Longitudinal consistency of self-reports of adverse childhood experiences among adolescents in a low-income setting

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ABSTRACT

A sizeable literature documents the associations between adverse childhood experiences (ACEs) and poor health in later life. By and large, ACEs are measured using retrospective self-reports. Little is known about the longitudinal consistency of these self-reports in panel data with multiple measurements. This is especially true in adolescence, as most studies using ACEs self-reports have been conducted among adults. Furthermore, very few studies have explored the consistency of ACEs self-reports in low- and middle-income countries, where the reported prevalence of ACEs tends to be higher than in high-income countries. Addressing these gaps, the current study examines the consistency of ACEs self-reports among a cohort of adolescents (N = 1,878, age 10 to 16 at survey baseline) in rural Malawi. We use data from two waves of the ACE project of the Malawi Longitudinal Study of Families and Health carried out in 2017-18 and 2021. In addition to the high prevalence of self-reported ACEs among adolescents in our sample, we document very low consistency of self-reports over time (average Kappa coefficient of 0.11). This low consistency is attributable not only to adolescents reporting more ACEs over time, which could be due to new exposures, but also to adolescents reporting fewer ACEs over time. Analyses of survey vignettes indicate that individual and sociocultural perceptions of abuse do not explain this low consistency. We find that external events (such as changes in socioeconomic status and negative economic shocks) and internal psychological states (such as depression and post-traumatic stress disorder) both predict inconsistencies in ACEs self-reports. Compared with results from prior studies, our findings indicate that the longitudinal consistency of ACEs self-reports may be lower in adolescence than in adulthood. Taken together, these findings suggest that ACEs self-reports provided by adults may be biased by key processes unfolding in adolescence.

1. Introduction

Adverse childhood experiences (ACEs) encompass a wide range of stressful and potentially traumatic events happening in early life, from episodes of abuse and neglect to family and community dysfunctions. A sizeable literature documents associations between ACEs and poor health outcomes in later life (Hughes et al., 2017; Kalmakis & Chandler, 2015; Petruccelli et al., 2019). This literature largely relies on retrospective self-reports of ACEs. However, a growing literature underscores daunting problems undermining these reports (Danese, 2020; Widom, 2019). Studies document only poor agreement between retrospective self-reports and records of ACEs provided by external sources during respondents’ childhood (Baldwin et al., 2019), calling into question the accuracy of ACEs self-reports. Other studies highlight contradictions in reports provided by the same respondents in successive interviews (Holden et al., 2020, pp. 161–182; Widom et al., 2004), calling into question the consistency of ACEs self-reports.

Verifying the accuracy of ACEs self-reports is impossible for most population-based samples. But much can be gained from understanding their consistency. To this end, one must first determine how the consistency of ACEs self-reports varies over the life course; whether such variations correspond to specific changes in individuals’ objective and subjective life circumstances; and how these associations vary across individuals and contexts. This task is essential to assessing potential biases or misclassifications in the measurement of ACEs and may also provide insights into the pathways linking ACEs – remembered and forgotten – to health outcomes over the life course (Danese, 2020).

However, the empirical evidence on the consistency of self-reports of ACEs over the life course remains limited. Existing studies on this topic focus almost exclusively on adults in high-income countries (HICs).

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Little is known about patterns observed in earlier life, especially in adolescence, when life narratives and the internal processing of ACEs may be more in flux. We also know little about patterns observed in low- and middle-income countries (LMICs), where respondents report a higher prevalence of ACEs (Cluver et al., 2015; Naicker et al., 2017; Soares et al., 2016). These gaps highlight the need to investigate a broad set of determinants of self-reports of ACEs, one that includes not only psychological determinants but also the contexts – demographic, economic and sociocultural – in which self-reports arise.

The present study explores the consistency of self-reports of ACEs using longitudinal data on adolescents from the Malawi Longitudinal Study of Families and Health – Adverse Childhood Experiences (MLSFH-ACE) study. We offer two main contributions to the literature on ACEs. First, we examine the consistency of ACEs self-reports earlier in the life course than most prior studies on this topic. This allows us to assess whether distinct patterns of inconsistencies can be observed during adolescence. We also provide the first assessment of patterns of consistency in ACEs self-reports using the ACE-International Questionnaire (ACE-IQ) developed by the World Health Organization (WHO). Second, the rich array of data collected by the MLSFH-ACE study allows us to investigate a wider array of predictors of these changes and inconsistencies than most prior studies. We focus on five main categories of predictors: demographic and life-course factors, socioeconomic resources, physical health, mental health, and cognitive health. We also explore whether individual and sociocultural perceptions of child abuse influence ACEs self-reports.

1.1. Measures of ACEs

ACEs have been measured in two ways in the existing literature: (1) through respondents’ self-reports or (2) through reports provided by external sources (including caregivers, institutional actors and official records). Measures of the first type are typically labelled “subjective” or “retrospective”, whereas measures of the second type are often labelled “objective” and “prospective”. It is worth noting that measures of the second type are neither objective nor prospective: external sources may use different (subjective) criteria to identify ACEs and typically elicit (retrospective) information about events that took place in the past. Nevertheless, the present study maintains the standard terminology used in the literature to distinguish self-reports from reports provided by external sources. Accuracy of self-reports refers to comparisons between prospective and retrospective measures of ACEs, whereas consistency refers to comparisons between successive retrospective measures.

1.2. Levels of accuracy and consistency

A recent meta-analysis yields sobering findings on the accuracy of self-reports of childhood adversity (Baldwin et al., 2019). When analyzing all existing studies that include both prospective and retrospective reports of ACEs, the authors found an average Kappa coefficient of 0.19, denoting an overall poor agreement between the two types of reports. In a landmark study of victims of child maltreatment whose cases were tried in courts, nearly 25% of victims of physical abuse did not recall or disclose the abuse in retrospective self-reports in adulthood; this number grew to nearly 45% in cases of sexual abuse and more than 50% in cases of severe neglect (Danese & Widom, 2020). Crucially, however, the authors found that prospective reports of maltreatment only predicted symptoms of psychopathology in adulthood if combined with a retrospective report. In other words, self-reports of ACEs predicted mental health in adulthood even when inaccurate: among respondents known to have been victims of maltreatment or neglect in childhood, those who did not report or recall the events in adulthood (false negatives) had significantly lower odds of developing psychopathologies than those who did (true positives).

The accuracy of ACEs self-reports must be distinguished from their consistency. A respondent could very well provide consistently inaccurate self-reports. Yet highly inconsistent self-reports must betray some degree of inaccuracy. Inconsistent self-reports, like inaccurate ones, may therefore convey important information for predicting health outcomes and for understanding the pathways linking childhood adversity to well-being in later life. Because consistency may oscillate with each new self-report, it must be assessed dynamically over the life course. Yet prior research on inconsistencies of ACEs self-reports is limited to adults in HICs, with little evidence on patterns observed earlier in the life course and in LMICs.

Studies suggest that adult respondents provide at least moderately consistent self-reports of ACEs over time. Dube et al. (2004) carried out a test-retest examination of the standard ACEs questionnaire among 657 adults (average age of 64 years) over an interval of 20 months. They obtained Kappa coefficients ranging from 0.41 to 0.86 for all binary ACEs indicators, denoting “good to excellent reliability in the reports of adverse childhood experiences during adulthood” (736), Yancura and Aldwin (2009) similarly found “moderate to high cross-time reliability” (Kappa coefficients ranging from 0.20 to 0.93) in self-reports of selected positive and negative life experiences in a sample of 571 adults (average age of 43 years) interviewed over an interval of five years. Ayalon (2017) found moderate to high agreement (Kappa coefficients ranging from 0.56 to 0.74) between self-reports of selected negative early life experiences among older adults (average age of 68 years) from two waves of the Health and Retirement Study carried out over a time interval of four years. However, Langeland et al. (2015) measured only fair to moderate reliability (Kappa coefficient of 0.39) of self-reports of childhood sexual abuse among a sample of nearly 2500 adults (average age of 56 years) surveyed online over a time interval of four to six weeks.

To our knowledge, only two studies have examined the consistency of self-reports of adversity among adolescents. Spinboven et al. (2006) analyzed self-reports of traumatic experiences among unaccompanied refugee minors from 48 countries (most of them LMICs) currently residing in the Netherlands. Consistency of self-reports at a 12-month follow-up was fair to moderate, with an average Kappa coefficient of 0.44 across 12 binary indicators. It is unclear, however, whether their findings can be extrapolated to non-refugee populations. More recently, Naicker et al. (2017) documented the prevalence of ACEs among the birth-to-twenty cohort in South Africa. Kappa coefficients of self-reports between ages 11–13 and 15 all fall below 0.10 (except for self-reports of fathers’ absences), denoting poor agreement. Kappa coefficients between ages 15 and 18 also denote poor agreement but were slightly higher.

These results suggest that the consistency of ACEs self-reports may be lower among adolescents than among adults. This observation may be unexpected given that ACEs are more temporally proximate for adolescents than for adults. Depending on definitions, however, new ACEs may still emerge during adolescence, in which case discrepancies in self-reports would not signal inconsistencies or inaccuracies. Nevertheless, the studies cited above document a substantial proportion of adolescent respondents forgetting or omitting to report adverse experiences that they had previously reported. These considerations are aligned with psychological studies positing that a consolidation of autobiographical memories or life stories occurs during adolescence and the transition to adulthood (Adler, 2019; Köber & Habermas, 2017; McAdams, 2001). Documenting patterns of fluctuation and consolidation in life narratives in adolescence, especially as they relate to ACEs, may therefore shed light into what is eventually captured in adults’ ACEs self-reports.

1.3. Determinants of accuracy and consistency

Current research shows that the determinants of accuracy and consistency of ACEs self-reports largely overlap. Overall, scholars highlight three categories of predictors of accuracy and consistency of self-reports: 1) timing and saliency of the adverse experiences, 2) relationships between victim and perpetrator(s), 3) respondent’s characteristics. In the case of childhood sexual abuse, for example, accurate retrospective
reports are more likely when the abuses were deemed more severe; when the children were older at the time of the abuses; when the perpetrators were not close relatives; and when the victim received support from a caregiver (Goodman et al., 2003; Widom & Morris, 1997; Williams, 1994). Mirroring these findings, Langeland et al. (2015) found that inconsistent self-reports of childhood sexual abuse were more likely to occur when respondents deemed the abuses less severe and reported that the perpetrators were family members.

Mental health is emerging as a critical individual-level predictor of both accuracy and consistency of ACEs self-reports. Studies have found that respondents were more likely to recall or disclose ACEs when they were, at the time of the self-reports, depressed or showing symptoms of distress (Schraedley et al., 2002; White et al., 2007). These findings are consistent with the mood-congruence hypothesis, according to which respondents are more likely “to recall information that corresponds with their current mood state” (Frampton et al., 2018, p. 47). However, this hypothesis has received only mixed support in empirical studies. Colman et al. (2016) found that inconsistent retrospective reports of ACEs were more likely to occur among adults who reported increasing levels of depression, distress and chronic stress over time. These reports were compared over an interval of 11 years. Comparing self-reports provided over an interval of three months, Frampton et al. (2018) measured a high test-retest reliability correlation of 0.91 and found no consistent association between depression and inconsistent self-reports.

A study by Ayalon (2017) examines the role of cognitive health on consistency of self-reports. In their sample of respondents aged 50 and older, those with higher cognitive scores were significantly more likely to provide consistent reports of childhood physical abuse and repeating a year at school. However, cognitive scores were not significantly associated with consistency of self-reports of substance abuse in the household or troubles with the police.

Virtually all studies on these determinants were conducted among adults, providing little information on patterns observed earlier in the life course. To our knowledge, only one study has explored these determinants of inconsistencies in ACEs self-reports among adolescents. In their sample of unaccompanied refugee minors over an interval of 12 months, Spinhoven et al. (2006) found that inconsistencies were more likely to occur among younger respondents and among respondents with lower levels of internalizing behavior and higher levels of post-traumatic stress.

1.4. A preliminary framework

The studies cited above provide elements for a preliminary framework of consistency of ACEs self-reports over the life course. Fig. 1 offers a simplified illustration of this framework in which self-reports of ACEs are influenced by respondents’ internal states and by external events.

Internal states primarily refer to respondents’ psychological and cognitive well-being at the time of the self-reports. A large literature in psychology offers key insights into the determinants of retrospective recall of autobiographical memories (Brewin, 2011, 2014; Gotlib & Joormann, 2010). In addition to the linkages between cognitive health and recall ability (Depp et al., 2010), the linkages between psychological states and memory biases are dynamic and complex. Psychopathologies are key components of these linkages as they may both result from and lead to biases in memory.

External events range from respondents’ demographic and socioeconomic characteristics to the factual occurrence of ACEs. Studies in several contexts have found that poverty, mothers’ young ages at birth, and respondent’s higher birth order are associated with higher counts of self-reported ACEs in adulthood (Meinck et al., 2015, 2016; Soares et al., 2016). However, no study has examined whether these external predictors are associated with inconsistencies in ACEs self-reports.

Physical health as well as perception of abuse could be seen as straddling both internal states and external events. Poor physical health in children may be associated with differential treatment from parents (Finkelhor & Korbin, 1988) as well as with increased health worries and negative psychological states (Crombez et al., 2013). Research highlights how perception of abuse is related to reports of ACEs by external sources such as nurse, physicians and teachers (Feng et al., 2010; Lines et al., 2020; Menoch et al., 2011), not to mention cultural differences in the perception of child maltreatment (Ferrari, 2002). However, no study
has examined the role of these perceptions on consistency of self-reports. Fig. 1 admittedly oversimplifies the full complexity of linkages between ACEs, external events, and internal states. A comprehensive description of these linkages would involve multiple reciprocal interactions and feedback loops between respondents’ objective and subjective experiences. This complexity is especially dense in adolescence, a period during which ACEs are more proximal and may still be occurring. Adolescence and the transition to adulthood are also periods of crucial changes in social and family relationships, schooling, and employment. Based on the psychological literature, one could also expect to observe a consolidation of life narratives— including those related to adversity— during adolescence and the transition to adulthood.

2. Methods

2.1. Data and sample

We use longitudinal data from the Adverse Childhood Experiences project of the Malawi Longitudinal Study of Families and Health (MLSFH-ACE), which follows a cohort of adolescents interviewed over two survey waves (2017-18 and 2021). The adolescents are household members— mostly children— of respondents interviewed in prior waves of the MLSFH (Kohler et al., 2015). The MLSFH-ACE thus presents a population-based sample of adolescents living in three districts in rural Malawi. Respondents were interviewed in private settings at their homes and in their natal languages (chichewa, chitumbuka, or chiyao). All respondents provided informed consent (or assent for minors) to participate in the study. IRB approval was obtained from Stony Brook University and Malawi’s National Health Science Research Committee.

A total of 2061 adolescents between ages 10 to 16 were interviewed at baseline (2017-18) and 1878 were interviewed again at follow-up (2021), yielding an attrition rate of less than 10%. Attrition was slightly more concentrated among girls and among respondents living in the southern region, and was primarily due to migration outside of the area covered by the survey. Among those adolescents located in 2021, only 3 declined to take part in the follow-up survey.

2.2. Measures: outcomes

The MLSFH-ACE provides a unique opportunity to examine ACEs self-reports using the ACE-IQ developed by the WHO. The psychometric properties of the ACE-IQ were validated in Malawi in a prior study using MLSFH-ACE data (Kidman et al., 2019). Using a set of more than 30 questions, the ACE-IQ asks respondents how frequently they were exposed to 13 different domains of adversity. These domains of adversity include physical, emotional and sexual abuse and neglect, family or household dysfunction, and peer and community violence. We created 13 binary indicators denoting whether respondents declared that they were ever (from “once” to “many times”) exposed to these different domains of adversity. These binary indicators denote lifetime exposure to adversity at both survey waves.

We create two separate counts summing the number of ACEs “removed” and “added” between survey waves. For each of the 13 binary domains of adversity, we consider whether respondents reported the ACE at survey baseline but not at follow-up, and vice versa. We then sum how many binary ACEs each respondent removed or added, which allows us to directly identify inconsistencies and to explore whether there are asymmetries between the determinants of these two counts. While removed ACEs can be directly defined as inconsistencies in self-reports, we make no assumption on whether added ACEs are attributable to inconsistencies or to the occurrence of new ACEs. These two counts are preferable to using a single net count of changes in cumulative ACEs scores between baseline and follow-up, as this net score would underestimate the number of respondents with inconsistent self-reports. (For example, respondents who removed one binary ACE but added another one in a different domain would have a net count of zero, showing no sign of inconsistency in the net score.)

2.3. Measures: predictors

The present study focuses on five categories of predictors of changes and inconsistencies in self-reports of ACEs: (1) demographic and life course, (2) socioeconomic, (3) physical health, (4) mental health and (5) cognitive health. In separate analyses, we also explore the role of individual and sociocultural perceptions of child abuse on patterns of self-report.

Demographic and life-course measures include respondents’ age, gender, marital status (at follow-up), whether the respondent has (a) child(ren) (at follow-up), and region of residence (at baseline).

Socioeconomic measures include a standardized wealth score as well as a score summing exposure to three negative economic shocks in the 12 months prior to interview. The standardized wealth score sums the number of durable assets (range: 0–20) owned by a respondent’s household (Table S1 in supplementary material). Each asset is weighted by the inverse of the proportion of respondents in the sample who own this asset. Negative economic shocks are poor crop yields or loss of livestock, loss of income source in the household, and damage to house due to unexpected event. These socioeconomic measures were provided by adolescents’ primary caregiver at baseline and by adolescents themselves at follow-up.

Our measure of physical health is a binary indicator denoting whether the respondent reported having “worse” or “much worse” health than people in his or her age group. We created a categorical indicator denoting whether the respondent never had (0-0), consistently had (1-1), recovered from (1-0) or developed (0-1) worse self-rated health.

Mental health measures include binary indicators of depression and post-traumatic stress disorder (PTSD), as well as a categorical variable on levels of perceived stress. As data on perceived stress were collected on only a subset of respondents at baseline, our analyses focus on perceived stress at follow-up. For depression and PTSD, we use a categorical variable denoting whether the respondent never had (0-0), consistently had (1-1), recovered from (1-0) or developed condition (0-1). Respondents who scored more than 17 on the Beck Depression Inventory (a self-reported scale of 21 items each scored 0 to 3) were deemed to show symptoms of moderate to severe depression. PTSD was assessed using an 8-item scale based on the DSM-IV criteria for PTSD (Hansen et al., 2010). Respondents were asked to describe and reflect on their “most difficult experience” to date. The eight items were sorted in three categories of symptoms— intrusion, avoidance and hypervigilance— and were each scored on a scale of 0–3. Respondents who scored 2 or more on each category of symptoms were deemed to show symptoms of PTSD. Our categorical variable of perceived stress is based on Cohen’s perceived stress scale (PSS), distinguishing respondents with low (0–13), moderate (14–26), or high (27–40) PSS.

Our measure of cognitive health is executive functioning (verbal fluency) measured at survey baseline. For this variable, we use a continuous score denoting how many animals respondents could name in a span of 60 s.

To investigate the role of perceptions of abuse on patterns of self-reports, eight vignettes describing cases of child abuse were shown to respondents at survey follow-up. Vignettes vary in the type and intensity of abuses depicted, as well as in the relationship between the perpetrators and victims (Table S3 in supplementary material). We matched the gender of the respondents and victims in vignettes describing cases of emotional and physical abuse, whereas vignettes describing cases of sexual abuse only depicted female victims. Respondents were asked to report “How acceptable was this behavior to you?” and “How abusive do you think this behavior was?” on a scale ranging from “Not at all” to “Extremely”.
Results are robust to using listwise deletions as an alternative approach to handling missing values. Significant associations between perceptions of abuse and inconsistent self-reports, we briefly discuss these analyses in the results section and focus on agreement and Kappa coefficients across all 13 domains. As shown in Fig. 2, some binary ACEs showed net increases in self-reports while others showed net decreases in self-reports. Physical neglect is the binary ACE that was most likely removed (21% of respondents removed it), whereas bullying was most likely to be added (35% of respondents added it). The average Kappa coefficient across all 13 domains is 0.11, ranging between 0.03 (physical abuse) and 0.50 (parental absence). It is noteworthy that 8 of the 13 domains show Kappa coefficients below 0.10, denoting poor agreement. These results highlight the very low consistency of ACEs self-reports in our sample.

The average count of self-reported ACEs increased from 5.1 at baseline to 5.9 at follow-up. However, this increase was not uniform across the 13 binary ACEs. As shown in Fig. 2, some binary ACEs showed net increases in self-reports while others showed net decreases in self-reports. Physical neglect is the binary ACE that was most likely removed (21% of respondents removed it), whereas bullying was most likely to be added (35% of respondents added it). The average Kappa coefficient across all 13 domains is 0.11, ranging between 0.03 (physical abuse) and 0.50 (parental absence). It is noteworthy that 8 of the 13 domains show Kappa coefficients below 0.10, denoting poor agreement. These results highlight the very low consistency of ACEs self-reports in our sample.

Fig. 3 shows the distribution of respondents according to the total number of ACEs they removed or added between survey waves. On average, respondents removed 1.5 ACEs between survey waves. These inconsistencies were not concentrated among only a few respondents, as nearly 70% of respondents in our sample removed at least one ACE. Correspondingly, more than 80% of respondents added at least one ACE between the two survey waves. On average, respondents added 2.3 ACEs between the two survey waves.

### 2.4. Analyses

We carry-out descriptive and multivariate analyses of inconsistency in ACEs self-reports. Descriptive analyses focus on agreement and Kappa coefficients among each 13 binary ACEs, as well as distributions of respondents by number of removed and added ACEs. Multivariate analyses use ordinary least square (OLS) regression models of counts of removed and added ACEs. Standard errors in these models are clustered at the caregiver-level to account for the study’s sampling frame. Out of 1878 respondents, 10 had missing values on the dependent variables and 45 had missing values on explanatory variables. Missing values on predictors were handled using the multiple imputation module in Stata/SE 17.0. Results are robust to using listwise deletions as an alternative approach to handling missing values.

To explore perceptions of abuse, we examine perceived acceptability and abusiveness of cases of child maltreatment described in the vignettes using descriptive and multivariate analyses. As we found no significant associations between perceptions of abuse and inconsistent self-reports, we briefly discuss these analyses in the results section and provide additional information as supplementary material.

### 3. Results

#### 3.1. Descriptive analyses

Table 1 describes key changes that occurred among adolescents in the MLSFH-ACE cohort between baseline (2017-18) and follow-up (2021). Note that marriage and childbearing occur early for women in Malawi, with a median age at first marriage of 18 years and a median age at first birth of 19 years (National Statistical Office/Malawi & ICF, 2017). Consistent with these national trends, more than 10 percent of respondents in our sample – virtually all of them girls – were married or had given birth by survey follow-up. Of all 239 adolescents who moved 5 or more kilometers away from their residence at survey baseline, 95 percent stayed in the same district. Households reported virtually no increase in ownership of durable assets but reported fewer negative economic shocks at follow-up than baseline.

While scores of self-rated health, depression, perceived stress and executive functioning were relatively stable between the two survey waves, there was a sizeable increase in the number of respondents with symptoms of PTSD. This is attributable to a large increase in the number of respondents who declared having faced a “most difficult experience”:

- less than half of all respondents reported such experiences in the first wave compared to more than 90 percent in the second wave.

The negative events reported by respondents comprise a wide range of experiences, including witnessing domestic violence, corporal punishment or being yelled at by parents. Conditional on reporting such difficult experiences, the proportions of respondents showing symptoms of PTSD remains similar between the two survey waves.

The average count of self-reported ACEs increased from 5.1 to 5.9 at follow-up. However, this increase was not uniform across the 13 binary ACEs. As shown in Fig. 2, some binary ACEs showed net increases in self-reports while others showed net decreases in self-reports. Physical neglect is the binary ACE that was most likely removed (21% of respondents removed it), whereas bullying was most likely to be added (35% of respondents added it). The average Kappa coefficient across all 13 domains is 0.11, ranging between 0.03 (physical abuse) and 0.50 (parental absence). It is noteworthy that 8 of the 13 domains show Kappa coefficients below 0.10, denoting poor agreement. These results highlight the very low consistency of ACEs self-reports in our sample.

Table 2 presents results of multivariate OLS regressions of the counts of removed and added ACEs on demographic, economic, physical health, mental health and cognitive health predictors. Estimates show that the determinants of removed ACEs overlap and are symmetrically
Fig. 2. Self-Reports of Binary ACEs at Baseline and Follow-Up
Notes: 0-0 = never reported the ACE; 1-0 = reported the ACE at baseline but not at follow-up; 0-1 = reported the ACE at follow-up but not at baseline; 1-1 = reported the ACE at both baseline and follow-up. Percentages are indicated. Kappa coefficients are provided for each binary ACE. Adding columns (1-0) and (1-1) gives the prevalence of a binary ACE at baseline; adding columns (0-1) and (1-1) gives the prevalence of a binary ACE at follow-up (also see Table S2 in supplementary materials).

Fig. 3. Distribution of Respondents by Number of Removed and Added Binary ACEs
Notes: Percentages are indicated.
Table 2
Multivariate OLS regression analyses of counts of removed and added ACEs.

| Counts of Removed ACEs | Counts of Added ACEs |
|------------------------|----------------------|
| β         | p-value | β         | p-value |

Demographic and Life Course

| Age         | 0.01   | 0.684 | 0.01   | 0.613 |
| Female      | 0.03   | 0.727 | 0.01   | 0.904 |
| Married     | 0.05   | 0.717 | 0.24   | 0.121 |
| Has a child | 0.14   | 0.330 | –0.27  | 0.095 |
| Region (Central) | –0.39  | <0.001  | 0.44   | <0.001  |
| South       | –0.44  | <0.001  | 0.95   | <0.001  |
| North       | –0.84  | <0.001  | 1.64   | <0.001  |

Economic

| SES at Baseline | –0.02 | 0.487 | 0.01   | 0.919 |
| SES (Follow-Up) – SES (Baseline) | –0.06 | 0.013 | 0.05   | 0.069 |
| Negative Economic Shocks at Baseline | 0.00 | 0.990 | 0.07   | 0.316 |
| Neg. Shocks (Follow-Up) – Neg. Shocks (Baseline) | –0.16 | <0.001  | 0.23   | <0.001  |

Physical Health

| Worse Self-Rated Health (Ref: Never (0-0)) | Consistently (1-1) | 0.74 | 0.278 | –0.38 | 0.493 |
| Recovered (1-0) | 0.36 | 0.026 | –0.47 | 0.002 |
| Developed (0-1) | –0.05 | 0.738 | –0.03 | 0.853 |

Mental Health

| Depression (Ref: Never (0-0)) | Consistently (1-1) | 0.24 | 0.259 | –0.38 | 0.066 |
| Recovered (1-0) | 0.46 | <0.001 | –0.33 | 0.004 |
| Developed (0-1) | 0.20 | 0.092 | –0.07 | 0.608 |
| PTSD (Ref: Never (0-0)) | Consistently (1-1) | –0.12 | 0.512 | 0.13 | 0.530 |
| Recovered (1-0) | 0.23 | 0.129 | –0.14 | 0.333 |
| Developed (0-1) | –0.19 | 0.008 | 0.25 | 0.010 |
| Perceived Stress at Follow-up (Ref: Low) | Moderate | –0.11 | 0.133 | 0.27 | 0.002 |
| High | –0.84 | <0.001 | 1.64 | <0.001 |

Cognitive Health

| Executive Functioning at Baseline | 0.01 | 0.335 | –0.04 | 0.001 |
| Intercept | 1.46 | <0.001 | 2.00 | <0.001 |

N = 1,868

Notes: Estimates (β) are coefficients alongside 95% confidence intervals. All predictors are included in a single model predicting two outcomes, namely, (1) count of removed ACEs and (2) count of added ACEs.

Related to the determinants of added ACEs. This suggests that added ACEs are not solely attributable to new experiences of adversities and at least partly reflect inconsistencies in self-reports, such as false negatives at survey baseline.

We find no statistically significant differences in the count of removed ACEs by respondents’ ages, gender, marital and parental status. Respondents from the central region had higher counts of removed ACEs than respondents from elsewhere. This is likely attributable to a minor change in answer choices of the ACEs questionnaire enacted after the first segment of the study in central Malawi in late 2017, before northern and southern regions were surveyed. Moreover, each region was each surveyed by different team of interviewers at baseline, whereas only one team of interviewers surveyed all three regions at follow-up.

Indicators of socioeconomic status are significantly associated with the count of removed ACEs even after controlling for other covariates.

Upward socioeconomic mobility (increases in the number of household assets between baseline and follow-up) is negatively associated with the count of removed ACEs. By contrast, increased negative economic shocks at follow-up is negatively associated with the count of removed ACEs. Transitions in self-reported health also predict higher counts of removed ACEs: respondents who went from worse to equal or better removed more ACEs between waves than those who consistently reported relatively good health.

Internal psychological states significantly predict the number of removed ACEs. Respondents who recovered from depression removed more ACEs than respondents who were never depressed. Respondents who developed PTSD show significantly lower counts of removed ACEs than their counterparts with no symptoms of PTSD. Lastly, respondents with high perceived stress at follow-up have on average 0.8 removed ACEs fewer than their counterparts with low perceived stress. However, only 15 adolescents were categorized as having high perceived-stress scores at follow-up. Executive functioning at baseline is not significantly associated with the count of removed ACEs.

Demographic and life-course predictors are not associated with the count of added ACEs. Regional differences remain significant predictors of consistency in ACEs self-reports, although these results show that respondents from the northern region have significantly higher counts of added ACEs than respondents from both central and southern regions. Household durable-goods ownership is not significantly associated with the number of added ACEs after controlling for selected covariates. However, negative economic shocks are positively associated with added ACEs.

Improvements in self-rated health and having recovered from depression are both negatively associated with adding ACEs, and developing PTSD predicts higher count of added ACEs. Perceived stress has a strong positive association with the count of added ACEs. Higher executive functioning (verbal fluency) at baseline predicts lower counts of added ACEs.

3.3. Do perceptions of child abuse play a role?

In separate analyses, we explored whether perceptions of abuse contribute to inconsistencies in ACEs self-reports. Scholars have hypothesized that respondents’ subjective perceptions of ACEs, which could be related to sociocultural norms on parenting and abuse, may mediate associations between ACEs and health outcomes over the life course (Smith & Pollak, 2020, 2021).

Respondents widely agreed in categorizing cases of abuse described in survey vignettes as unacceptable and abusive (see Supplementary Table S2). For all except one of the vignettes, 95–99% of all respondents deemed the cases being depicted “slightly” or “not at all” acceptable, and 87–99% deemed them “considerably” or “extremely” abusive. These results show no evidence of widespread acceptance of child emotional, physical and sexual abuse among respondents. Furthermore, we carried out additional analyses and found no evidence that the few respondents who described these cases as acceptable or not abusive provided more inconsistent self-reports of ACEs (results in supplementary material).

4. Discussion

We find very low longitudinal consistency of self-reports of ACEs in an adolescent cohort in a low-income setting. We also identify several significant predictors of inconsistencies in ACEs self-reports. These results, considered alongside measures from another cohort study among adolescents (Naicker et al., 2017), substantiate the hypothesis that the consistency of ACEs self-reports may be lower in adolescence than adulthood. This suggests that ACEs self-reports provided by adults may be biased by key processes that shaped self-reports earlier in the life course.

Findings from multivariate analyses show that significant predictors of inconsistent self-reports include both external events (e.g., economic shocks) and internal psychological states, such as perceived stress and depression. These findings align with the notion that subjective perceptions of ACEs, which may reflect sociocultural norms on parenting and abuse, can mediate associations between ACEs and health outcomes.
shocks) and internal states (e.g., depression) experienced by respondents. Furthermore, variables predicting the count of removed ACEs largely overlap (and show symmetrical associations) with variables predicting the count of added ACEs. This suggests that added ACEs do not solely reflect incidences of new ACEs between survey waves: they may also directly reflect inconsistencies in baseline self-reports.

Psychological states are among the strongest predictors of inconsistencies in ACEs self-reports. Respondents who recovered from depression between survey waves had removed more ACEs at follow-up than respondents who never suffered from depression. Similarly, respondents who developed PTSD symptoms removed fewer ACEs at follow-up than those who never showed symptoms of PTSD. These findings are consistent with the mood-congruence hypothesis, although our analyses do not establish precise pathways explaining this hypothesis. Respondents suffering from psychopathologies such as depression or PTSD may exhibit negative memory biases (Gotlib & Joormann, 2010). Yet a bias toward negative memories does not mean that these memories are inaccurate, which implies that respondents not suffering from such psychopathologies could also provide positively biased self-reports. But differently, it may be that depressed or distressed respondents are less likely to ignore or repress memories of ACEs than their healthier counterparts (Fergusson et al., 2000).

Our study is the first to document significant associations between SES, negative economic shocks and inconsistencies in ACEs self-reports. Recent negative economic shocks (increases in the number of shocks between survey waves) are associated with lower counts of removed ACEs and higher counts of added ACEs. Negative economic shocks may heighten tensions and conflicts in households, or may lead to heightened psychological distress, thereby leading to increases in self-reported ACEs. In contrast, we find that upward socioeconomic mobility (increase in household wealth) had lower counts of removed ACEs. The pathways explaining this association remain unclear. The fact that both internal states and external events are significant predictors of inconsistencies in self-reports highlights the need for building an interdisciplinary approach to model these inconsistencies.

We found no evidence that sociocultural factors contribute to inconsistencies in self-reports. We explored this question using responses to vignettes describing cases of child psychological, physical and sexual abuse. Overwhelmingly, respondents deemed the cases presented in these vignettes unacceptable and abusive, and the few respondents who described these cases as acceptable or not abusive did not provide more inconsistent self-reports between survey waves.

4.1. Limitations

These results must be interpreted cautiously. While survey attrition remains low (below 10 percent) among respondents, we cannot ascertain to which extent inconsistencies in self-reports could be higher or lower among adolescents who were lost to follow-up. Moreover, the exposure period for ACEs according to ACE-IQ definitions (the first 18 years of life) may influence Kappa coefficients, as adolescents report ACEs while still in this exposure period whereas adults report ACEs after this exposure period. Hence new exposures may make adolescents' self-reports inherently more variable than adults' self-reports. However, the symmetries between the determinants of removed and added ACEs in Table 2 suggest that many gained ACEs among adolescents in our sample do result from direct inconsistencies.

As for our multivariate analyses, it is worth noting that most predictors in our models are provided by the adolescents themselves. This introduces the possibility that unobserved variables, especially those linked to mood and memory, influence both the consistency of ACEs self-reports and the consistency of other measures reported by adolescents. We attempt to minimize this risk of omitted variable bias by including variables on mental and cognitive health in our final regression models and using baseline economic variables reported by caregivers.

5. Conclusions

Our results enjoin us to revisit findings of the literature on health outcomes associated with ACEs. By documenting the very low consistency of ACEs self-reports among adolescents in a high-adversity setting, and by highlighting key determinants of inconsistent self-reports, our study highlights the need for deeper case studies providing more exhaustive measures of ACEs but also richer and more dynamic descriptions of how victims subjectively carry ACEs in themselves over their lives. Are ACEs most consequential as objective events that happen to oneself, independently of conscious recollection, or as subjective experiences carried in oneself and consciously remembered? Recent studies suggest that “objective” ACEs may be more predictive of physical outcomes whereas “subjective” ACEs may be more predictive of mental health outcomes (Danese & Widom, 2020; Osborn & Widom, 2020; Reuben et al., 2016). In this perspective, inaccurate and inconsistent self-reports may convey important signals about both resilience in the face of adversities and the insidiousness of trauma.

Ethics statement

IRB approval for the MLSFH-ACE project was obtained from SUNY Stony Brook University (IRB-ID:1008094) and the National Health Science Research Committee in Malawi (NHSRC ref. number: 1805).

Author statement

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Declaration of competing interest

The authors declare no conflict of interest.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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