Adverse Childhood Experiences: Longitudinal outcomes in the context of risk and intervention

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Adverse Childhood Experiences (ACEs)

TRADITIONAL CONCEPTUALIZATION OF ACES (KAISER/CDC)

- Abuse, Neglect, & Household Dysfunction

TRADITIONALLY EXAMINED OUTCOMES

- Behavior & Physical/Mental Health

Graphics: Robert Wood Johnson Foundation
The original ACE research participants:
- <10% African American
- 75% white
- >75% had some college or were college graduates
- Nearly half over 60 years of age

Of those, men, non-whites, less educated, and less financially secure participants evinced poor outcomes at higher rates, but sample sizes of some of these groups were relatively small (Anda & Felitti,
Where does poverty fit in?

In childhood:
- High poverty contexts can amplify the effects of adverse experiences.
- Certain circumstances that are a result of poverty can be adverse experiences:
  - Not being able to afford adequate food or medical care.
  - Living in a high-crime neighborhood.
  - Witnessing or being the victim of a violent crime.

In adulthood:
- Research has linked broader measures of well-being, like educational attainment and crime, to adversity as well.
Generalizing to non-white and higher neighborhood poverty populations

- Previous research with the current, higher-risk sample (Giovanelli, Reynolds, Mondi, & Ou, 2016) showed strong ACE effects, suggesting generalization.

Giovanelli et al., 2016
Adverse Childhood Experiences (ACEs)

TRADITIONAL CONCEPTUALIZATION OF ACES (KAISER/CDC)

- Abuse, Neglect, & Household Dysfunction

The three types of ACEs include:

- **ABUSE**
  - Physical
  - Emotional
  - Sexual

- **NEGLECT**
  - Physical
  - Emotional

- **HOUSEHOLD DYSFUNCTION**
  - Mental Illness
  - Encouraged/Refused
  - Mother treated violently
  - Substance Abuse
  - Divorce

TRADITIONALLY EXAMINED OUTCOMES

- Behavior & Physical/Mental Health

Possible Risk Outcomes:

**BEHAVIOR**

- Lack of physical activity
- Smoking
- Alcoholism
- Drug use
- Misdemeanor

**PHYSICAL & MENTAL HEALTH**

- Severe obesity
- Diabetes
- Depression
- Suicide attempts
- STDs

- Heart disease
- Cancer
- Stroke
- COPD
- Broken bones

Graphics: Robert Wood Johnson Foundation
Adverse Childhood Experiences (ACEs)

EXPANDED CONCEPTUALIZATION

- Abuse, Neglect, & Household Dysfunction

+ broader environmental ACEs

EXPANDED OUTCOMES

- Behavior & Physical/Mental Health

+ broader measures of well-being
What now?

The three types of ACEs include:

- **Abuse**
  - Physical
  - Emotional
  - Sexual

- **Neglect**
  - Physical
  - Emotional

- **Household Dysfunction**
  - Mental Illness
  - Incest/Abuse
  - Divorce

Possible Risk Outcomes:

**Behavior**
- Lack of physical activity
- Smoking
- Alcoholism
- Drug use
- Missed work

**Physical & Mental Health**
- Severe obesity
- Diabetes
- Depression
- Suicide attempts
- STDs
- Heart disease
- Cancer
- Stroke
- COPD
- Broken bone
Chicago Longitudinal Study sample

Original sample
- 1,539 children beginning preschool at age 3 in 1983-1984 or age 4 in 1984-1985
- (CPC = 989; Comparison group = 550)
- Matched group, quasi-experimental design
  - Born in 1980
  - Resided in high poverty neighborhoods
  - Attended Chicago Public Schools
- 93% African-American; 7% Latino
- 49.7% male, 50.3% female

Current sample
- 1,202 participants with ACE data
- Retrospective data gathered at 22-24
- Administrative data collected from 0-18
- 94% African-American, 6% Latino
- 45.9% male, 54.1% female

Groups

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Sex

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Race

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**Groups: Sex, Race**
Primary Research Questions:

1. Do cumulative ACEs predict well-being in a primarily African American sample?

2. Are associations between cumulative ACEs and outcomes in adulthood strongest for males and for participants attending schools in the highest poverty neighborhoods?

3. Do 5 Hypothesis Model (5HM) mediators explain the effects of ACEs?
Predictors: ACEs

- Abuse, Neglect, & Household Dysfunction + broader environmental ACEs

The three types of ACEs include:

**ABUSE**
- Physical
- Emotional
- Sexual

**NEGLECT**
- Physical
- Emotional

**HOUSEHOLD DYSFUNCTION**
- Mental Illness
- Intergenerational Violence
- Mother treated violently
- Substance Abuse
- Divorce
- Incarcerated Relative
ACE Prevalence: Current Sample vs Kaiser/CDC

How Common are ACES?

Chicago Longitudinal Study Sample

- Zero: 24%
- One: 26%
- Two: 8%
- Three: 19%
- Four or more: 23%

How Common are ACES?

ACE Study

- # of ACES
  - Zero: 36%
  - One: 26%
  - Two: 16%
  - Three: 9.5%
  - Four or more: 12.5%
ACE prevalence by neighborhood poverty

<table>
<thead>
<tr>
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<th>Lower Poverty</th>
<th>Higher Poverty</th>
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<td>Four or more</td>
<td>27.18</td>
<td>22.95</td>
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<tr>
<td>Three</td>
<td>18.47</td>
<td>9.41</td>
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<tr>
<td>Two</td>
<td>24.04</td>
<td>18.80</td>
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<tr>
<td>One</td>
<td>23.39</td>
<td>20.91</td>
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<tr>
<td>Zero</td>
<td>27.54</td>
<td>20.50</td>
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Legend: Lower Poverty, Higher Poverty
Subgroups

SEX

- Male: 45.9%
- Female: 54.1%

NEIGHBORHOOD POVERTY

Participants in school neighborhoods with ≥60% poverty vs all other

- Higher Poverty: 76.1%
- Lower Poverty: 23.9%
Mediation

≥4 ACEs

X → M → Y

≥4 ACEs

X → Y

Smoking (yes/no)

(Kenny, 2016)
Early Childhood
Ages 3-9

Exogenous Conditions
Gender
Socio-environmental risk
Neighbourhood attributes

Program Participation
Timing
Duration
Intensity

Motivation
Self-efficacy
Perceived competence
Persistence in learning

Developed Abilities
Cognitive development
Literacy skills
Pre-reading/numeracy skills

Social Adjustment
Classroom adjustment
Peer relations
Self-regulating skills

Family Support
Parent-child interactions
Home support for learning
Participation in school
Parenting skills

School Support
Quality of school environment
Classroom environment
School-level performance

Ages 5-12

MA = Motivational Advantage
CA = Cognitive Advantage
SA = Social Adjustment
FS = Family Support
SS = School Support

Adolescence
Ages 12-

Social Competence Behaviours
School achievement and performance
Retention in grade
Receiving special education services
Delinquency and services
Educational attainment
Mediators: 5 Hypothesis Model (Reynolds & Ou, 2016)

1. Prolonged absence of a parent or divorce of parents
2. Death of parent, sibling, or close friend
3. Frequent family conflict
4. Parent substance abuse
5. Witness to a violent crime
6. Victim of a violent crime
7. Child Welfare (overall) 0-3
8. Physical abuse, 4-18
9. Sexual abuse, 4-18
10. Neglect, 4-18

Ages 0-18

Ages 5-12

Motivation
- Self-efficacy
- Perceived competence
- Persistence in learning

Developed Abilities
- Cognitive development
- Literacy skills
- Pre-reading/numeracy skills

Social Adjustment
- Classroom adjustment
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School Support
- Quality of school environment
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Adulthood – ages 22-24

High school graduation
Occupational prestige
Smoking
Juvenile arrest
Adult felony

(Motivational Advantage) (Cognitive Advantage) (Social Adjustment) (Family Support) (School Support)
Mediators

- Examination of mechanisms of effects aids intervention design by identifying malleable environmental conditions (e.g., school quality) that can be modified to improve children’s success. These factors then can be manipulated to improve outcomes for affected children (Reynolds, Ou, & Topitzes, 2004).

**Cognitive Advantage**
- Iowa Test of Basic Skills, Kindergarten and 8th grade

**Social Adjustment**
- Teacher-rated classroom socio-emotional adjustment, grades 1-6
- Teacher-rated task orientation and frustration tolerance, grades 6-7

**Family Support**
- Parent involvement in school and at home, elementary school

**School Support**
- Magnet school attendance and number of school moves, grades 4-8

**Motivational Advantage**
- School commitment, grades 5-6
Outcome Measures

Education
- High school graduation

Health
- Smoking

Criminal justice system involvement
- Juvenile arrest
- Adult felony

Socioeconomic well-being
- Occupational prestige
  - Continuous (0-8)
  - Dichotomized (≥4)
Research Question 1

Do cumulative ACEs predict **well-being** in a primarily African American sample?
Research Question 1

ACEs Birth-18 and Adult Well-Being

- High School Graduation
- Smoking
- Juvenile Arrest
- Felony Arrest

Marginal Effect

1 ACE  2 ACEs  3 ACEs  ≥4 ACEs

*p < .05, **p < .01, ***p < .001
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect Size for 3 ACE group</th>
<th>Effect Size for ≥4 ACE group</th>
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<tbody>
<tr>
<td>High School Graduation</td>
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<td>-.39</td>
</tr>
<tr>
<td>Smoking</td>
<td>.32</td>
<td>.45</td>
</tr>
<tr>
<td>Juvenile Arrest</td>
<td>.43</td>
<td>.48</td>
</tr>
<tr>
<td>Felony Arrest</td>
<td>--</td>
<td>.39</td>
</tr>
</tbody>
</table>

*Note: Effect size conventions: Small = .2, Medium = .5, Large = .8*
Percentage Point Differences in Outcomes

- 3 and ≥4 ACE groups had significantly higher rates of all outcomes when compared to 0 ACE group.
- ≥4 ACE group had significantly higher rates of juvenile arrest and felony arrest.
Timing: Looking at just birth-5

Do cumulative ACEs predict well-being in a primarily African American sample?

![Graph showing the relationship between ACEs and adult well-being](image_url)

\[1^p < .10; ^* p < .05, ^** p < .01, ^*** p < .001\]
## Effect Sizes, ≥2 ACE group

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Effect Size for ≥2 ACE group</th>
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<tbody>
<tr>
<td>Smoking</td>
<td>.23</td>
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<tr>
<td>Juvenile Arrest</td>
<td>.34</td>
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<tr>
<td>Felony Arrest</td>
<td>.21</td>
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</tbody>
</table>

*Note: Effect size conventions: Small = .2, Medium = .5, Large = .8*
Subgroup differences by neighborhood poverty, 0-5
Research Question 2

Are associations between cumulative ACEs and outcomes in adulthood strongest for **males** and participants in the **highest poverty neighborhoods**?
Male vs. Female, ACEs 0-18

High School Graduation Males | High School Graduation Females | Smoking Males | Smoking Females | Juvenile Arrest Males | Juvenile Arrest Females | Felony Arrest Males | Felony Arrest Females

Marginal Effect

1 ACE | 2 ACEs | 3 ACEs | ≥4 ACEs

*p < .05, **p < .01, ***p < .001
Subgroup differences by sex: ACEs on smoking
Subgroup differences by sex: ACEs on High school graduation
Subgroup differences by sex: ACEs on juvenile arrest
Subgroup differences by neighborhood poverty
Subgroup differences by neighborhood poverty
Subgroup differences by neighborhood poverty: ≥4 ACEs on smoking
Research Question 3

Do 5 Hypothesis Model (5HM) mediators help to explain the effects of ACEs?
Percent Reduction

Example:

Effect of ≥4 ACEs on High School Graduation: -0.194

Effect of ≥4 ACEs on High School Graduation when social adjustment mediators added into the model: -0.137

Percent reduction [percent of effect of ≥4 ACEs explained by social adjustment factors] =

\[ \frac{.194 - .137}{.194} = \frac{.57}{.194} = 29.4\% \]
Individual Mediation Effects by Mediator, ≥4 ACEs

5HM Mediation 0-18, Full Sample

- High School Graduation
  - Social: 29.4%
  - School: 26.8%
  - Motivation: 19.6%
  - Family Support: 16.5%
  - Cognitive Advantage: 0%

- Juvenile Arrest
  - Social: 0%
  - School: 10.8%
  - Motivation: 5.9%
  - Family Support: 0%
  - Cognitive Advantage: 0%

- Smoking
  - Social: 24.3%
  - School: 17.5%
  - Motivation: 14.1%
  - Family Support: 0%
  - Cognitive Advantage: 2.3%

- Felony Arrest
  - Social: 17.5%
  - School: 17.5%
  - Motivation: 13.6%
  - Family Support: 9.7%
  - Cognitive Advantage: 0%

- Occupational Prestige
  - Social: 7%
  - School: 5.4%
  - Motivation: 0%
  - Family Support: 0%
  - Cognitive Advantage: 0%
Mediators partially explained effects of childhood and adolescent ACEs on both males and females.
Mediators partially explained effects of childhood and adolescent ACEs in both higher and lower poverty neighborhoods.
Full Mediation Effects: Smoking

- 5 Mediators: family, school, social, cognitive, and motivation factors
  - 7 Mediators: Juvenile arrest, high school graduation
Full Mediation Effects: High School Graduation

- 5 Mediators: family, school, social, cognitive, and motivation factors
- 7 Mediators: Juvenile arrest, high school graduation
Conclusions

**Question 1:** Participants with high ACEs were at significantly increased risk for multiple adverse outcomes by emerging adulthood
- Links with occupational prestige were weak

**Question 2:** Generally, males showed stronger relations between ACEs and well-being in adulthood; effects were mixed for neighborhood poverty for ACEs from 0-18
- For **males**, even just 2 or 3 ACEs affected educational attainment, crime, and smoking outcomes
- ACE effects on **smoking** were stronger for the higher neighborhood poverty group
Conclusions

**Question 3:** 5 HM mediators accounted for many of the effects of high ACEs on outcomes

- Contributions from single mediators ranged from 1.6-64.3%

- Cognitive advantage was the only mediator that showed very few significant mediation effects

- When entered together, 5HM mediators partially to fully mediated the effects of ACEs on outcomes
  - High school graduation and juvenile arrest further increased effects
Conclusions

Question 3, continued

- Sex differences in mediation
  - For both sexes, **social adjustment** and **school support** were impactful
  - **Motivation** mediated effects for males, while **family support** tended to mediate effects for females

- Poverty differences in mediation
  - For the higher poverty group, **social adjustment**, **motivation**, and **family support** were most impactful
  - For the lower poverty group, **school support** and **motivation** were most impactful (only on high school graduation)
Limitations

1. Retrospective self-report of household dysfunction

2. Underreporting for abuse and neglect

3. Limited ability to replicate given different ACEs

4. Limited assessment of expanded ACEs
   - E.g., involvement in gangs; out of home placement; homelessness
Implications

- ACE effects generalize to low income and minority populations
  - Poverty and male sex can confer higher vulnerability to these effects

- Reduced impacts of ACEs on the lower poverty participants, particularly for early childhood ACEs
  - Even a small decrease in neighborhood poverty may have meaningful protective effects

- Critical need for primary prevention and for intervention efforts
  - Programs targeting risk and protective factors at multiple levels of the child’s ecological system
  - Universal screening at well-child visits or at preschool entry
Future Directions

- Replication with large, diverse, prospective longitudinal samples
- Does early childhood intervention program status moderate the effects of ACEs? Does dosage matter?
- Do different types or timing of ACEs differentially impact outcomes?
- Why and how do specific mediators differentially explain outcomes?
- What are the relations between ACEs and physiological indicators of biological processes and adult health (e.g., cortisol, obesity, telomere length)?
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