Prévisibilité, volatilité et trauma : quel devenir pour les enfants ?
Unpredictability, volatility and trauma: Their impact on children

Bence Cs. Farkas

Outline

- Theoretical background
  - Uncertainty and its forms
  - Their relevance for the development of life strategies
  - Life strategies as vulnerability factors for psychopathology
- Evidence
  - Classics
  - Our own contributions
  - Future works

Theoretical background

Growing up and living in an uncertain world

Theoretical background

What is an uncertain world?

The interruption of our lives by events that:

Theoretical background

What is an uncertain world?

The interruption of our lives by events that:

can only be partially predicted

Theoretical background

What is an uncertain world?

The interruption of our lives by events that:

- can only be partially predicted
- change our environments in more or less permanent ways

Theoretical background

What is an uncertain world?

The interruption of our lives by events that:

- can only be partially predicted
- change our environments in more or less permanent ways
- change the consequences of our behaviour

Theoretical background

What is an uncertain world?

These events sometimes elevate our living conditions and physical and mental well-being

Theoretical background

What is an uncertain world?

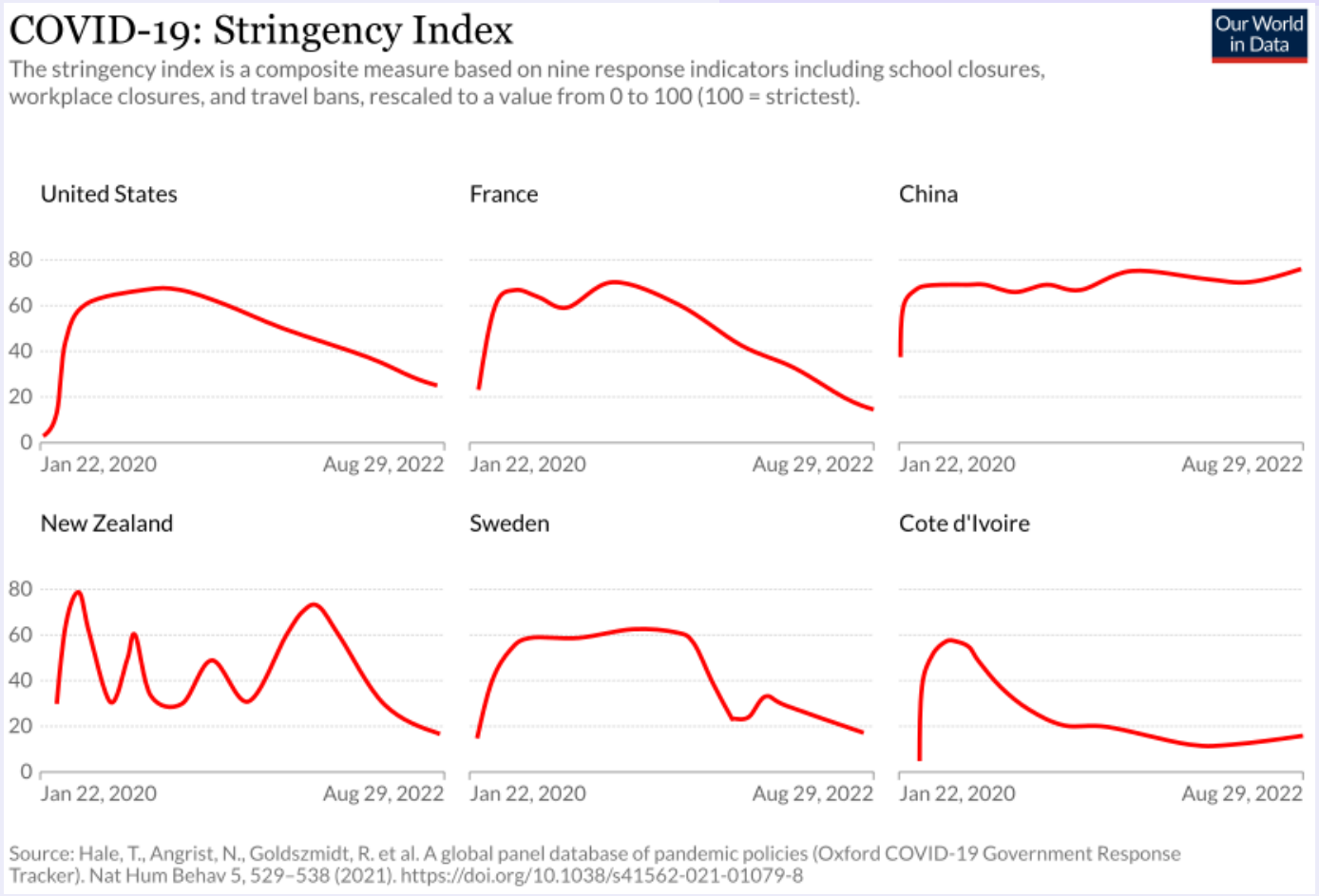
And sometimes not…

Theoretical background

Multiple types of uncertainty

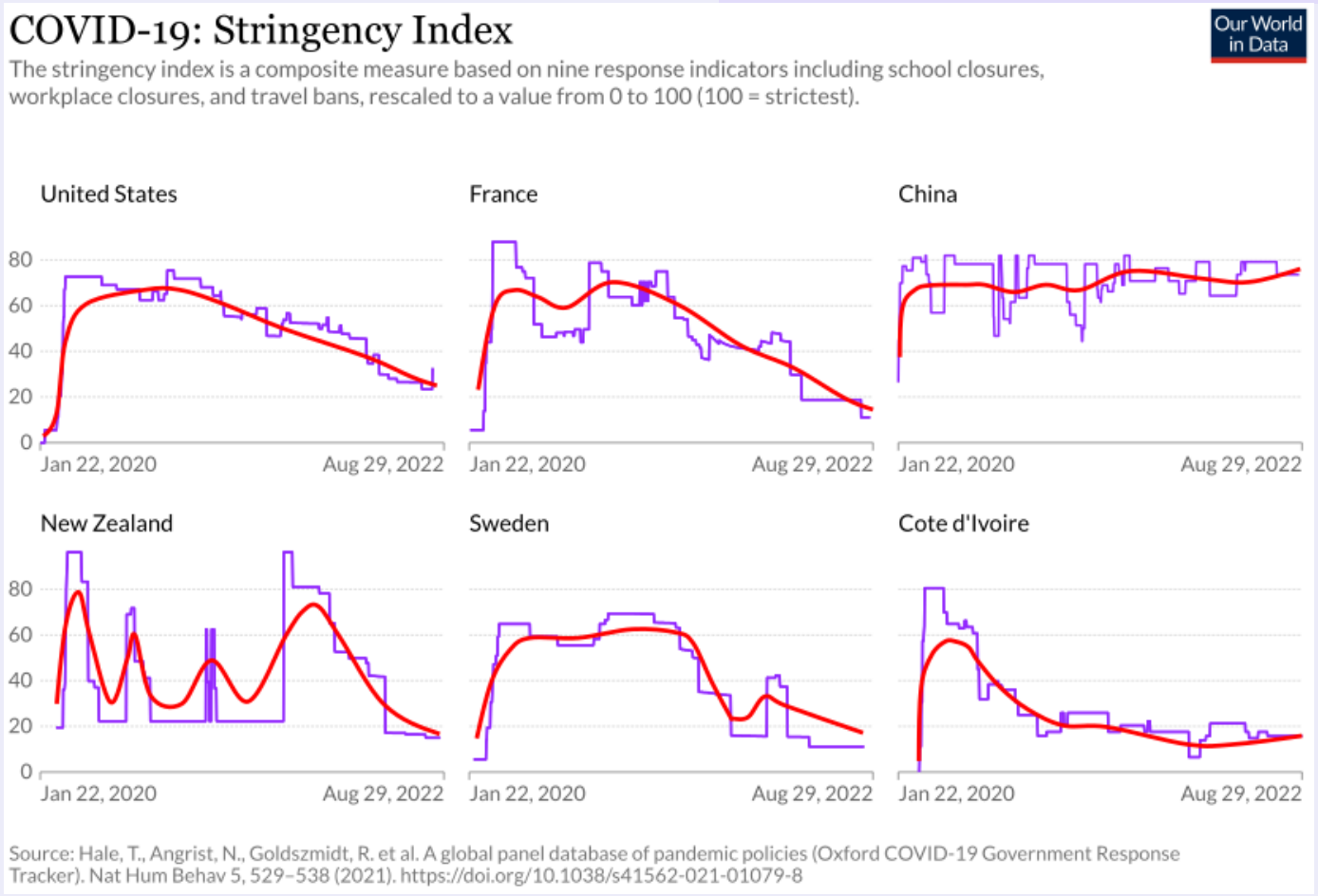
Theoretical background

Multiple types of uncertainty



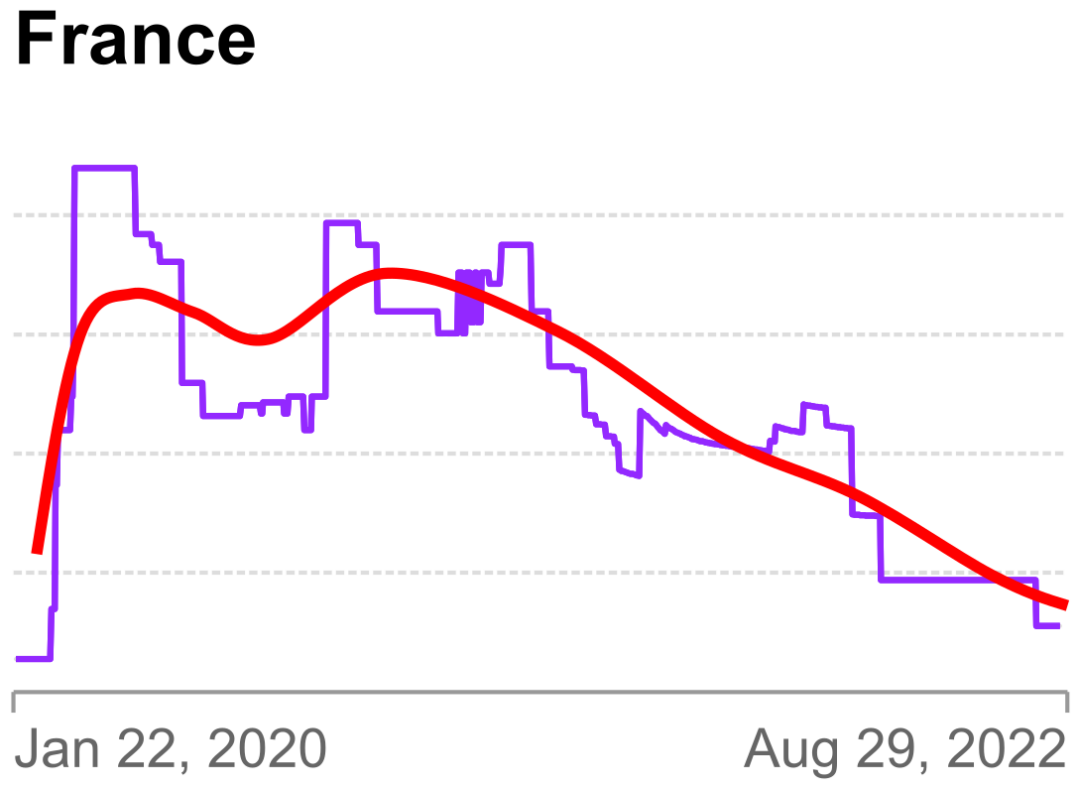
Theoretical background

Multiple types of uncertainty



Theoretical background

Distinct temporal signatures



Long timescale
months, years, decades
Volatility

Short timescale
hours, days, weeks
Stochasticity

Theoretical background

Uncertainty, adversity and life history strategies

The physical, social and psychological environment that we grow up in is also subject to these forms of uncertainty

Theoretical background

Uncertainty, adversity and life history strategies

Adversity factors subject to stochasticity

Parental care
Parent-child interactions
Daily routines
Family instability
Parental mental illness
…

Theoretical background

Uncertainty, adversity and life history strategies

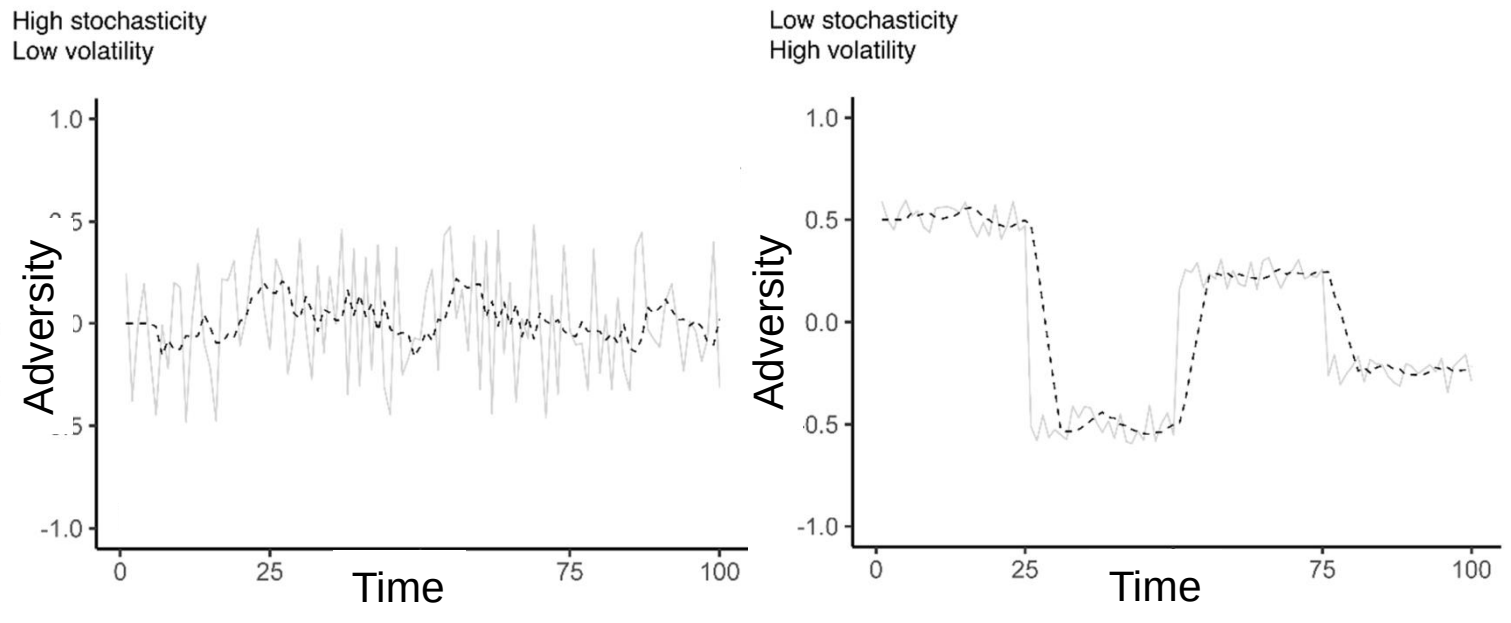
Adversity factors subject to volatility

Changes in family socioeconomic status
Changes in residence or school
Separation from parents
Institutionalization
…

Theoretical background

Uncertainty, adversity and life history strategies

Fluctuations of the adversity of early environment partially determine developmental and life trajectories

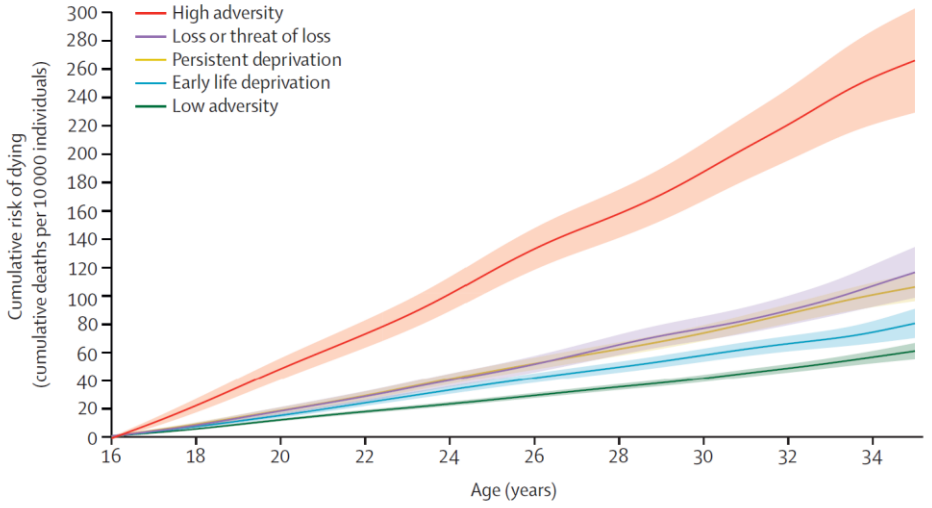


Theoretical background

Uncertainty, adversity and life history strategies

Reason 1

Adversity reduces the life expectancy of organisms (and thus their chance to reproduce)



	Deaths	Person years	Deaths per 10 000 individuals per year	Hazard ratio (95% CI)	Hazard difference (per 10 000 individuals per year)
High adversity	421	318 000	13·2	4·54 (4·07–5·06)	10·30 (9·03–11·60)
Loss or threat of loss	425	816 359	5·2	1·80 (1·61–2·00)	2·31 (1·79–2·83)
Persistent deprivation	804	1 532 324	5·2	1·77 (1·62–1·93)	2·27 (1·88–2·66)
Early life deprivation	787	1 951 522	4·0	1·38 (1·27–1·51)	1·11 (0·79–1·43)
Low adversity	1390	4 781 508	2·9	1·00 (ref)	0 (ref)

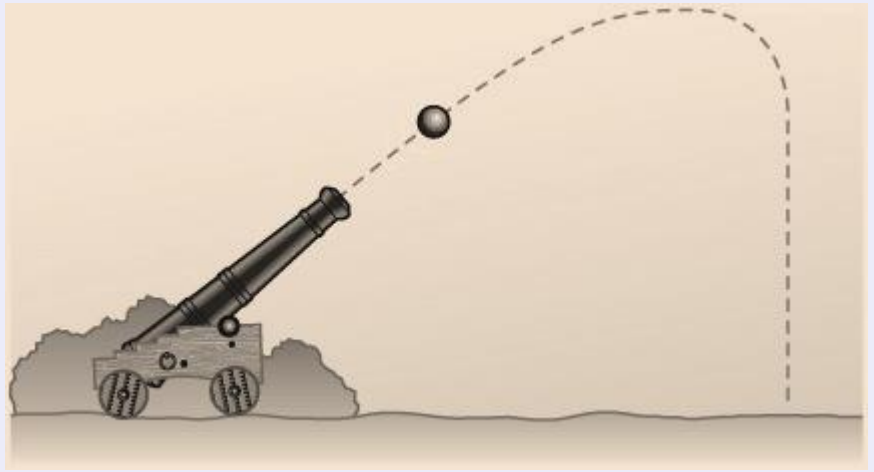
Rod et al., 2020. *The Lancet*, DOI: https://doi.org/10.1016/S01406736(20)30621-8

Theoretical background

Uncertainty, adversity and life history strategies

Reason 2

Some types of uncertainty might be too fast to induce an efficient developmental response



Theoretical background

Uncertainty, adversity and life history strategies

How to optimise allocating resources (energy, time etc.) in a world where there is a risk of death and disease ?

Theoretical background

Uncertainty, adversity and life history strategies

How to optimise allocating resources (energy, time etc.) in a world where there is a risk of death and disease ?

Develop a phenotype that allows to reproduce as early and as many times as possible

Theoretical background

Uncertainty, adversity and life history strategies

Our hypothesis

This optimal phenotype will depend on the reliability of early adversity as a predictor of later life conditions
…and therefore, their stochasticity and volatility

Theoretical background

Uncertainty and development

The degree of stochasticity and volatility will determine the possible « developmental horizon »

Theoretical background

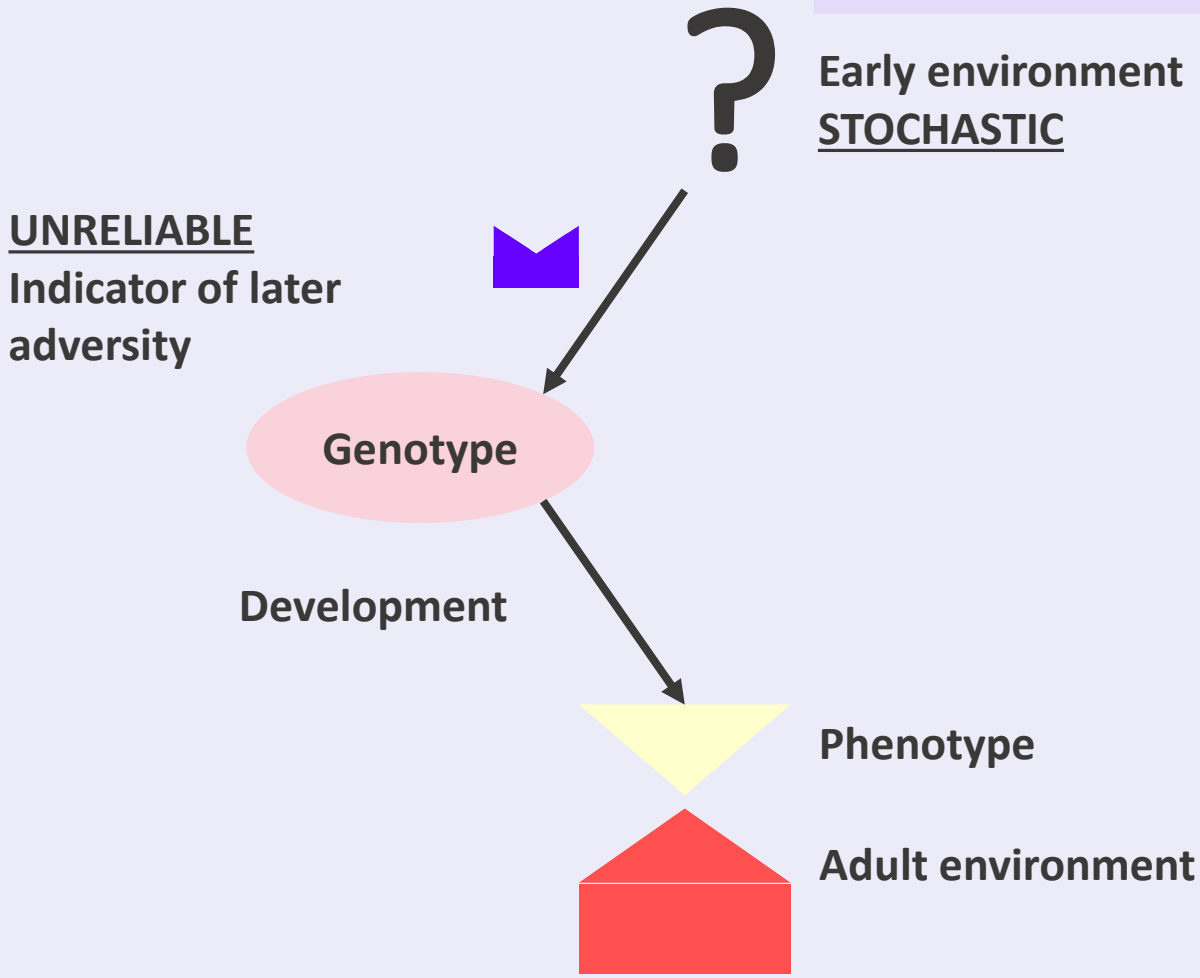
Uncertainty and development

The degree of stochasticity and volatility will determine the possible « developmental horizon »

If adversity varies primarily stochastically, the organism can only have a short time horizon

Theoretical background

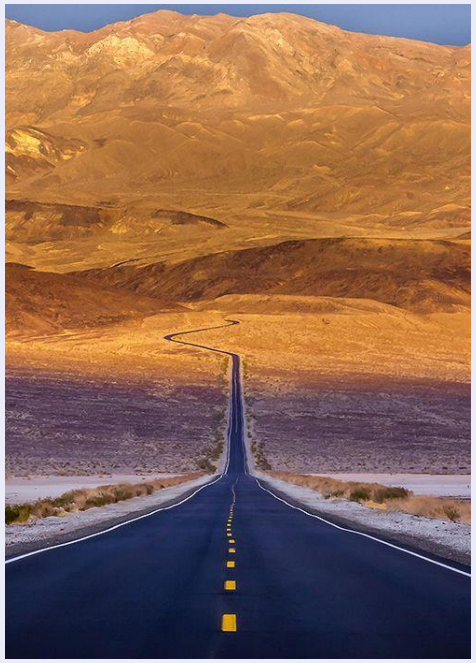
Uncertainty and development



Theoretical background

Uncertainty and development

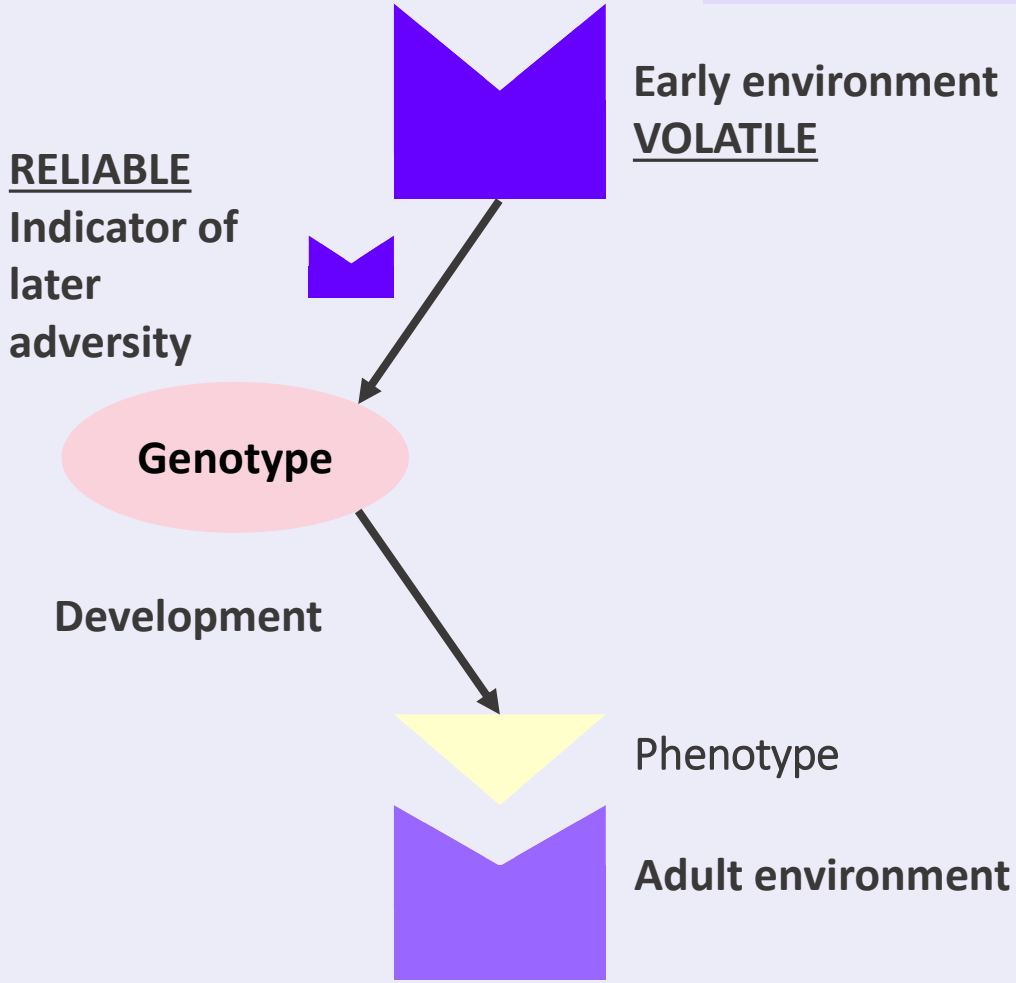
The degree of stochasticity and volatility will determine the possible « developmental horizon »



If adversity varies primarily in a volatile way, the organism can have a longer time horizon

Theoretical background

Uncertainty and development



The link to psychopathology

Psychological bases of life history traits

Behavioural traits

The link to psychopathology

Psychological bases of life history traits

Behavioural traits

- Less selectivity in partners
- Sexual promiscuity
- Social status and partner access through dominance and manipulation
- Less parental investment

The link to psychopathology

Psychological bases of life history traits

Behavioural traits

- Less selectivity in partners
- Sexual promiscuity
- Social status and partner access through dominance and manipulation
- Less parental investment

Psychological bases

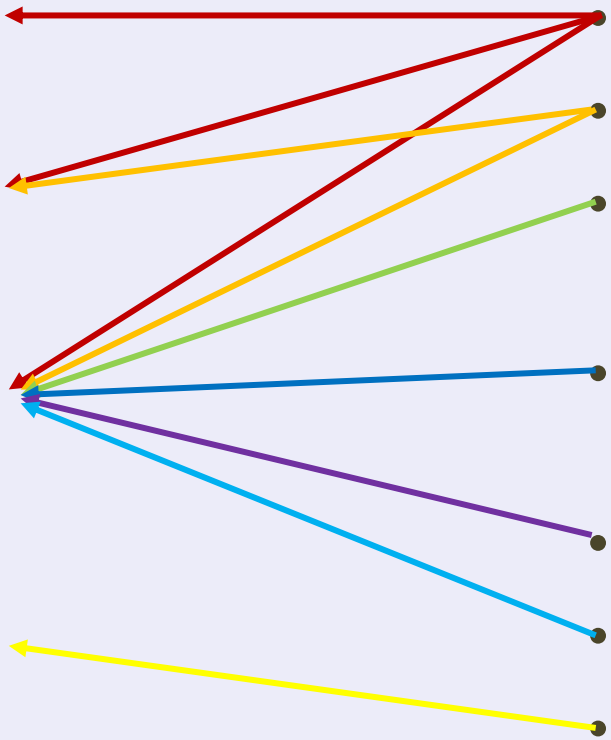
- Impulsivity
- Disinhibition
- Emotional disregulation
- Hypervigilance to threat
- Agression
- Antisociality
- Shallow empathy

The link to psychopathology

Psychological bases of life history traits

Behavioural traits

- Less selectivity in partners
- Sexual promiscuity
- Social status and partner access through dominance and manipulation
- Less parental investment

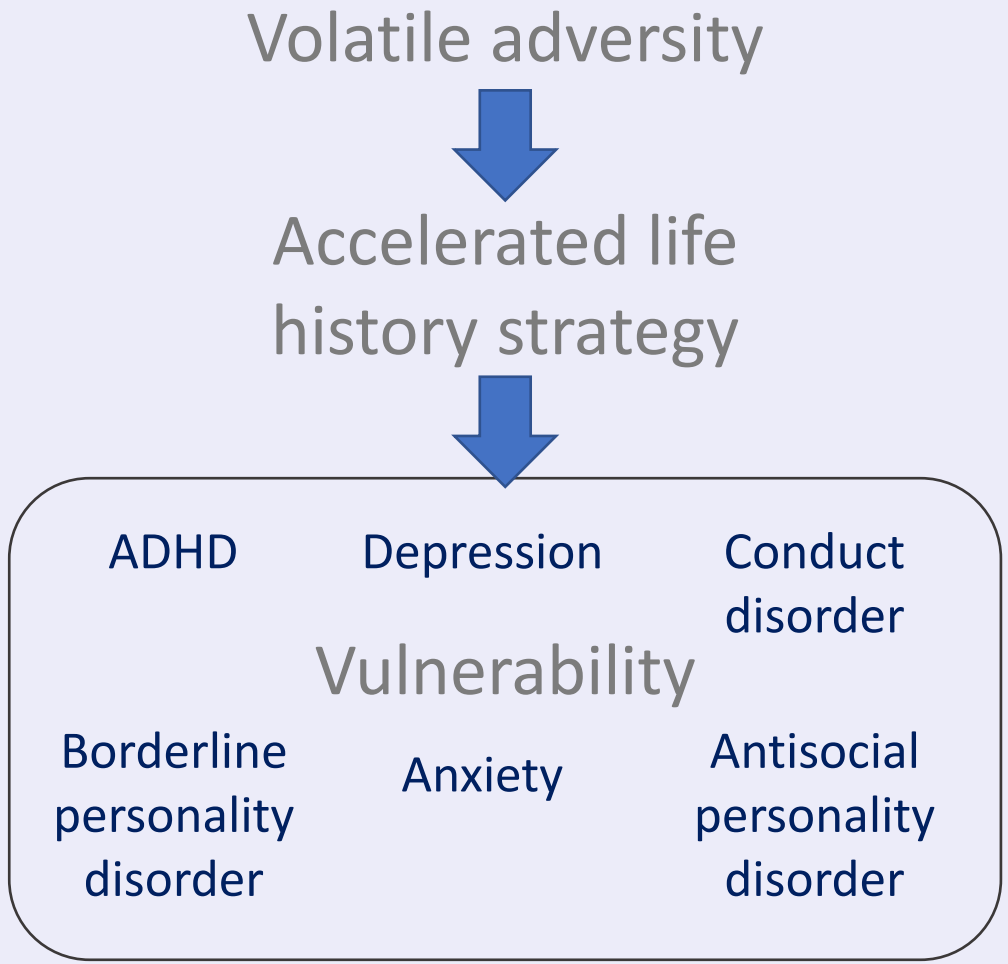


Psychological bases

- Impulsivity
- Disinhibition
- Emotional disregulation
- Hypervigilance to threat
- Agression
- Antisociality
- Shallow empathy

The link to psychopathology

Model for vulnerability

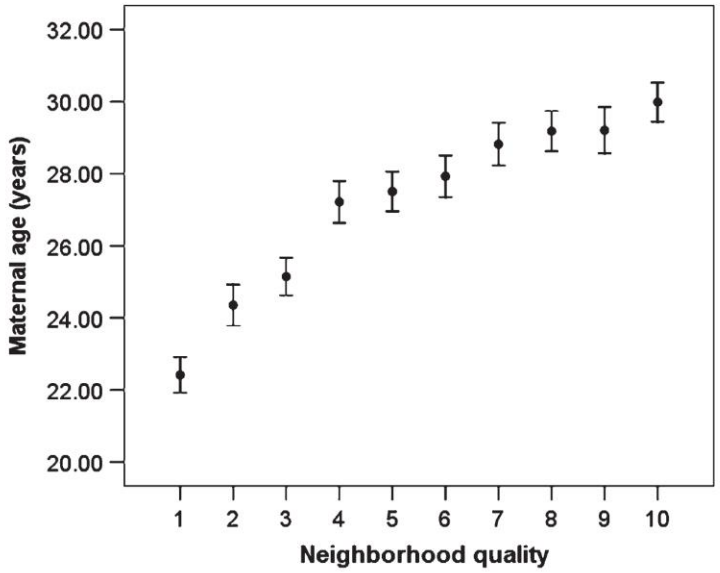


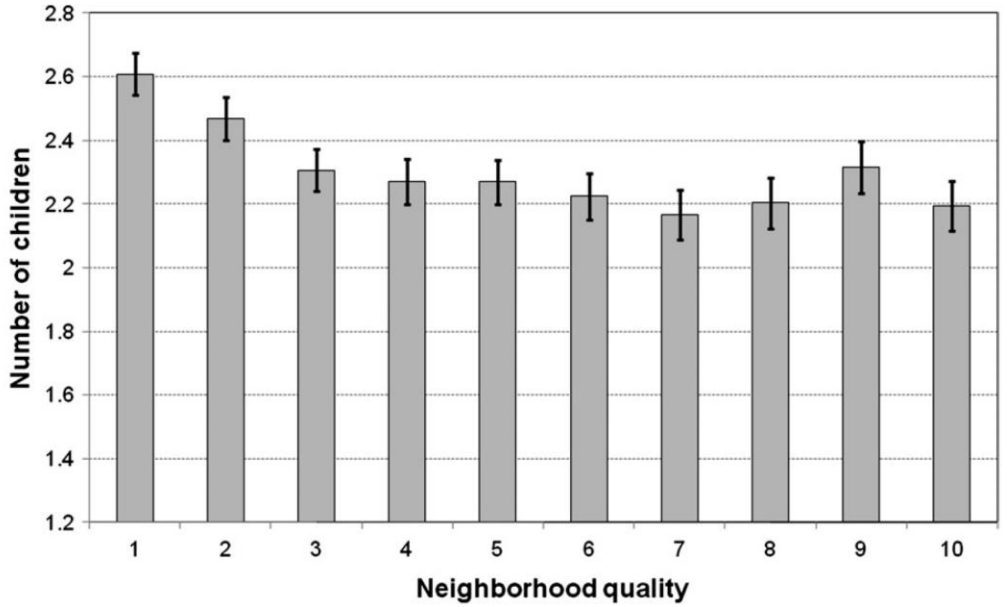
Evidence

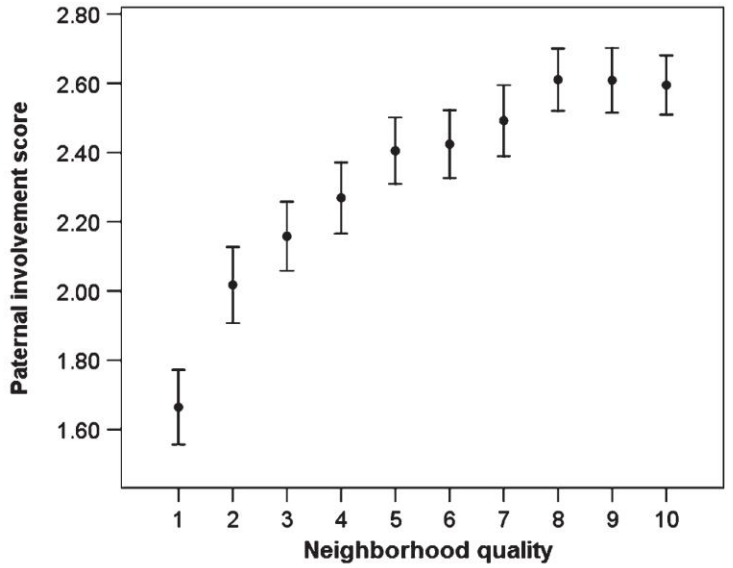
Adversity induces accelerated life strategies

Evidence

Adversity induces accelerated life strategies



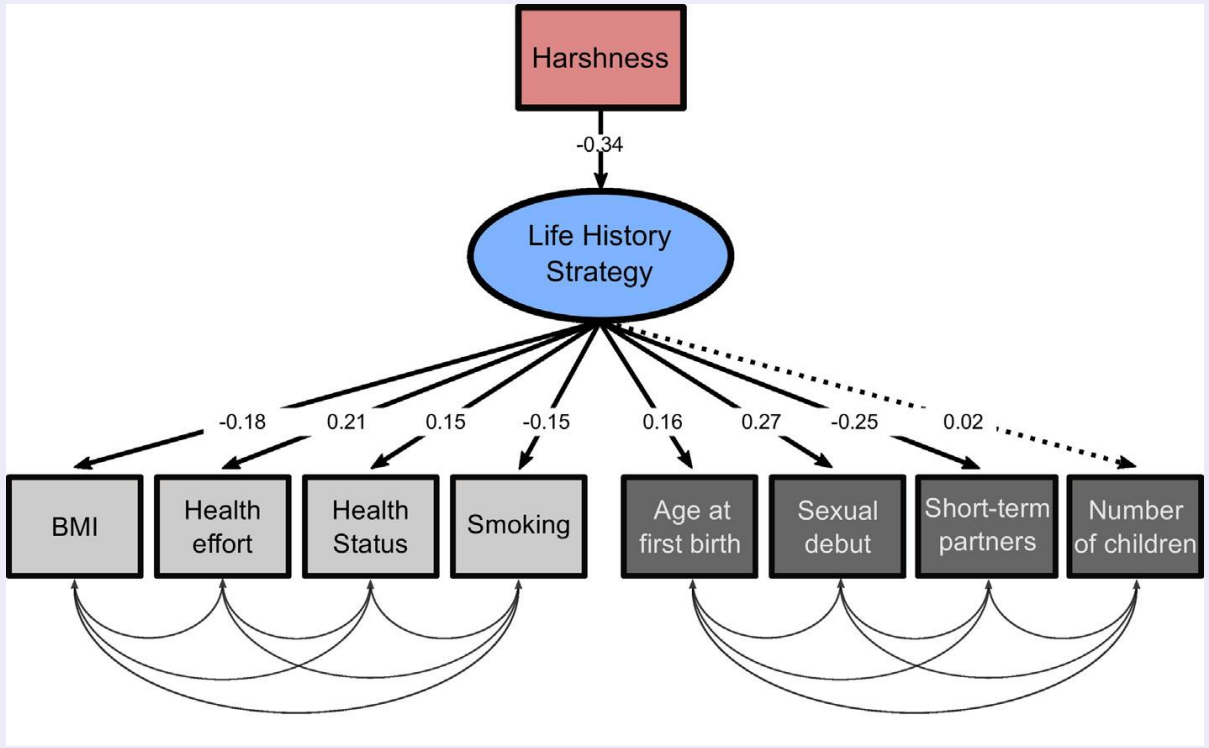




Nettle, 2010. Behavioural Ecology, DOI: https://doi.org/10.1093/beheco/arp202

Evidence

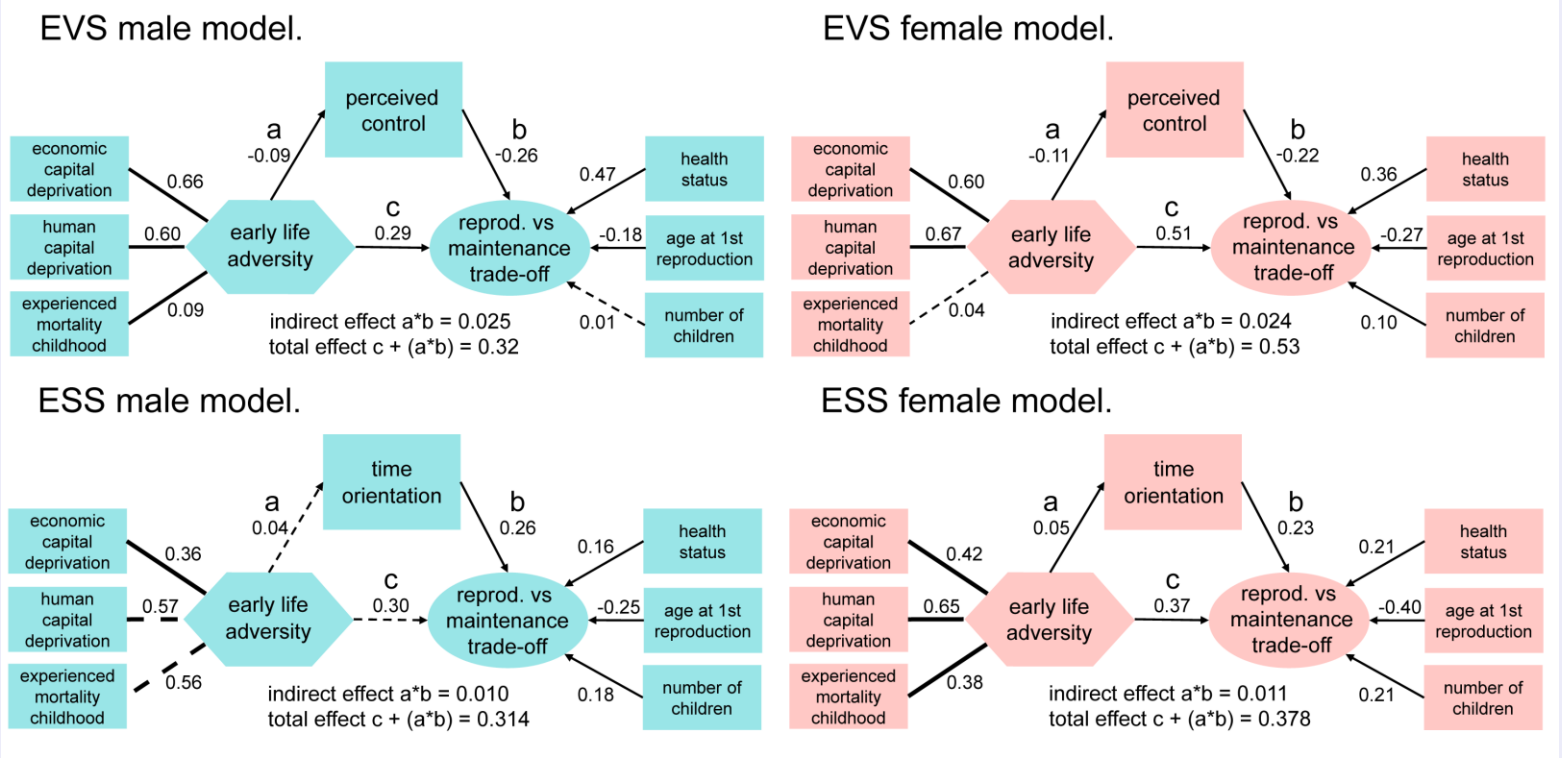
Adversity induces accelerated life strategies



Mell et al., 2018. *Evolution and Human Behavior*, DOI: https://doi.org/10.1016/j.evolhumbehav.2017.08.006

Evidence

Adversity induces accelerated life strategies



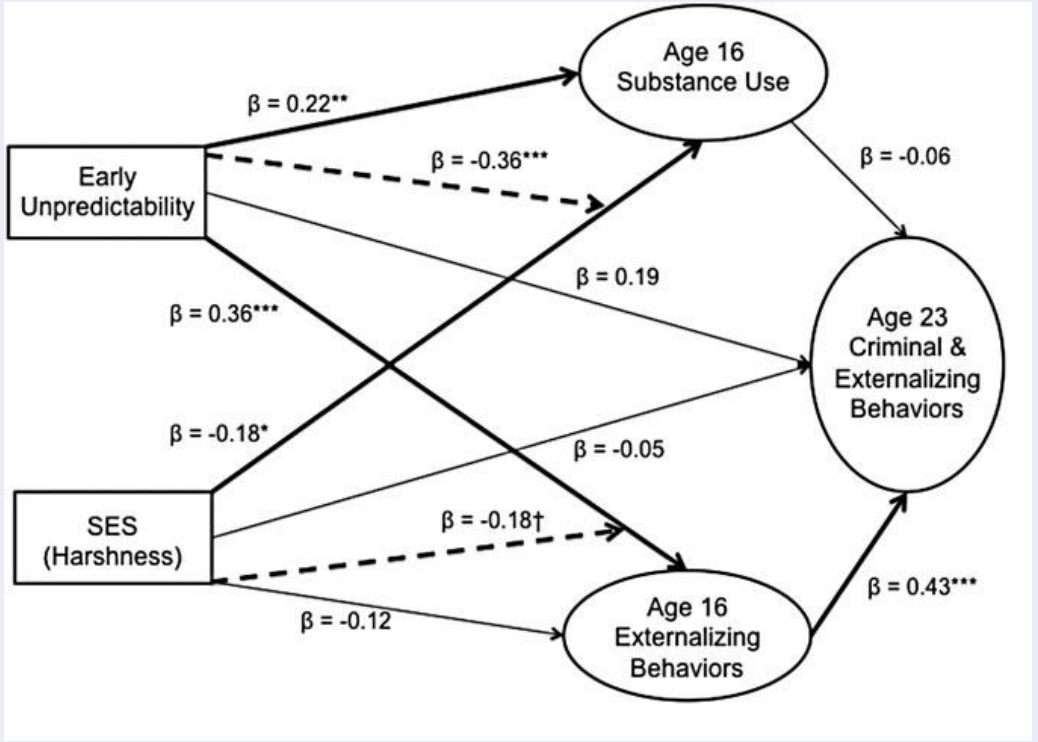
Farkas, Chambon & Jacquet, 2022. *Humanities and Social Sciences Communications*, DOI: https://doi.org/10.1057/s41599-022-01066-y

Evidence

Life strategies are associated with psychopathology

Evidence

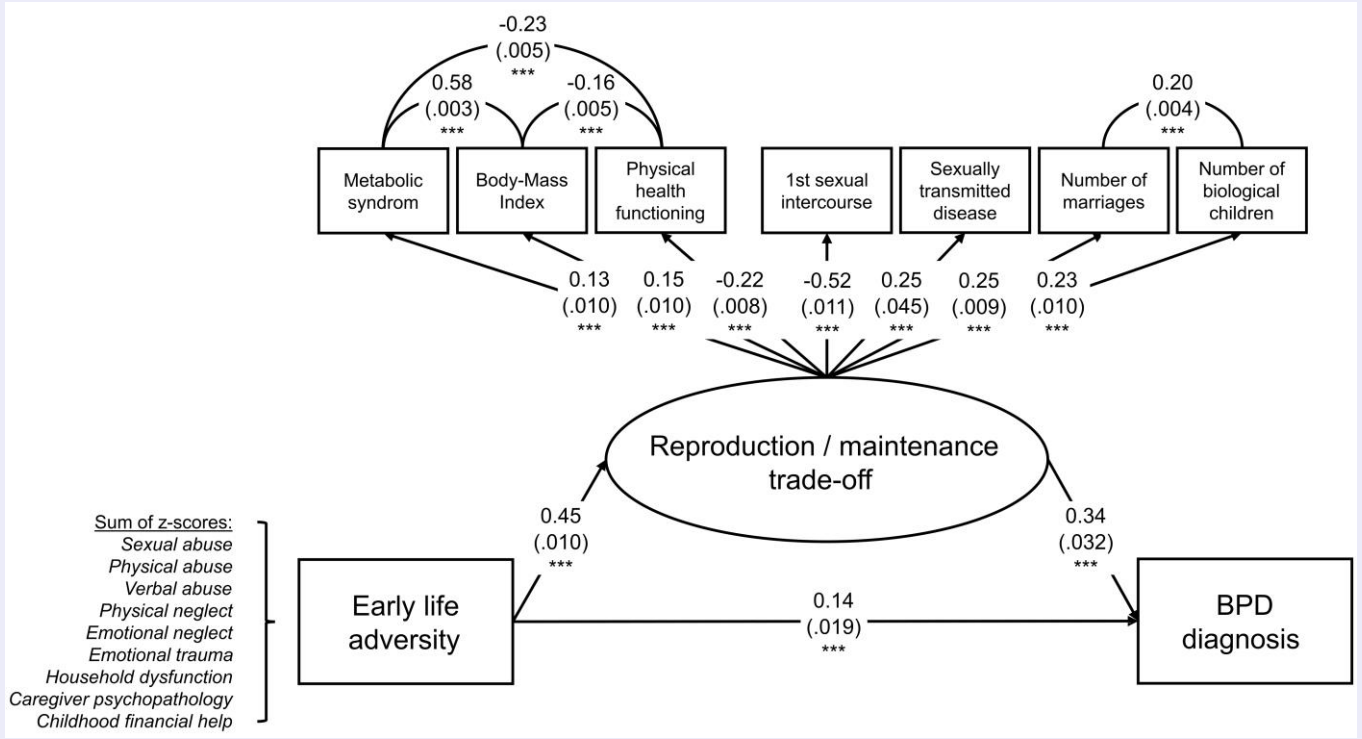
Life strategies are associated with psychopathology



Doom et al., 2016, *Development and Psychopathology*, DOI: https://doi.org/10.1017/S0954579416000948

Evidence

Life strategies are associated with psychopathology



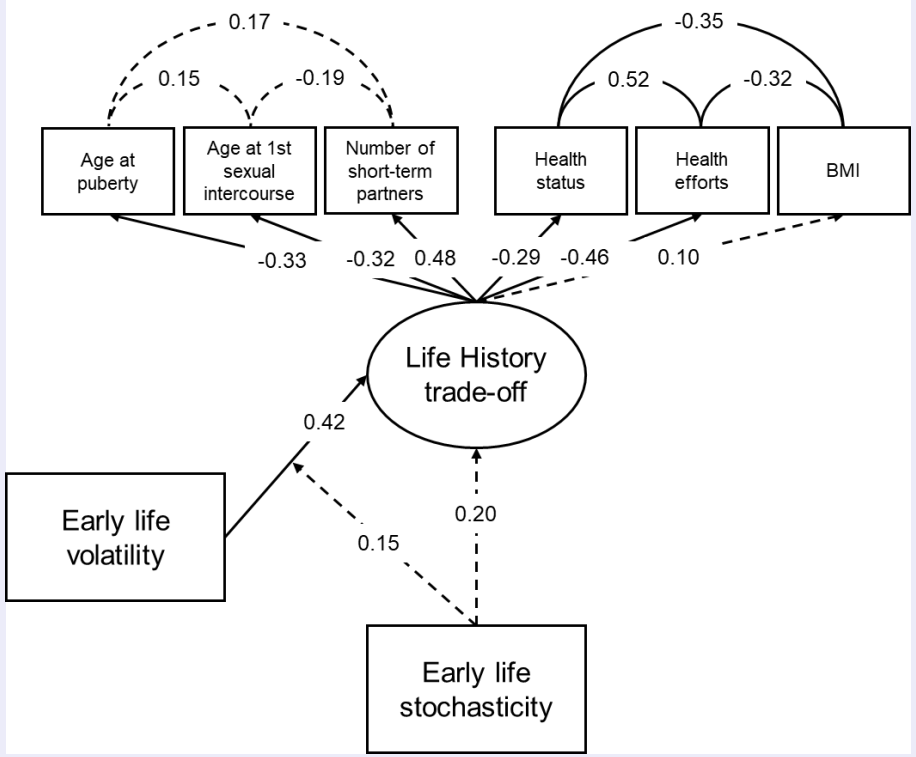
Baptista et al., Under review, *JAMA Psychiatry*

Evidence

The nature of unpredictability influences life strategies

Evidence

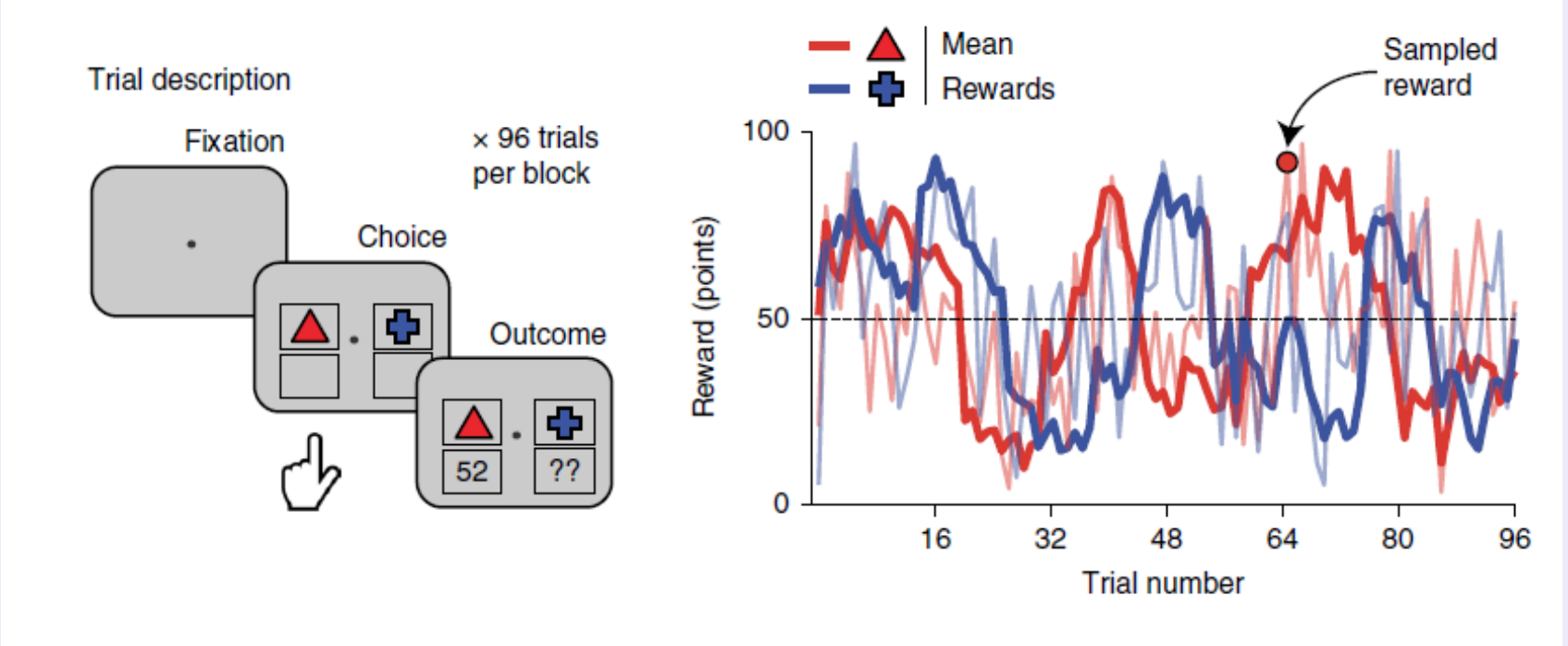
The nature of unpredictability influences life strategies



Jacquet, Farkas & Wyart, Preliminary data

Evidence

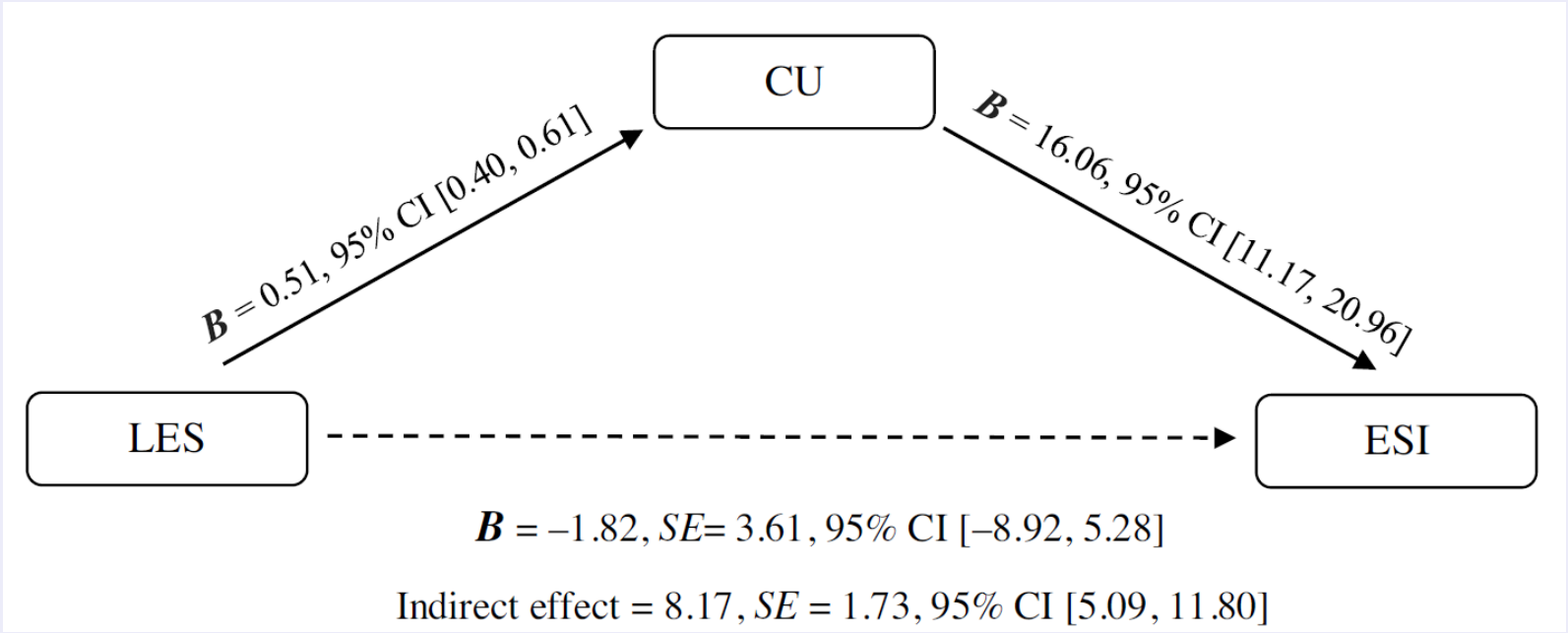
The nature of unpredictability influences life strategies



Jacquet, Farkas & Wyart, Preliminary data

Evidence

The nature of unpredictability influences life strategies



Martinez et al., 2022, *Development and Psychopathology*, DOI: https://doi.org/10.1017/S0954579421001607

Evidence

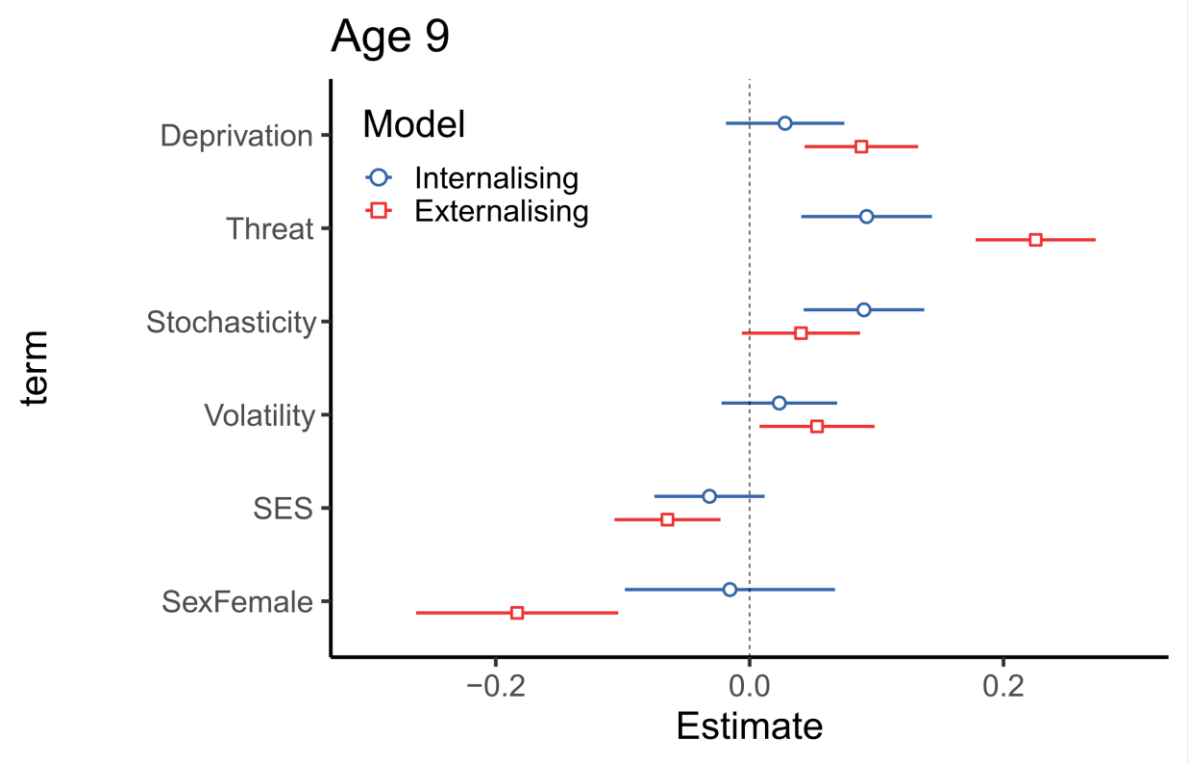
The nature of unpredictability influences life strategies

	Internalising age 9		Externalising age 9		Internalising age 15		Externalising age 15	
	Mean AIC	Pooled R^2	Mean AIC	Pooled R^2	Mean AIC	Pooled R^2	Mean AIC	Pooled R^2
Model 1. Baseline	6291.844	.004	6239.806	.027	6040.879	.112	5725.805	.229
Model 2. Deprivation and threat	6260.293	.020	6070.802	.100	6038.272	.114	5672.654	.249
Model 3. Overall unpredictability	6246.227	.027	6065.237	.103	6027.200	.120	5668.663	.251
Model 4. ST, LT main effects	6244.135	.029	6067.078	.104	6028.229	.120	5666.779	.252
Model 5. ST, LT 2-way	6249.786	.030	6068.912	.106	6032.158	.121	5670.729	.253
Model 6. ST, LT 3-way	6252.015	.032	6057.117	.113	6037.624	.122	5673.078	.255

Farkas et al., Under review, *Developmenal Science*

Evidence

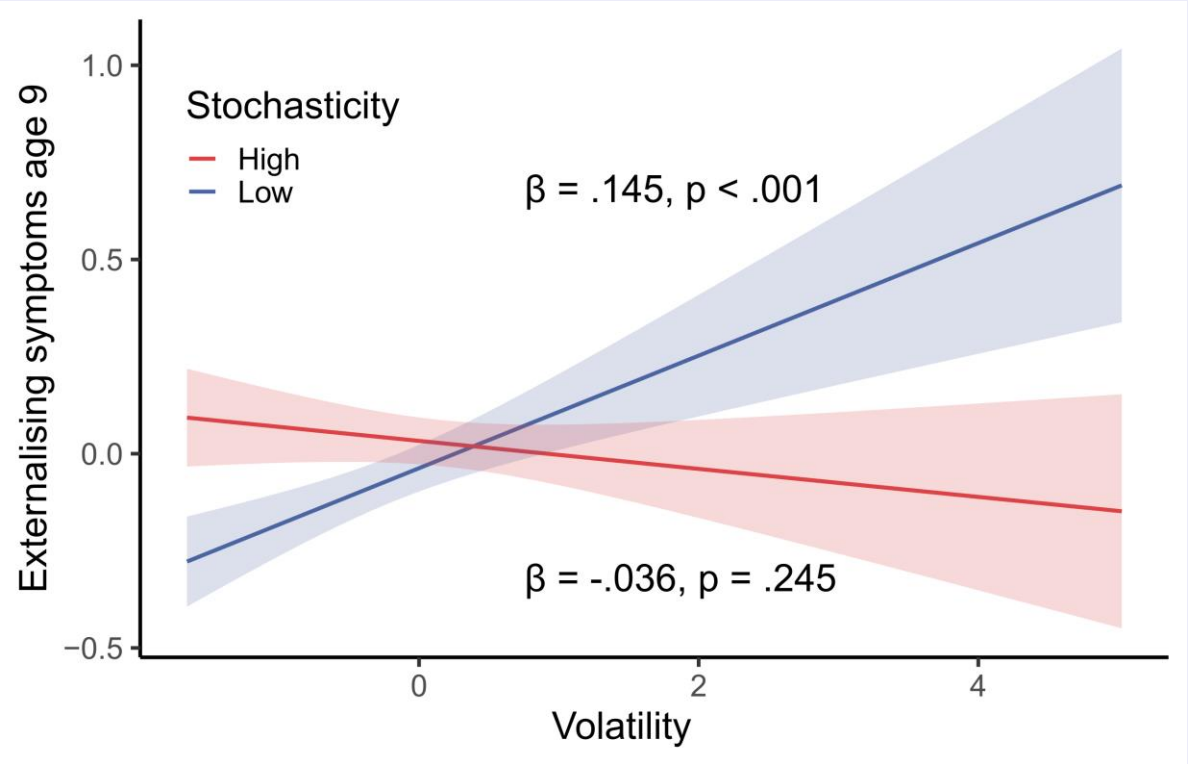
The nature of unpredictability influences life strategies



Farkas et al., Under review, *Developmenal Science*

Evidence

The nature of unpredictability influences life strategies



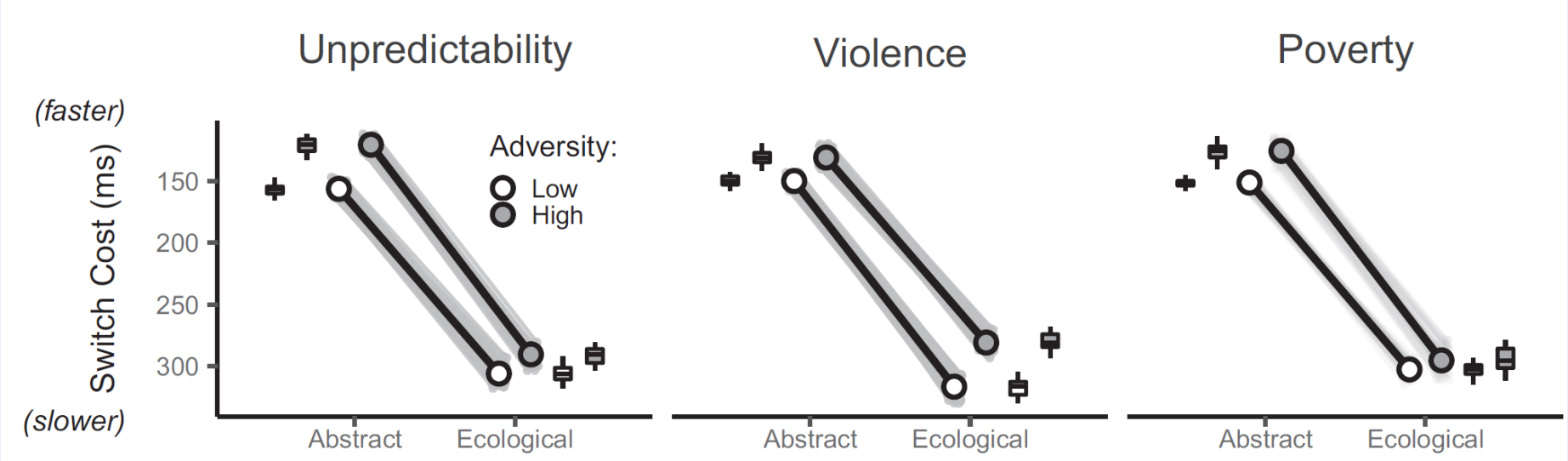
Farkas et al., Under review, *Developmenal Science*

Evidence

Hidden talents

Evidence

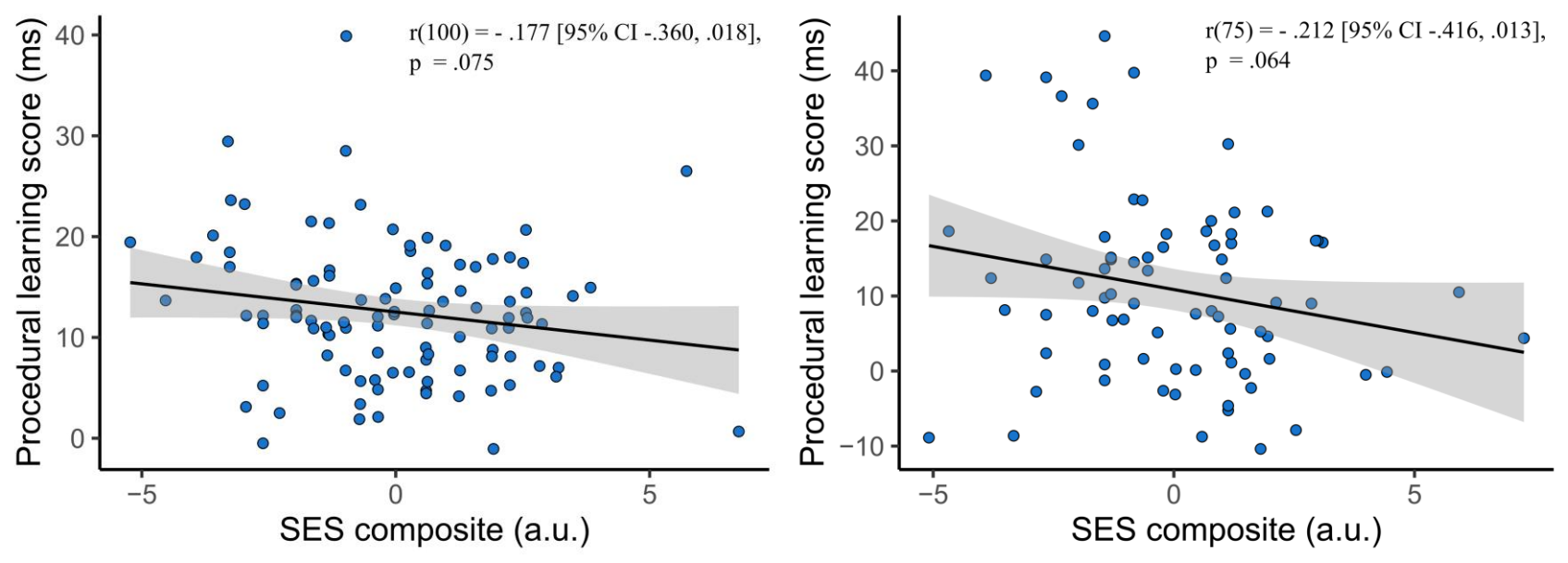
Hidden talents



Young et al., 2022, *Child Development*, DOI: https://doi.org/10.1111/cdev.13766

Evidence

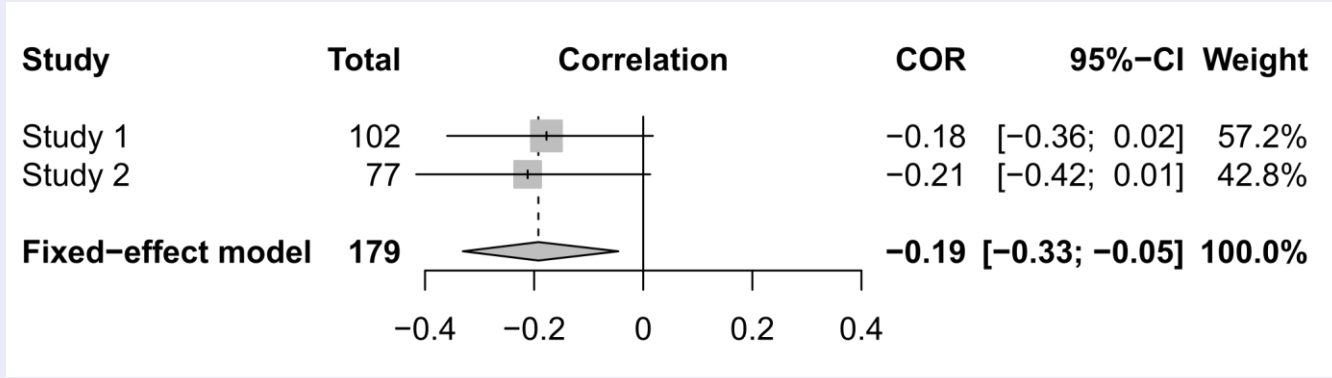
Hidden talents



Farkas et al., Preliminary data

Evidence

Hidden talents



Farkas et al., Preliminary data

Summary

Take-home messages

1. The nature of uncertainty in early environments influences our development

Summary

Take-home messages

1. The nature of uncertainty in early environments influences our development
2. When such uncertainty is primarily volatile, the organism can infer current and future states (to some degree)

Summary

Take-home messages

1. The nature of uncertainty in early environments influences our development
2. When such uncertainty is primarily volatile, the organism can infer current and future states (to some degree)
3. On this basis, it can calibrate its development towards a strategy that will maximize biological goals of survival and reproduction

Summary

Take-home messages

1. The nature of uncertainty in early environments influences our development
2. When such uncertainty is primarily volatile, the organism can infer current and future states (to some degree)
3. On this basis, it can calibrate its development towards a strategy that will maximize biological goals of survival and reproduction
4. This life strategy can be characterized by an accelerated life course of early reproduction and high fertility

Summary

Take-home messages

1. The nature of uncertainty in early environments influences our development
2. When such uncertainty is primarily volatile, the organism can infer current and future states (to some degree)
3. On this basis, it can calibrate its development towards a strategy that will maximize biological goals of survival and reproduction
4. This life strategy can be characterized by an accelerated life course of early reproduction and high fertility
5. And can be seen as a risk factor for certain kinds of mental illness

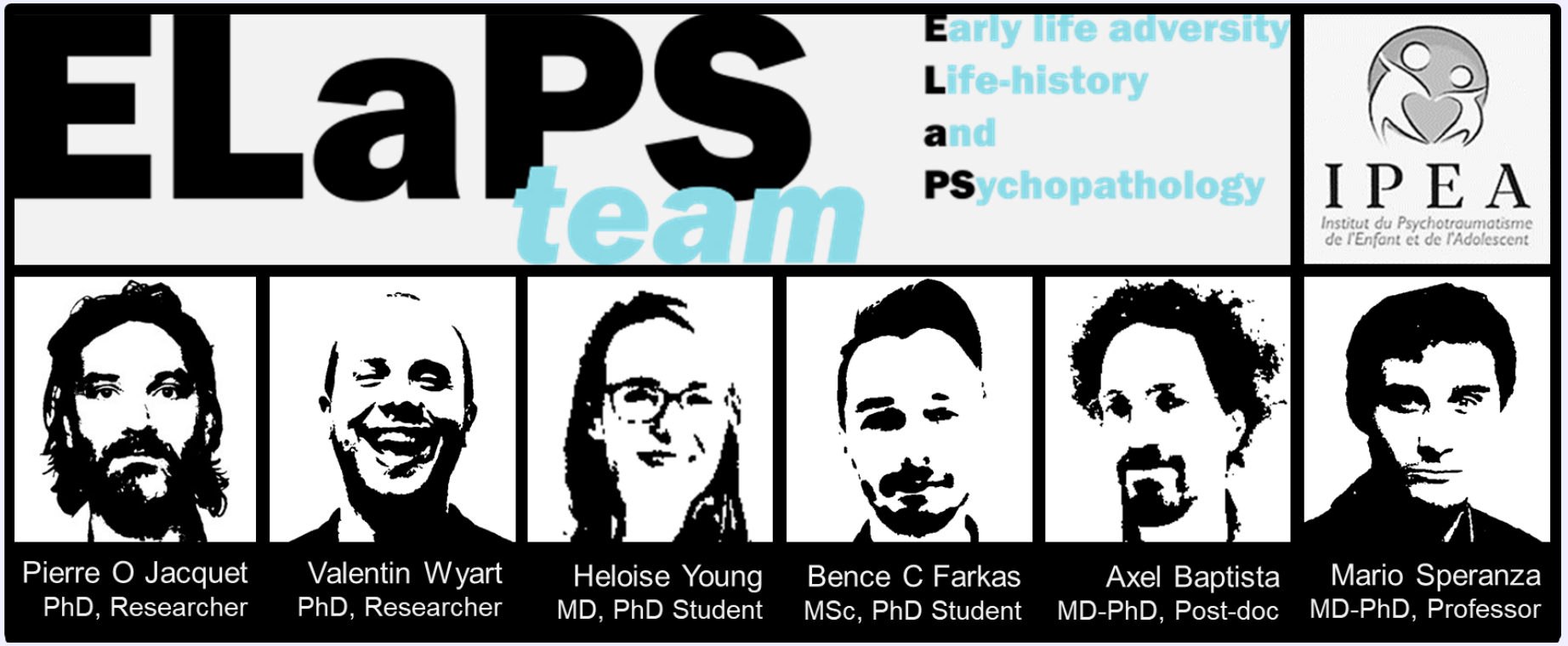
Summary

Take-home messages

1. The nature of uncertainty in early environments influences our development
2. When such uncertainty is primarily volatile, the organism can infer current and future states (to some degree)
3. On this basis, it can calibrate its development towards a strategy that will maximize biological goals of survival and reproduction
4. This life strategy can be characterized by an accelerated life course of early reproduction and high fertility
5. And can be seen as a risk factor for certain kinds of mental illness
6. But might also be associated with « hidden talents »

Prévisibilité, volatilité et trauma : quel devenir pour les enfants ?
Unpredictability, volatility and trauma: Their impact on children

Thank you!



Centre de Recherche en Neurosciences de Lyon, Eotvos Lorand University Budapest

Dezso Nemeth
PhD, Researcher