

When It Rains, It (Possibly) Hurts: The Impact of Rainfall Shocks on Violence Against Children in Nigeria

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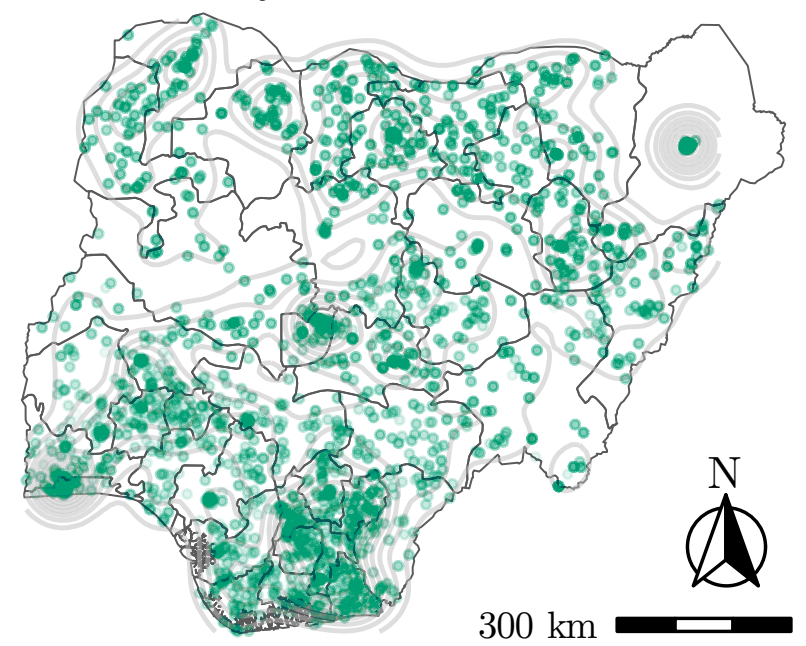
MOTIVATION

- One in two children have experienced some form of violence (physical, psychological, or sexual) [6], making **domestic violence** a particularly alarming issue.
- The acceleration of **climate change** has led to more frequent and intense extreme weather events, which disproportionately affect vulnerable populations.
- In countries where **household incomes** remain heavily **dependent on agriculture**, climate shocks can exacerbate economic stress $\Rightarrow$ contribute to an increase in domestic violence against children.

Focus on Nigeria

- Population: +200 million, **half of the population under 18 years old**.
- Agricultural sector**: 35% of the workforce, 22% of value added to GDP in 2021.
- Limited irrigation infrastructure**: less than 1% of agricultural lands irrigated.
- The Nigerian agricultural sector is particularly vulnerable to various extreme climatic shocks.

Nigerian Map. Green dots: surveyed households.



We investigate how exposure to **weather shocks** affects **domestic violence against children** in Nigeria.

Weather shocks are defined here as:

- wet shocks**: higher than usual **rainfall**,
- dry shocks**: higher than usual **consecutive dry days**.

Violence against children is defined as:

- psychological violence, physical violence, severe violence, any kind.

SCARCE LITERATURE

Weather events and child maltreatment:

Developing countries: mostly focusing on violence against children following **disasters**:

- Exposure to various **disasters** (floods, fires, tornadoes, etc.) is associated with a **higher risk of violence** [1].
- Children were more likely to experience **unintentional injury** and **parental violence** during **floods** in Bangladesh in 2007 [2].
- Livestock mortality caused by **severe winter disasters** in Mongolia is linked to an increased probability of both **physical and psychological violence** [7].

Developed countries:

- Positive correl. between **temperature increases** and **child maltreatment** in the USA [5].

Child marriage as a coping mechanism:

- Negative rainfall shocks** increase the **proba. of early marriage for girls** (not boys) [4].
- While **negative rainfall shocks increase** the **likelihood of child marriage** in Africa, the **opposite effect** is observed in **India** [3].

Our paper:

We document the possible links between weather variations (not focusing on disasters only) and violence against children, in a developing country.

DATA

Survey Data

- Multiple Indicator Cluster Survey (MICS)
- Geocoded, Nigeria
- 41,532 children, 39,632 households
- September and December 2021
- Disciplinary practices**: 2 violent psychological practices, 6 violent physical, 1 nonviolent disciplinary practices.

Weather Data

- CPC Global Precip./Unified Temp.
- 0.5 x 0.5 degree grid
- Daily, 1980-2023
- Daily **temperature** and **precipitation**.

The households are located in 269 distinct grid cells of the weather dataset.

	N	Overall <i>n</i> = 17,912	Female <i>n</i> = 8,918	Male <i>n</i> = 8,995	p-value
Violence of any kind	17,912	93% (0.003)	93% (0.004)	93% (0.004)	>0.9
Psychological violence	17,912	88% (0.003)	87% (0.005)	88% (0.004)	0.4
Physical violence	17,912	80% (0.004)	80% (0.006)	81% (0.006)	0.13
Severe violence	17,912	53% (0.005)	52% (0.008)	55% (0.007)	<0.001

Child discipline. Standard deviations in round brackets.

WEATHER SHOCKS

Wet Shock

- 90th percentile of daily precipitation** (on **wet days, >1mm**), over a 31-day window centered on each calendar day.
 - Ex: Oct. 1st, 2021 rainfall compared to all Oct. 1st, 1981–2010 $\pm$ 15 days.
- High Rainfall**: total rainfall on days exceeding this **threshold**, within a **period**.

Dry Shock

- Longest sequence of consecutive dry days (<1mm) within a **period**.
- Dry Spell**: persistence of low-rainfall conditions.

Periods: previous 30 days; previous 365 days; sowing season; harvesting season.

EMPIRICAL STRATEGY

For the baseline strategy

$$\text{Violence}_{ihtge} = \alpha + \beta \text{Rainfall}_{htg} + \gamma_1 X_i + \gamma_2 X_h + \lambda_t + \lambda_g + \lambda_e + \varepsilon_{ihtge} \quad (1)$$

child characteristics date interviewer
HH characteristics meteo. grid

- Violence_{ihtge}**: indicator for whether child *i* in hh *h* in meteo. grid *g*, interviewed by interviewer *e* at time *t*, has experienced violence (any, psychological, physical or severe).
- Rainfall_{htg}**: rainfall-based metrics for hh *h* in meteo. grid *g* at the date of interview *t*.
- Standards errors are clustered at the grid level.

For the heterogeneity analysis

$$\text{Violence}_{ihtge} = \alpha + \beta_0 \text{Rainfall}_{htcg} + \beta_1 z + \beta_2 \text{Rainfall}_{htcg} \times z + \gamma_1 X_i^{-z} + \gamma_2 X_h^{-z} + \lambda_t + \lambda_g + \lambda_e + \varepsilon_{ihtge}$$

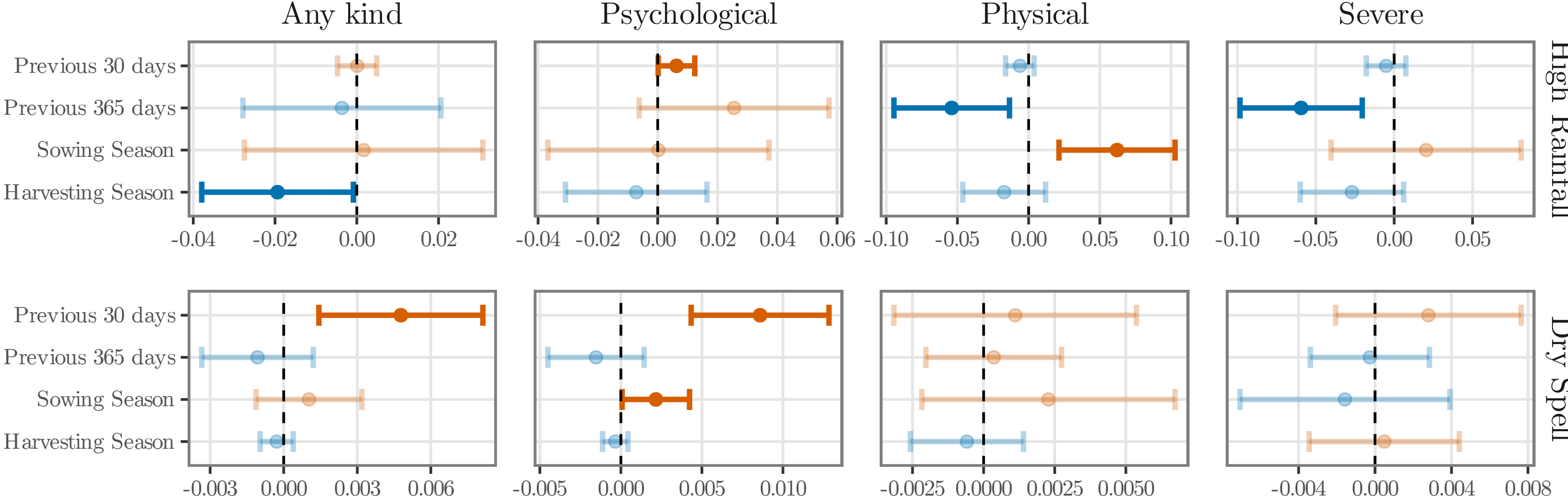
variable of interest

If $\beta_2 > 0$: **Exacerbating effect**.

Else, $\beta_2 < 0$: **Attenuating effect**.

RESULTS

Exceptional Rainfall (top) and Dry Spell (bottom).



Sex of the child :

- Rainfall**: no systematic differences.
- Dry days**: higher probability of experiencing **psychological violence** for girls in the short-term (30 days)

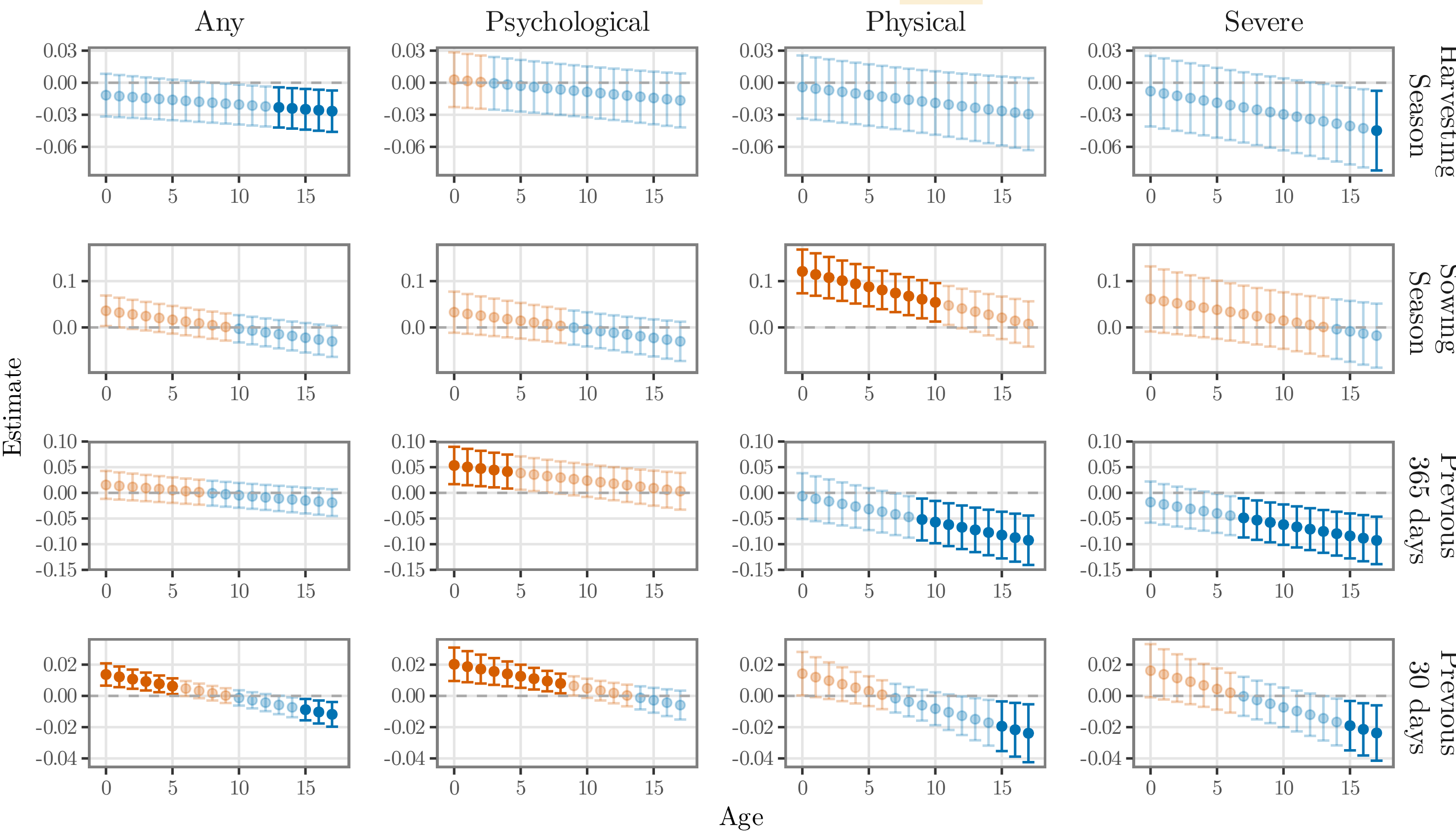
HH income: no systematic differences.

Child Work: **attenuating effect**. Involvement in income-generating activities may strengthen children's bargaining position, improve their outside options.

Land Ownership: no statistical difference.

Animal Ownership: **mitigating effect on physical violence** specifically during harvesting and sowing seasons under heavy rainfall conditions but no differences for dry shocks.

Potential Mechanisms: Income-Generating Through Age (High Rainfall Only).



Placebo Analysis: random spatial realloc., other outcome (school closure due to strikes).

CONCLUSION

- In the short term**, rainfall shocks **increase psychological violence** only.
- During the sowing season**, rainfall and droughts **increase violence**:
 - Rainfall $\rightarrow$ physical violence
 - Dry days $\rightarrow$ psychological violence
- Over a full agricultural year**, excess rainfall **reduces physical and severe violence**.
- Economic coping mechanisms** such as child labor or animal ownership appear to mitigate these effects.

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