

# Developmental Origins of Suicide Mortality

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**Content warning: Suicide**



## TAKE-HOME MESSAGE

**Vulnerability to suicide is partly established early in development, even before birth**

# Outline

- **Developmental study of suicide**
- **Research**
  - ✓ Prenatal factors
  - ✓ Neurocognitive factors
  - ✓ Adverse childhood experiences
- **Final remarks**



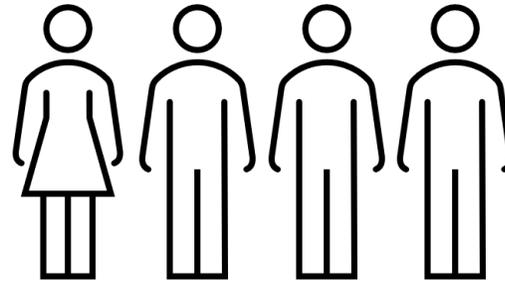
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**Suicide is rare**  
**≈8 per 100.000 pop.**







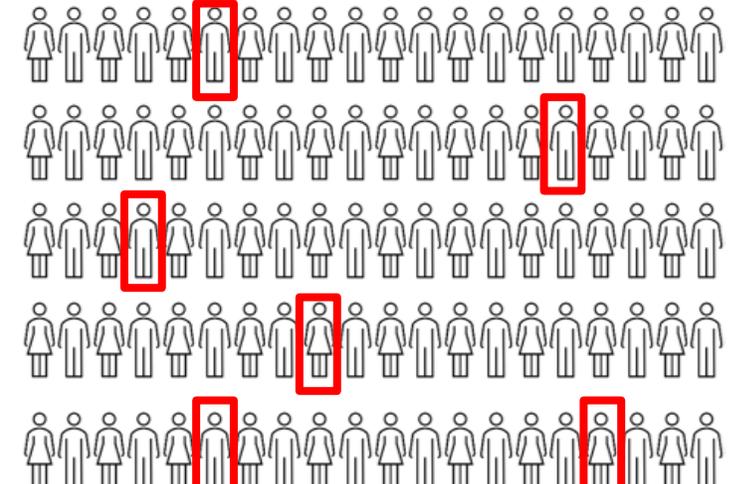
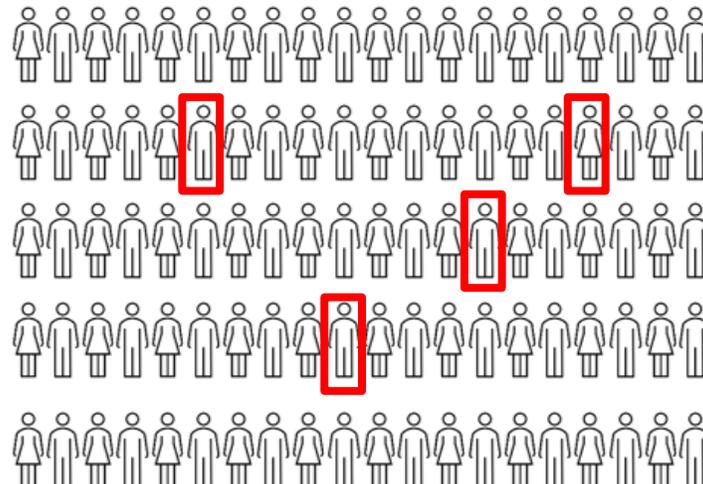
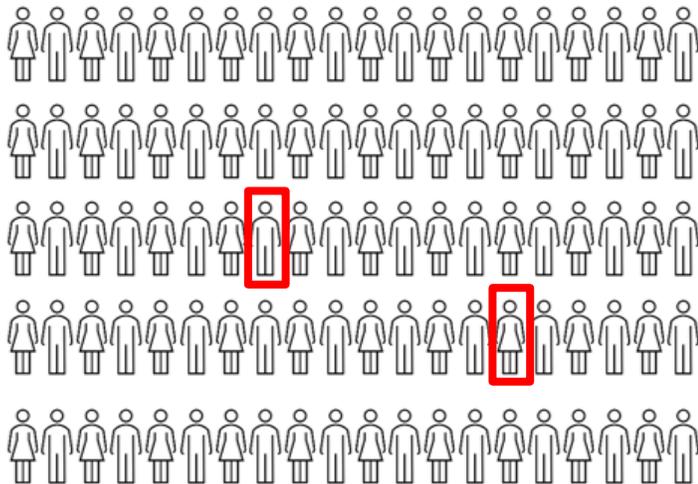
## High-risk populations



Depression in an  
outpatient setting

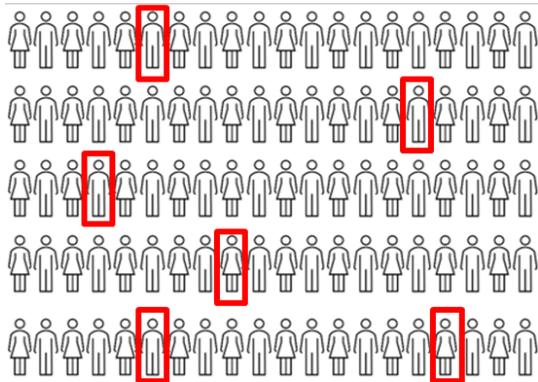
Depression in an  
inpatient setting

Depression in an  
inpatient setting  
following suicide  
ideation or attempt



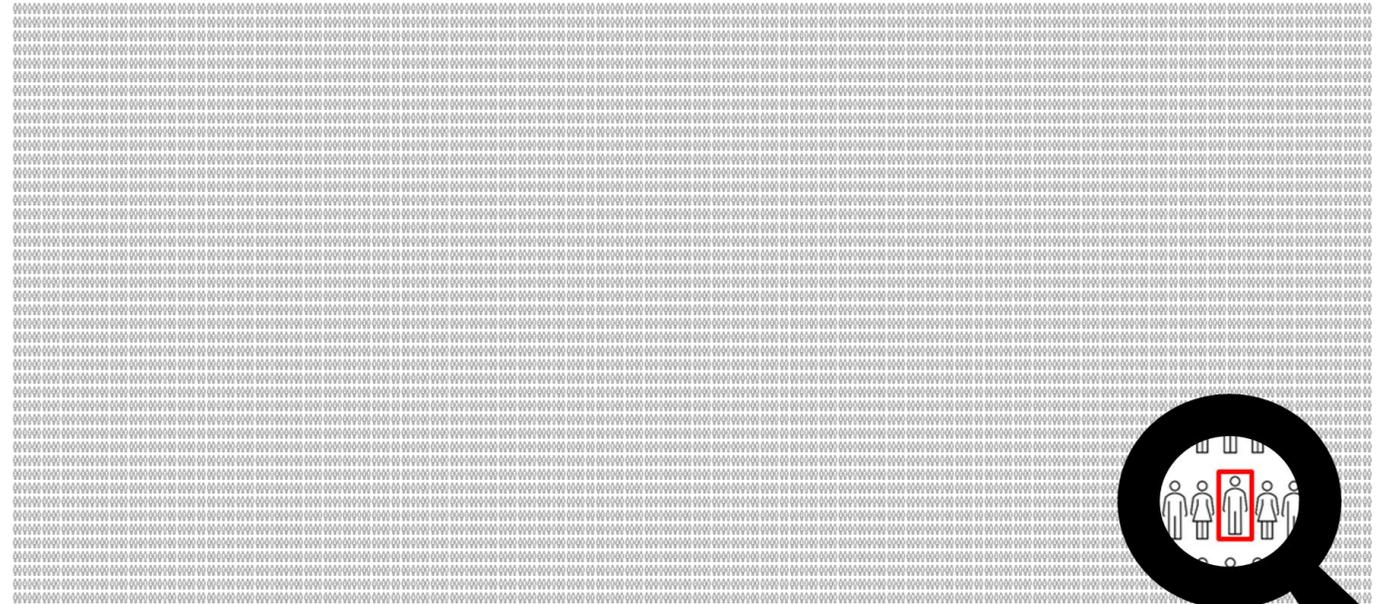


Depression in an  
inpatient setting  
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ideation or attempt



≠

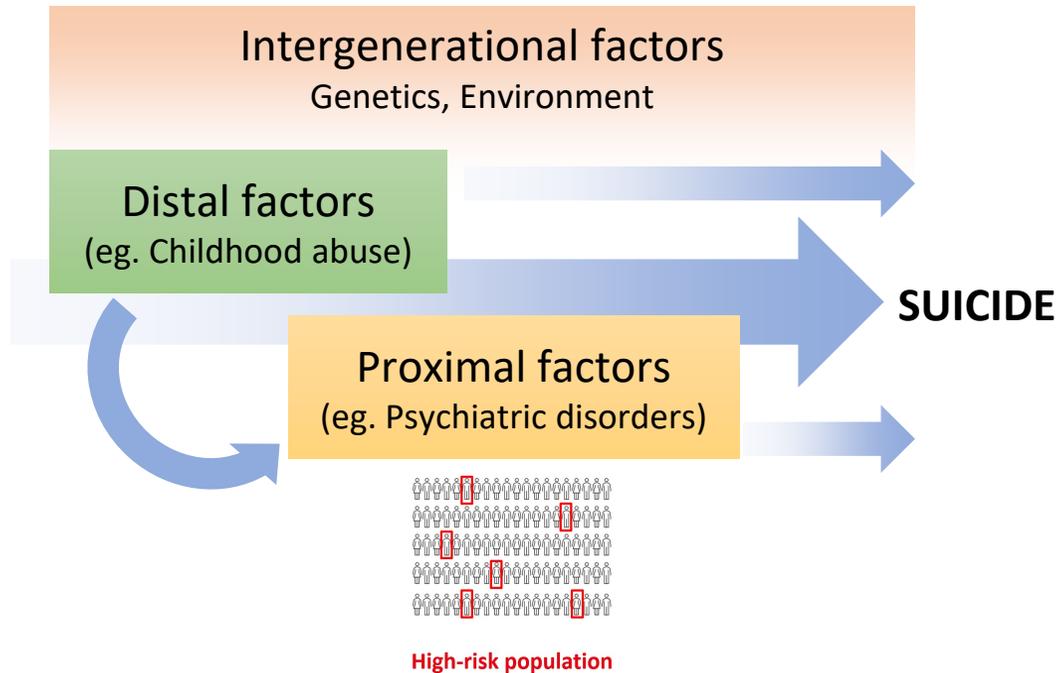
**High-risk population**



**General population**



## Suicide is a MULTICAUSAL phenomenon



## Evidence of developmental origins of psychiatric disorders



### AIM:

- Prenatal sociodemographic factors
- Pregnancy and birth factors
- Early childhood factors

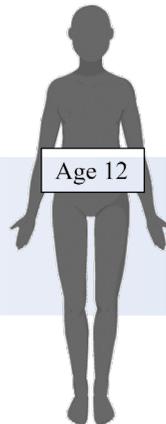
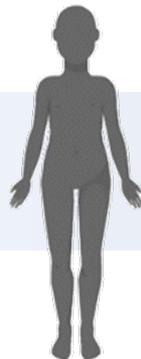


# The developmental origins of suicide mortality: a systematic review of longitudinal studies

[Pablo Vidal-Ribas](#) , [Theemeshni Govender](#), [Jing Yu](#), [Alicia A. Livinski](#), [Denise L. Haynie](#) & [Stephen E. Gilman](#)

*European Child & Adolescent Psychiatry* (2022) | [Cite this article](#)

**Exposure**  
happens here



**Design is**  
**prospective**

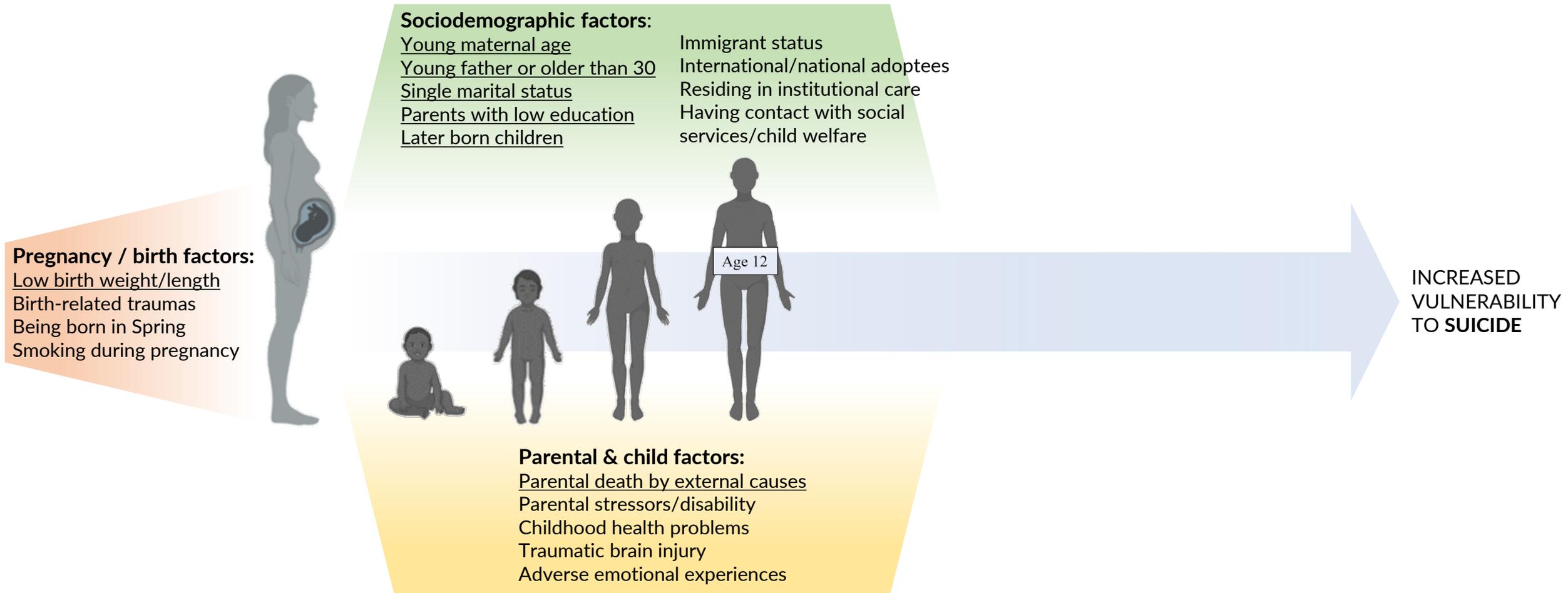


**This is the**  
**outcome**



**SUICIDE**  
**DEATH**  
Certified by  
ICD code







# Very few studies...

... **combining** exposures.

... examining **childhood exposures**.

... **outside** Scandinavia and United Kingdom.

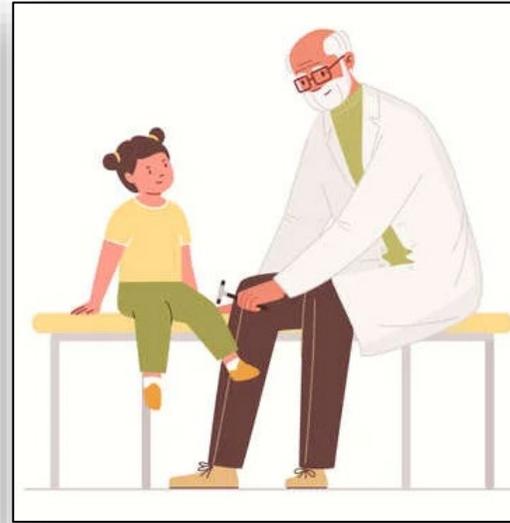
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# Collaborative Perinatal Project (CPP) Cohort



1959-1966 Birth ----->----->----->----->----->----->----->----->----->-----> 7 years

**N > 59,000** pregnancies at 12 U.S. sites.





# Collaborative Perinatal Project (CPP) Mortality Linkage Study



CPP Linkage  
Collaborative Perinatal Project



CPP Cohort  
Birth  
1959-1966

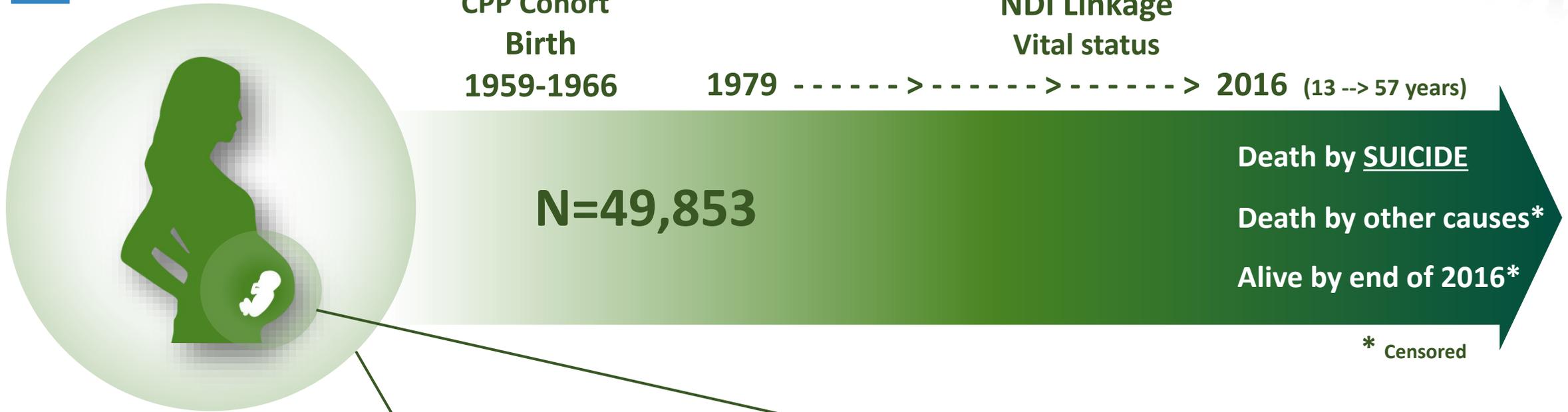
**U.S. National Death Index (NDI)**

Vital status

1979 ----->----->-----> 2016 (13 --> 57 years)

**N>59,000**

**DEATH (and cause)  
or  
ALIVE**



\* Censored

- Sociodemographic Factors**
- Race
  - Sex
  - Family structure
  - Household density
  - Poverty ratio
  - Parental education
  - Parental occupation
  - Birth order

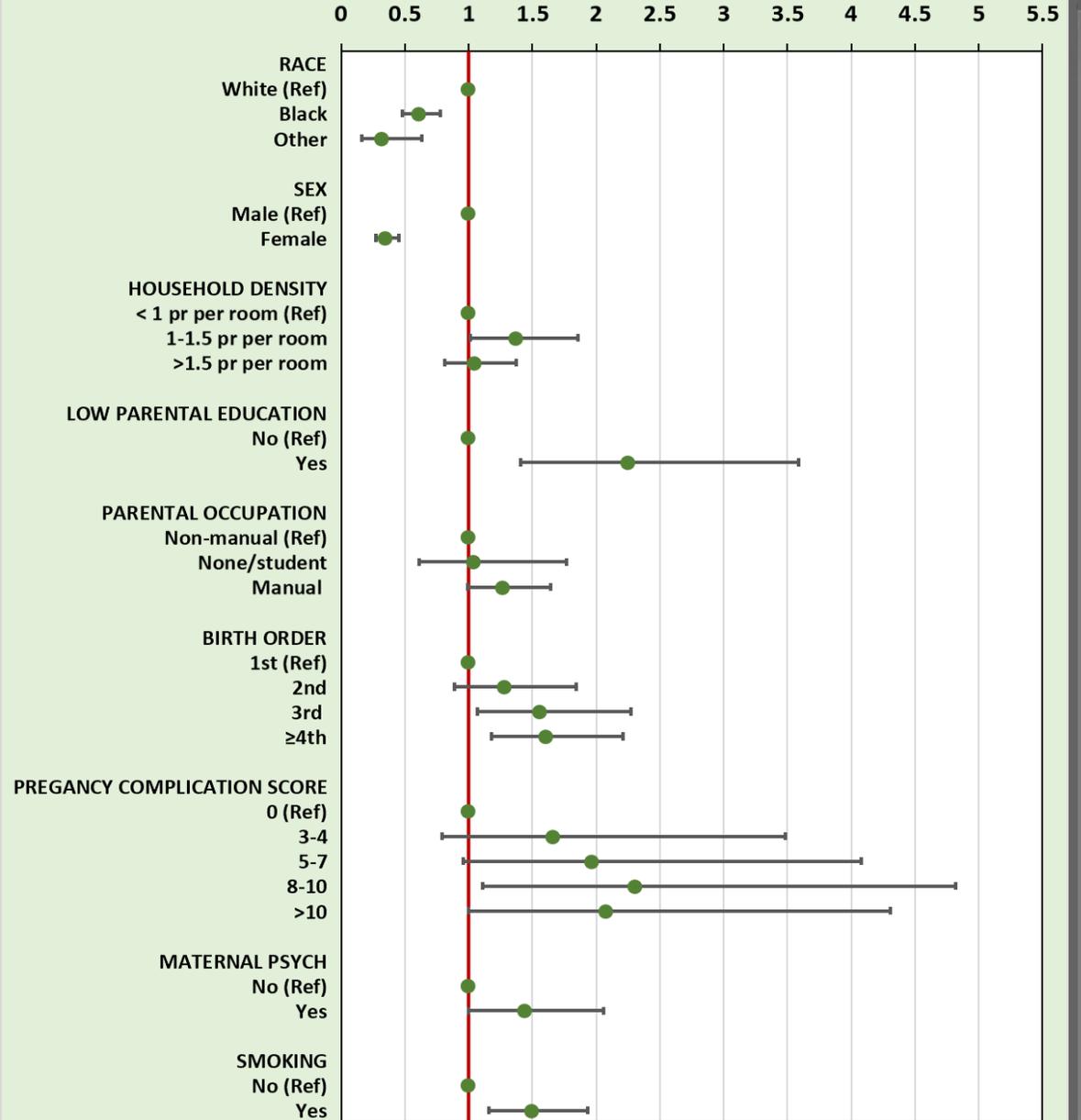
- Pregnancy, Birth, and Neonatal Factors**
- Pregnancy complication score
  - Birth and delivery complication score
  - Neonatal complication score
  
  - Maternal age
  - Maternal psychiatric history
  - Birth weight
  - Small for gestational age
  - Smoking during pregnancy

- Statistical Analysis:**
- Incidence rate per 100,000 person-years
- Cox proportional hazard models
- **Unadjusted**
  - **Adjusted**

**288** suicide cases  
214 males (74%)  
74 females (26%)

Incidence Rate  
**15.6** per 100,000  
(95%CI, 13.9-17.5)

Unadjusted Hazard Ratios, 95%CI





## CONCLUSIONS

**Prenatal sociodemographic and pregnancy-related factors independently associated with suicide risk in offspring**

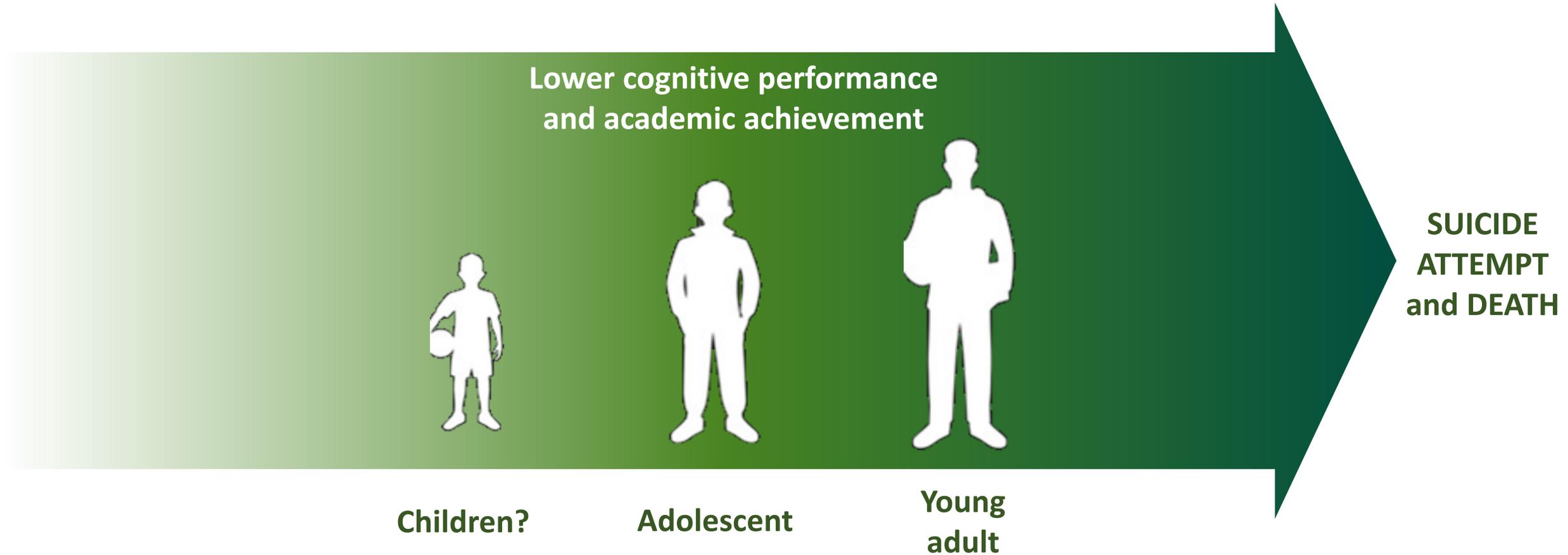
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## Cognitive performance and suicide risk: For who?





# Prevent study

**N=49,853**

CPP Cohort  
Birth  
1959-1966

NDI Linkage  
Vital status

1979 -----> -----> 2016 (13 --> 57 years)

Socio

Parental education  
Parental occupation  
Birth order

Pre  
&  
factors

Pregnancy  
complications



7 years

Death by SUICIDE

Death by other causes\*

Alive by end of 2016\*

\* Censored

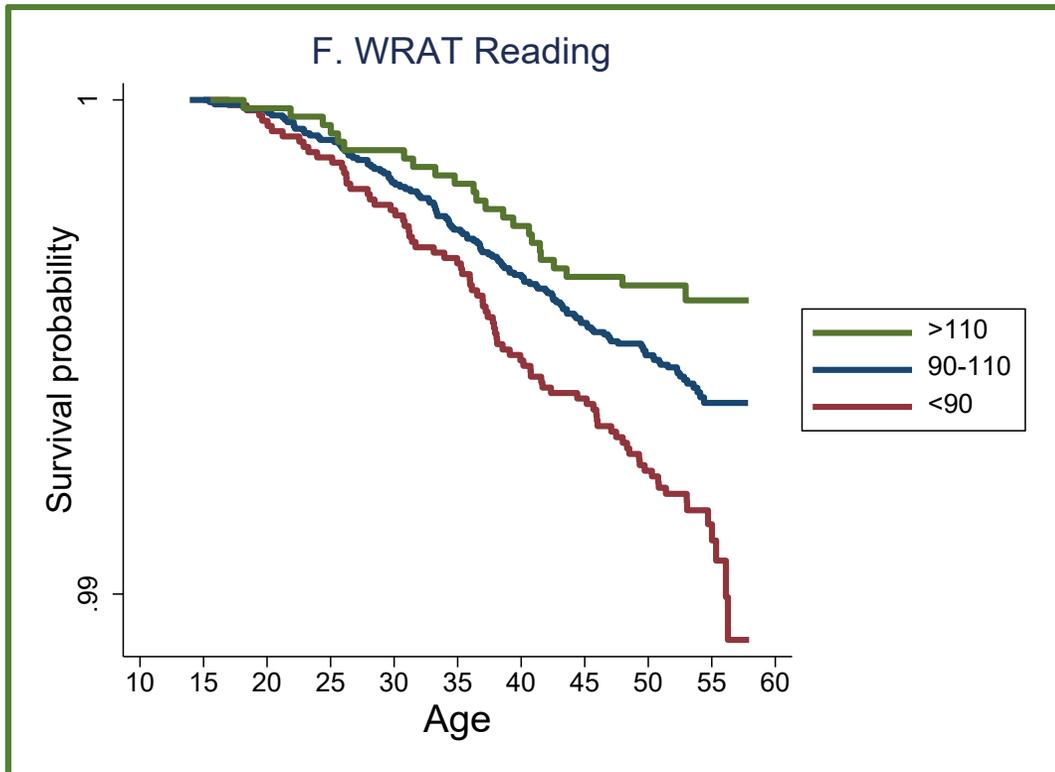
Neurocognitive factors



**Intelligence - WISC:**  
Verbal IQ  
Performance IQ  
Full-Scale IQ

**Academic Skills - WRAT:**  
Reading  
Spelling  
Arithmetic

## Survival by Verbal IQ Score in Childhood



**Table 1. Results of survival analysis of the association of childhood neurocognition and suicide death**

Neurocognition at age 7	Unadjusted HR (95%CI)	Adjusted <sup>1</sup> HR (95%CI)
<b>FULL SCALE IQ</b>		
<85	1.40 (0.78, 2.52)	
85-115	1.53 (0.89, 2.60)	
>115	<i>Ref.</i>	
<b>VERBAL IQ</b>		
<85	1.59 (0.81, 3.12)	1.76 (0.86, 3.60)
85-115	<b>1.97 (1.05, 3.71)</b>	<b>1.97 (1.03, 3.78)</b>
>115	<i>Ref.</i>	<i>Ref.</i>
<b>PERFORMANCE IQ</b>		
<85	1.27 (0.79, 2.03)	
85-115	1.23 (0.82, 1.84)	
>115	<i>Ref.</i>	
<b>SPELLING</b>		
<90	<b>2.02 (1.16, 3.51)</b>	1.61 (0.90, 2.88)
90-110	1.52 (0.89, 2.60)	1.36 (0.78, 2.35)
>110	<i>Ref.</i>	<i>Ref.</i>
<b>READING</b>		
<90	<b>2.01 (1.27, 3.17)</b>	<b>1.67 (1.02, 2.72)</b>
90-110	1.42 (0.91, 2.22)	1.34 (0.84, 2.13)
>110	<i>Ref.</i>	<i>Ref.</i>
<b>ARITHMETIC</b>		
<90	1.49 (0.74, 2.98)	
90-110	1.53 (0.80, 2.92)	
>110	<i>Ref.</i>	

<sup>1</sup> Adjusted for race, sex, sociodemographic index and pregnancy complications.



## CONCLUSIONS

Prenatal sociodemographic and pregnancy-related factors independently associated with **suicide risk** in offspring.

**Lower childhood neurocognitive** performance is associated with **vulnerability to suicide** through middle-adulthood.

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# This is not new!

But most studies...

... **restrospective.**

... **ideation and attempt as outcome.**

... **“children” = everyone under 18!**

... **ACEs by total score or individually**



# Adverse Childhood Adversities(ACEs) increase risk for...

- ... death by **any cause**?
- ... death by **suicide**?
- ... death by **other causes**?



**N=49,853**



CPP Cohort  
Birth  
1959-1966



7 years



ADVERSE CHILDHOOD EXPERIENCES

NDI Linkage  
Vital status

1979 -----> -----> 2016 (13--> 57 years)

Death by SUICIDE

Death by other causes\*

Alive by end of 2016\*

\* Censored



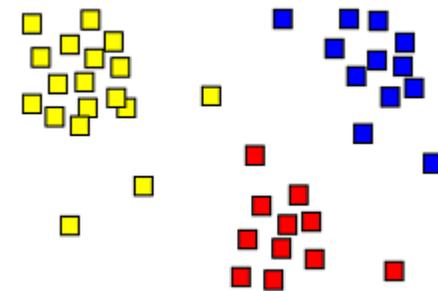
### ADVERSE CHILDHOOD EXPERIENCES (ACEs).

- Parent harshness at 8 months
- Parent neglect at 8 months
- History of family mental illness between birth and age 7
- Divorce/separation at age 7
- Two or more marital changes between birth and age 7
- Parental (age 1 and 7) or sibling death (between birth and age 7)
- Foster care at ages 1 and 7
- Five or more residential changes between birth and age 7
- Household highly crowded (person/room > 1.5) at age 7
- Welfare receipt at age 7
- Poverty at age 7
- Income decline between birth and age 7
- Severe chronic conditions of children at age 7

➔ **Cumulative score**

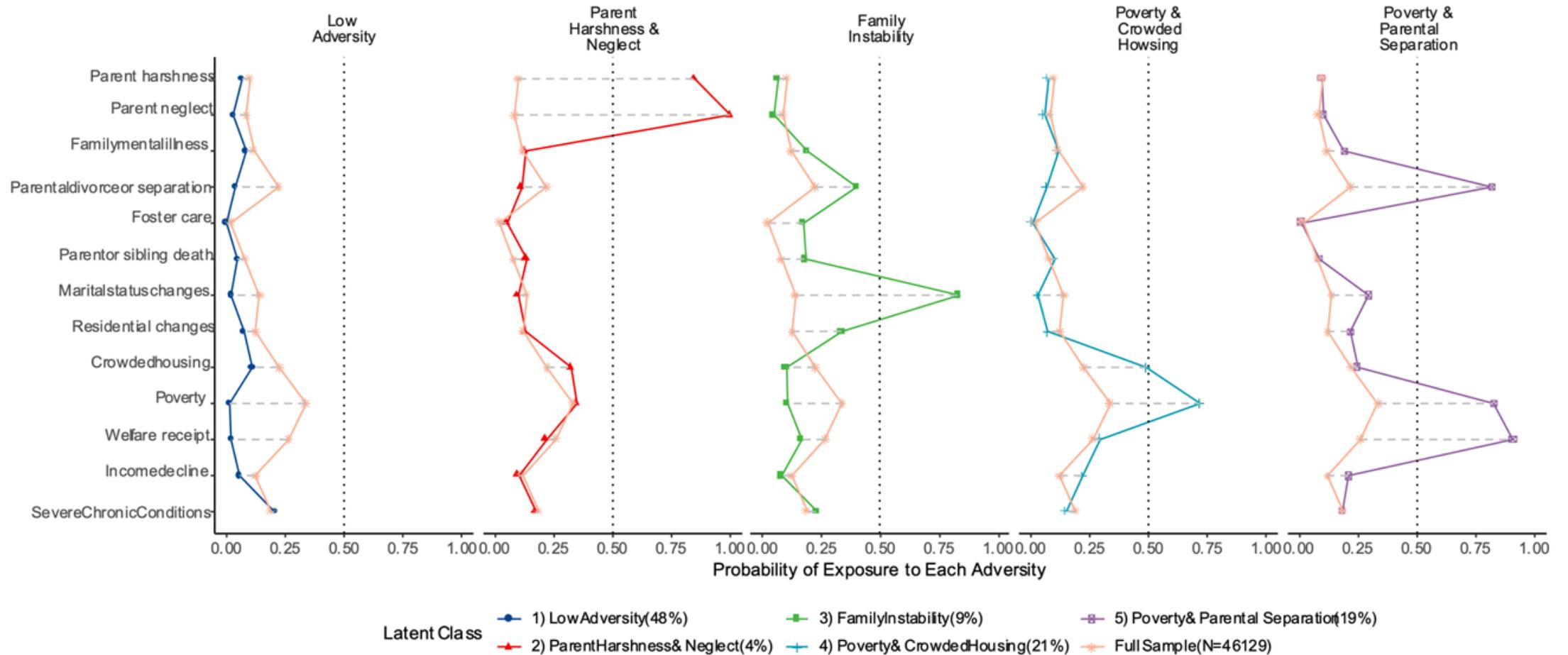
$$ACE_1 + ACE_2 + ACE_3 + \dots = \sum_{ACE_j}$$

➔ **Latent classes**



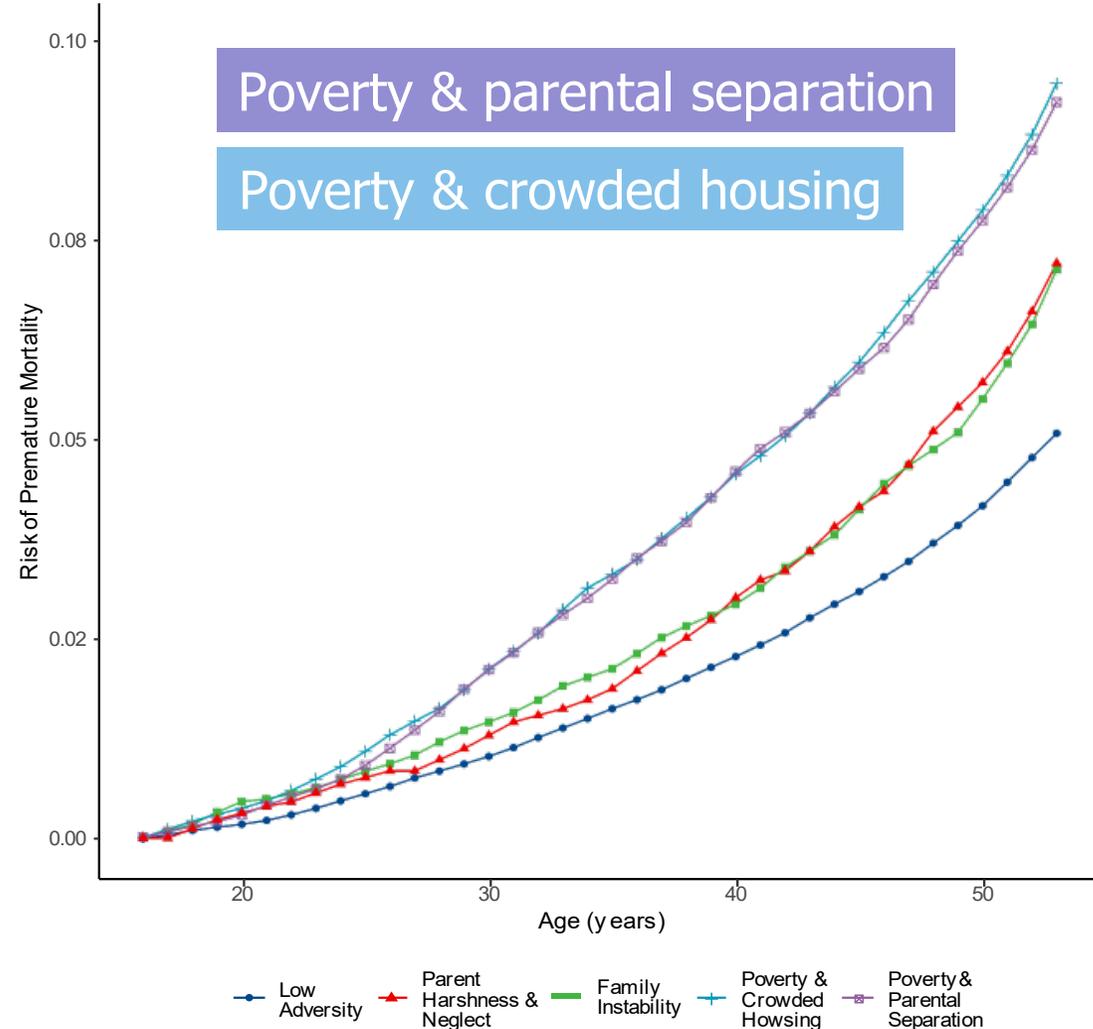


## Five latent classes of early childhood adversities identified in the CPP cohort



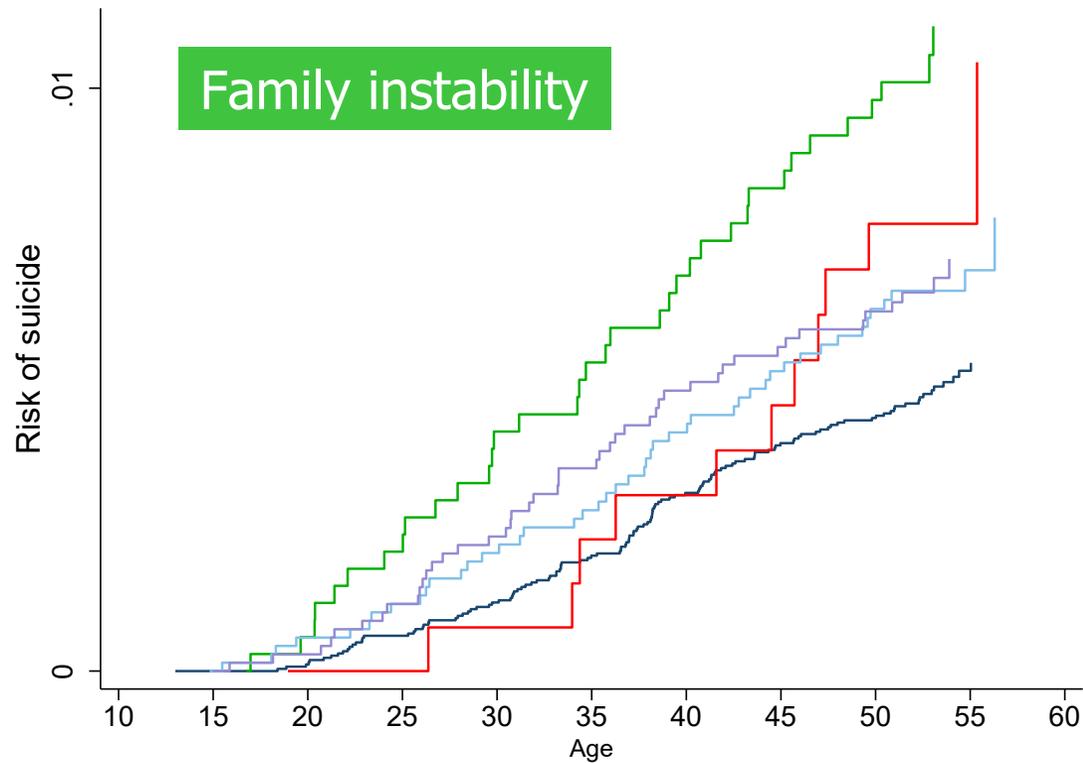


## Risk of premature **all-cause mortality** for individuals in each latent class of ACEs



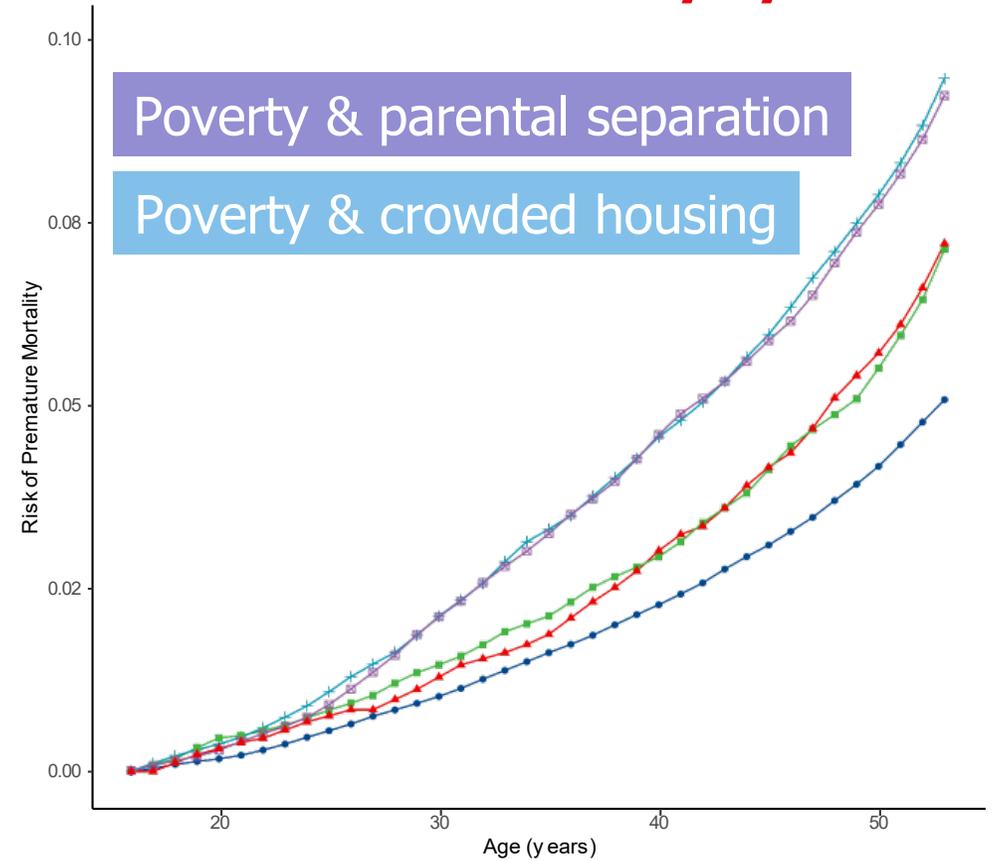


## Suicide death by ACEs



Family instability

## All-cause mortality by ACEs



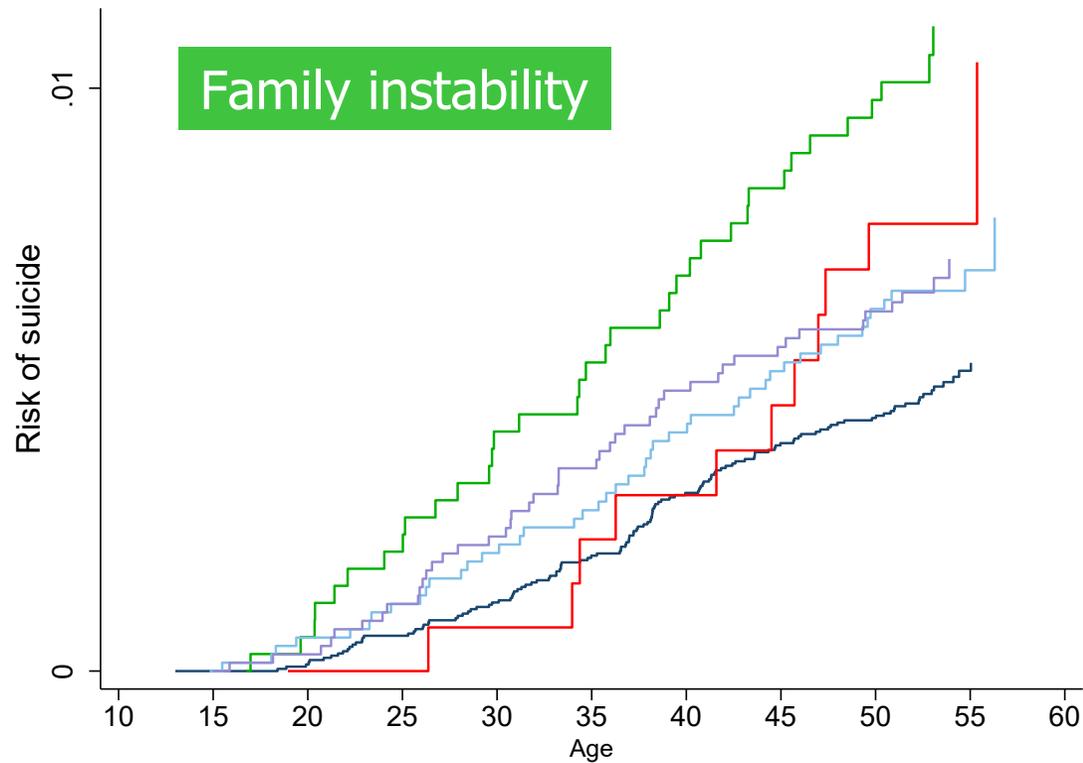
Poverty & parental separation

Poverty & crowded housing

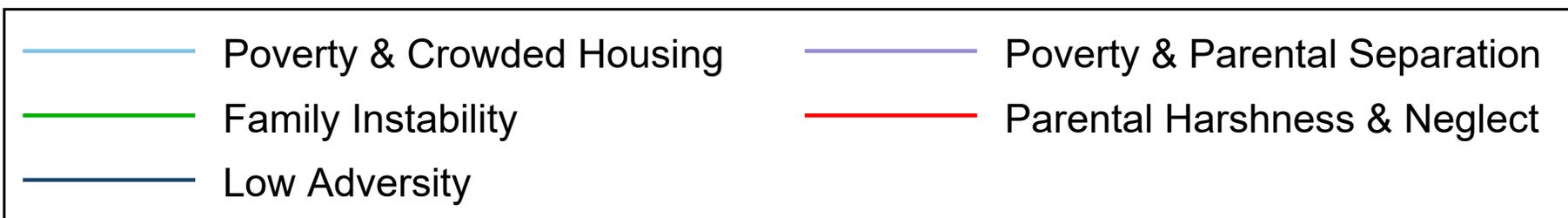
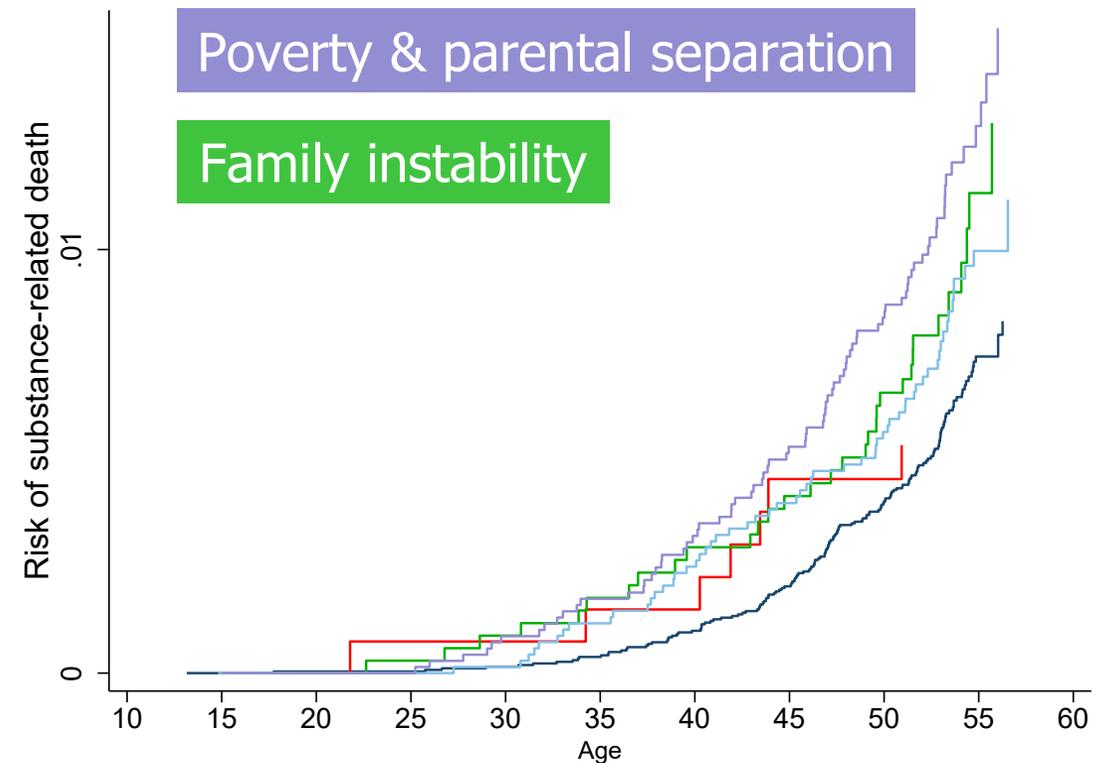
- Poverty & Crowded Housing
- Family Instability
- Low Adversity
- Poverty & Parental Separation
- Parental Harshness & Neglect



## Suicide death by ACEs



## Substance-related death by ACEs





## Type of ACEs matters above number of ACEs

**Table 1. Results of survival analysis of the association of ACEs classes and score**

	Classes and score <b>SEPARATELY</b> HR (95%CI)	Classes and score <b>TOGETHER</b> HR (95%CI)
<b>ACEs classes</b>		
Low Adversity	Ref.	Ref.
Parental Harshness & Neglect	1.57 (0.84, 2.91)	1.37 (0.69, 2.72)
<b>Family Instability</b>	<b>1.92 (1.32, 2.79)</b>	<b>1.75 (1.14, 2.68)</b>
Poverty & Crowded Housing	1.38 (0.97, 1.96)	1.25 (0.83, 1.89)
Poverty & Parental Separation	1.37 (0.97, 1.94)	1.14 (0.67, 1.95)
<b>Cumulative ACEs</b>	<b>1.10 (1.02, 1.17)</b>	1.05 (0.94, 1.18)

1. Adjusted for race, sex, and parental education.



## CONCLUSIONS

Prenatal sociodemographic and pregnancy-related factors independently associated with **suicide risk** in offspring.

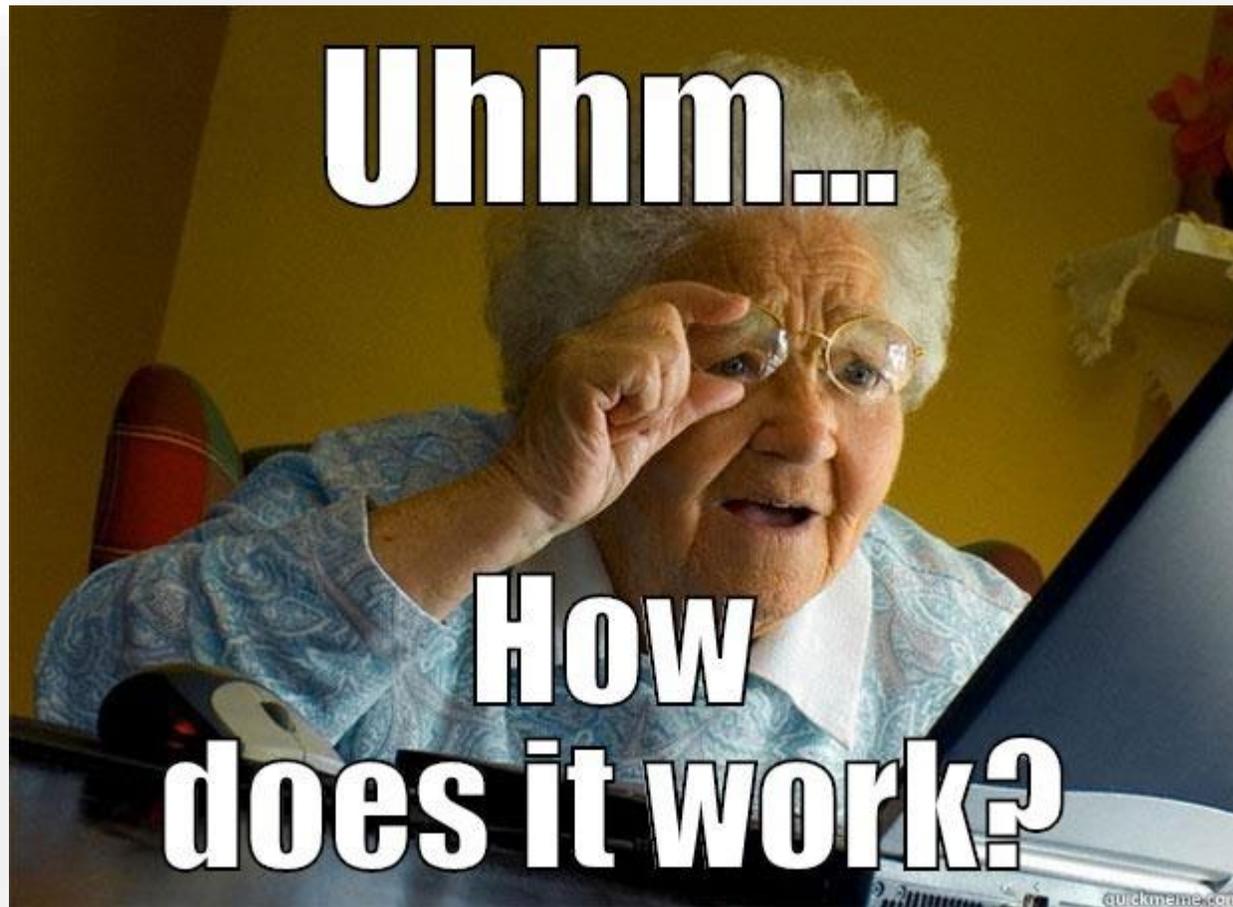
Lower childhood neurocognitive performance associated with **vulnerability to suicide** through middle-adulthood.

**Adverse childhood experiences** associated with **suicide risk** and **type of ACEs** matters

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Genetic and environmental family factors

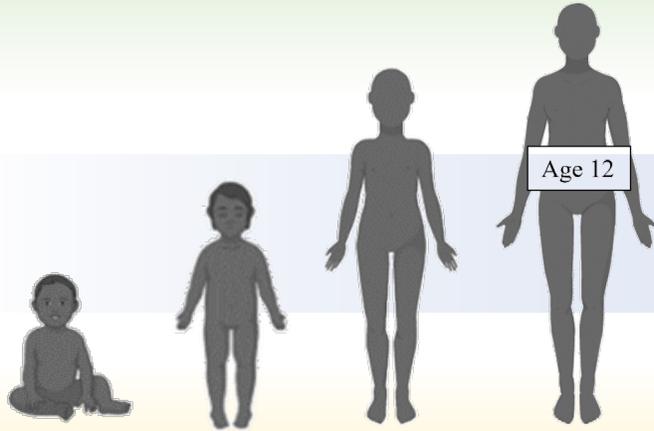


**Pregnancy / birth factors:**

- Low birth weight/length
- Birth-related traumas
- Being born in Spring
- Smoking during pregnancy

**Sociodemographic factors:**

- Young maternal age
- Young father or older than 30
- Single marital status
- Parents with low education
- Later born children
- Immigrant status
- International/national adoptees
- Residing in institutional care
- Having contact with social services/child welfare



**Parental & child factors:**

- Parental death by external causes
- Parental stressors/disability
- Childhood health problems
- Traumatic brain injury
- Adverse emotional experiences

**Changes**

- Epigenetics
- Neural systems
- Immune
- Neuroendocrine
- Social
- Psychological



**Proximal factors**

- Psychiatric disorders
- Altered decision making\*
- Personality traits\*
- Stressful life events
- Socioeconomic disadvantage

1

Increased sensitivity to stressful environments and proximal factors

2

INCREASED VULNERABILITY TO SUICIDE



## TAKE-HOME MESSAGE

**Vulnerability to suicide is partly established early in development, even before birth**



# Thank you

**Pablo Vidal-Ribas, PhD**

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