Child Abuse & Neglect 97 (2019) 104136

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

The childhood roots of adult psychological distress: Interdisciplinary perspectives toward a better understanding of exposure to cumulative childhood adversity

Loanna S. Heidinger[a], Andrea E. Willson[b,*]

[a] Department of Sociology, Social Science Centre, University of Western Ontario, London, ON N6A 5C2 Canada
[b] Department of Sociology, Social Science Centre, University of Western Ontario, London, ON N6A 5C2, Canada

ARTICLE INFO

Keywords:
Cumulative childhood adversity
Adverse childhood experiences
Psychological distress
Latent class analysis

ABSTRACT

Background: Although most children experience at least one adversity, it is the experience of multiple adversities that produces a context of disadvantage that increases the risk of various negative outcomes in adulthood. Previous measures of cumulative childhood adversity consider a limited number of adversities, overlook potential differences across experiences of adversity, and fail to measure the effects of multiple co-occurring childhood adversities. These limitations have led to inconsistent and incomplete conclusions regarding the impact of multiple adverse childhood experiences on adult mental health.

Objective: This study assesses how the operationalization and modeling of exposure to cumulative childhood adversity (CCA) influences estimates of the association between CCA and adult psychological distress and develops an improved measure of CCA.

Methods: We use data from the Panel Study of Income Dynamics, a nationally representative sample of households in the United States, and its supplement, the Childhood Retrospective Circumstances Study ($N = 4219$). We compare four measures of CCA that consider various distinct aspects of adverse experiences (additive, severity, type, and patterns of experience using latent class analysis).

Results: All measures of CCA were associated with increases in adult psychological distress, but effects depend on the measurement of CCA. Results suggest the sum score overestimates the overall impact of CCA. Latent class analysis captures the co-occurrence of adversities across severity *and* type, providing an improved measure of CCA.

Conclusions: The heterogeneity across adversities impacts estimates of adult psychological distress. Measuring CCA as patterns of co-occurring adverse experiences is a promising approach.

1. Introduction

Decades of research documents that childhood adversity is associated with poor mental health, physical health, and socioeconomic outcomes during adulthood (e.g., Björkenstam et al., 2015; Green, Gruber, Sampson, Zaslavsky, & Kessler, 2010, Green, McLaughlin et al., 2010; Willson & Shuey, 2016). Exposure to adverse childhood experiences is not uncommon, with the majority of children experiencing at least one adversity (Friedman, Montez, Sheehan, Guenewald, & Seeman, 2015; Green, Gruber et al., 2010; Green, McLaughlin et al., 2010). However, it is the experience of multiple adversities that produces a context of disadvantage that increases the risk of various negative outcomes in adulthood (Chapman et al., 2004; Felitti et al., 1998; Nurius, Logan-Greene, & Green, 2012; Schilling, Aseltine, & Gore, 2007).

* Corresponding author.
E-mail addresses: lheidin@uwo.ca (L.S. Heidinger), willson@uwo.ca (A.E. Willson).

https://doi.org/10.1016/j.chiabu.2019.104136
Received 29 January 2019; Received in revised form 28 July 2019; Accepted 7 August 2019
Available online 23 August 2019
0145-2134/ © 2019 Elsevier Ltd. All rights reserved.

While the persisting impacts of cumulative childhood adversity have been well-documented, previous measures of cumulative adversity consider a limited number of childhood stressors, overlook potential differences across experiences of adversity, and fail to measure the effects of multiple co-occurring childhood adversities. Furthermore, measures of cumulative childhood adversity generally have focused on acute adverse events and traumatic experiences within the familial domain while frequently overlooking the potential importance of chronic adverse childhood contexts that act as ongoing strains across various domains, and further provide an environment for additional childhood stressors to occur (Friedman et al., 2015). These limitations have led to inconsistent and incomplete conclusions regarding the overall impact of multiple adverse childhood experiences on an array of adult outcomes, such as mental health.

Utilizing data from the Panel Study of Income Dynamics' Childhood Retrospective Circumstances Study (PSID-CRCS), this study assesses how the operationalization and modeling of exposure to cumulative childhood adversity impacts estimates of the association between cumulative childhood adversity and psychological distress in adulthood. A better understanding of how measurement of the heterogeneity in *severity, type*, and *experience* of adverse childhood experiences influences estimates of adult psychological distress provides important insight into the lasting imprint of early disadvantage.

2. Cumulative childhood adversity and adult outcomes

Childhood is an influential period of the life course in which cognitive, physical and emotional development is occurring (Monnat & Chandler, 2015; Schafer, Ferraro, & Mustillo, 2011). Experiences of adversity and stressors during this time can have a detrimental influence on a wide range of adult outcomes. Early studies of childhood adversity focused on the deleterious impact of single adverse childhood experiences such as parental divorce (Amato, 2000) or childhood poverty (Sobolewski & Amato, 2005). More recent literature demonstrates that adverse experiences do not occur in isolation; rather, childhood adversities tend to cluster together while also increasing the risk of exposure to additional adverse childhood conditions (Friedman et al., 2015; Nurius, Green, Logan-Greene, & Borja, 2015; Scott-Storey, 2011; Seery, Holman, & Cohen Silver, 2010;). Therefore, focusing on the impact of a single adverse experience may result in an overestimation of the distinct contribution of any measured adversity on the outcome of interest (Felitti et al., 1998; Green, Gruber et al., 2010; Green, McLaughlin et al., 2010; Nurius et al., 2012).

Cumulative measures of childhood adversity result in a stronger association with mental health outcomes, and the number of childhood adversities experienced is highly correlated with increases in adult psychological distress, a measure of anxiety and mood disorders in the population (Anda, Butchart, Felitti, & Brown, 2010; Kessler et al., 2003; Nurius et al., 2015; Scott-Storey, 2011). Although researchers use terms such as cumulative childhood adversity (Schilling, Aseltine, & Gore, 2008; Turner & Butler, 2003), childhood adversity (Green, Gruber et al., 2010, Green, McLaughlin et al., 2010; Ford, Clark, & Stansfeld, 2011; Friedman et al., 2015), adverse childhood experiences (Anda et al., 2010; Chapman et al., 2004; Felitti et al., 1998; Monnat & Chandler, 2015; Nurius et al., 2012, 2015; Schilling et al., 2007) and childhood misfortune (Schafer & Ferraro, 2013; Schafer et al., 2011) in an attempt to investigate the experience of exposure to multiple childhood stressors, these terms generally address the same phenomenon. However, differences in the number and type of childhood adversities included may reflect disciplinary criterion or data limitations that dictate the adverse experiences considered from study to study (Friedman et al., 2015).

Childhood adversities also accumulate in the context of broader social and economic circumstances that can further increase the risk of exposure to additional adversity (Avison, 2010). Chronic stressors emerge from constant and enduring disadvantageous environmental conditions in which children are situated (Avison, 2010; Bond et al., 2007; Hammen, Kim, Eberhart, & Brennan, 2009; Wheaton & Clarke, 2003). For example, studies link adult psychological distress to neighborhood circumstances (Wheaton & Clarke, 2003), childhood school experiences (Arseneault, Bowes, & Shakoor, 2010; Bond et al., 2007; Shochet, Dadds, Ham, & Montague, 2006), economic hardship (Hsu & Wickrama, 2015; Sobolewski & Amato, 2005), and ongoing exposure to parental mental health problems (Goosby, 2013). Research on adult mental health demonstrates that more comprehensive measures of cumulative stressors in adulthood provide an improved estimate of overall stress exposure compared to a simple sum score of recent stressful life events (Turner & Avison, 2003). In addition, the inclusion of various dimensions of stress reveals differences in exposure to risk and accounts for variations in mental health outcomes (Turner & Lloyd, 1995; Turner, Wheaton, & Lloyd, 1995).

Despite these findings, chronic and ongoing childhood adversities, with a few exceptions, have been largely excluded from most measures of CCA. Cumulative measures of adversity that do include chronic stressors primarily focus on the impact of family dysfunction (Felitti et al., 1998; Nurius et al., 2015) and childhood poverty (Schilling et al., 2007; Turner & Butler, 2003) which does not fully capture the potential environmental strain experienced by children. In sum, social stress includes an array of dimensions; measures of cumulative childhood adversity that incorporate a wider stress universe for children would allow a fuller understanding of the impact of CCA on variations in adult mental health outcomes (Anda et al., 2010; Avison, 2010).

2.1. Methodological challenges in the study of cumulative childhood adversity

Methodological advances in measures of CCA suggest that there may be heterogeneity in the exposure and experience of various childhood adversities that cannot be captured using a typical sum score (Green, Gruber et al., 2010; Green, McLaughlin et al., 2010; Schilling et al., 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015). These findings suggest that differences across adversities may result in variations in the impact of CCA on adult psychological distress and have refocused attention to the conceptualization and operationalization of CCA (Schilling et al., 2008). Recent research has begun to consider non-additive measures of CCA and these studies take unique approaches to capturing the heterogeneity across adversities (Green, Gruber et al., 2010; Green, McLaughlin et al., 2010; Schilling et al., 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015).

Although useful, differences in data and inconsistency in the number and type of adversities considered hinders the comparison of

measures of CCA across studies. Variations in statistical models used to measure heterogeneity in CCA, and the lack of generalizability of some study samples, further limit the inferences that can be drawn from results. For example, Schilling et al. (2008) utilized a regression-based weighting technique to roughly categorize childhood adversities by their severity, or impact factor, on mental health. Results indicated that the severity of adversities experienced, rather than the total number of adversities experienced, had more important implications for adult mental health outcomes. Björkenstam et al. (2015) applied a person-centered approach to group respondents into homogenous classes based on similarities in exposure to childhood stressors, accounting for the potential clustering, or co-occurrence, of adversities. Results suggested that participants with a high probability of experiencing teenage parenthood, household public assistance, and single parent households had the highest levels of self-reported depression. Green, Gruber et al. (2010), Green, McLaughlin et al. (2010) relied on a variable-centered approach to group adversities based on inter-correlations among childhood stressors. Analyses determined that adversities grouped related to maladaptive family functioning were the strongest predictor of first onset of clinical mental health disorders.

Other studies have attempted to meaningfully group childhood adversities by type of stressor (Friedman et al., 2015; Schafer & Ferraro, 2013); however, again, there are inconsistencies in the types of adversities considered, which shapes the groups of adversities that are identified. Schafer and Ferraro (2013) found that adversities related to abuse had a more detrimental impact on initial levels of somatic and psychosocial symptoms than adversities pertaining to family structure and financial strain. Friedman et al. (2015) found that adversity related to academic interruptions and sexual and physical abuse were the most consequential for cardio metabolic health.

Despite varying approaches and inconsistent results, these studies suggest the benefits of non-additive approaches for measuring CCA as a predictor of health in adulthood. Results demonstrate that there is heterogeneity among stressors and that the association between CCA and adult outcomes is not equal across experiences of adversity. However, results cannot be adequately compared across measures of CCA and it remains unclear how variations in measurement influence estimates of psychological distress and the overall interpretation of results.

In order to compare results across various conceptual models, it is important for research that utilizes the same data to analyze different methodological approaches for measuring the cumulative impact of childhood stressors. Developing a consistent, theoretically coherent and comprehensive measure of cumulative childhood adversity would contribute to the overall knowledge of adverse childhood experiences and improve the comparability of results across studies and disciplines. The following research focuses on the effect of different conceptualizations and measures of CCA on adult psychological distress. The PSID-CRCS includes a large number of items measuring childhood adversities, some of which have not been previously available, which broadens the scope of childhood adversity indicators to include contextual childhood adverse circumstances arising from domains such as the school and neighborhood environments. The analyses compare estimates of psychological distress across four different measures of CCA, including the commonly used sum score of total adversity experienced. The other three measures focus on different dimensions of childhood adversity: severity, type, and pattern of experience.

3. Methodology

3.1. Data and sample

The present study uses data from the Panel Study of Income Dynamics (PSID), a nationally representative sample of households in the United States (Panel Study of Income Dynamics, 2016). The first wave of data was collected in 1968 and was comprised of over 5000 American families. These families were interviewed annually until 1997, after which interviews were conducted biennially. The Childhood Retrospective Circumstances Study (CRCS) was collected in 2014 and consists of a representative subsample of PSID household heads and/or spouses/partners of household heads from the 2013 survey wave (McGonagle & Freedman, 2015). The supplement contains data from 8072 individuals who were 19 years of age or older at the time of the 2013 PSID main interview data collection. Selected respondents were asked to retrospectively answer questions pertaining to circumstances and experiences occurring during their childhood, prior to the age of 17. The weighted response rate was 67%.

Data from the CRCS is linked to respondents' data from the main PSID interview, which includes a measure of psychological distress (described below). Although the PSID is a household survey, only data on the mental health of the respondent was collected. Therefore, the sample was limited to participants who were the respondent during the main 2013 PSID interview ($N = 5451$).

The sample was further limited to respondents who were 25 years or older to allow sufficient time for students to graduate from a four-year university ($N = 5142$). Lastly, respondents with missing data were not included in the sample, resulting in a final sample size of 4219. Approximately 17% of the sample was excluded due to missing data on indicators of childhood adversity and approximately 1% of participants were missing on control variables (described below). A missing data analysis (not included here) indicated that the majority of these excluded participants were missing on a single adversity. In a multivariate logistic regression analysis predicting missing vs. non-missing data, missing cases were significantly ($p < .05$) more likely among non-whites, older sample members and those with lower education. These results indicate the potential for downward bias in the association between measures of adversity and psychological distress in our analyses and therefore the results may be conservative estimates of the relationship between CCA and mental health in adulthood.

3.2. Measures

3.2.1. Cumulative childhood adversity

Respondents were retrospectively asked whether an array of childhood adversities ever occurred before the age of 17. Adversities included in the present study were chosen based on previous CCA research (e.g., Turner & Lloyd, 1995; Schafer & Ferraro, 2013), as well as indicators that have not been considered in previous studies of CCA.

The following childhood adversities were dichotomized to indicate whether respondents did or did not experience each adversity

before the age of 17: *parental divorce*; *poor childhood health*; *missed a month of school or more due to health*; *perceived poor financial comparison to average family*; *repeated a grade*; *victim of a crime*; *arrested or taken into custody by police*; *convicted of a crime*; *sentenced to probation*; *paternal unemployment*; *maternal unemployment*; *financial struggle*; *received welfare for three or more months*; *lonely for friends*; *bullied in school*; *bullied outside of school*; *unhappy at school*; and *felt unsafe at school*.

Poor childhood mental health was measured by questions asking respondents whether they had drug or alcohol problems, depression, anxiety, panic attacks, attention deficit disorder, or any other emotional or psychological problems before the age of 17. The experience of any indicator of poor childhood mental health indicated the respondent had experienced the adversity. Our decision to include poor childhood mental health as an indicator of childhood adversity rather than a control variable is based on research demonstrating the chain of disadvantage linking poor childhood physical and mental health, low educational attainment and other status attainments, and subsequent poor adult mental health (e.g. Haas, 2006; Jackson, 2009; McFarland & Wagner, 2015; McLeod & Fettes, 2007; McLeod & Kaiser, 2004). Because our goal is to assess the relative impact of adversities in various measures of CCA and the clustering of childhood mental health with other childhood adversities, its inclusion as an indicator of adversity is required.

Poor parental mental health was assessed from questions about each parent. Consistent with the National Comorbidity Study, questions considered some of the most prevalent adult mental health conditions (McGonagle & Freedman, 2015). Respondents were asked if their mother or father ever had trouble keeping a job, often got into physical fights, ever had anxiety attacks, ever had periods of depression, or ever had a problem with substance abuse. Any occurrence was considered poor parental mental health.

To assess the conflict experienced by the respondent, particularly parental abuse, sibling abuse, and family disorder (conflict between parents), the CRCS utilized questions modeled by the well-established Conflict Tactics Scale (McGonagle & Freedman, 2015). *Parental abuse* was comprised of questions based on the frequency that a parent pushed, grabbed or shoved, threw things, slapped or hit, or physically harmed the respondent in any way before they were the age of 17. *Sibling abuse* was measured utilizing questions about how often respondent's siblings pushed, grabbed or shoved, threw things, slapped or hit, or physically harmed the respondent during their childhood. *Family disorder* assessed the relationship between the respondent's parents. The respondent was asked how often their parents pushed, grabbed or shoved, threw things, slapped or hit, or physically harmed each other before the respondent was 17. Although these questions measure a level of frequency, consistent with previous research, any instance of abuse indicated that the respondent had experienced that particular adversity (Schafer & Ferraro, 2013).

Two scales captured the important contextual experience of childhood neighborhood conditions. Consistent with previous research, neighborhood circumstances were grouped into two categories that together provide an overall context for the neighborhood in which the child spent most of their time (Root & Humphrey, 2014; Ross & Mirowsky, 2001). *Neighborhood disorder* consists of the physical attributes of the neighborhood: was the neighborhood safe at night, was the neighborhood safe during the day, was the neighborhood safe for kids, was the neighborhood clean and attractive, and did neighbors take care of homes and property. *Neighborhood cohesion*, on the other hand, captures the experience of networks and relationships among neighbors, which can be linked to accountability and trustworthiness. Two questions measure neighborhood cohesion: did neighbors help each other, and were neighbors close knit. Responses were recorded on a four point Likert scale where 1 = very true and 4 = not true at all. These variables were further dichotomized 1 = not very true/not true at all (perceptions of more disorder/less cohesion) and 0 = very true/somewhat true (perceptions of less disorder/more cohesion). A multicollinearity analysis did not indicate multicollinearity among the childhood adversity variables included in the analysis.

3.2.2. Psychological distress

Psychological distress was measured in the PSID using the K6 Nonspecific Psychological Distress Scale (Kessler, Andrews, Colpe, & Hiripi, 2002; Kessler, Baker & Colpe, 2003). The scale measures the experience of symptoms of psychological distress over the past 30 days. Although only a six-item scale, researchers find that the K6 produces a more accurate measure of psychological distress than other scales that contain more items and are more time consuming and burdensome for respondents (Cairney, Veldhuizen, Wade, Kurdyak, & Streiner, 2007).

Respondents were asked how often they felt: so sad nothing could cheer you up; nervous; restless or fidgety; hopeless; that everything was an effort; and worthless. Responses were recoded so that higher values indicated higher levels of distress and ranged from 0 = none of the time to 4 = all of the time. Individual responses were then summed, producing a scale ranging from 0-24. Previous studies consider individuals with scores greater than 13 to have serious psychological distress that reaches the threshold for clinical diagnosis (Kessler, Barker, & Colpe, 2003). However, dichotomizing psychological distress into a binary variable does not capture the overall distribution of distress, or differences in the level of distress experienced across respondents. Research suggests that only participants with the most extreme and persistent distress would reach clinical levels (Green, Gruber et al., 2010, Green, McLaughlin et al., 2010). Therefore psychological distress was measured as a continuous variable.

3.2.3. Control variables

Sex was measured as male and female. Race was dichotomized into two categories, white and non-white. Age was measured as a continuous variable. Respondent's education was measured as less than high school degree, high school degree but less than college degree, and college degree or higher. Lastly, parental education was measured similar to respondents', but also included a "don't know" category.

3.3. Overview of statistical analyses

To determine whether a more comprehensive measure that considers contextual circumstances, heterogeneity across adversities, and co-occurrence of multiple adversities provides a more adequate measure of the impact of CCA on adult mental health outcomes, a basis of comparison was necessary. Therefore, consistent with previous studies, CCA was first measured utilizing a sum score of total adversities experienced, which is a summed index in which each adversity is equally weighted, and each additional adversity is

assumed to exert an equal impact on the outcome of interest.

The other three measures of CCA consider distinct aspects of adverse experiences. Following Schilling et al. (2008), the second approach focuses on the severity, or impact factor, of each adversity. The impact factor provides an estimate of the relative impact of each adversity on adult psychological distress. Using Ordinary Least Square regressions, psychological distress was regressed on each adversity, controlling for gender, race, age, education, and parental education. Regression coefficients were standardized and ranged from 0.06-0.26. Adversities were grouped into 3 categories of severity based on the relative magnitude of the standardized coefficients: low = 0.06-0.08, medium = 0.09-0.11, high = 0.12 + . Adversities within each category were summed creating three variables that measure the cumulative experience of adversities at each level of severity.

The third approach builds on previous research on stress and mental health that emphasizes the importance of considering the stress universe, whereby different stressors can be distinguished by type (e.g., Turner & Lloyd, 1995; Turner & Avison, 2003; Friedman et al., 2015). Adversities were grouped into six meaningful and distinct categories depending on the nature of adversity experienced: the family context, school circumstances, neighborhood environment, economic hardship, health status, and involvement in crime. Variables within each category were summed to produce cumulative measures of the experience of childhood adversities within each category. Categories were not mutually exclusive; respondents who experienced adversities across multiple categories were represented in each category.

The last approach used Latent Class Analysis (LCA), a finite-mixture model that identifies groups of individuals who share similar patterns of responses on observed variables, in this case indicators of childhood adversities, and sorts respondents into mutually-exclusive and exhaustive groups based on identified patterns (Collins & Lanza, 2010). The experience of childhood adversity does not occur in a vacuum; rather, childhood stressors tend to co-occur, or cluster together. Using LCA allows for the identification of classes of individuals who share similar latent experiences of exposure to adverse childhood circumstances, and further identifies adversities that have a high probability of co-occurring among participants in identified classes. All analyses were estimated using Stata 15, including the LCA Stata plugin used to estimate LCA models (Lanza, Dziak, Huang, Wagner, & Collins, 2011; StataCorp, 2017).

4. Results

Table 1 presents the weighted distribution of all variables. The majority of respondents (86.13%) in the sample were white, 58% of the sample was female, and the average age was 50. Almost half (46.21%) had a college degree. Less than 10% of the sample reported experiencing no childhood adversities. This is consistent with recent literature that finds that the majority of people will experience at least one adversity during their childhood (Chapman et al., 2004; Friedman et al., 2015; Surtees & Wainwright, 2007). Approximately 40% of the sample experienced five or more adversities during their childhood. Although this percentage is higher than findings from earlier studies, it is not surprising given the more extensive list of adverse childhood experiences included in the present study.

Financial struggle was the most commonly experienced childhood adversity with just under half of the sample stating that their families struggled financially at some point during their childhood. Parental mental health problems during childhood were also a common adversity, with approximately 36% of the sample having a mother or a father who struggled with a mental health issue. Approximately 21% of the sample reported struggles with mental health prior to the age of 17. Involvement in the criminal justice system was not very common; however, it is important to note that approximately 13% of the sample was arrested before the age of 26, but only about a third of those participants (approximately 5% of the total sample) were convicted of a crime during the same time period.

Table 2 displays standardized coefficients from regression of psychological distress on each adversity. Model 1 presents the bivariate association, while model 2 controls for demographic characteristics as well as respondent and parental education. Associations with psychological distress are significant (at $p < 0.001$) for all adversities, and remain significant after the controls are introduced. Standardized coefficients are all positive ranging from 0.06 – 0.26, signifying that all childhood adversities are associated with increased psychological distress in adulthood. However, there is variability in the impact of each childhood stressor on the outcome.

The final column of Table 2 includes the relative impact of each adversity on psychological distress (Low, Medium, High). Adversities characterized as childhood traumas in previous research, such as parental abuse and childhood mental health, have a high impact factor. So do adversities pertaining to the school environment, such as experiences of bullying and perceptions of unsafe schools. Low impact adversities include parental divorce and paternal or maternal unemployment. Financial struggle and neighborhood disadvantage adversities are characterized as medium impact adversities. Three cumulative adversity variables – low, medium, and high – capture the additive impact of adversities within each severity category.

Next, Table 3 displays the standardized coefficients of the effect of the three measures of CCA on adult psychological distress: the typical sum score measure, the measure based on relative impact, and the measure determined by type of adversity. Model 1 illustrates the bivariate association, while results presented in Model 2 are adjusted for sex, race, age, education, and parental education of the respondent. The first measure of CCA considered (Measure 1, Table 3) is the sum score approach. Results indicate an increase in psychological distress ($\beta = .273$; $p < 0.001$) with the experience of each additional adversity, controlling for demographic and educational attainment variables.

Results from Measure 2, adversities grouped by impact factor, indicate that the effect on psychological distress differs by severity. As the categories increase in severity, the standardized coefficients also increase indicating higher psychological distress. For example, in Model 1, with each additional low impact adversity experienced, psychological distress increases by .05, while each additional high impact adversity experienced leads to an increase of .26. Although the crude effects of all three impact categories are associated with a statistically significant increase in adult psychological distress, after the controls are included, only the high impact category remains statistically significant.

Measure 3 groups stressors into categories based on the type of stressor experienced. After including controls, three out of the six categories, family context, school circumstances, and health status, are associated with statistically significant (at $p < 0.001$) increases in psychological distress. Childhood adversities relating to health status have the largest effect on psychological distress ($\beta = .161$).

Table 1
Weighted Sociodemographic Characteristics of Participants and the Distribution of Adversities (N = 4219).

	N	% or Mean (SE)
Sex		
Male (0)	1,753	41.55
Female (1)	2,466	58.45
Race		
White (0)	3,634	86.13
Other (1)	585	14.87
Age (mean)		
Range: 25-97	4219	50.19
Education		
Less than High School	274	6.50
High School	1,995	47.30
College Degree or Higher	1,949	46.21
Parental Education		
Less than High School	543	12.88
High School	2127	50.42
College Degree or Higher	1,256	29.76
Missing	293	6.94
Psychological Distress		
0	1,396	33.09
1	449	10.65
2	717	16.99
3	279	6.60
4	423	10.03
5	137	3.25
6	229	5.42
7	130	3.08
8	103	2.44
9	60	1.42
10	79	1.87
11	44	1.04
12	37	0.88
13	36	0.86
14	22	0.53
15+	77	1.82
Mean Psychological Distress		2.99 (3.72)
Childhood Adversity Indicators		
Parental Divorce	439	10.41
Childhood Health Status	197	4.67
Missed Month + School for Health Reason	394	9.35
Childhood Mental Health Status	888	21.05
Dad Unemployment	785	18.61
Mom Unemployment	960	22.75
Financial Struggle	1,957	46.40
Welfare 3+ Months	567	13.44
Family Finance Compared to Average	839	19.89
Neighborhood Disorder	468	11.10
Neighborhood Cohesion	712	16.89
Repeat a Grade	399	9.45
Lonely for Friends	1,380	32.70
Bullied at School	1,281	30.37
Bullied Outside of School	692	16.40
Happy at School	598	14.16
School Safety	467	11.07
Crime Victim before Age 17	367	8.70
Arrested before Age 26	554	13.12
Convicted before Age 26	208	4.93
Probation before Age 26	200	4.73
Parental Mental Health Problems	1,524	36.12
Parental Abuse	991	23.49
Family Disorder	356	8.43
Sibling Abuse	1,412	33.47
Cumulative Number of Adversities		
0	407	9.65
1	589	13.95
2	554	13.12
3	509	12.07
4	440	10.42
5 +	1720	40.78

(*continued on next page*)

Table 1 (*continued*)

	N	% or Mean (SE)
Mean Number of Adversities		
Total sample	4219	4.42
Sample experiencing 1 or more adversities	3841	4.89

Table 2
Standardized Individual Effects of Childhood Adversity on Psychological Distress Controlling for Demographics (N = 4219).

	Model 1 Psychological Distress		**Model 2 Psychological Distress + Controls**		**Relative Impact Factor**
Adversity	**b**	**S.E.**	**b**	**S.E.**	
Parental Divorce	.071***	.172	.056***	.170	Low
Childhood Health Status	.118***	.282	.110***	.278	Medium
Missed Month + School for Health Reason	.082***	.208	.077***	.204	Low
Childhood Mental Health Status	.259***	.139	.262***	.138	High
Dad Unemployment	.069***	.145	.063***	.143	Low
Mom Unemployment	.089***	.129	.071***	.128	Low
Financial Struggle	.114***	.113	.099***	.112	Medium
Welfare 3+ Months	.139***	.140	.105***	.147	Medium
Family Finance Compared to Average	.079***	.141	.069***	.140	Low
Neighborhood Disorder	.124***	.157	.104***	.159	Medium
Neighborhood Cohesion	.103***	.146	.099***	.144	Medium
Repeat a Grade	.118***	.179	.084***	.183	Low
Lonely for Friends	.181***	.122	.189***	.121	High
Bullied at School	.157***	.123	.159***	.121	High
Bullied Outside of School	.154***	.152	.152***	.149	High
Happy at School	.172***	.158	.151***	.157	High
School Safety	.154***	.171	.140***	.169	High
Crime Victim before Age 17	.097***	.198	.102***	.194	Medium
Arrested before Age 26	.082***	.159	.078***	.162	Low
Convicted before Age 26	.082***	.240	.074***	.239	Low
Probation before Age 26	.072***	.240	.064***	.239	Low
Parental Mental Health Problems	.165***	.117	.157***	.115	High
Parental Abuse	.129***	.131	.118***	.129	High
Family Disorder	.106***	.191	.088***	.189	Medium
Sibling Abuse	.118***	.119	.115***	.117	High

*p < .05; **p < .01; ***p < .001; Model 1: crude; Model 2: adjusted for race, sex, age, education, and parental education.

Notably, effect sizes of stressors associated with school circumstances are also large (β = .153). Family context adversities have a smaller standardized effect on psychological distress than health and school environments (β = .082). Adverse experiences pertaining to the neighborhood environment, economic hardship, or involvement in crime do not reach statistical significance.

The fourth measure of CCA utilizes LCA to group respondents into classes based on similar patterns of adverse experiences, indicating that certain adversities tend to cluster or co-occur. To identify the optimum number of latent classes, a series of models

Table 3
Ordinary Least Squares Regressions of Measures of Cumulative Childhood Adversity and Psychological Distress (N = 4219).

	Model 1 β (SE)	Model 2 β (SE)
Measure of Cumulative Childhood Adversity 1		
CCA Sum Score	.310*** (.015)	.273*** (.015)
Measure of Cumulative Childhood Adversity 2		
CCA Low Impact Adversities	.050* (.046)	.024 (.046)
CCA Medium Impact Adversities	.075*** (.050)	.042 (.051)
CCA High Impact Adversities	.259*** (.031)	.261*** (.031)
Measure of Cumulative Childhood Adversity 3		
CCA Family Context	.089*** (.051)	.082*** (.051)
CCA School Circumstances	.163*** (.044)	.153*** (.044)
CCA Neighborhood Environment	.041 (.091)	.024 (.091)
CCA Economic Hardship	.031 (.044)	.002 (.044)
CCA Health Status	.156*** (.99)	.161*** (.098)
CCA Involvement in Crime	.038 (.070)	.027 (.071)

*p < .05; **p < .01; ***p < .001.
Model 1: crude.
Model 2: adjusted for sex, race, age, respondent education and parental education.

Table 4
Weighted Probability of Experiencing Adversities by Latent Class (N = 4219).

LCA Classes of Cumulative Childhood Adversity	Adversities with a Conditional Probability over 60% (Black) and Elevated Risk over 50% (Grey)	n	%
Class 1: "No to Low Adversity"	(Reference)	1,675	39.71
Class 2: "Involvement in Criminal Activity"	Arrested, Convicted, Probation	194	4.60
Class 3: "Bullied and Alone"	Bullied school, elevated risk of bullied outside school and childhood loneliness	486	11.52
Class 4: "Economic Hardship, Poor Parental Mental Health, and Elevated risk of Neighborhood Disadvantage"	Mom unemployed, Financial struggle, Childhood welfare, Financial comparison, Parental mental health, elevated risk of experiencing neighborhood disorder and neighborhood cohesion	315	7.46
Class 5: "Adversities across Different Domains"	Child mental health, Financial struggle, Childhood welfare, Bullied in school, Arrested, Convicted, Probation, Parental mental health, Parental abuse, Sibling abuse, elevated risk of experiencing Financial comparison, Bullied outside of school, and Childhood loneliness	111	2.63
Class 6: "Financial Struggle, Negative School Environment and Elevated risk of Familial Abuse and Poor Childhood Mental Health"	Financial struggle, Bullied in school, bullied outside school, childhood loneliness, elevated risk of Child mental health, Mom unemployment, Financial Comparison, School safety, Parental abuse, and Sibling abuse	329	7.80
Class 7: "Financial Struggle"	Financial Struggle	674	15.97
Class 8: "Poor Parental Mental Health"	Parental mental health	435	10.32

were estimated fitting 2–10 classes and model diagnostics were used to identify the optimal number of classes for the data (Collins & Lanza, 2010). The Schwarz Bayesian information criterion (BIC; Schwarz, 1978) and the Akaike information criterion (AIC; Akaike, 1987) were compared across model estimates; smaller values of both AIC and BIC indicate a better model fit. With each increase in the number of latent classes estimated, the BIC and AIC declined before increasing with the estimation of 9 classes, indicating that 8 latent classes was the best fit for the data. Table 4 shows the weighted distribution of participants across latent classes. Item-response probabilities, the probability of experiencing each adversity conditional on class membership, were used to interpret latent classes. Item-response probabilities over 60% indicate that an adversity had a high probability of occurring; conditional probabilities between 50 and 60% indicate that an adversity had an elevated risk of occurring.

The *No to Low Adversity* class (Class 1), approximately 40% of the sample, included individuals with a low probability of experiencing any adversity during their childhood. The *Involvement in Criminal Activity* class (Class 2) included participants with a high probability of having been arrested, convicted of a crime, or on probation during childhood. Individuals in Class 3, *Bullied and Alone*, had a high probability of experiencing bullying and feelings of loneliness during childhood. Class 4 participants were characterized by *Economic Hardship, Poor Parental Mental Health, and an Elevated Risk of Neighborhood Disadvantage*. Respondents in Class 5, *Adversities across Different Domains*, endured a multitude of adversities including mental health struggles, financial hardship, criminal activity, parental mental health problems, and experiences of parental abuse. While this class was composed of a small percentage of the total sample, approximately 3%, the high probability of experiencing a multitude of different adversities suggests that this class includes some of the most disadvantaged respondents.

Individuals in Class 6, *Financial Struggle, Negative School Environment, and Elevated Risk of Familial Abuse and Poor Childhood Mental Health*, had a high probability of having experienced economic hardship, bullying, and feelings of loneliness, as well as an elevated risk of exposure to parental and sibling abuse, and poor childhood mental health. Participants in Class 7, *Financial Struggle*, primarily experienced economic hardship during childhood. Class 8, *Poor Parental Mental Health*, represented respondents with a high probability of having an unpredictable

Table 5
Ordinary Least Squares Regressions of Latent Classes of Cumulative Childhood Adversity and Psychological Distress (N = 4219).

LCA Classes of Cumulative Childhood Adversity	Model 1 β (SE)	Model 2 β (SE)
Class 1: "No to Low Adversity"	1 (REF)	1 (REF)
Class 2: "Involvement in Criminal Activity"	.077*** (.246)	.059*** (.248)
Class 3: "Bullied and Alone"	.117*** (.192)	.116*** (.189)
Class 4: "Economic Hardship, Poor Parental Mental Health, and Elevated risk of Neighborhood Disadvantage"	.150*** (.198)	.117*** (.197)
Class 5: "Adversities across Different Domains"	.181*** (.322)	.153*** (.323)
Class 6: "Financial Struggle, Negative School Environment and Elevated risk of Familial Abuse and Poor Childhood Mental Health"	.218*** (.218)	.196*** (.215)
Class 7: "Financial Struggle"	.060*** (.161)	.047* (.159)
Class 8: "Poor Parental Mental Health"	.127*** (.200)	.121*** (.192)

*p < .05; **p < .01; ***p < .001.
Model 1: crude.
Model 2: adjusted for sex, race, age, respondent education and parental education.

parent, or parents, with poor mental health.

Table 5 displays the standardized coefficients of the effect of latent classes of cumulative childhood adversity on adult psychological distress. All classes, when compared to the reference class of *No to Low Adversity*, are associated with statistically significant (at $p < 0.001$) increases in psychological distress. Membership in Class 6, *Financial Struggle, Negative School Environment and Elevated Risk of Familial Abuse and Poor Childhood Mental Health*, was the strongest predictor of psychological distress ($\beta = .218$). Class 5, *Multiple Adversities across Different Domains*, had the second strongest impact on psychological distress ($\beta = .181$).

5. Discussion

The present study utilized data from the PSID-CRCS to construct multiple measures of CCA that consider the heterogeneity among childhood stressors and examine how differences in the operationalization of CCA can influence its association with mental health outcomes. A further contribution of this study is the inclusion of a broader range of adversities, addressing an important limitation of previous research by providing a more comprehensive measure of cumulative childhood adversity and advancing the understanding of the overall impact of early life stressors. Taken together, results indicate that all measures of CCA are associated with increases in adult psychological distress; however, variations in the measurement of CCA resulted in differential estimates of the impact on adult psychological distress.

Four key findings contribute to the understanding of CCA and its association with adult mental health. First, there is heterogeneity among childhood stressors that contributes to disparities in psychological distress. While the accumulation of childhood adversities was a significant predictor of psychological distress, CCA is a complex process, which cannot be adequately captured using a simple sum score. The sum score of adversities estimates the impact of each additional adversity on psychological distress but does not provide detail on the differences across adverse experiences and the underlying process of accumulation. The sum score had the largest effect across measures, suggesting that a simple additive measure overestimates the overall impact of indicators of CCA. After grouping childhood stressors into more homogenous categories based on severity, type, or experience, it was clear that the impact of adversities on estimates of adult psychological distress was not uniform across adversities. Using LCA to group participants into latent classes based on similar experiences of adversity furthered understanding of underlying patterns of experiences of CCA and the differential impact of co-occurring adversities on psychological distress.

Second, it is clear from these results that estimates of the effect of childhood adversities on psychological distress depend on the measure and conceptualization of CCA. Estimates of the magnitude of association with psychological distress differed across measures of CCA. Grouping adversities by severity highlighted the importance of the accumulation of high impact adversities, which had a strong association with increases in adult psychological distress net of controls, and grouping adversities by type revealed the distinct effects of the accumulation of adversities within each category. Overall, cumulative experiences of adversity within the family context, school circumstances, and health status domains were associated with statistically significant increases in psychological distress, even after the addition of controls. Both of these methods for grouping adversities relied on variable-centered approaches and focus on the experience of adversities *within* each impact factor or type and not across them; therefore, results did not simultaneously capture the experience of adversities across different levels of severity or type of adversity.

In contrast, grouping respondents based on latent similarities in experiences of adversity using LCA provided further insights into the heterogeneity of CCA and was the most promising approach for conceptualizing cumulative childhood adversity. Because LCA uses a person-centered approach, respondents were grouped by similarities in the experience of adversities; therefore, the latent classes captured the co-occurrence of adversities across severity *and* type. Specifically, it was the co-occurrence of adversities in childhood across various domains within the stress universe that had a detrimental impact. Grouping adversities by severity or type assumes that adversities accumulate solely within the parameters of the category in which they belong and therefore may overestimate or underestimate their effects. Adversities accumulate across various domains and differ in severity; hence, the actual experience of co-occurring adversities is important to consider.

Third, it is important to expand the stress universe for children to include measures of chronic and contextual stressors to ensure that the overall cumulative effect of childhood adversity is captured. For example, when adversities were grouped by type, economic hardship did not have a significant association with adult psychological distress. Similarly, the *Financial Struggle* latent class (Class 7) had only a modest

association with adult psychological distress. These results are consistent with previous research that finds an overall weak association between indicators of financial strain and adult health (Schafer & Ferraro, 2013). However, the latent class characterized primarily by economic hardship coupled with parental mental health and perceptions of neighborhood disadvantage (Class 4) had a stronger association with adult psychological distress. The contexts in which childhood adversities occur, such as disadvantaged neighborhoods, are important chronic stressors to include in cumulative measures of childhood adversity as they may work to cumulatively impact psychological distress. For example, parental mental health status may impede the acquisition of a stable job, which can lead to financial struggles; financial struggles in turn may contribute to the type of neighborhood one can afford. While the present study did not focus on the sequence of adverse exposure, these potential processes suggest an important avenue for future research.

Finally, the results indicate that the school environment is an important childhood context to consider when evaluating the impact of childhood adversities on adult outcomes. In accordance with earlier research (Ozer & Weinstein, 2004; Smokowski & Kopasz, 2005; Takizawa, Maughan, & Arseneault, 2014), exposure to bullying, feelings of loneliness for friends, and perceptions of unsafe schools emerged as strong predictors of adult psychological distress across the measures of CCA. Both the experience of school adversities alone and the high probability of co-occurrences of school adversities with other childhood adversities, such as poor childhood mental health, were important determinants of later adult psychological distress. However, CCA research typically has not included these important school-related risk factors. The results demonstrate the importance of expanding the stress universe for children to include adverse experiences that occur within the school context and act as chronic stressors.

While this study provides important insights into the experience of CCA and its impact on adult psychological distress, it is not without limitations. First, the analysis relies on retrospective measures of adverse childhood circumstances due to the lack of prospective longitudinal data that includes childhood adverse experiences. Although retrospective data on childhood adversity may be influenced by recall failure, resulting in upwardly biased results, studies have found that retrospective recounts of childhood adverse circumstances remain a valid and reliable measure of early life exposure (Hardt & Rutter, 2004; Surtees & Wainwright, 2007). Furthermore, the CRCS is specific to childhood experiences, while adulthood psychological distress was measured a year prior during the PSID main interview. Staggering the collection of childhood retrospective data and adult data may further improve the accuracy of retrospective childhood circumstances reports.

Another limitation of the current study is that important life course principles of sequencing and duration of adversities are not considered. There is growing evidence that these factors have implications for adult mental and physical health (Friedman et al., 2015). It is likely that one adversity occurred prior to another and had cascading effects. Furthermore, measures of the duration of childhood stressors would provide additional information on the variations in exposure to childhood adversities. For example, research finds that differences in timing and duration of exposure to poverty during childhood contributes to differences in health and overall life chances (Kuh & Ben-Shlomo, 2002). While the data do not allow for the temporal ordering of adversities, LCA is able to account for patterns in the accumulation of adverse circumstances experienced during childhood, which extends research on CCA. Future studies would benefit from considering these various life course dimensions of adversity.

Lastly, the present study does not focus on racial or gender differences, and psychological distress is measured at a single point in time. Future research would further benefit from considering gender and racial differences in exposure to childhood adversity that can begin a process of cumulative disadvantage that compounds across the life course. Measures of psychological distress over time would further provide additional information on the dynamic process of mental health and the manner in which childhood adversities contribute to trajectories of psychological distress across the life course.

The present study advocates for considering a wide array of childhood stressors in measures of cumulative childhood adversity and provides evidence that the heterogeneity across adversities and the measurement of cumulative childhood stressors impact estimates of adult psychological distress. A measure of cumulative childhood adversity that focuses on patterns of co-occurring adverse experiences is a promising approach that captures exposure to adversity across various facets of disadvantage.

Funding

This research was supported by the Social Sciences and Humanities Research Council of Canada Doctoral Fellowship awarded to Heidinger.

References

Akaike, H. (1987). Factor analysis and AIC. *Psychometrika, 52*, 317–332.
Amato, P. R. (2000). The consequences of divorce for adults and children. *Journal of Marriage and the Family, 62*(4), 1269–1287.
Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine, 39*(1), 93–98.
Arseneault, L., Bowes, L., & Shakoor, S. (2010). Bullying victimization in youths and mental health problems: 'Much ado about nothing'? *Psychological Medicine, 40*, 717–729.
Avison, W. R. (2010). Incorporating children's lives into a life course perspective on stress and mental health. *Journal of Health and Social Behavior, 41*(4), 361–375.
Björkenstam, E., Burström, B., Brännström, L., Vinnerljung, B., Björkenstam, C., & Pebley, A. R. (2015). Cumulative exposure to childhood stressors and subsequent psychological distress: An analysis of US panel data. *Social Science & Medicine, 142*, 109–117.
Bond, L., Butler, H., Thomas, L., Carlin, J., Glover, S., Bowes, G., et al. (2007). Social and school connectedness in early secondary school as predictors of late substance use, mental health, and academic outcomes. *Journal of Adolescent Health, 40*, 357.e9–357.e18.
Cairney, J., Veldhuizen, S., Wade, T. J., Kurdyak, P., & Streiner, D. (2007). Evaluation of 2 measures of psychological distress as screeners for depression in the general population. *The Canadian Journal of Psychiatry, 52*(2), 111–120.
Chapman, D. P., Witfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders, 82*, 217–225.
Collins, L. M., & Lanza, S. T. (2010). *Latent class and latent transition analysis.* Hoboken, NJ: Wiley.
Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., et al. (1998). Relationship of childhood abuse and household dysfunction to

many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245–258.
Ford, E., Clark, C., & Stansfeld, S. A. (2011). The influence of childhood adversity on social relations and mental health at mid-life. *Journal of Affective Disorders, 133*, 320–327.
Friedman, E. M., Montez, J. K., Sheehan, C. M., Guenewald, T., & Seeman, T. E. (2015). Childhood adversities and adult cardiometabolic health: Does the quantity, timing, and type of adversity matter? *Journal of Aging and Health, 27*(8), 1311–1338.
Goosby, B. J. (2013). Early life course pathways of adult depression and chronic pain. *Journal of Health and Social Behavior, 54*(1), 75–91.
Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2010). Improving the K6 shot scale to predict serious emotional disturbance in adolescents in the USA. *International Journal of Methods in Psychiatric Research, 51*(19), 23–35.
Green, J. G., McLaughlin, K. A., Berglund, P. A., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., et al. (2010). Childhood adversities and adult psychiatric disorders in the National Comorbidity Survey Replication I: Associations with first onset of DSM-IV disorders. *Archives of General Psychiatry, 67*(2), 113–123.
Hammen, C., Kim, E. Y., Eberhart, N. K., & Brennan, P. A. (2009). Chronic and acute stress and the prediction of major depression in women. *Depression and Anxiety, 26*, 718–723.
Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Association for Child Psychology and Psychiatry, 45*(2), 260–273.
Haas, S. A. (2006). Health selection and the process of social stratification: The effect of childhood health on socioeconomic attainment. *Journal of Health and Social Behavior, 47*(4), 339–354.
Hsu, H., & Wickrama, K. A. S. (2015). Linking family economic hardship to early childhood health: An investigation of mediating pathways. *Maternal and Child Health Journal, 19*(12), 2636–2645.
Jackson, M. I. (2009). Understanding links between adolescent health and educational attainment. *Demography, 46*(4), 671–694.
Kessler, R. C., Andrews, G., Colpe, L. J., & Hiripi, E. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine, 32*(6), 959–976.
Kessler, R. C., Barker, P. R., & Colpe, L. J. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry, 60*(2), 184–189.
Kuh, D., & Ben-Shlomo, Y. (2002). A life course approach to chronic disease epidemiology: Conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology, 31*(2), 285–293.
Lanza, S. T., Dziak, J. J., Huang, L., Wagner, A. T., & Collins, L. M. (2011). *LCA stata plugin users' guide (Version 1.0).* University Park: Methodology Center, Pennsylvania State University.
McFarland, M. J., & Wagner, B. G. (2015). Does a College Education Reduce Depressive Symptoms in American Young Adults? *Social Science & Medicine, 146*, 75–84.
McGonagle, K., & Freedman, V. A. (2015). *The panel study of income dynamics' childhood retrospective circumstances study (PSID-CRCS) user guide: Final release 1.* Institute for Social Research, University of Michigan.
McLeod, J. D., & Fettes, D. (2007). Trajectories of failure: The educational careers of children with mental health problems. *The American Journal of Sociology, 113*(3), 653–701.
McLeod, J. D., & Kaiser, K. (2004). Childhood emotional and behavioral problems and educational attainment. *American Sociological Review, 69*(5), 636–658.
Monnat, S. M., & Chandler, R. F. (2015). Long-term physical health consequences of adverse childhood experiences. *The Sociological Quarterly, 56*, 723–752.
Nurius, P. S., Green, S., Logan-Greene, P., & Borja, S. (2015). Life course pathways of adverse childhood experiences toward adult psychological well-being: A stress process analysis. *Child Abuse & Neglect, 45*, 143–153.
Nurius, P. S., Logan-Greene, P., & Green, S. (2012). Adverse childhood experiences (ACE) within a social disadvantage framework: Distinguishing unique, cumulative, and moderated contributions to adult mental health. *Journal of Prevention & Intervention in the Community, 40*, 278–290.
Ozer, E. J., & Weinstein, R. S. (2004). Urban adolescents' exposure to community violence: The role of support, school safety, and social constraints in a school based sample of boys and girls. *Journal of Clinical Child and Adolescent Psychology, 33*(3), 464–476.
Panel Study of Income Dynamics (2016). *Public use dataset. Produced and distributed by the survey research center, institute for social research.* Ann Arbor, MI: University of Michigan.
Root, E. D., & Humphrey, J. L. (2014). Neighborhood racial composition and trajectories of child self-rated health: An application of longitudinal propensity scores. *Social Science and Medicine, 120*, 31–39.
Ross, C. E., & Mirowsky, J. (2001). Neighborhood disadvantage, disorder, and health. *Journal of Health and Social Behavior, 42*(3), 258–276.
Schafer, M. H., & Ferraro, K. F. (2013). Childhood misfortune and adult health: Enduring and cascadic effects on somatic and psychological symptoms? *Journal of Aging and Health, 25*(1), 3–28.
Schafer, M. H., Ferraro, K. F., & Mustillo, S. A. (2011). Children of misfortune: Early adversity and cumulative inequality in perceived life trajectories. *The American Journal of Sociology, 116*(4), 1053–1091.
Schilling, E. A., Aseltine, R. H., & Gore, S. (2007). Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health, 7*(30), 1–10.
Schilling, E. A., Aseltine, R. H., & Gore, S. (2008). The impact of cumulative childhood adversity on young adult mental health: Measures, models and interpretations. *Social Science and Medicine, 66*, 1140–1151.
Schwarz, G. (1978). Estimating the dimension of a model. *Annals of Statistics, 6*, 461–464.
Scott-Storey, K. (2011). Cumulative abuse: Do things add up? An evaluation of the conceptualization, operationalization, and methodological approaches in the study of the phenomenon of cumulative abuse. *Trauma, Violence & Abuse, 12*(3), 135–150.
Seery, M. D., Holman, E. A., & Cohen Silver, R. (2010). Whatever does not kill us: Cumulative lifetime adversity, vulnerability, and resilience. *Journal of Personality and Social Psychology, 99*(6), 1025–1041.
Shochet, I. M., Dadds, M. R., Ham, D., & Montague, R. (2006). School connectedness is an underemphasized parameter in adolescent mental health: Results of a community prediction study. *Journal of Clinical Child and Adolescent Psychology, 35*(2), 170–179.
Smokowski, P. R., & Kopasz, K. H. (2005). Bullying in school: An overview of types, effects, family characteristics, and intervention strategies. *Children and Schools, 27*(2), 101–110.
Sobolewski, J. M., & Amato, P. R. (2005). Economic hardship in the family of origin and children's psychological well-being in adulthood. *Journal of Marriage and the Family, 67*(1), 141–156.
StataCorp (2017). *Stata statistical software release 15.* College Station, TX: StataCorp LLC.
Surtees, P. G., & Wainwright, N. W. J. (2007). The shackles of misfortune: Social adversity assessment and representation in a chronic disease epidemiological setting. *Social Science & Medicine, 64*, 95–111.
Takizawa, R., Maughan, B., & Arseneault, L. (2014). Adult health outcomes of childhood bullying victimization: Evidence from a five-decade longitudinal British birth dohort. *The American Journal of Psychiatry, 171*(7), 777–784.
Turner, J. R., & Avison, W. R. (2003). Status variations in stress exposure: Implications for the interpretation of research on race, socioeconomic status, and gender. *Journal of Health and Social Behavior, 44*(4), 488–505.
Turner, H. A., & Butler, M. J. (2003). Direct and indirect effects of childhood adversity on depressive symptoms in young adults. *Journal of Youth and Adolescence, 32*(2), 89–103.
Turner, J. R., & Lloyd, D. A. (1995). Lifetime traumas and mental health: The significance of cumulative adversity. *Journal of Health and Social Behavior, 4*(36), 360–376.
Turner, R. J., Wheaton, B., & Lloyd, D. A. (1995). The epidemiology of social stress. *American Sociological Review, 60*(1), 104–125.
Wheaton, B., & Clarke, P. (2003). Space meets time: Integrating temporal and contextual influences on mental health in early adulthood. *American Sociological Review, 68*(5), 680–706.
Willson, A. E., & Shuey, K. M. (2016). Life course pathways of economic hardship and mobility and midlife trajectories of health. *Journal of Health and Social Behavior, 57*(3), 407–422.