Investigating the Impact of Lifetime Environmental Stressors on the Health and Quality of Life of Adults with Tourette Syndrome

Presented By:

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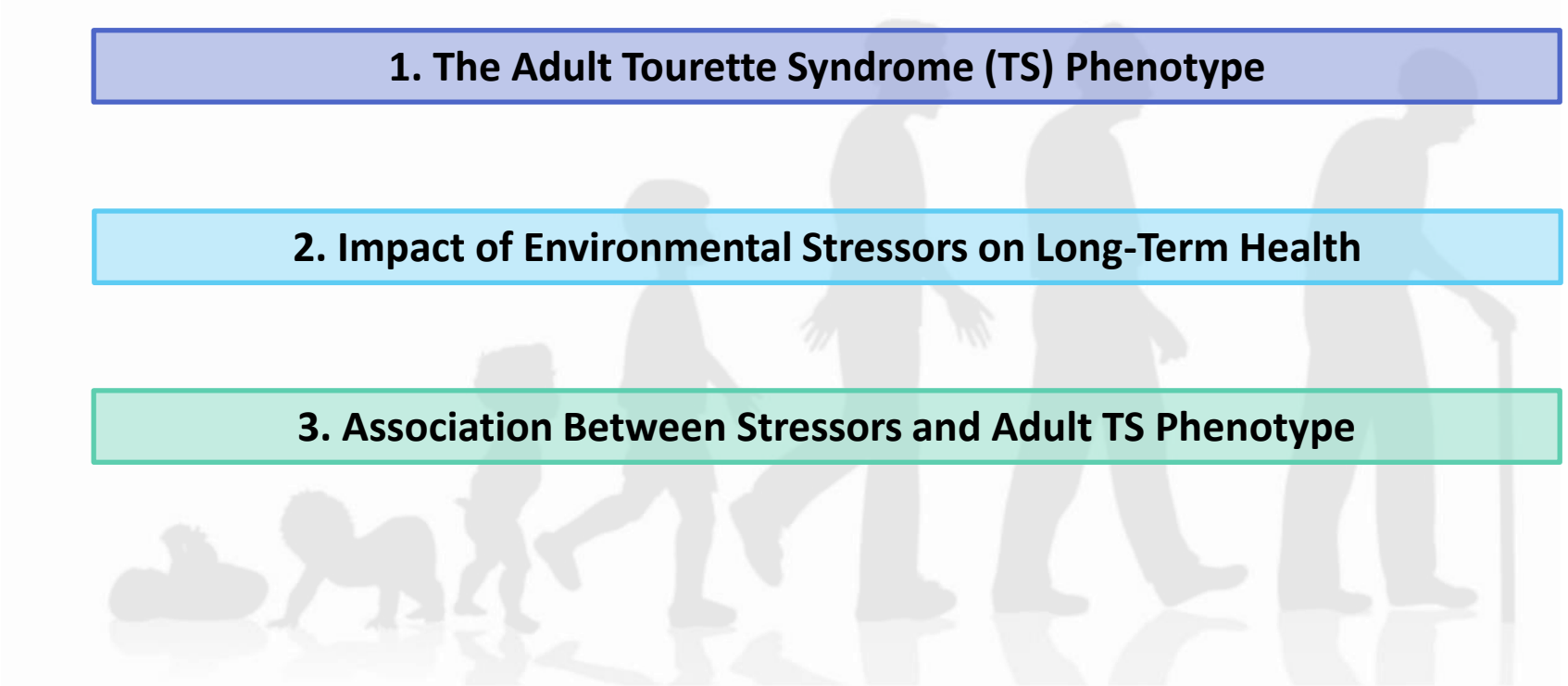
OUTLINE

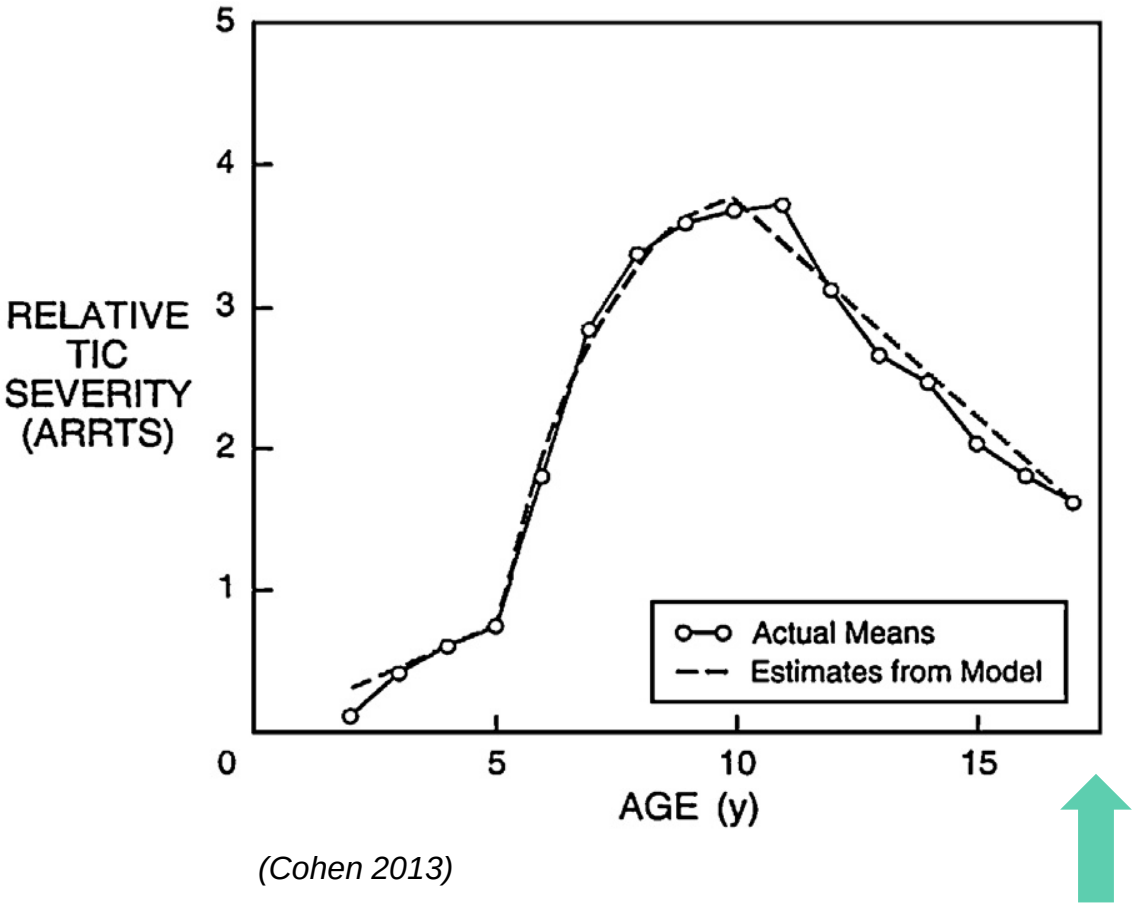
1. The Adult Tourette Syndrome (TS) Phenotype

2. Impact of Environmental Stressors on Long-Term Health

3. Association Between Stressors and Adult TS Phenotype



1. The Adult TS Phenotype



(Cohen 2013)

- Only ~10-20% of individuals with TS experience tic remission in adulthood.
  (Reagan 2022)
- One-third of individuals with TS experience bothersome tics in adulthood.
  (Cohen 2013)
- At least 40% of adults with TS avoid social situations because of tics.
  (Conelea 2013)

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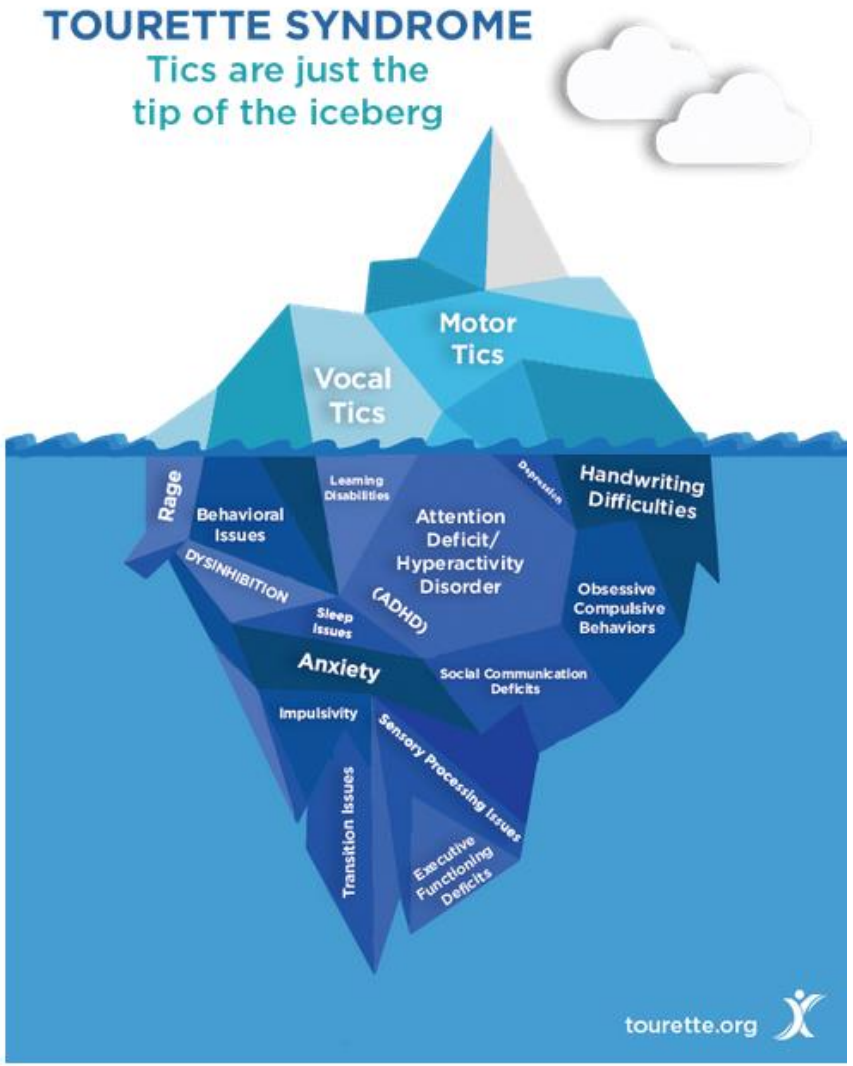


- Lifetime prevalence rates of psychiatric diagnoses in adults with TS:
  - mood disorders 60%
  - anxiety disorders 40%
  - OCD 55%
  - ADHD 36%

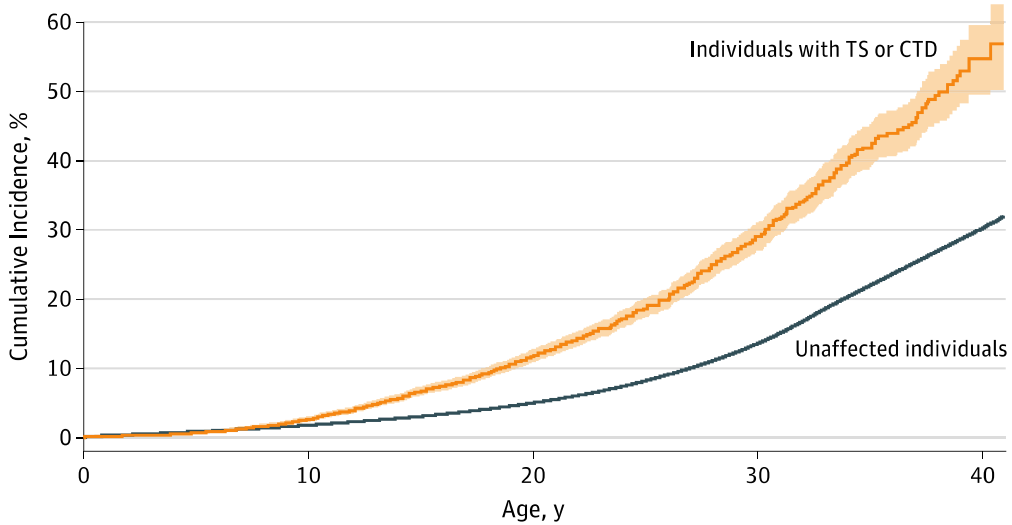
  (Hirschtritt et al., 2015)
- One-third of adults with TS report inadequate support from their families.
  (Elstner et al., 2001)

1. The Adult TS Phenotype

Relative to the general population, individuals with TS are at…

- 4-fold greater odds of completing **suicide** *(de la Cruz 2016)*
- 2.5-fold higher risk of **substance-related death** *(Virtanen 2020)*
- 2.8-fold higher risk of **obesity** *(Brander 2019)*
- 1.7-fold higher risk of type 2 **diabetes** *(Brander 2019)*
- 1.8-fold higher risk of **cardiovascular diseases** *(Brander 2019)*

Figure. Cumulative Incidence of Any Cardiometabolic Disorder

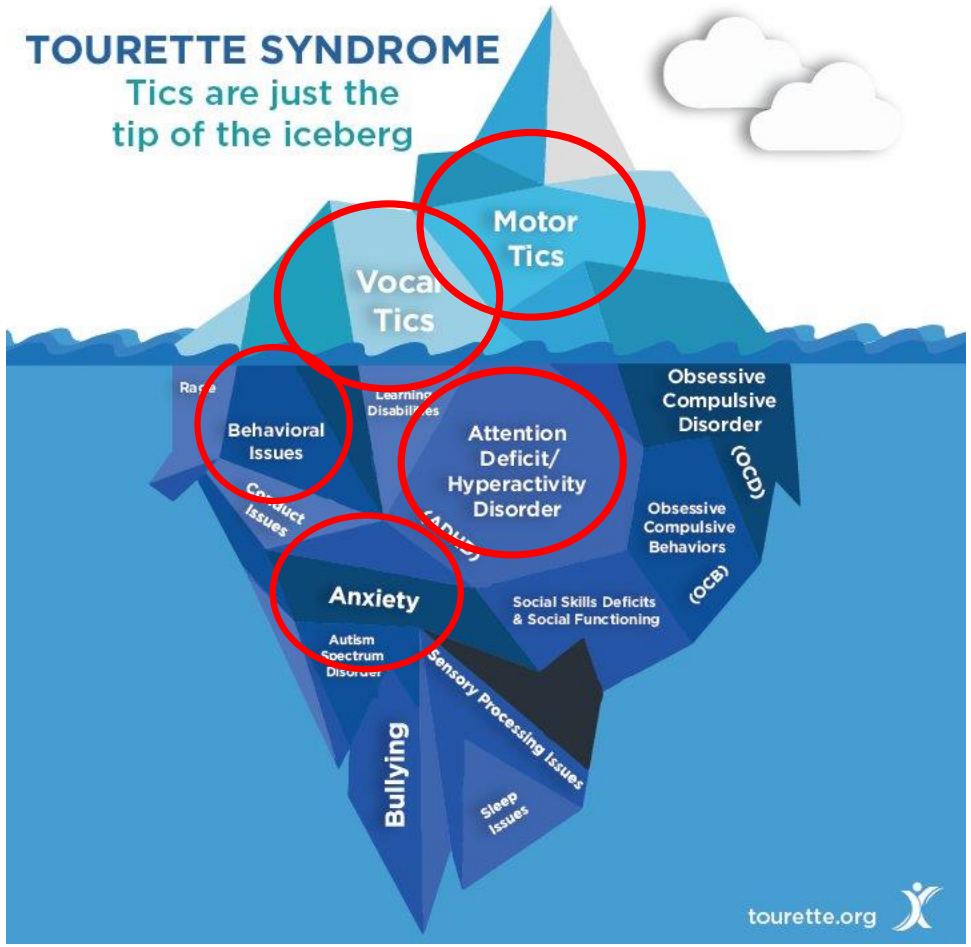


1.8-fold higher risk of premature death from any cause.

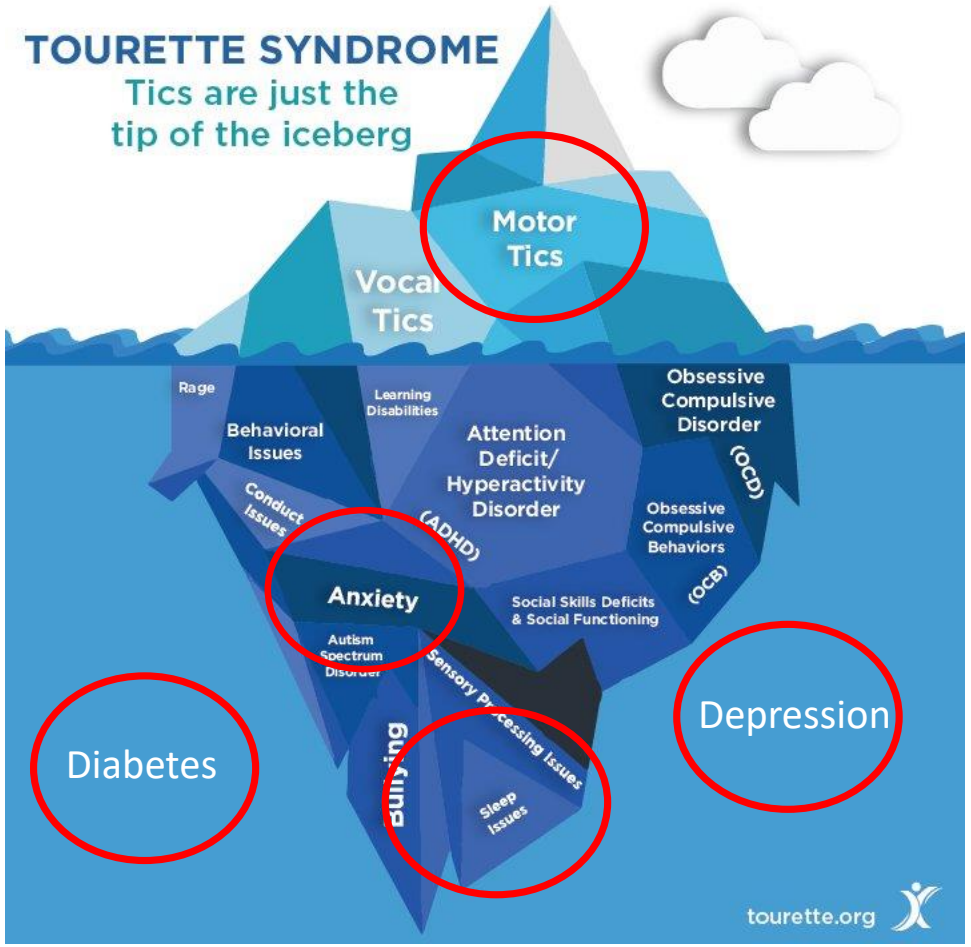
After exclusion of those with comorbid ADHD, OCD, and substance abuse, tics remained associated with increased mortality risk (MRR 2.30), as did TS (MRR 1.81).

(Meier 2017)

1. The Adult TS Phenotype



12 years of age



42 years of age

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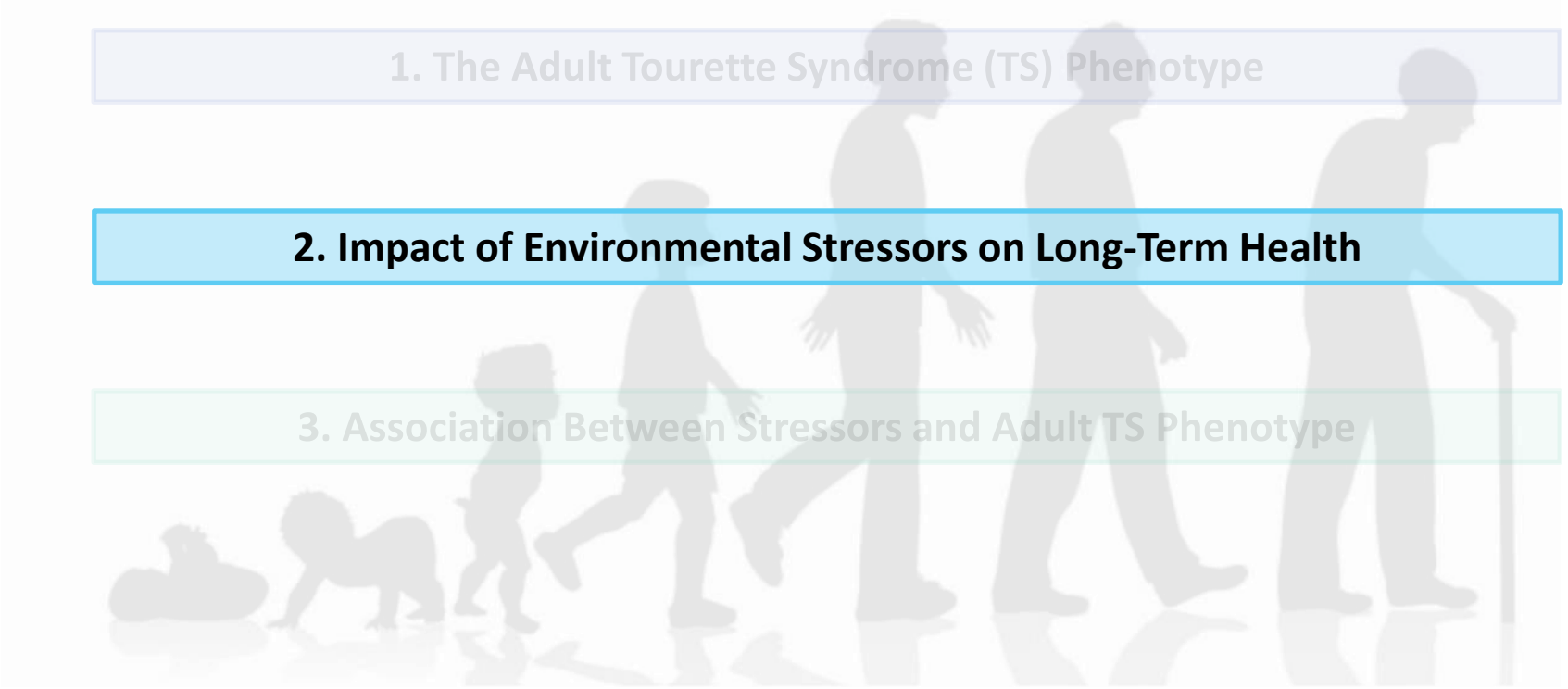
3. Association Between Stressors and Adult TS Phenotype



2. Impact of Environmental Stressors on Long-Term Health

Adverse childhood experiences (ACEs) are stressful or potentially traumatic events that children experience before age 18 years.

2/3rd of the US population have been exposed to 1 or more ACEs.

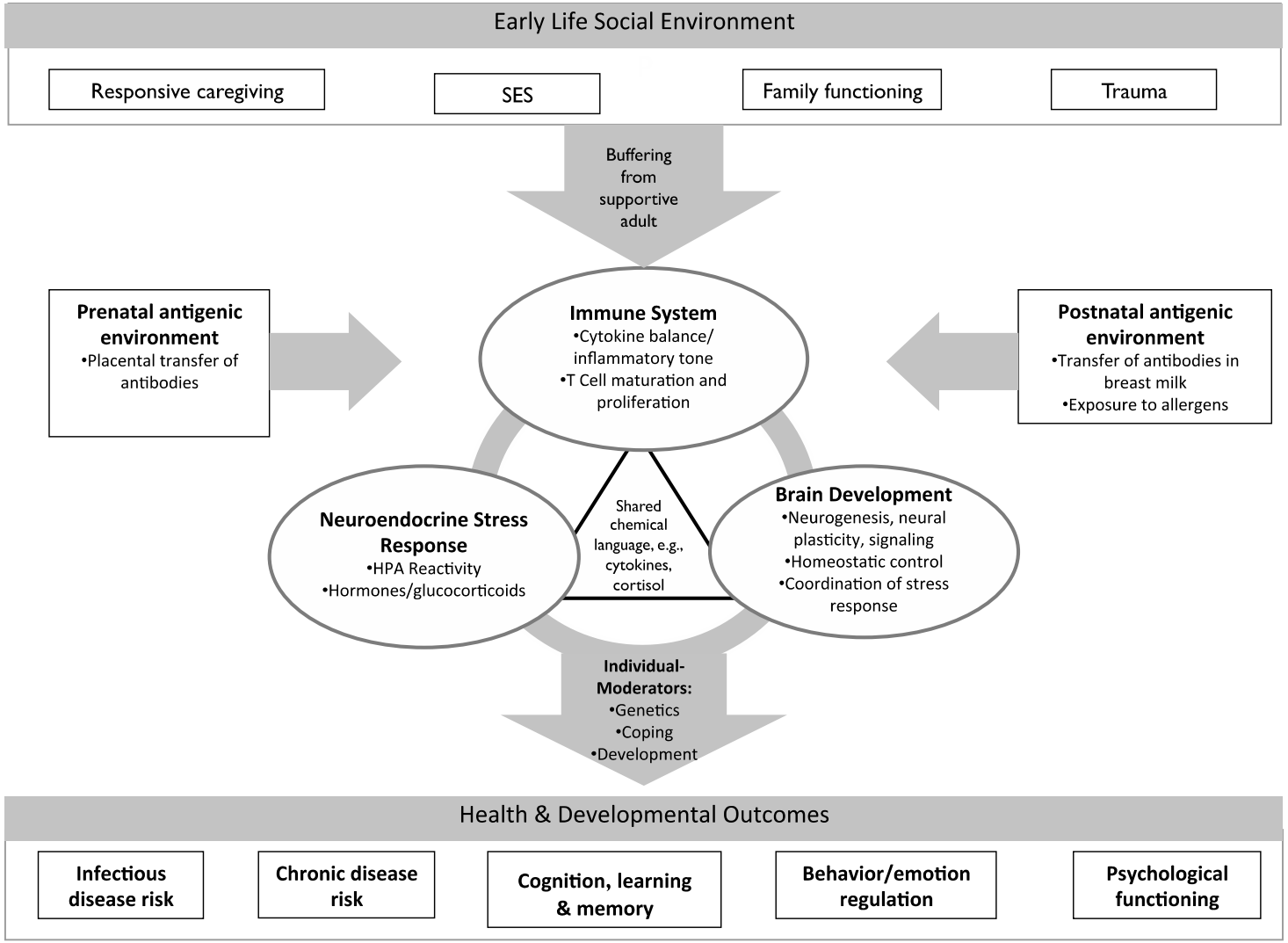
ACEs are associated with:

Traumatic injuries
Depression
Anxiety
Suicide
PTSD
Sexually transmitted diseases
Pregnancy complications

Diabetes
Alcohol and drug abuse
Low educational level
Unemployment
Household poverty
HIV
Cancer

Risk of negative outcomes increases with number of ACEs.

2. Impact of Environmental Stressors on Long-Term Health



(Johnson 2013)

2. Impact of Environmental Stressors on Long-Term Health

- One longitudinal study in children with TS (n=37) observed that baseline environmental stress predicted tic and psychiatric symptom severity at two-year follow-up. *(Lin 2007)*
- A recent cross-sectional study in TS adults (n=351) found that adverse childhood experiences are linked with greater “worst-ever” tic severity and impairment. *(Yang 2022)*

The longitudinal impact of environmental stressors on adults with TS remains uncertain.

Identifying modifiable risk factors for tics and psychiatric symptoms is critical for developing interventions to reduce the substantial mental and physical health burden on adults with TS.

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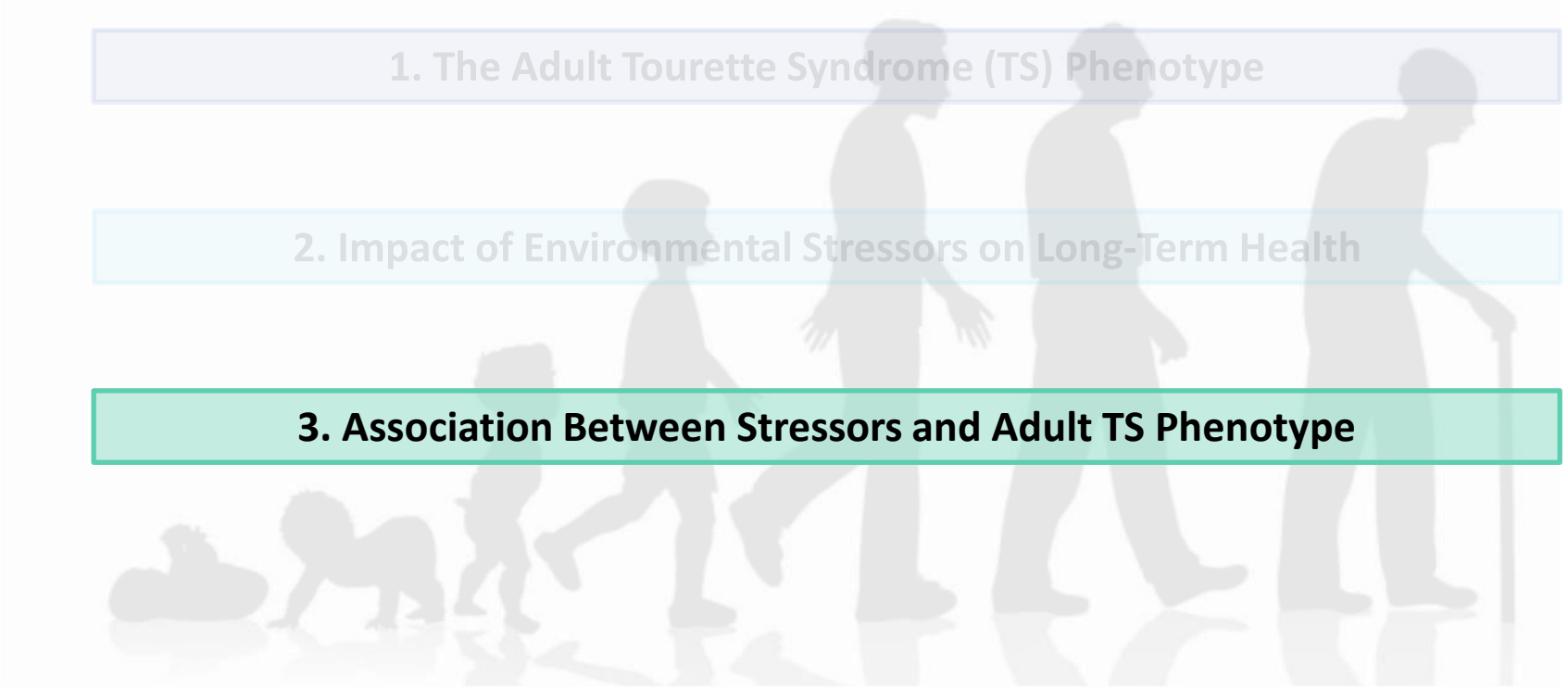


3. Association Between Stressors and Adult TS Phenotype

Question: What is the impact of environmental stressors on long-term outcomes in TS?

** *environmental stressor = an external condition or event that poses a threat to an individual's well-being* *(Gundersen 2011)*

Methods: Assess clinical symptoms, quality of life, and cumulative stressor burden in adults with TS (and other chronic tic disorders) **every two years.**

- Participants are predominantly recruited through our institution's Adult TS Clinic

<u>Self-Report Questionnaires</u>

- Socio-demographic variables
- Adult ADHD Self-Report Screening Scale
- Dimensional Obsessive-Compulsive Scale
- NeuroQOL-Depression
- NeuroQOL-Anxiety
- Multifactorial Assessment of Perceived Social Support
- Gilles de la Tourette-Quality of Life Scale
- **Lifetime STRAIN**
- **Shelby County ACEs Survey**
- **Benevolent Childhood Experiences Questionnaire**

<u>Clinician-Administered Measures</u>

- Yale Global Tic Severity Scale
- Mini International Neuropsychiatric Interview

3. Association Between Stressors and Adult TS Phenotype

STRAIN
Stress and Adversity Inventory

- **Assesses:** Major acute life events & chronic difficulties
- **Time:** 18-25 minutes to complete online
- **Outputs:** 115 lifetime stress exposure scores & charts
- **Format:** Self-administered or Interviewer-administered

Adult STRAIN

55 major stressors including
—26 acute life events
—29 chronic difficulties

Adolescent STRAIN

75 major stressors including
—33 acute life events
—42 chronic difficulties

TABLE 1. Dimensions of Life Stress Assessed by the Stress and Adversity Inventory (STRAIN)

Exposure Indices	Exposure Timing	Stressor Types	Primary Life Domains	Core Social-Psychological Characteristics
Stressor count	Early life stress	Acute life events	Housing	Interpersonal loss
Stressor severity	Adulthood life stress	Chronic difficulties	Education	Physical danger
	—		Work	Humiliation
			Treatment/Health	Entrapment
	Continuous age across the life course		Marital/Partner	Role change/Disruption
			Reproduction	
			Financial	
			Legal/Crime	
			Other relationships	
			Death	
			Life-threatening situations	
			Possessions	

*** generates 2 continuous variables: acute life stressor count (range 0-26); chronic life stressor count (0-29)*

(Slavich 2018)

3. Association Between Stressors and Adult TS Phenotype

Table 1. Demographic Characteristics **at Baseline**

Characteristic	
Sex (M:F)	18 : 20
Age (years)	31† (23-41)
Ethnicity	
Hispanic or Latino/a	0
NOT Hispanic or Latino/a	38
Unknown / Not Reported	0
Race	
American Indian/Alaska Native	0
Asian	2
Native Hawaiian or Other Pacific Islander	0
Black or African American	1
White	34
More Than One Race	0
Unknown / Not Reported	1
Educational Attainment	
Did not graduate from high school	1
Graduated from high school or obtained GED	3
Currently enrolled in 2- or 4-year college / university	7
Attended some college but did not receive a degree	5
Obtained associate degree	2
Obtained bachelor's degree	16
Currently enrolled in graduate school	2
Obtained Master's degree	2
Obtained professional school or doctoral degree	0

† median (interquartile range)

3. Association Between Stressors and Adult TS Phenotype

Table 2.
Clinical Characteristics

Variable	
Co-occurring Psychiatric Diagnoses, Self-Reported	
Attention-deficit / hyperactivity disorder (ADHD)	16
Obsessive-compulsive disorder (OCD)	17
Anxiety disorder	21
Mood disorder	13
Autism spectrum disorder	0
Number of Self-Reported Co-occurring Psychiatric Diagnoses (from above list)	
0	11 (29%)
1	6
2	7
3 or more	14
Adult ADHD Self-Report Screening Scale for DSM-V (ASRS-5)	12.5† (10-16)
Dimensional Obsessive-Compulsive Scale (DOCS)	14.5 (6-26)
NeurQoL-Depression Short Form	12 (10-16)
NeurQoL-Anxiety Short Form	18 (12-25)
GTS-QOL Total Raw Score	35 (19-43)
GTS-QOL Total Scaled Score	31.7 (16.8-41.0)

† median (interquartile range)

3. Association Between Stressors and Adult TS Phenotype

Table 3.
Stressor Characteristics

Variable	
ACEs Total Score	1 (0-4)
0	11 (28.9%)
1	9 (23.7%)
2	6 (15.8%)
3 or more	12 (31.6%)
Core Stressor Indices	
Total Count of Stressors (StressCT)	18† (14-30)
Total Severity of Stressors (StressTH)	47 (28-74)
Count of Acute Life Events	10 (8-14)
Count of Chronic Difficulties	10 (5-13)
Severity of Acute Life Events	20 (14-30)
Severity of Chronic Difficulties	28 (12-36)
Time-Limited Stressor Indices	
Early Adversity – Total Count	4.5 (2-9)
Early Adversity – Total Threat	15 (5-23)
Early Adversity – Count of Acute Life Events	2 (0-4)
Early Adversity – Severity of Acute Life Events	5.5 (0-9)
Early Adversity - Count of Chronic Difficulties	2 (1-4)
Early Adversity - Severity of Chronic Difficulties	7.5 (4-17)
Adulthood - Total Count	12.5 (8-19)
Adulthood - Total Severity	30.5 (17-47)
Recent - Total Count of Stressors in the Past 12 Months	2 (1-5)
Recent - Total Severity of Stressors in the Past 12 Months	10 (4-17)
Positive Childhood Experiences	9 (8-10)

† median (interquartile range)

3. Association Between Stressors and Adult TS Phenotype

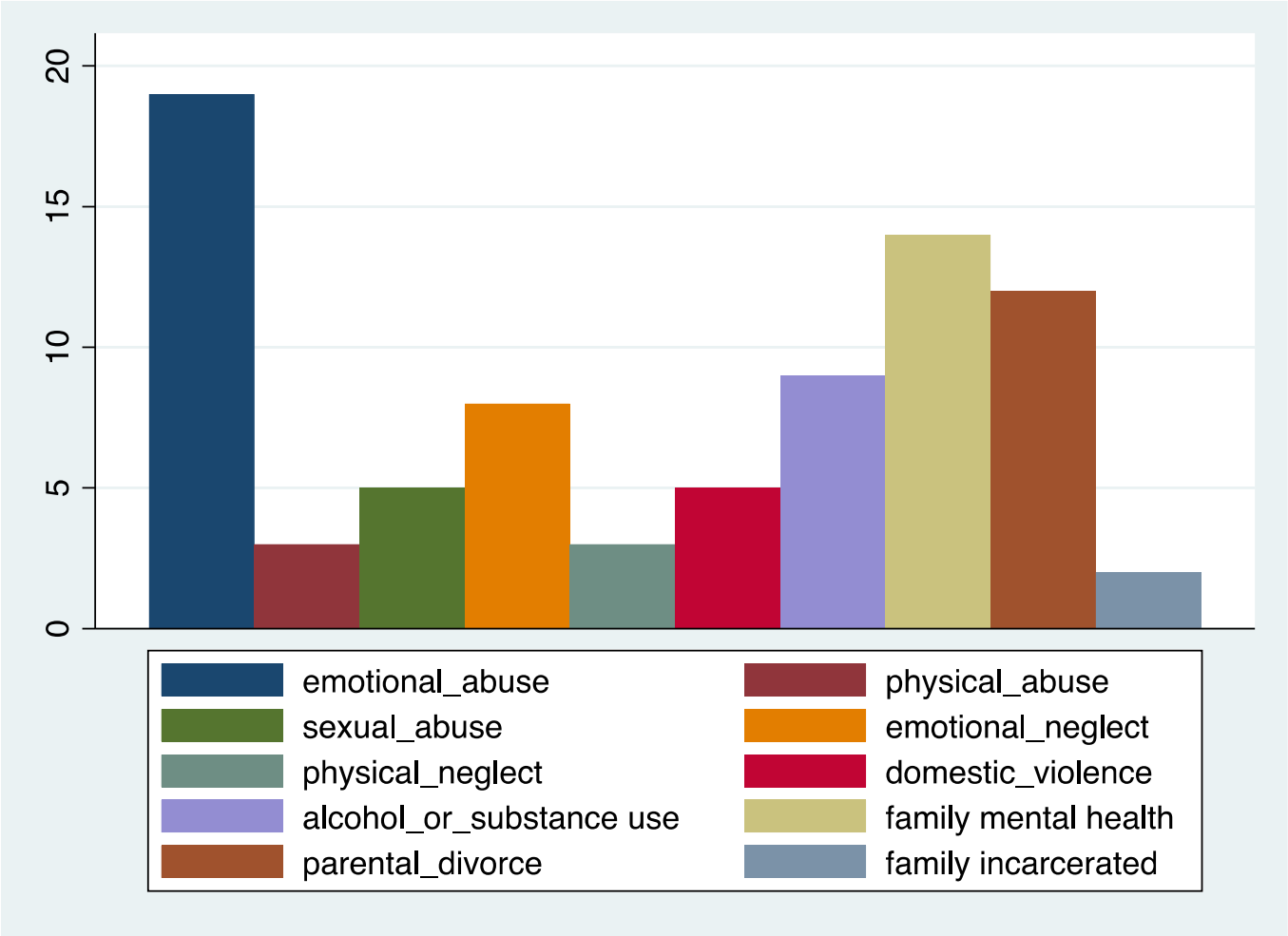
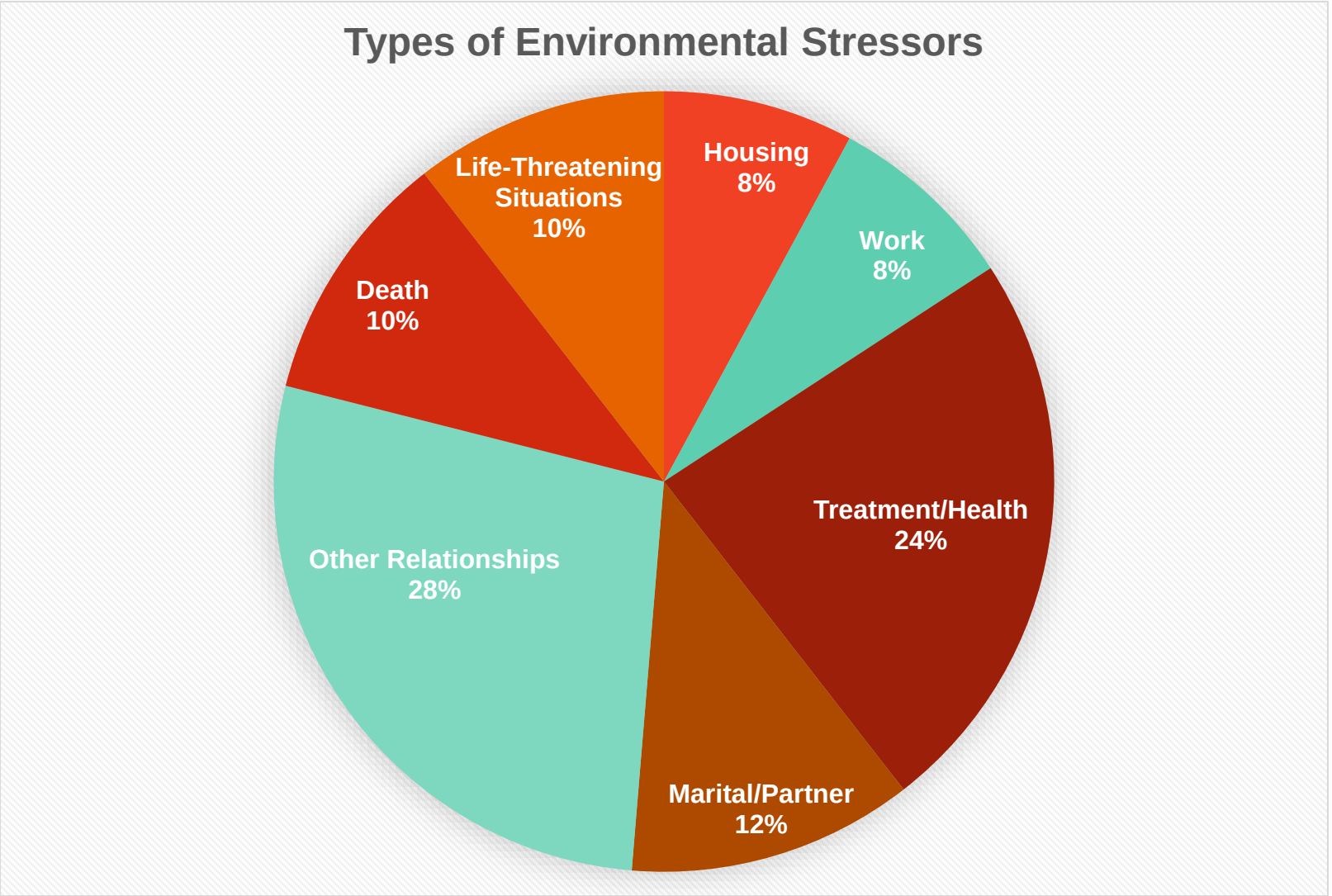


Figure.
Counts by ACEs Category

Yang 2022: **"Mental illness** in the household was the most commonly reported ACE, and, along with **emotional abuse**, represent the 2 ACEs most strongly associated with worst-ever impairment."

3. Association Between Stressors and Adult TS Phenotype



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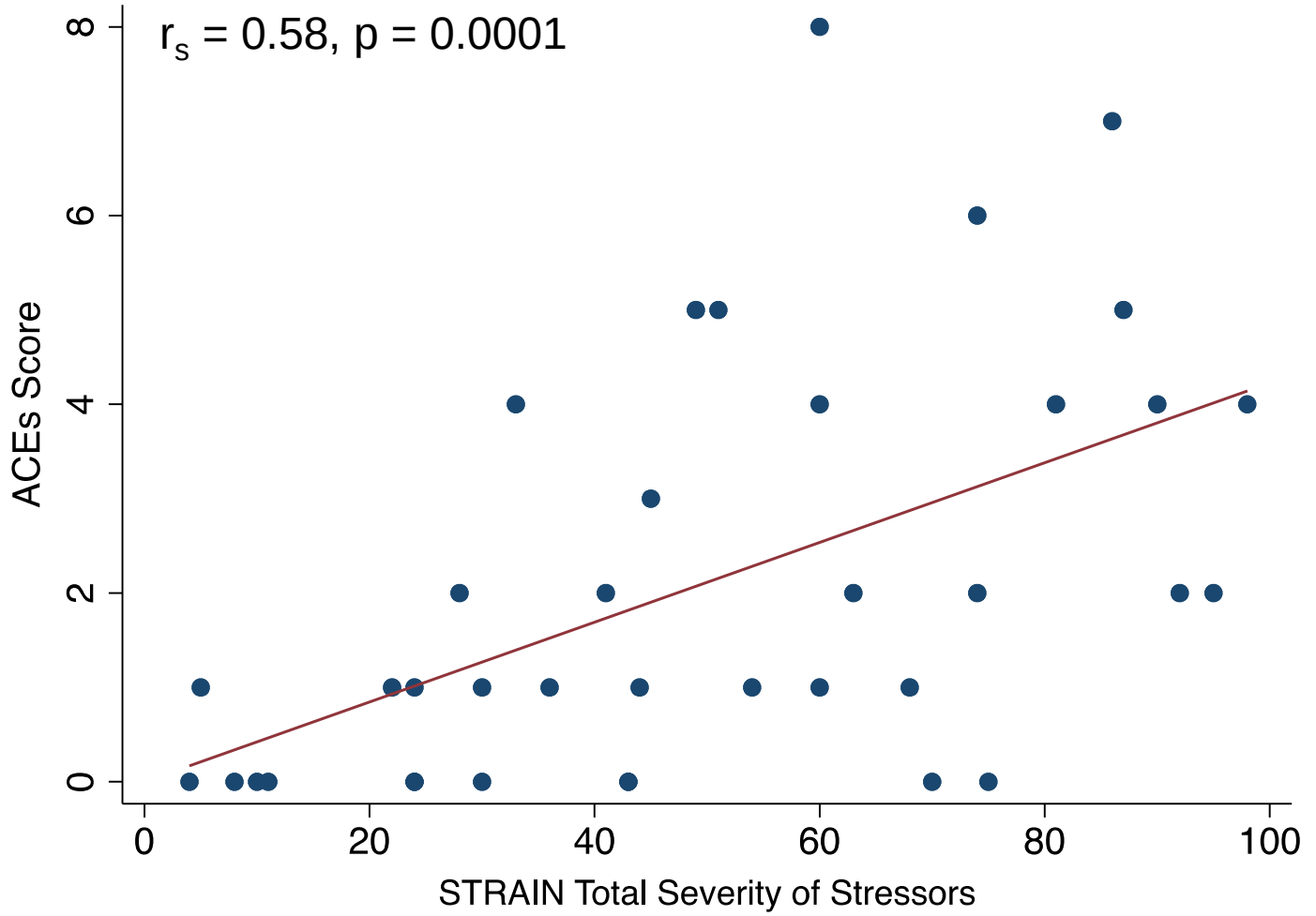
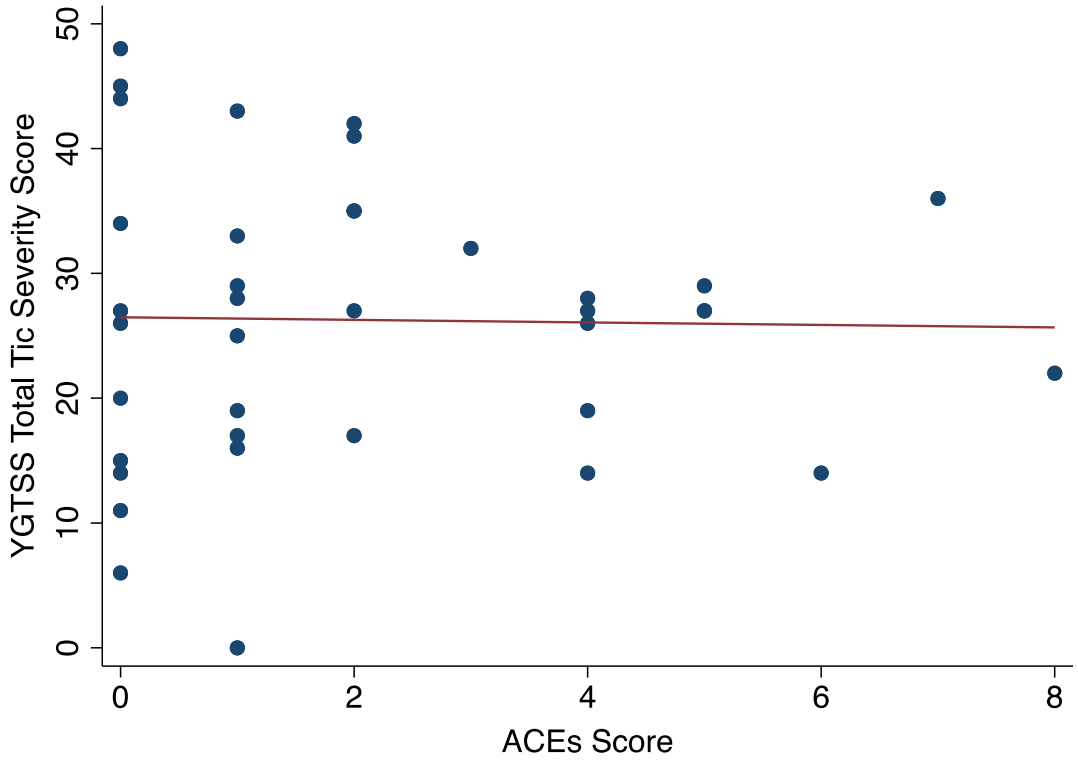
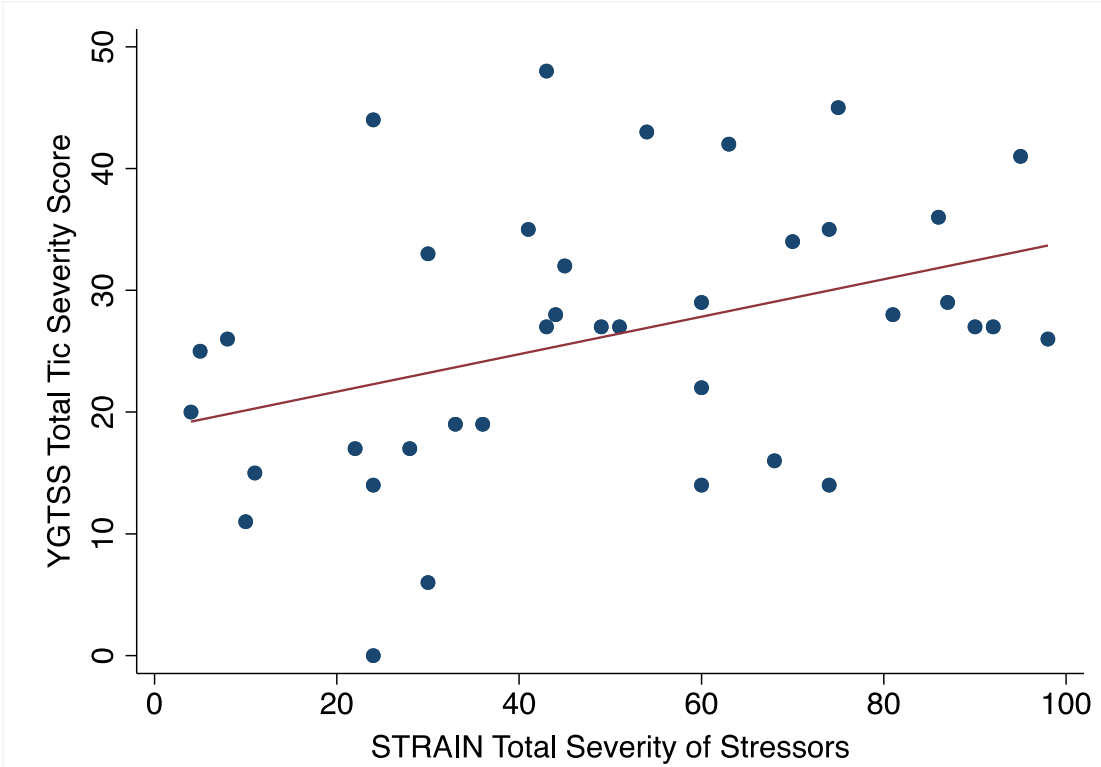


3. Association Between Stressors and Adult TS Phenotype

$r_s = 0.03$, $p > 0.05$

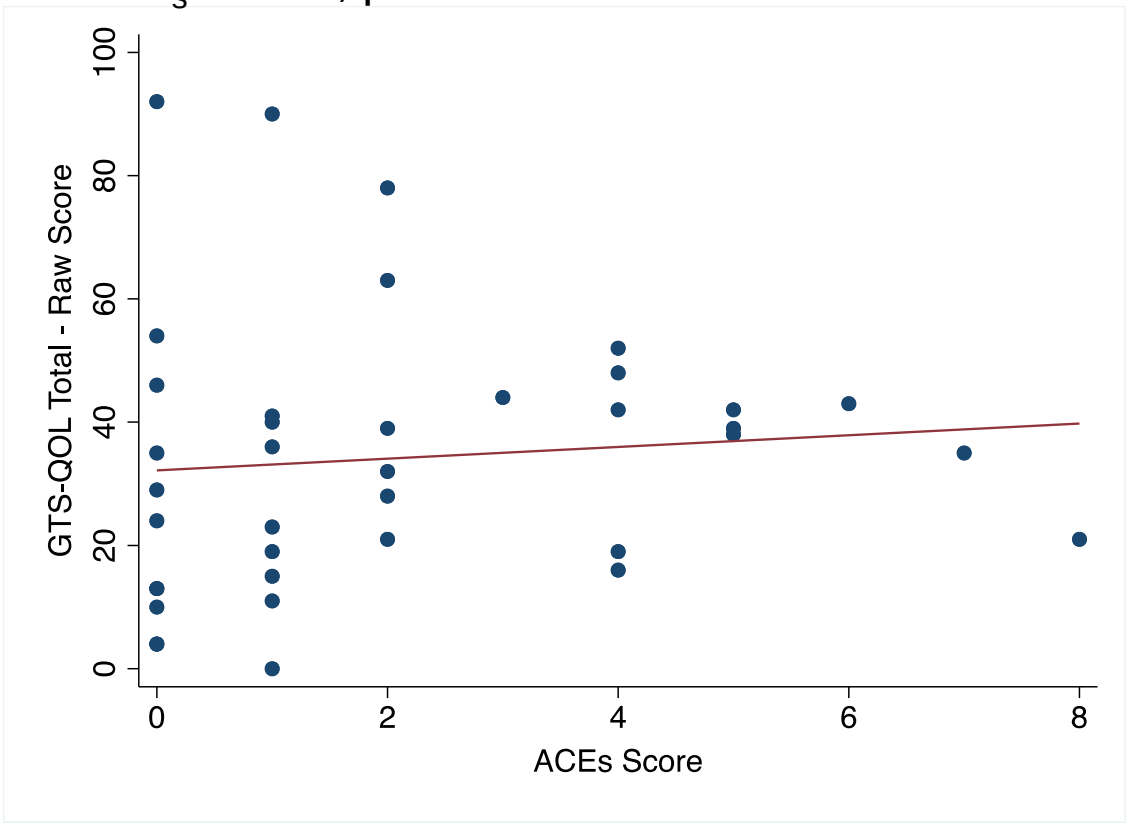


$r_s = 0.41$, $p = 0.01$

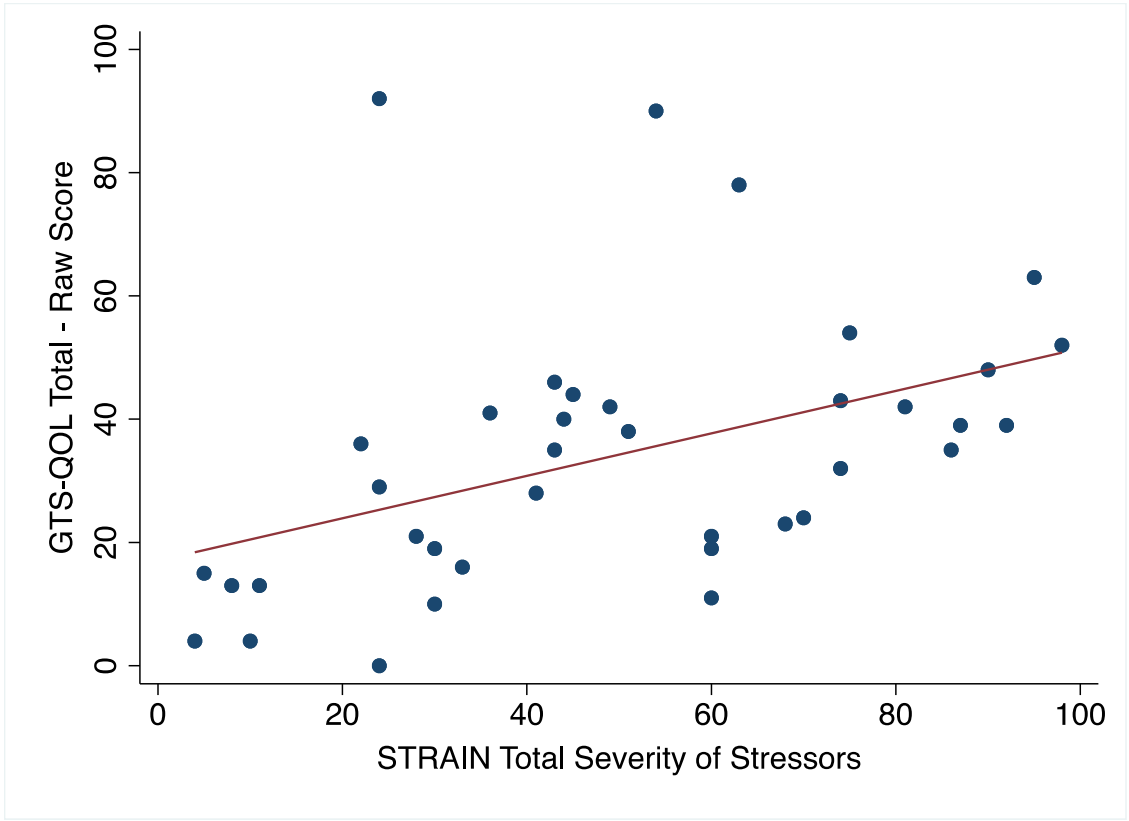


3. Association Between Stressors and Adult TS Phenotype

$r_s = 0.26$, $p > 0.05$



$r_s = 0.57$, $p = 0.0002$



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Limitations of Current Study…

- non-diverse sample
- most participants have more severe tics because recruited through a specialty clinic
- not collecting physical health outcomes
- not collecting measures of resiliency

Future Directions

- recruit from community, i.e., non-clinical, samples
- involve additional sites
- incorporate additional physical health and resiliency measures

If you have further questions / feedback regarding this study and/or have any interest in collaborating on this work, please email me: david.a.isaacs@vumc.org

3. Association Between Stressors and Adult TS Phenotype

THANK YOU

Funders / Supporting Agencies

Tourette Association of America

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Vanderbilt TS Center Team

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Harrison Walker, MD

Collaborators

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Movement Disorders Division
Regional TS Working Group
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	StressCT	StressTH	EvntCT	DiffCT	EvntTH	DiffTH	RecTotTH	trad_aces	mapss_total	bce_total	tts_score	docs_total	asrs_total_c	nql_dep_raw	nql_anx_raw	gtsqol_total_raw
StressTH	0.92															
EvntCT	0.91	0.82														
DiffCT	0.9	0.86	0.69													
EvntTH	0.86	0.9	0.89	0.69												
DiffTH	0.85	0.95	0.69	0.85	0.74											
RecTotTH	0.57	0.59	0.51	0.48	0.54	0.58										
trad_aces	0.63	0.58	0.4	0.76	0.41	0.6	0.23									
mapss_total	-0.47	-0.47	-0.34	-0.52	-0.35	-0.47	-0.41	-0.37								
bce_total	-0.43	-0.43	-0.38	-0.49	-0.27	-0.54	-0.11	-0.41	0.35							
tts_score	0.36	0.41	0.34	0.31	0.32	0.45	0.43	0.03	-0.04	-0.27						
docs_total	0.20	0.28	0.27	0.18	0.29	0.30	0.27	0.20	-0.16	-0.36	0.36					
asrs_total_c	0.39	0.41	0.38	0.26	0.38	0.39	0.30	0.15	0.05	-0.17	0.51	0.35				
nql_dep_raw	0.26	0.35	0.31	0.24	0.29	0.34	0.47	0.17	-0.50	-0.41	0.32	0.42	0.15			
nql_anx_raw	0.27	0.28	0.19	0.33	0.24	0.25	0.53	0.23	-0.49	-0.25	0.33	0.28	0.04	0.62		
gtsqol_total_	0.43	0.57	0.38	0.42	0.42	0.60	0.47	0.26	-0.37	-0.44	0.62	0.48	0.34	0.62	0.47	

Spearman rank correlations