Factors Associated with Adult Mental Health Treatment Among Youth with and without Adverse Childhood Experiences from the 1997 National Longitudinal Survey of Youth

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Research article

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2 RUNNING HEAD: LONGITUDINAL MENTAL HEALTH

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1 **Abstract**

2 **Background:** Evidence suggests that childhood is an important critical period for adult mental

3 health outcomes. Most studies evaluating childhood factors use cross-sectional data, limiting our

4 understanding of life course factors contributing to mental health. The purpose of this study was

5 to evaluate the contribution of life course factors on adult mental health treatment from a

6 longitudinal cohort of U.S. respondents.

7 **Methods:** We used data from the National Longitudinal Survey of Youth-1997 (N=8,984)

8 through the 2011 data collection year, in which n=7,009 adult respondents reported on the

9 number of mental health visits between 2009-2011. We used zero-inflated negative binomial

10 regression to evaluate the impact of childhood, adolescent, and adult factors on mental health

11 visits.

12 **Results:** Respondents with more than three adverse childhood experiences (ACE) reported in

13 adolescence were significantly more likely to utilize mental health treatment as an adult

14 (Incidence Rate Ratio[IRR]=1.30). No other childhood or adolescent factors contributed to adult

15 mental health utilization. Adult factors associated with greater mental health visits included:

16 having any health insurance (IRR=1.40), being unemployed (IRR=1.56) or employed part-time

17 (IRR=1.31). African-American respondents had significantly fewer mental health visits than

18 white respondents (IRR=0.79). Non-significant factors included: gender, ethnicity, parent-

19 reported childhood emotional problem, family receipt of governmental assistance as an

20 adolescent, living in a high-poverty household as an adult, and living in a state with high

21 unemployment.

22 **Conclusions:** Critical periods of development, combined with cumulative risk and protective

23 factors, contribute to adult mental health seeking. Adolescence is a critical period for trauma and

1   later need for mental health treatment. Other factors, such as full-time employment, appear to be

2   associated with reduced likelihood of the need for mental health treatment. Future evaluation of

3   community and population-based approaches, including policy interventions, is needed to

4   understand risk and protective factors contributing to mental health across the life course.

5   **Key Words:** Mental Health, Adverse Childhood Experiences, Life Course Outcomes,

6   longitudinal, National Longitudinal Survey of Youth 1997 (NLSY97)

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1   **Background**

2   Between 20 to 40% of adolescents have a lifetime prevalence of a mental health (MH)

3   condition.(1) Improving adolescent MH and treatment is a national priority for achieving public

4   health. Healthy People 2020 recognizes 12 long-term priorities to improve MH outcomes in the

5   United States, with 50% of the goals related to improving mental health outcomes among youth

6   under the age of 18 years.(2) Similarly, the U.S. Health Resources and Services Administration,

7   Maternal and Child Health Bureau [4] has prioritized two National Outcome Measures

8   associated with mental health: obtaining mental health treatment (NOM-18), and reducing

9   suicide among adolescents (NOM-16.3). National Outcome Measures reflect longer-term metrics

10   that demonstrate successful maternal and child health initiatives of state Title V programs and

11   state governments.(3) Addressing mental health and the factors that contribute to poor mental

12   health, are of critical public health importance.

13   Improving MH requires prevention efforts to target life course experiences that impact an

14   individual's MH trajectory. Halfon and Hochstein(4) proposed that early interactions of a child

15   with his or her environment, along with other biological and social factors, could alter

16   trajectories of health. Their Life Course Health Development framework has been adopted by the

17   Maternal and Child Health Bureau(5) and the World Health Organization(6) as a model for

18   understanding necessary biological, social, temporal, and psychological factors that influence

19   later-life health. Since that time, life course outcomes research has demonstrated that a variety of

20   risk and protective factors at the individual, family, and environmental levels intersect to

21   promote or hinder health outcomes.(7-9) Evidence from large longitudinal studies, for example,

22   suggests that early socioeconomic indicators predict adult health outcomes.(10, 11)

1   Factors that intersect to promote positive or negative health over a person's lifetime are

2   of utmost interest to public health and medical practitioners. However, most literature evaluates

3   the impact of early risk and protective factors on physical health outcomes, such as

4   cardiovascular events(12), diabetes(13), or obesity(14), to the exclusion of MH outcomes. As

5   such, any recommendations for preventive health focus on approaches and strategies to reduce

6   long-term cardiovascular risk, such as healthy diet and exercise. There is a paucity of research

7   evaluating the impact of life course factors evaluated over long periods of a person's life on MH

8   outcomes.

9   Recent evidence from a high-quality meta-analysis suggests that adverse child and

10   adolescent experiences (ACE) are strong predictors of future MH.(15) Taken across the lifespan,

11   poverty, exposure to violence and abuse, separation from family, homelessness, and insufficient

12   health insurance contribute to greater risk for MH problems in adulthood.(15, 16) Unfortunately,

13   although rigorous research supports the impact of ACE and other adversity on outcomes in cross-

14   sectional analyses (17), few studies evaluate individuals over time, (13, 18) hampering public

15   health efforts to understand and develop systematic risk reduction approaches for those on

16   trajectories of poor MH across critical periods.

17   The life course approach to epidemiological evaluation of health suggests life outcomes

18   are impacted by earlier life experiences.(6) Halfon and colleagues(4) suggested that both risk and

19   protective factors, in conjunction with critical periods of development, set individuals on optimal

20   or poor trajectories for later adult health. One challenge to testing these hypotheses is the nature

21   of examining such trajectories necessarily requires longitudinal (not cross-sectional) data. Our

22   study specifically relies on longitudinal data to investigate the combined premise that early risk

23   for MH problems predicts later life outcomes, but that later life protective or risk factors will

more strongly contribute to adult MH than early life factors. We hypothesized that youth

reported to have an emotional or learning problem at Time 1 in 1997 will demonstrate

statistically different self-reported MH treatment in adulthood between 2009-2011 than those not

reported to have early life emotional or learning problems (H1-Critical Period Hypothesis). We

also hypothesized that individual factors in adulthood will be more strongly associated with adult

MH treatment than individual, family, or environmental factors measured at earlier periods of

time (H2- Critical Period Plus Later Life Modifiers).

Methods

Design

We used a retrospective longitudinal design of existing secondary data, with individual,

family, and environmental variables measured at three points: T1 (late childhood or early

adolescence), T3-T10 (adolescent period), and as an adult in 2009 (T13), 2010 (T14), and 2011

(T15). This study was deemed non-human subjects research following Institutional Review

Board review at the primary author's institution.

Data Sources and Sampling

We used secondary data from rounds 1-15 of the National Longitudinal Survey for Youth

1997 (NLSY97).(19) The NLSY97 survey is funded by the U.S. Bureau of Labor Statistics

(BLS). The NLSY97 includes a nationally representative sample of youth who were 12 to 16

years of age as of December 31, 1996. A national representation of youth of various

demographic characteristics and a large sample size (N=8,984) support statistical power

sufficient to detect even small associations. Details regarding the panel data collection and

sampling is publicly-available.(19) We used the entire available sample for analysis at each time

1   point, thus no inclusion/exclusion criteria were applied. In order to link participants to state-level

2   unemployment rates, we also use a restricted-access BLS state geocode.

3   *Variables*

4   *Outcome Variable.* Our primary outcome was self-reported adult *mental health treatment*

5   at T13-15, when respondents were between 23-30 years old: "*How many times have you been*

6   *treated by a mental health professional?*" Data were coded as either '0' visits, '1', '2', '3', or '4

7   or more' visits in a year. MH treatment was treated as both a binary variable (any MH

8   treatment-Y/N) and as a count variable (total number of visits). The count variable was right-

9   censored. The sum total of visits in the three-year period therefore ranged from 0-12 visits.

10   *Predictor Variables.* Risk and protective factors were those occurring during the late

11   childhood period (T1), adolescent period (between T3-T10), or adult period (T13-T15). Not all

12   questions were asked for each timepoint, therefore, our selected variables reflect both

13   theoretically selected and pragmatically available variables. Risk factors contributed to an

14   increased likelihood of MH problems (e.g. increase need) and/or lack of resources to obtain MH

15   treatment for perceived problems (e.g. reduced opportunity to address need). Protective factors

16   contributed to an individual's ability to reduce their MH risk (e.g. reduce need), and/or provided

17   resources that help the individual address their MH problems (e.g. increased opportunity to

18   address need).

19   In our model, selected childhood risk factors included: having an emotional/learning

20   problem at T1 and being female. The adolescent risk factors included: greater ACEs, and the

21   respondent's family being on welfare at any point in the adolescent period. The adult risk factors

22   were lack of health insurance, unemployment, self-report of poor/fair/good health (as compared

1   to very good/excellent health), living in a household with income at <300% federal poverty level

2   (FPL), and living in a state with >7.5% unemployment in 2009.

3   *Calculation of ACE Variable.* ACEs were identified from 11 separate NLSY97 questions

4   using criteria by Hughes and colleagues(15) as indicative of ACE from the extant literature. We

5   summed 'yes' responses to ACE that youth may have experienced, with a possible range of 0-11

6   (Table 1). This variable was used as a categorical variable with four levels (0, 1, 2, or 3+ ACE).

7   Table 1. Adverse Childhood Experiences Ascertained in NLSY97 Survey Waves between 1997-
8   2002

1. Is Youth's first non-responding biological parent deceased?
2. Is Youth's second non-responding biological parent deceased?
3. In the last 5 years, since you were x years old, has a close relative of yours died?
4. In the last 5 years, has an adult member of your household other than yourself experienced one or more periods of unemployment lasting at least 6 months?
5. In the last 5 years, have your parents divorced, either from each other or from their former spouse?
6. In the last 5 years, has an adult member of your household other than yourself been sent to jail or prison?
7. In the last 5 years, have you been the victim of a violent crime for example, physical or sexual assault, robbery or arson?
8. Sometimes children go through hard times. For example, they live in a place without water or electricity, or in a homeless shelter. To the best of your knowledge, has [this youth] ever experienced such hard times?
9. Before you turned age 12, were you ever the victim of repeated bullying?
10. Did you ever have your house or apartment broken into between the ages of 12-18?
11. Between ages of 12-19, have you ever been shot at or seen someone get shot or shot at with a gun?

9   *Note:* These questions were asked across several NLSY97 survey waves between 1997 and 2002. The 'in the last 5
10   years' questions were specifically referencing the period between 1997-2002.
11

12   **Statistical Analyses**

13   *Weighting for Complex Sample.* Custom sampling weights were created based on the

14   design features and years used for analysis.(20) Stata's svyset function was used for weighting:

15   strata (VSTRAT_1997), sampling unit (VPSU_1997), and a sampling weight (pweight). Per the

16   NLSY97 documentation, weights were applied when generating descriptive statistics, but not

17   when running complex regressions.(20)

1   *Missingness and Power.* A total of 8,984 respondents participated in T1 NLSY97

2   questions. Of these, 7,880 respondents answered whether they had an emotional or learning

3   problem at T1. At Time 13-15, a maximum of 7,009 respondents provided answers on all

4   variables used in our analyses. No corrections were made for missingness. An *a priori* power

5   analysis was conducted for both the bivariate and multivariate tests; we had more than the $n=964$

6   minimum sample to detect medium effect sizes for both hypotheses.(21)

7   *Primary Analyses.* We used weighted design-based F statistics to test the null hypothesis

8   of no difference in the reported proportion of adults reporting any MH treatment for each year

9   (T13, 14, 15) for those with a parent-reported emotional or learning problem at T1 (Hyp 1). We

10   used zero-inflated negative binomial regression (ZINB) to evaluate the contribution of life course

11   variables on number of adult MH visits (Hyp 2). We considered the use of zero-inflated Poisson

12   regression, however, based on statistically significant Vuong test(22), and evaluation of AIC and

13   BIC(23), the best estimation approach was ZINB. The regression was inflated on all predictors,

14   with stepwise reduction of the inflated model to include only statistically significant predictors

15   resulting in good overall model fit (log-alpha <0.05). Only the count model, predicting MH visits

16   greater than 0, is presented. Alpha was set to $p<.05$ for all analyses.

17   **Results**

18   In 1997 (T1), 7,880 parents of youth aged 12-16 years provided data on whether the

19   youth had an emotional problem (Table 2). Approximately 10% were reported to have an

20   emotional or learning problem. Those with emotional problems were statistically more likely

21   than those with no emotional problem to: report Fair or Poor health in childhood; receive welfare

22   during adolescence; have three or more ACEs; and were less likely to be employed full time or

23   have health insurance in adulthood.

Table 2. Weighted Individual, Family, and Environmental Characteristics of Respondents with
reported Emotional Problems at Time 1

	No Emotional Problem (n=7,058)	Yes Emotional Problem (n=822)	Total respondents (N=7,880)
Individual Factors			
f (weighted %)			
Age in Years, Mean (SD)	14.30 (1.47)	14.18 (1.49)	14.29 (1.47)
Sex			
Female	3,553 (50.68)	281 (34.63)	3,834 (48.88)
Hispanic status			
Hispanic	1,461 (12.68)	118 (9.11)	1,579 (12.28)
Race			
White	4,163 (73.42)	531 (78.80)	4,694 (74.02)
African-American	1,887 (15.76)	208 (13.89)	2,095 (15.55)
Other	963 (10.44)	80 (6.81)	1,043 (10.03)
Missing	45 (3.8)	3 (0.50)	48 (3.9)
Adverse Childhood Events, 1997-2002			
0	1,395 (22.76)	99 (12.57)	1,494 (21.62)
1	2,392 (38.34)	263 (35.46)	2,655 (38.02)
2	2,027 (24.19)	229 (26.38)	2,256 (24.44)
>3	1,244 (14.71)	231 (25.59)	1,475 (15.93)
General Health, 2009			
Excellent	1,442 (24.46)	135 (16.30)	1,577 (23.54)
Very Good	2,289 (40.23)	212 (31.76)	2,501 (39.28)
Good	1,677 (27.05)	235 (33.98)	1,912 (27.83)
Fair/Poor	570 (8.23)	124 (17.96)	694 (9.32)
Missing	1,080 (0.034)	116 (0.0)	1,196 (0.03)
Health Insurance Status 2009			
Uninsured	1,921 (29.22)	309 (42.57)	2,230 (30.72)
Insured	4,053 (70.73)	396 (57.14)	4,449 (69.20)
Missing	1,084 (0.52)	117 (0.29)	1,201 (0.79)
Employment, 2009			
None	1,186 (16.65)	216 (24.80)	1,402 (17.56)
Part-time	1,618 (24.66)	200 (27.41)	1,818 (24.97)
Full-time	3,463 (56.39)	316 (43.98)	3,779 (55.00)
Missing	791 (2.29)	90 (3.82)	881 (2.47)
Poverty Ratio, 2009			
0-99% FPL	915 (11.64)	192 (22.29)	1,107 (12.83)
100-199% FPL	982 (15.89)	118 (17.63)	1,100 (16.09)
200-299% FPL	939 (16.28)	89 (14.38)	1,028 (16.07)
300% and over FPL	2,460 (45.88)	211 (32.63)	2,671 (44.40)
Missing	1,762 (10.31)	212 (13.08)	1,974 (10.62)
Family Factor			
Any government assistance, 2005-2009	2,134 (29.02)	320 (40.88)	2,454 (30.35)
Environmental Factor			
State Unemployment Rate, 2009			
4-7.5%	703 (12.62)	94 (14.09)	797 (12.79)
Over 7.5%	5,114 (84.79)	605 (84.53)	5,719 (84.76)
Missing	1,241 (2.59)	123 (1.38)	1,364 (2.46)

Data Source: NLSY97, U.S. Bureau of Labor Statistics. Design-based F statistics were used with custom weights to
produce reported proportions.

1   In our analysis of primary hypotheses, we found that those with parent-reported

2   emotional problems were significantly more likely to report any MH treatment in adulthood at

3   each time point: 2009 ($F(1,117)=12.01$, $p=.0007$), 2010 ($F(1,117)=13.19$, $p=.0004$), and 2011

4   ($F(1,117)=20.99$, $p<.0001$) (Table 3).

5   When evaluating Hypothesis 2, we found that adolescent experience of 3+ ACEs, and

6   adult factors of older age, presence of health insurance, along with adult health status, and

7   un/under-employment predicted significantly greater MH visits (Table 4). African-American

8   adults were significantly less likely to report MH visits than white respondents.

9

10   Table 3. Weighted percentage of respondents with emotional problem in 1997 accessing mental
11   health treatment in 2009-2011

	Respondents Reporting Receipt of 1 or More Mental Health Visits (%) [95% Confidence Interval]	
	No Emotional Problem	Yes Emotional Problem
2009*	6.9 [6.20, 7.67]	10.6 [8.25, 13.43]
2010*	5.2 [4.56, 5.98]	10.1 [7.31, 13.85]
2011*	4.8 [4.19, 5.51]	10.0 [7.42, 13.22]

12   * Design-based F (1, 117) comparing MH visit (0, 1+) between those with and without emotional problems was
13   statistically significant at p<.001 for all comparison years, weighted using complex survey design features from the
14   NLSY97.
15   Data Source: NLSY97, U.S. Bureau of Labor Statistics.

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1   Table 4. Life Course Factors Associated with Adult Mental Health Treatment

	IRR [a]	95% CI
Individual Factors		
Age	1.05*	1.00-1.10
Gender		
Female	0.93	0.80-1.07
Race		
Black or African-American	0.79**	0.65-0.94
Other	1.02	0.78-1.33
Not reported	1.59	0.58-4.57
Hispanic ethnicity	0.86	0.68-1.09
Late Childhood		
Yes, Emotional Problem, 1997	1.01	0.83-1.21
Adolescence		
Adverse Childhood Experiences, 1997-2002		
1 ACE	1.14	0.93-1.42
2 ACEs	1.20	0.96-1.50
3+ ACEs	1.30*	1.03-1.64
Any government assistance as an adolescent, 2005-2009	0.91	0.77-1.07
Adulthood		
General Health, 2009		
Good	1.18*	1.01-1.38
Fair or Poor	1.09	0.90-1.33
Has Health Insurance, 2009	1.40**	1.18-1.66
Employment Status, 2009		
Unemployed	1.56**	1.27-1.91
Part-time (< 30 hours/week)	1.31**	1.10-1.57
Family Factors		
Federal Poverty Level, 2009		
0-99%	1.03	0.84-1.27
100-199%	0.95	0.77-1.17
200-299%	0.76**	0.60-0.95
Environmental Factors		
Average Unemployment Rate (%) in Residential State, 2009		
5.0-7.5	1.10	0.58-2.13
> 7.5	0.96	0.51-1.81

2   Data Source: NLSY97, U.S. Bureau of Labor Statistics.
3   Abbreviations: ACE: Adverse Childhood Experience; FPL: Federal Poverty Level; IRR: Incident-rate ratio
4   Reference case was: male, White, non-Hispanic, No emotional or learning problem, zero ACE, no government
5   assistance, 'Excellent or very good' health, Uninsured, Employed, >300% FPL, 0-5% state unemployment.
6   [a]Zero-inflated negative binomial regression used for count dependent variable. Non-zero observations =715 included
7   in count model. Zero observations=6,294; inflated on: gender, race, emotional problem as child, ACE as an
8   adolescent, any government assistance as adolescent, health insurance status as adult, general health as adult.
9   Inflated model results not presented.
10   * $p<.05$, **$p<.01$
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1 **Discussion**

2 Our population-based study measured the association of individual, family, and

3 environmental risk factors, documented across several developmental periods, on receipt of MH

4 treatment in adulthood. According to the Life Course Outcomes Model,(4) critical periods of

5 development, combined with cumulative risk and protective factors, contribute to adult

6 outcomes. In evaluation of a critical-period hypothesis, we found that early life emotional

7 problems (reported by parents) was associated with greater MH treatment as an adult (as reported

8 by grown children). Although our findings suggest a critical period for MH when childhood

9 factors are evaluated in isolation, that variable-- childhood reported emotional problem-- was no

10 longer a significant predictor of adult MH treatment once other adolescent and adult factors were

11 included in our analyses.

12 Including later life risk and protective factors across adolescence and adulthood in

13 additional modeling resulted in revised interpretations of the impact of childhood factors. Our

14 second hypothesis was that adult factors would be most associated with adult MH treatment, but

15 we did not find this to be the case entirely. Although most of the variables that predicted adult

16 MH service use were those collected when the respondent was an adult, we found that earlier life

17 experiences, such as reporting three or more ACEs in adolescence, contributed to a significantly

18 greater likelihood of MH utilization as an adult.

19 Our results align with previously published literature detailing associations between

20 exposure to ACEs and increases in broad health care utilization.(24-26) However, this is the first

21 study to our knowledge revealing that ACEs occurring specifically in adolescence may

22 contribute to increased reported MH visits seen among those same adults evaluated more than a

23 decade later. It is well known that exposure to early adversity in childhood is a significant public

1   health problem linked to toxic stress responses.(27) Others have also identified that among those

2   with poor MH, the trajectories differentiating high versus lower risk groups begins in

3   adolescence, with poor outcomes manifesting in young adulthood.(8) Of interest is that once

4   adolescent ACEs were considered in our model, the earlier childhood parent-reported emotional

5   problems were no longer significant predictors of later MH utilization. Our data specifically

6   suggest that *adolescence*, perhaps more so than childhood, is a critical period for which we

7   should evaluate risk and exposure to adversity in order to prevent future metal health problems.

8   Our findings support the hypothesis that complex interactions of risk and protection,

9   occurring over a person's life, influence MH service utilization. Although our outcome was MH

10   service utilization, and not MH symptoms, well-established links between early adversity and

11   adult mental illness (15) support the idea that MH symptomology due to a variety of factors is

12   associated with increased service utilization. Although our study was not designed to evaluate

13   the complex social and cultural factors influencing service utilization, our finding that African

14   American participants were less likely to receive MH treatment as adults is supported by

15   literature. The complexity of cultural beliefs and stigma influence perceived need for MH

16   treatment and realized access (obtaining needed treatment).(28, 29) More research is needed to

17   evaluate the mediating role of MH symptomology, and the influence of other co-occurring

18   cultural factors related to adolescent ACEs on MH-seeking behaviors in adulthood.

19   Of interest is that we did identify that certain adult factors were associated with greater

20   MH utilization, but the interpretation of these factors is ambiguous. For example, we found that

21   those who were employed full-time as an adult were statistically less likely to report MH visits

22   than those who were unemployed or underemployed. Full-time employment, therefore, appears

23   to be a protective factor, possibly acting to both reduce the need for MH treatment (e.g.

1 accomplishment of a major developmental goal, employment, of adulthood), and providing

2 resources to address any need they might have (e.g. through financial security to pay for such

3 services). Alternatively, it could be that those who had more MH problems were less likely to

4 work, either due to their MH condition or due to stigma associated with significant mental

5 illness. Our study, however, is not able to establish a causal relationship between employment

6 status and MH utilization. Further, although we examined emotional problems in childhood,

7 many MH conditions emerge in early adulthood. These data were unavailable in the dataset and

8 could not be included in analyses.

9   Interestingly, having any health insurance as an adult was associated with greater MH

10 utilization. This finding suggests, similar to the financial security argument above, that having

11 insurance is protective (e.g. increases a person's opportunity to address a MH need), despite

12 most MH providers not accepting insurance. Unfortunately, the variable does not distinguish

13 between those publicly insured (e.g. Medicaid) versus those privately insured.

14   *Limitations.* We acknowledge that we did not have an evaluation of diagnosed conditions,

15 which result in specific emotional or learning problems in childhood. Additionally, our models

16 relied on censored data related to our primary outcome variable (MH visit counts), which could

17 have impacted our ability to understand the relationship between the variables. Of importance,

18 our definition of ACEs was limited to the constraints of the NLSY97 survey battery. Our

19 analyses did not examine the independent effects of each type of ACE on adult MH service

20 utility—we only evaluated the accumulation of ACEs. Understanding the effect of specific types

21 of ACEs is an important next step, with recent studies highlighting that child abuse, bullying,

22 witnessing violence, caregiver death, are associated with increased utility of MH services

23 among.(30, 31) We were also unable to assess child abuse and neglect occurrences among

1   participants. We would expect only stronger support for links between ACEs and health seeking

2   in adulthood with the inclusion of such variables. Lastly, we were unable to control for the

3   historical effects that affect a single, large cohort. Our primary outcome variable of interest, MH

4   visits, was measured between 2009-2011, at the height of the U.S. Great Recession,(32) and

5   therefore, our results should be taken in historical context of the economic reality of the time.

6   However, we did control for state-level unemployment to address systemic or state-level effects

7   that could affect MH.

8   Strengths of this study include the use of a large, longitudinal sample of youth for which

9   we have both parent report and self-report of important variables. Our results are generalizable to

10   individuals living in the United States who were born between 1980 and 1985. Our analyses rely

11   on inclusion of specific variables hypothesized to affect the outcome of interest, and future

12   analyses can continue to examine this sample's outcomes relative to earlier reported health and

13   socio-demographic experiences.

14   **Conclusions**

15   Novel approaches for identification of life course factors contributing to lifetime risk for

16   MH problems are needed to inform policy and practice interventions that provide supports

17   during critical periods of development, and for those exposed to risk factors that impact MH

18   across their lifetime. Importantly, our results suggest that adults who are seeking greater MH

19   treatment are significantly more likely to have had adolescent ACEs. These findings support

20   ongoing preventive efforts to identify and support children at risk for emotional problems, in

21   addition to the provision of trauma-informed care to children and adolescents who have

22   experienced or are at risk for ACEs (33). Our findings point to the need to evaluate policy efforts

23   aimed at maintaining funding for public programs that support the healthy development of

1 children and adolescents, especially those most at risk for mental illness and in need of treatment

2 at an early age. Preventive efforts to address MH throughout the life course will have the greatest

3 public health implications for national expenditures on healthcare, and require further evaluation

4 to determine their impact.

5 **References**

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Declarations

Ethics approval and consent to participate

This study was reviewed by the Institutional Review Board, IRB B-Social/Behavioral Committee (IRB Registration #00009620), of Augusta University and was deemed non-human subjects research.

Consent for publication

Not applicable

Availability of data and materials

The data used and analyzed are publicly available NLSY97 data from the U.S. Bureau of Labor Statistics at https://www.nlsinfo.org/. Restricted geocodes are available to approved investigators following the process and procedures described by the U.S. Bureau of Labor Statistics.

Competing interests

The authors declare that they have no competing interests. M.D.'s work on this manuscript was conducted as a paid consultant.

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Authors' contributions

TB conceptualized the design, obtained funding, analyzed data, drafted and revised the article. VH contributed to the design, funding, obtained and analyzed the data, and substantially revised the article. MD contributed to the funding, interpretation, and substantially revised the article. AT contributed to the interpretation and substantial revision of the article. All authors have read and approve of the final manuscipt as submitted.

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