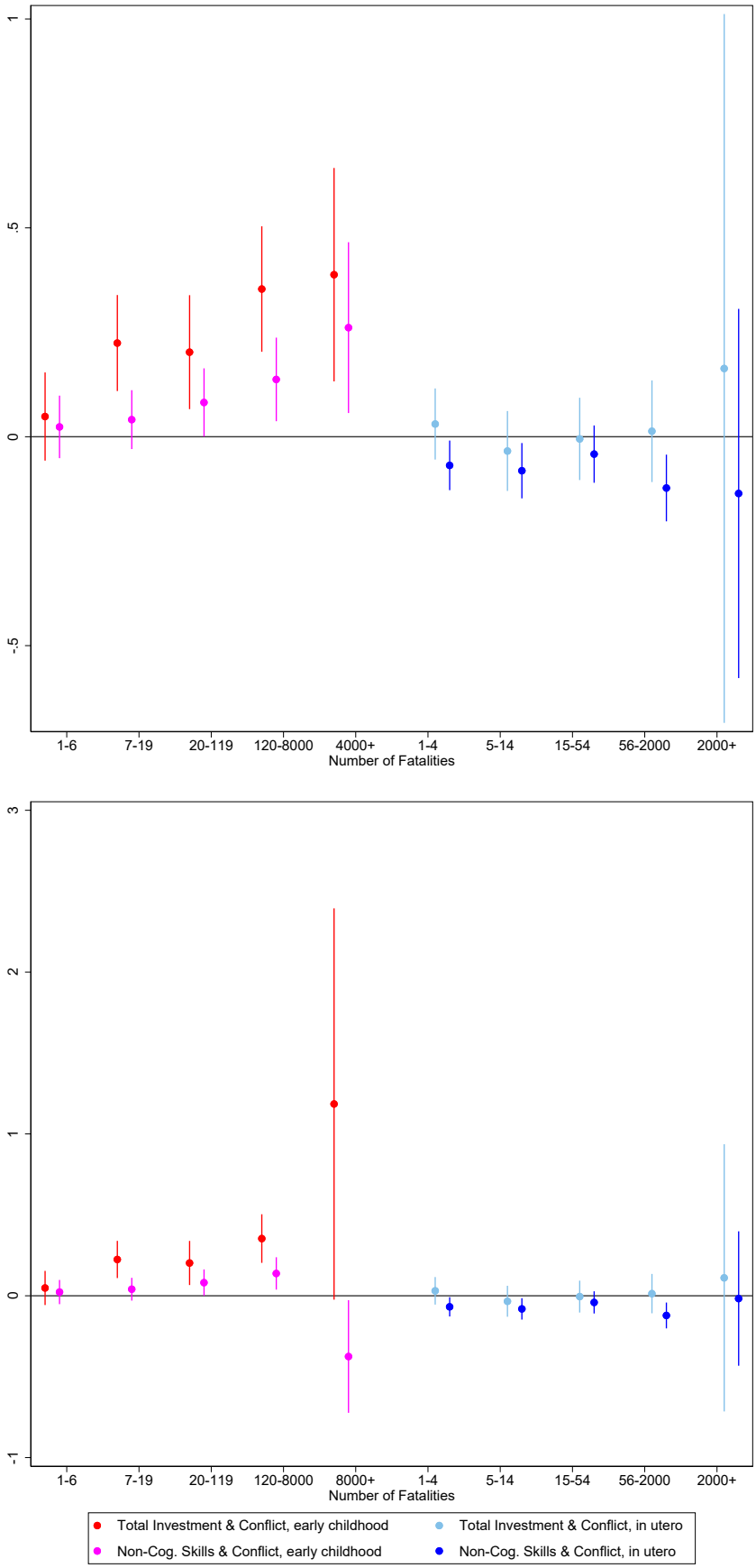
The results are shown in Table 4. In general, the findings for parental investments perfectly mirror the ones for non-cognitive skills. Our data allows us to distinguish between investments by all adult household members, mothers, fathers.

First, parents and others are significantly more likely to invest in their child when it is exposed to conflict during early childhood (regressions 1-2). The point estimate of 0.068 (std error 0.021) is substantial, a one standard-deviation increase in the number of fatalities increases the parenting index by about 1.5 percent. Drought while in utero and during early childhood both significantly decrease parental investment in the child.

When we unpack the total investment index into investments by mothers, fathers, and other household members, the results in regressions 3 to 8 suggest that both parents increase their investments in the child when it is exposed to conflict. On the other hand, the drop in investments for drought is exclusively driven by a drop in investments by other household members. Both mothers and fathers do not significantly change their parenting behavior (regressions 3 to 6).

Non-Linear Effects To provide more evidence for the strong parallelity between a child's non-cognitive skills and parental investment and to show that communities respond to different conflict threat levels, we dummy out our two conflict exposure measures.

Figure 2: Non-Linear Effects



Notes: In this figure we plot the point estimates for various dummies of conflict exposure (threshold defined on the x-axis) for the outcomes non-cognitive skills and total investments together with 95 percent confidence intervals. In the bottom sub-figure we allow for very large conflicts (fatalities larger than 8000).

Concrete, we split our two conflict exposure measures into quartile dummies (and an additional dummy to capture extremely large conflicts) and re-run our main specification. Figure 2 shows the results. Starting with the top sub-figure where large conflicts are defined as fatalities above 4000, we can clearly see convex effects for conflict in early childhood on non-cognitive skills. For low levels of conflict the effects are close to zero and insignificant. However as the number of fatalities increase, so does their effect on non-cognitive skills. Interestingly, this non-linear pattern is again perfectly mirrored in parental investment behavior, suggesting once more that parents compensation is driving the results. The effects of conflict in utero on the other hand (depicted to the right in the top picture) are negative and do not depends on the number of fatalities (and neither do investments).

It may seem surprising that non-cognitive skills seem ever increasing since at some point the conflict should become so serious that parents cannot compensate for it (also recall the negative effects for co-ethnic conflict for minorities). In the subfigure at the bottom we use 8000 fatalities as a threshold for a large conflict. In this case the effects of parental investment and non-cognitive skills clearly diverge. Eventhough parents investment shoots up, non-cognitive skills significantly drop. Taken together, while parents desperately try to compensate for large conflict, non-cognitive skills still drop.

Gender Equality A large literature suggests that mothers care more about the welfare of their children in the household. Since the positive effect of conflict during early childhood on non-cognitive skills clearly seems to be driven by parental investment, these effects might be stronger in places with *stronger mothers* or put differently more gender equality. In Figure 3 we split the sample into more and less gender equal countries (according to the women's participation index provided by VDem) and re-run our main specifications. The point estimates of conflict during early childhood on non-cognitive skills clearly differ for the two sub-samples. The positive overall effect is exclusively driven by the more gender equal countries. For the less gender equal countries the point estimate is precisely zero. When we repeat the exercise for parental investment, split into our three categories mothers, fathers, and others, we see the largest difference in investments for fathers and others. These are precisely the two categories where we expect an increase in more gender equal countries. Consistently, mothers investments

are independent of the gender ranking, the two point estimates are indistinguishable.

To rule out that our measure of gender equality is merely picking up political and economic freedom and not gender equality per se (although the point estimates for fathers highly suggests otherwise), we repeat this exercise in Figure 4 in the appendix but split the sample along the economic freedom house index. Importantly, we do not see the same pattern as with gender equality.

Robustness Checks We provide several robustness checks in the appendix. First, to test for outliers, we drop one country at a time and re-run our main specifications. Figure 5 in the appendix suggests that the results are not driven by a particular country.

Next, we show that our results do not depend on the exact threshold to measure fatalities. Our baseline specification counts conflict events within 50km of a DHS cluster. In Figure 6 we report results also for 10km, 25km and 75 km thresholds. Overall the results are highly robust.

Our baseline specification counts conflict within 50km of a DHS cluster. If clusters are close to a border this may include conflict events in neighboring countries. For robustness sake, we re-run our main specification but exclude conflict in neighboring countries. Table 6 suggests that the results are robust.

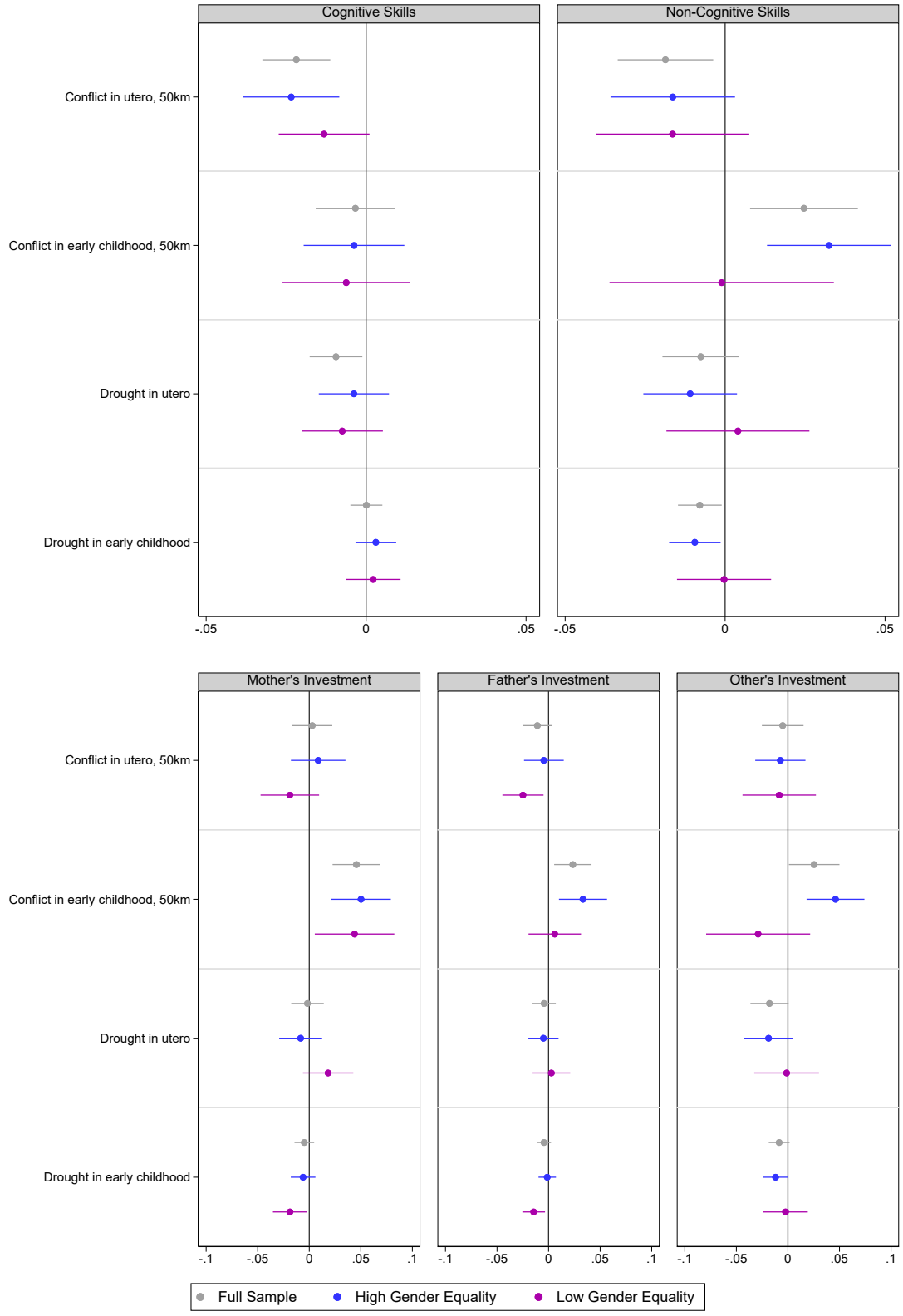
Our hazard exposure measures in utero and during early childhood may be highly correlated. To rule out that multicollinearity is affecting our findings we re-run our main specifications but add each hazard exposure variable one by one. Importantly, the results are robust.

In Table 7 we provide a final set of robustness checks. First, we drop the top 1% of the conflict distribution to show that our results are not driven by extreme outliers. Next, our baseline specification takes the natural logarithm of fatalities, however our results to not depend on it. The results are robust to a simple linear specification. Finally, the results are robust to adding age by sex and mother occupation fixed effects.

6 Discussion and Conclusion

Our main results demonstrate the ruinous consequences on children's development of cognitive and non-cognitive skills when exposed to armed conflict and drought during the fetal stage. In

Figure 3: Effects by Gender Equality Status



Notes: The sample is split at the 25th percentile of the VDem Gender Equality Index. All points of the same color within a column represent a separate regression. We report 95 percent confidence intervals.

line with our proposed theory, we find that development in early childhood is better protected during conflict than drought exposure. Surprisingly, we even find that conflict exposure in early childhood significantly positively affects young children's non-cognitive skills. When investigating the mechanism behind this pattern, we see that the more exposed the child is, the more parents invest, which in turn increases the positive effect on non-cognitive skills. Unfortunately, for the most intense wars, children's non-cognitive skills still drop despite their parent's best efforts. Finally, we investigate the importance of underlying conditions. First, we find that the positive effects are driven by countries above the bottom 25th percentile of the global gender equality distribution. In these countries, the father primarily drives the increase in parental investments.

These findings align with the fetal origin hypothesis, suggesting that the time in utero is a susceptible period against adversity. It highlights the importance of protecting pregnant women from conflict and environmental hazards. Importantly, it adds to the almost non-existent research on the impacts of these hazards on children's non-cognitive skills. Interestingly, similar to the larger literature on the impact of shocks on non-cognitive skills for adults, these findings suggest that there can be positive effects already for very young children. Our theoretical expectations are routed in social psychology, and the previous findings show that inter-group conflict and competition promote within-group cooperation, which we expected to be helpful for conserving children's development trajectories in times of crisis. Our findings suggest that the clear, visible threat of conflict makes parents not only capable of conserving their level of investment in their children but sometimes even invest more with positive results for some of their children's skills. However, parents do not seem to (be able to) put in that additional investment for less sudden and visible threats like drought or when the child was not already born but still in utero during the exposure. These results demonstrate parental and child resilience but highlight an important caveat: only when threats are clear and obvious do parents respond by increasing investments. Furthermore, the impact of conflict exposure in early childhood turns negative for children exposed to co-ethnic conflict from minority mothers. Based on our theory, we expect this to be the case because they lack the benefits, such as cooperation to preserve resources and mental health, from the increase in in-group cohesion during conflict exposure.

Important to note is that the positive effects on non-cognitive skills disappear for children belonging to any ethnic group who is associated with the fighting dyad, suggesting that the result is not driven by the inter-group competition components specifically and that when direct part of the conflict, enough resources cannot be preserved.

There are a few potential limitations to our study. First, our outcome variables are based on self-reported survey data and may suffer from social desirability bias. For example, mothers may pretend to invest more in their children than they actually do. Mothers may overstate the involvement of fathers and the abilities of their children. Mothers exposed to conflict may especially feel the need to report that they can still sufficiently care for their children; the bias may thus be correlated with conflict exposure. However, if true, we should also observe the positive effects of conflict exposure while in utero, which we do not. However, maybe only recent conflict exposure is salient enough to swing mothers' answers. To rule this out, we calculate conflict exposure for the three months before the survey interview and add it to our main specification. Importantly, our findings are robust and the point estimate on the additional regressor is small and insignificant.

Another concern may be selective killings. Maybe violence targeted the most vulnerable households, which could explain the positive effects of conflict exposure in early childhood on non-cognitive skills. However, it could not explain the adverse effects of conflict exposure in utero.

Besides selective killings, selective migration might also explain our findings. In this case, we cannot argue that the negative point estimate on exposure in utero lets us rule this out because more vulnerable households may decide to migrate after their pregnancy. We present two pieces of evidence to suggest that this is unlikely. First, more prosperous and more affluent households usually migrate because they can afford to – this would go against our finding. Second, the DHS data contains a question on how long a household has lived in their surveyed location. Importantly, the effects do not differ for the total sample (including migrants who moved in after their child was born) and households that experienced violence in their surveyed location.

Addressing these limitations through, for instance, other more objective measures is one

avenue for future research. Another would be to test some of our theoretical implications directly: that in-group cohesion during conflict preserves mental health and material resources and that these factors promote higher quantity and quality of parental investments. Exploring the impact from other shocks without the inter-group component but more immediate visibility, such as earthquakes would be one way to build on these findings. The newly added child development module in the DHS that made this study possible is an important contribution to understanding these questions. However, additional data on household dynamics, including positive and negative parenting, more diverse child development outcomes, and indicators of parents' resilience, are needed.

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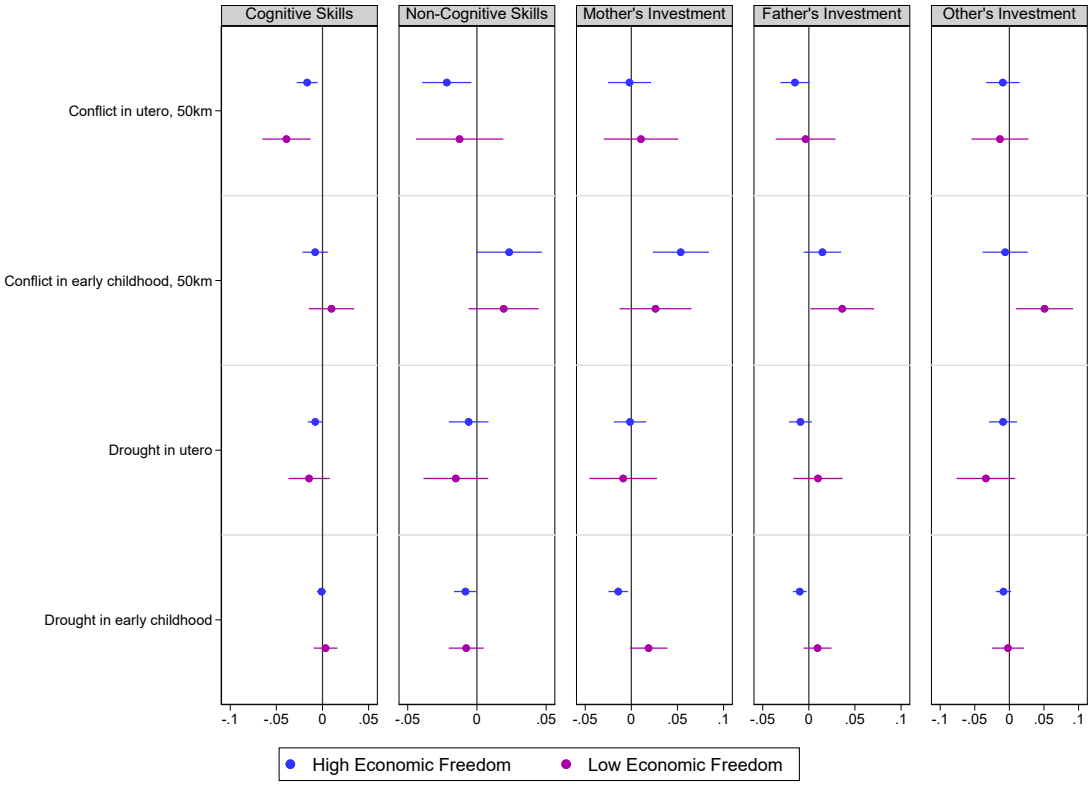
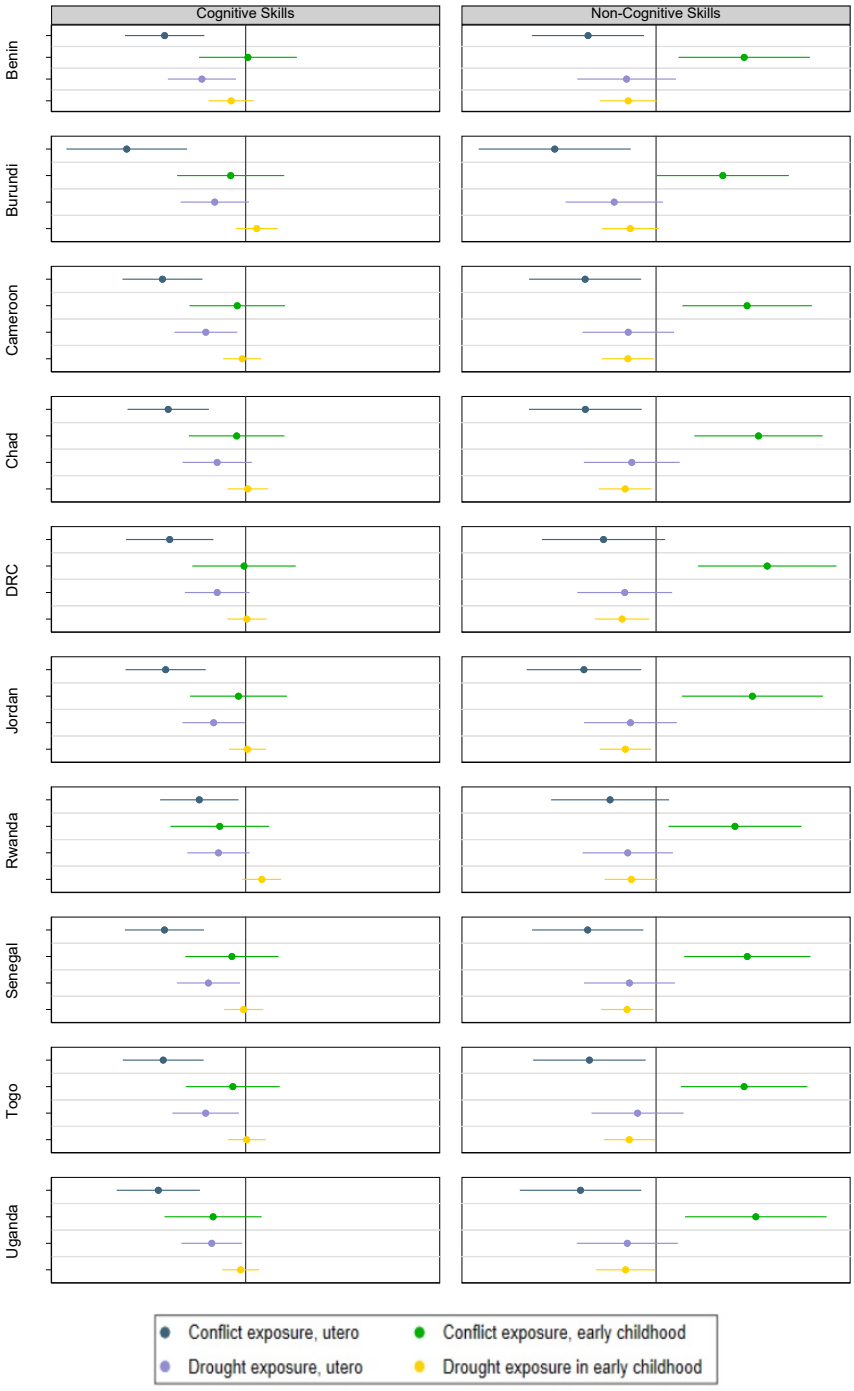
Figure 4: Effects by Economic Freedom



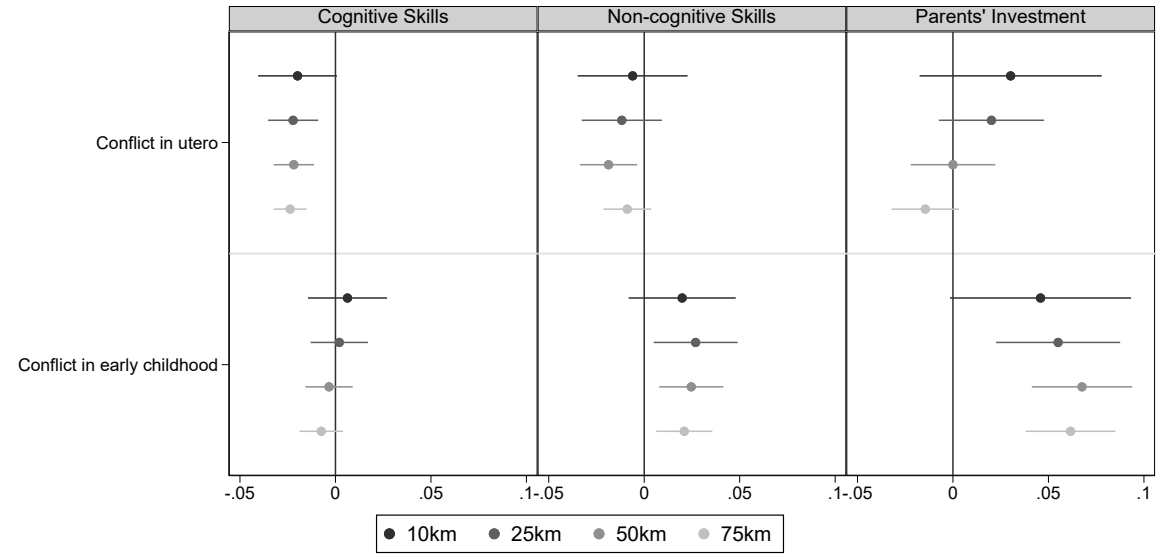
Notes: The sample is split at the 25th percentile of the Economic Freedom Index. All points of the same color within a column represent a separate regression. We report 95 percent confidence intervals.

Figure 5: Dropping One Country at a Time



Notes: The figure shows the point estimates on our main specification when dropping one country at a time, denoted vertically on the y-axis. We also report 95 percent confidence intervals.

Figure 6: Effects by Exposure Distance



Notes: We vary the exposure distance to measure fatalities from 10 km to 75km and re-run our main specification. All points of the same color within a column represent a separate regression. We report 95 percent confidence intervals.

Table 5: Balance Test

	Low Violence	High Violence	
	Mean (Std.Dev.)	Mean (Std.Dev.)	p-Value
Panel A. Conflict Exposure in Utero			
Household Wealth	2.755	2.707	0.379
	(1.420)	(1.389)	
Age of Household Head	1.170	1.164	0.866
	(0.375)	(0.370)	
Sex of Household Head	37.598	40.054	0.770
	(10.299)	(12.308)	
Household Size	2.173	2.462	0.001
	(0.862)	(1.317)	
Mother's Age	31.244	30.277	0.507
	(6.105)	(6.373)	
Mother's Education	5.029	3.635	0.906
	(4.645)	(4.291)	
Panel B. Conflict Exposure in Early Childhood			
Household Wealth	2.879	2.645	0.988
	(1.433)	(1.372)	
Age of Household Head	1.171	1.162	0.833
	(0.376)	(0.369)	
Sex of Household Head	37.680	40.487	0.607
	(10.344)	(12.592)	
Household Size	2.138	2.532	0.756
	(0.837)	(1.382)	
Mother's Age	31.198	30.112	0.115
	(6.099)	(6.411)	
Mother's Education	4.661	3.526	0.462
	(4.605)	(4.238)	

Notes: The full sample is split at the median value of conflict exposure in utero in Panel A and early childhood in Panel B. The p-value of the test of equality of means is based on standard errors clustered at DHS cluster level and after netting out fixed effects.

Table 6: Robustness Check: Excluding Conflict in Neighboring Countries

Dependent variable:	Cog. Skills		Non-Cog. Skills		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict in utero, 50km	−0.029	−0.026	−0.027	−0.026	0.015	0.017
	$(0.006)^{***}$	$(0.005)^{***}$	$(0.009)^{***}$	$(0.009)^{***}$	(0.013)	(0.013)
Conflict in early childhood, 50km	0.004	0.007	0.034	0.036	0.041	0.047
	(0.008)	(0.008)	$(0.012)^{***}$	$(0.012)^{***}$	$(0.019)^{**}$	$(0.019)^{**}$
Drought in utero	−0.012	−0.011	−0.011	−0.011	−0.022	−0.021
	$(0.004)^{***}$	$(0.004)^{**}$	(0.007)	(0.007)	$(0.010)^{**}$	$(0.010)^{**}$
Drought in early childhood	−0.005	−0.005	−0.012	−0.012	−0.015	−0.015
	$(0.003)^{*}$	$(0.003)^{*}$	$(0.004)^{***}$	$(0.004)^{***}$	$(0.006)^{**}$	$(0.006)^{**}$
Country-Cluster Effects	yes	yes	yes	yes	yes	yes
Child Age Effects	yes	yes	yes	yes	yes	yes
Country-Month Effects	yes	yes	yes	yes	yes	yes
Mother Controls	no	yes	no	yes	no	yes
Household Controls	no	yes	no	yes	no	yes
R^2	0.42	0.44	0.40	0.40	0.44	0.45
N	45836	45826	44932	44922	46248	46239

Notes: In this table we exclude fatalities in neighboring countries and re-calculate our two conflict exposure measures. Controls and fixed effects are defined in Table 2. **Standard errors** are clustered at the DHS cluster level.

Table 7: Robustness Check: Outliers, Functional Form, and Additional Controls,

Dependent variable:	Cognitive Skills				Non-Cognitive Skills				Total Investment			
	Drop Top 1%	Linear Spec.	Sex-Age Effects	Occupation Effects	Drop Top 1%	Linear Spec.	Sex-Age Effects	Occupation Effects	Drop Top 1%	Linear Spec.	Sex-Age Effects	Occupation Effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Conflict in utero, 50km	−0.022		−0.022	−0.022	−0.019		−0.019	−0.018	0.001		−0.000	−0.000
	(0.005)***		(0.005)***	(0.005)***	(0.008)**		(0.008)**	(0.008)**	(0.011)		(0.011)	(0.011)
Conflict in early childhood, 50km	−0.004		−0.003	−0.004	0.024		0.024	0.024	0.070		0.068	0.067
	(0.007)		(0.006)	(0.006)	(0.009)***		(0.009)***	(0.009)***	(0.014)***		(0.013)***	(0.013)***
Drought in utero	−0.009	−0.008	−0.010	−0.010	−0.007	−0.005	−0.009	−0.008	−0.028	−0.023	−0.027	−0.027
	(0.004)**	(0.004)*	(0.004)**	(0.004)**	(0.006)	(0.006)	(0.006)	(0.006)	(0.010)***	(0.010)**	(0.010)***	(0.010)***
Drought in early childhood	0.000	0.001	0.000	−0.001	−0.008	−0.006	−0.008	−0.008	−0.019	−0.013	−0.019	−0.020
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)**	(0.003)*	(0.003)**	(0.003)**	(0.005)***	(0.005)**	(0.005)***	(0.005)***
Conflict in utero, 50km, linear		0.449				−1.723				0.839		
		(1.008)				(1.088)				(1.557)		
Conflict in early childhood, 50km, linear		−0.086				0.421				0.396		
		(0.179)				(0.183)**				(0.243)		
Country-Cluster Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Birth Year Effects	yes	yes	no	no	yes	yes	no	no	yes	yes	no	no
Country-Month Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Mother Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Child Age-Sex Effects	no	no	yes	yes	no	no	yes	yes	no	no	yes	yes
Mother Occupation Effect	no	no	no	yes	no	no	no	yes	no	no	no	yes
R^2	0.44	0.44	0.44	0.45	0.40	0.40	0.40	0.40	0.45	0.45	0.45	0.46
N	48930	49419	49419	49216	47944	48439	48439	48245	49365	49863	49863	49660

Notes: In columns 1,4, and 7 we drop the top one percent of the fatality distribution. In columns 2, 5, and 8 we do not take the log of fatalities. In columns 3, 6 and 9 we add sex by age fixed effects. All other controls and fixed effects are defined in Table 2. **Standard errors** are clustered at the DHS cluster level.

Table 8: Robustness Check: Migration History

Sample:	Full Migration Sample			Migrated before Birth		
	Cog. Skills	Non-Cog. Skills	Total Inv.	Cog. Skills	Non-Cog. Skills	Total Inv.
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict in utero, 50km	−0.020	−0.014	0.007	−0.017	−0.015	0.007
	(0.007)***	(0.009)	(0.013)	(0.007)**	(0.009)*	(0.013)
Conflict in early childhood, 50km	0.004	0.032	0.077	0.005	0.038	0.076
	(0.008)	(0.010)***	(0.016)***	(0.008)	(0.011)***	(0.016)***
Drought in utero	−0.010	−0.000	−0.031	−0.010	−0.005	−0.028
	(0.006)	(0.008)	(0.013)**	(0.006)	(0.008)	(0.013)**
Drought in early childhood	0.000	−0.008	−0.026	0.003	−0.010	−0.023
	(0.003)	(0.004)*	(0.007)***	(0.004)	(0.005)**	(0.007)***
Country-Cluster Effects	yes	yes	yes	yes	yes	yes
Child Age Effects	yes	yes	yes	yes	yes	yes
Country-Month Effects	yes	yes	yes	yes	yes	yes
Mother Controls	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes
R^2	0.43	0.39	0.42	0.44	0.40	0.44
N	29527	29420	29782	26907	26793	27138

Notes: All controls and fixed effects are defined in Table 2. **Standard errors** are clustered at the DHS cluster level.