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Abstract

Children with conduct problems and co-occurring callous-unemotional (CU) traits show more severe, stable, and aggressive antisocial behaviors than those without CU traits. Exposure to negative life events has been identified as an important contributing factor to the expression of CU traits across time, although the directionality of this effect has remained unknown due to a lack of longitudinal study. The present longitudinal study examined potential bidirectional effects of CU traits leading to experiencing more negative life events and negative life events leading to increases in CU traits across three years among a sample of community-based school-aged (*M*=10.9, *SD*=1.71 years) boys and girls (N = 98). Repeated rating measures of CU traits, negative life events and conduct problems completed by children and parents during annual assessments were moderately to highly stable across time. Cross-lagged models supported a reciprocal relationship of moderate magnitude between child-reported CU traits and "controllable" negative life events. Parent-reported CU traits predicted "uncontrollable" life events at the earlier time point and controllable life events at the later time point, but no reciprocal effect was evident. These findings have important implications for understanding developmental processes that contribute to the stability of CU traits in youth.

Keywords: callous-unemotional traits, psychopathy, negative life events, maltreatment, reciprocal effects, longitudinal

Reciprocal Influences Between Negative Life Events and Callous-Unemotional Traits

Children with conduct problems and co-occurring callous-unemotional (CU) traits are a unique subpopulation showing greater impairment and more severe, stable, and aggressive antisocial behaviors across development relative to those low on CU traits (Byrd, Loeber, & Pardini, 2012; McMahon et al., 2010). CU traits describe individuals characterized by low levels of empathy and guilt, uncaring attitudes and behaviors, and a shallow experience and expression of emotions. They are believed to be a developmental precursor to psychopathic personality disorder, capturing its affective discomfort component (Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007). Analogous to adults with psychopathy, children with CU traits show a reward dominant response style and are insensitive to punishment when primed with reward (Barry et al., 2000), are underreactive to others' distress cues (Blair, 1999; Kimonis, Frick, Loney, & Fazekas, 2006), and show a preference for novel and dangerous activities (Frick, Cornell, Bodin et al., 2003; Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999). These characteristics put them at risk for exposure to potentially harmful environments and experiences. Moreover, such exposure may further contribute to and sustain the child's callous style, as it does for externalizing problems more generally (Cicchetti & Toth, 1997). Unfortunately, prior research has not yet examined reciprocal influences between exposure to negative life events and CU traits, which is the focus of the present study.

There is substantial research support for a link between exposure to negative life events and both antisocial behavior and CU traits (Dembo et al., 2007; Kim, Conger, Elder, & Lorenz, 2003). Negative life events may take the form of direct victimization experiences (e.g., childhood abuse and neglect) or witnessed traumatic events (e.g., being exposed to violence perpetrated by others onto others), both of which are linked to CU/ psychopathic traits (Kimonis,

Frick, Muñoz, & Aucoin, 2008). In their notable study, Weiler and Widom (1996) found that individuals with official records of childhood abuse and neglect (n = 652) scored significantly higher on a measure of psychopathy as adults, compared with a non-maltreated matched control group (n = 489). Beyond maltreatment, a host of other types of negative life events have also been associated with psychopathy. To illustrate, Dembo et al. (2007) found that incarcerated youths scoring high on a broad psychopathy measure reported the highest levels of exposure to negative life events, indexed by a summary measure capturing 13 specific types (e.g., changed schools or moved a lot, witnessed murder or attempted murder). Theories attempting to explain the link between psychopathy and negative childhood experiences often focus specifically on their impact on the development of the affective dimension of psychopathy that is captured by measures of CU traits in youth (Karpman, 1948; Porter, 1996).

Despite the strong support for an association between CU traits and negative life events, the directionality of the effect is unclear. That is, although theories of psychopathy propose a causal effect of negative life events on measures of CU traits, there is some indirect evidence to suggest that youth with CU traits could evoke more negative life events from their evironments. Specifically, although CU traits have not been subjected to these kinds of behavioral genetic analyses, research suggests that some individuals are more prone to repeatedly experience negative life events than others due to heritable personality factors (Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012). Also, there appears to be a reciprocal relationship between negative life events and other forms of psychopathology (Caspi, Elder, & Bern, 1987). For example, Kim and colleagues (2003) reported that delinquency predicted future experiences of negative life events, even after controlling for prior delinquency levels. Also, youth high on CU traits show a number of characteristics that could increase their risk of exposure to negative life

events, such as their tendencies to seek out novel and stimulating experiences (Frick, Cornell, Bodin et al., 2003; Frick et al., 1999) and to show impulsive and disinhibited behaviors (Jang, Stein, Taylor, Asmundson, & Livesley, 2003).

Unfortunately, longitudinal research is lacking in directly examining whether CU traits can lead to more negative life events. However, there is research showing that these traits in antisocial youth can have an evocative effect on at least two other important contextual factors. First, research has found that youth with CU traits tend to evoke more harsh and inconsistent discipline and less monitoring and involvement from their parents over time than do youth low on CU traits (Hawes, Dadds, Frost, & Hasking, 2011; Muñoz, Pakalniskiene, & Frick, 2011). Second, there is evidence that adolescents with CU traits, more than other adolescents, are highly influential on the level of delinquent involvement displayed by their peers (Kerr, Zalk, & Stattin, 2012).

Present Study

Based on this research, the purpose of the present study was to investigate the possible reciprocal relationship between negative life events and CU traits across a four-year study period among a sample of community youth, selected to overrepresent those with high rates of conduct problems and high rates of CU traits. Specifically, we tested whether CU traits predicted negative life events one and two years later, and vice versa, after controlling for initial levels and several demographic covariates. We hypothesized that exposure to negative life events would predict increases in CU traits, which in turn would place youth at risk for experiencing future negative life events. Furthermore, because research has demonstrated that youth exposed to various negative life events (e.g., maltreatment, violence) manifest characteristics and behaviors associated with CU traits, such as conduct problems (e.g., Maschi, Bradley, & Morgen, 2008;

Tiet et al., 2001), we controlled for co-occurring conduct problems in these analyses. While we acknowledge that some researchers view antisocial behavior as an integral part of psychopathy (e.g., Hare & Neumann, 2005), many theoretical models view it as a secondary characteristic that develops as a result of the core personality features (e.g., Skeem & Cooke, 2010). Furthermore, recent research supports the existence of CU traits in the absence of conduct problems and finds them to be significantly related to adjustment problems in youth without significant conduct problems (Kumsta, Sonuga-Barke & Rutter, 2011; Rowe et al., 2010).

Method

Participants

A University Institutional Review Board approved all study procedures, and informed parental consent and child assent were obtained from study participants. In order to oversample community school-aged (3^{rd}, 4^{th}, 6^{th}, 7^{th} grades) children with high rates of conduct problems and high rates of CU traits, a two-step stratified random sampling procedure was employed in rural and urban areas of a moderately sized city in the southeastern United States (see Frick, Cornell, Bodin, et al., 2003 for a more complete description of the full assessment procedures). In the first step, four groups of children were identified based on combined parent and teacher ratings of conduct problem symptoms and CU traits: (1) youth scoring below the mean on conduct problem and CU trait dimensions (controls; n=225), (2) at or above the upper quartile on conduct problems but below the mean on CU traits (CP only; n=66), (3) at or above the upper quartile on CU traits but below the mean on conduct problems (CU only, n=77), and (4) above the upper quartile on both dimensions (CU-CP; n=128). In the second step, 25 children from each of these four groups were recruited to participate in follow-up assessments using a stratified random sampling procedure that ensured that the 25 children matched the overall group on gender,

ethnicity, and socioeconomic status. Two children were lost to all follow-up assessments due to errors in data collection.

This procedure led to the identification of four groups of children (N=98, 47% girls) ranging in age from 8 to 14 years (*M*=10.9 and *SD*=1.71 years) who underwent a comprehensive initial assessment (T1) and then were reassessed at approximately yearly intervals for the next three years (Times 2-4). Only the data at these follow-up assessments were used in the current study, given that these were the time points at which data on life events over the previous year were collected. The average length of time between the completion of screening measures to form study groups and the last follow-up assessment was 50.91 months (*SD*= 4.4). The average length of time between the second and third waves was 12.63 (SD = 1.82) and 13.38 months (*SD* = 2.82) between the third and fourth waves. The average length of time between Time 2 and Time 4 was 26.13 (SD = 2.98) months. Ninety-one of the 98 participants (93%) completed three of the four assessments and 79 participants (81% of the sample) provided data at all four assessments. Importantly, there was no differential attrition across the four study groups.

Measures: Main Study Variables

Life events. The negative life events portion of the *Life Events Checklist* (LEC; Johnson & McCutcheon, 1980) was used to assess the number of minor (e.g., got a poor grade in school) and major (e.g., had a parent die) life events experienced by the child over the past 12 months. The LEC lists 34 negative life events and the child simply marks "yes" or "no" as to whether or not an event had happened to him or her. For the present study, items that overlapped with conduct problem behavior (e.g., getting into trouble with police, getting put in jail) were removed; this is consistent with prior uses of this measure in research on CU traits (Frick & Dantagnan, 2005). Life events were assessed via youth self-report at Times 2 through 4 and were

summed to create the total scores at each time point. Total LEC scores have demonstrated acceptable validity (Johnson & McCutcheon, 1980) and test-retest reliability (Brand & Johnson, 1982). Table 1 shows the percentage of participants who endorsed experiencing each life event. Across the three years participants rarely endorsed experiencing the death of a parent (n = 2) or sibling (n = 2). Running away from home was endorsed by 5% of youth at Time 2, but only by 1% for the following two time points. One of the most commonly endorsed items was getting into an argument with friends or siblings, with 1/4 to 1/3rd of youth endorsing these items.

The LEC includes both controllable (e.g., school suspension) and uncontrollable (e.g., death or illness of a family member) events (Sandberg & Rutter, 2008). There are at least two important reasons to use total LEC scores including both types of events. First, some researchers argue that in order to sample from the broader domain of life events it is necessary to include all negative life events, including the roughly half that are "controllable" (see Luthar, 1991). Second, the broader literature using the LEC typically includes the total number of life events reported by each individual, and eliminating items may compromise the reliability and validity of the scale as well as restrict the range of scores. Further, restricting study to uncontrollable life events would result in the exclusion of important areas of child functioning from study, such as peer and family conflict. Given these issues, we ran separate analyses for the total LEC score, controllable, and uncontrollable (i.e., child-independent) life events.

CU traits. The *Antisocial Process Screening Device* (APSD; Frick & Hare, 2001) is a 20-item behavior rating scale that was completed by the child and his or her parent. Each item on the APSD is scored either 0 (Not at all true), 1 (Sometimes true), or 2 (Definitely true). The 6-item Callous-Unemotional (CU) scale, which includes items such as "feels bad or guilty," "concerned about the feelings of others," and "does not show emotions", was used to measure

CU traits at all time-points as well as during screening. The CU dimension has proven to be the most stable dimension of the APSD in factor analyses across multiple samples (Frick, Bodin & Barry, 2000). In prior research using this sample, the self-report of CU traits has been shown to have acceptable reliability, stability and moderate correlations with parent-report (Muñoz & Frick, 2007). To correspond to the measurement of life events beginning at Time 2, CU traits measured at Times 2-4 via child- and parent-report were used to address study aims. The internal consistency for child-report was slightly lower (alphas ranging from .50 to .60) than for parent-report (alphas ranging from .72 to .75) of CU traits.

Measures: Covariates

Conduct problems. The sections of the *Children's Symptom Inventory-4* (CSI-4; Gadow & Sprafkin, 1995) assessing symptoms related to DSM-IV (American Psychiatric Association, 1994) criteria for ODD and CD were completed by parents and children at each follow-up assessment. Continuous scores from the follow-up periods (Time 2 to 4) were used in the present study to covary concurrent conduct problems in our analyses. Gadow and Sprafkin (1995) reported good correspondence between CSI-4 scores and clinician diagnoses in a clinic sample of school-aged children, with sensitivity rates for predicting the diagnoses of ODD and CD of .93.

Procedure

The follow-up assessments took place as close to the one-year anniversary of the initial comprehensive assessment as possible. To reduce attrition, all information collected during the follow-up assessments was completed by telephone and mail. Parents received $65 for their participation and youth received a $15 gift certificate to either a local music or book store.

Data Analytic Plan

To examine whether CU traits predicted increases in negative life events or whether negative life events predicted increases in CU traits, Mplus 7.0 (Muthén & Muthén, 1998-2012) was used to build cross-lagged models with our manifest variables. We used full-information maximum likelihood (FIML) estimations with robust standard errors, which estimates any missingness. The covariance coverage was between .72 and 1.00, being above the minimum recommended (.10; Muthén & Muthén, 1998-2012). We performed the analyses separately for parent-report and child-report of CU traits. We used Poisson regression with Montecarlo integration (with 6 dimensions of numerical integration) since the life events measure was a count variable created by summing the number of "yes" responses to negative life events (Gardner, Mulvey, & Shaw, 1995). We also tested whether zero-inflation (i.e., an abundance of zeros in the data) accounted for overdispersion in the data (Gardner et al., 1995), but the results were the same as reported here and convergence was more stable without accounting for zero-inflation. In addition, there was no evidence of overdispersion in the descriptive statistics (i.e., standard deviation > mean).

Our baseline model with no cross-lagged effects was compared against the model with cross-lagged effects estimated (e.g., life events predicting CU traits and vice versa). Significant differences between these models were determined by a significant change in the Log-Likelihood estimates. However, because we used scaled Log-Likelihood estimates in FIML, the use of Satorra-Bentler correction factors to determine the significance of the model is recommended (Satorra, 2000). The cross-lagged models tested whether CU traits predicted negative life events from Time 2 to 3 and from Time 3 to 4, while controlling for prior life events and demographic covariates (assessed at the comprehensive T1 assessment). Simultaneously, the models tested whether negative life events predicted CU traits from Time 2 to 3 and from Time 3 to 4, while controlling for prior CU traits and covariates. Next, we entered conduct problems as a

time-varying covariate to test whether its inclusion changed the significance of the cross-lagged effects. That is, we covaried concurrent conduct problems within reporters (e.g., when predicting child-report of CU, we covaried child-report of conduct problems). Below, we organize the results by our main aims although the models were tested and are displayed in figures by reporter (i.e., parent- and child-reports).

Results

Table 2 lists the descriptive statistics and zero-order correlations among primary study variables. CU traits were slightly more stable for parent-report of child CU traits (*r*s ranging from .68 to .72) than for child-report of CU traits (*r*s ranging from .48 to .58). The number of life events the child experienced in the past year were also fairly stable with *r*s ranging from .55 to .69. Socioeconomic status was weakly to moderately correlated with CU traits and life events. Parent-reported conduct problems were related over time, as were child-reported conduct problems ($r = .23$ and $r = .29$, respectively). Parent-reported conduct problems were concurrently related to parent-reported CU traits (*r*s = .38 for T3 and T4) and child-reported conduct problems were concurrently related to child-reported CU traits ($r = .29$; $r = .23$ for T3 and T4, respectively). Parent- and child-reported conduct problems were also related to concurrent life events ($r = .51$ and $r = .55$ for parent and child reports, respectively for T3; $r = .37$ and $r = .32$ for parent and child reports, respectively for T4 , respectively). Life events and CU traits were concurrently related, although Time 4 parent-report of CU traits was very weakly related to Time 4 life events ($r = .12$). Next, we tested the model without cross-lagged effects against the model with cross-lagged effects. Using the Satorra-Bentler scaled correction, the cross-lagged model showed a significantly better fit than the baseline model (Δ-2LL (Δdf=4) = 32.40, $p < .001$; Δ-2LL (Δdf=4) = 19.97, $p < .01$, for parent- and child-report models,

respectively). Additionally, the model including conduct problems as a time-varying covariate resulted in a significantly better fit than the cross-lagged model without covarying conduct problems (Δ-2LL (Δdf=4) = 45.52, $p < .001$; Δ-2LL (Δdf=4) = 25.80, $p < .01$, for parent- and child-report models, respectively). Thus, we next examined which predictions were significant in both models, excluding and including covarying conduct problems.

Do CU Traits Predict Increases in Negative Life Events?

Parent-report. First, we tested our hypothesis that CU traits place youth at risk for experiencing increases in negative life events. For the cross-lagged model without conduct problems, CU traits at Time 2 significantly predicted increases in negative life events at Time 3 (Beta= .10, SE=.03, $p < .01$), after accounting for the stability of life events (Beta = .06, SE = .01, $p < .001$, 95% CI = .04, .07). The confidence interval for the CU predictor did not include zero so the effect was significant (95% CI =.04, .15). Covarying conduct problems, CU traits still significantly predicted life events (Beta = .07, SE = .04, $p < .05$, 95% CI = .001, .14). Figure 1 presents the final model (including conduct problems as a time-varying covariate) with unstandardized estimates and standard errors.

Child-report. For the cross-lagged model without conduct problems, CU traits at Time 3 significantly predicted life events at Time 4 (Beta= .06, SE=.03, $p < .05$, 95% CI = .01, .12), after accounting for the stability of life events (Beta = .06, SE = .01, $p < .001$, 95% CI = .04, .07). CU traits remained a significant predictor of life events after controlling for child-reported conduct problems (Beta = .07, SE = .03, $p < .05$, 95% CI = .01, .13). Figure 2 presents the final model (including conduct problems as a time-varying covariate) with unstandardized estimates and standard errors for child-report.

The results suggest that higher levels of parent- or child-reported CU traits predicted greater negative life events across time at one time point but not the other, even after controlling for the severity of co-occurring conduct problems.

Do Negative Life Events Predict Increases in CU Traits?

Parent-report. To test whether experiencing a greater number of negative life events makes youth more callous and unemotional, we examined the prediction from negative life events to CU traits across the three time points. In the cross-lagged models, the stability estimates for CU traits were moderately high to high (Beta = .57, SE = .11, 95% CI = .35, .79 and Beta = .47, SE = .11, 95% CI = .25, .68). As shown in Figure 2, there were no significant effects for CU traits, whether or not conduct problems were covaried.

Child-report. In the cross-lagged models, the stability estimates for CU traits were moderately high to high (Beta = .34, SE = .10, 95% CI = .15, .53 and Beta = .44, SE = .14, 95% CI = .17, .71 for Time 2 to 3 and Time 3 to 4, respectively). A greater number of negative life events predicted increases in CU traits, but only for the earlier time points (i.e., Time 2 - 3). The effect was moderate (Beta= .12, SE=.04, 95% CI= .05, .19) with zero absent from the confidence interval and with a beta three times the size of the standard error (Bartholomew, Steele, Moustaki, & Galbraith, 2008).

In all, the results indicated that at one time point but not the other, children became more callous, uncaring, and unemotional due to experiencing greater negative life events on the basis of child, but not parent, report; this held after controlling for co-occurring conduct problems.

Do the Results Hold for Child-Independent Life Events?

Figures 3 and 4 present the final models (with conduct problems covaried) with unstandardized estimates and standard errors for parent- and child-report, respectively. For ease

of comparison, these figures combine the results of the analyses that were conducted separately for uncontrollable and controllable life events. Below, we also organize the results by reporter.

Parent-report. CU traits at Time 2 significantly predicted increases in uncontrollable negative life events, specifically, at Time 3 (Beta= .12, SE=.05, $p < .01$, 95% CI = .02, .21). A new finding emerged when examining controllable life events, whereby parent-reported CU traits at Time 3 significantly predicted greater controllable life events at Time 4 (Beta= .08, SE=.04, $p < .05$, 95% CI = .001, .15). Conduct problems remained related to uncontrollable (Beta= .06, SE=.02, 95% CI= .01, .10) and controllable (Beta = .04, SE = .02, 95% CI = .01, .07 life events at Time 3.

Child-report. As shown in Figure 4, controllable life events at Time 2 predicted greater CU traits at Time 3 (Beta= .18, SE=.05, $p < .001$, 95% CI = .09, .27), which further predicted greater controllable life events at Time 4 (Beta= .09, SE=.04, $p < .05$, 95% CI = .01, .17). The effect for the former relationship was moderate in size. A new finding emerged when examining controllable life events. Specifically, controllable life events at Time 3 predicted greater CU traits at Time 4 (Beta= .10, SE=.04, $p < .05$, 95% CI = .01, .19). When examining uncontrollable life events, there were no reciprocal effects, however, conduct problems remained related to life events at Time 3 (Beta= .08, SE=.03, 95% CI= .03, .13).

Overall, the bidirectional effect observed for child-reported CU traits and life events reflected the tendency for children experiencing negative experiences that are within their control to report higher CU traits over time, and for CU traits to predict further controllable negative events. Thus, for child-report, early controllable negative life events appear to predict an exacerbation of both CU traits and further controllable negative life experiences, over and above conduct problems. There was no bidirectional effect for negative life events that were considered independent of the

child's behavior (i.e., uncontrollable life events). However, child CU traits reported by parents predicted increases in exposure to negative life events that are out of the child's control at one time point, and predicted increases in exposure to events within the child's control at the other time point.

Discussion

Prior research has reported that negative life events are associated with CU traits in youth. However, this research failed to examine the directionality of these effects or whether the effect remains after accounting for co-occurring conduct problems that are common to youth with CU traits. Our results contribute three key findings to the literature. First, high levels of early child-reported "controllable" negative life events predicted increases in child-reported CU traits in later development, which subsequently further predicted increases in controllable negative life events across time. These results align with past research that has established a consistent association between negative life events and CU traits in youth (Dembo et al., 2007; Deutsch & Erickson, 1989; Frick & Dantagnan, 2005; Weiler & Widom, 1996), but they suggest that there may be reciprocal effects acounting for this relationship. Our findings extend this literature by accounting for co-occurring conduct problems, which is important since prior research supports a reciprocal relationship between negative life events and antisocial behavior (Kim et al., 2003). Second, and in contrast, parent-reported CU traits also appeared to signal vulnerability to negative life events but this was not consistent across time points or types of life events. Specifically, parent-reported CU traits predicted only "uncontrollable" life events at the earlier time point, and only controllable events at the later time point. Third, collapsing across the two types of life events, five out of the eight possible effects between life events and CU traits were significant, suggesting that the relationship between CU traits and negative life events may differ

across development and is likely to be more complex than is currently portrayed in theoretical models.

The present study is unable to address the question of whether a reciprocal process between child-reported CU traits and negative life events reflects an active or an evocative genotype-environment correlation. That is, future research is needed to address whether youth with CU traits seek out environments that are more risky (e.g., drug dealing), create or change situations (e.g., dropping out of school) to be compatible with their genetically influenced individual characteristics (i.e., active correlation), or whether their experiences (e.g., harsh parenting) arise as a consequence of social interaction and reactions to their genetically influenced individual characteristics (i.e., evocative correlation; Hawes et al., 2011; Kandler et al., 2012). Evidence demonstrating that child CU traits may elicit parental distress, punitive parenting, and less parental involvement over time (Fanti & Centifanti, 2014; Hawes et al., 2011), suggests that the characteristics of high CU youth may directly increase the likelihood of negative life events (e.g., family conflict) or predispose youth to circumstances that increase the risk for negative life events (e.g., poor parental monitoring leading to increased likelihood of poor grades). This may extend to the peer domain given links between CU traits and bullying, proactive and relational aggression (Fanti & Kimonis, 2012; Marsee, Silverthorn & Frick, 2005), and propensity towards revenge, dominance, and forced respect during peer conflict (Pardini, 2011; Pardini & Byrd, 2012). In support, reciprocal effects were evident only for controllable life events such as school suspension/failure and arguments with others. The lack of empathy for others, attachment difficulties, disinterest or even malevolent intent in relationship building suggests that youth with CU traits may not only create, but potentially escalate and prolong conflict - thereby limiting their ability to develop and maintain close family, romantic, and peer relationships.

The finding that parent-reported CU traits predicted "uncontrollable" life events when controlling for conduct problems was surprising. Examination of the "uncontrollable" life events items (see Table 1), categorised on the basis of their independence from child behavior, reveals that many appear to be related to the behavior of parents (e.g., separation/ divorce/ remarriage, parental arguments, job loss, financial difficulties). While our categorization of life events as controllable or uncontrollable was based on prior research (Luthar, 1991), it is possible that raising a child high in CU traits puts a strain on the parental relationship and/or parent functioning. Although it is unlikely that this strain would contribute to serious life events such as the death of family members, it is possible that it could play a role in a family's residential, employment, or financial stability, stress-related illness, or relationship problems between the child's parents. The present study is unable to disentangle to what extent strain related to parenting a child with CU traits contributed to such life events, constituting a fertile area of study for future research. Parental strain is likely to be greater when resources are limited, and at all time points parents of children with high CU traits reported lower SES. Socioeconomic status has strong links with negative life events, with those judged as independent of child behavior (e.g., parent conflict, death or illness of a family member) potentially related to neighbourhood factors (e.g., crime, substandard housing, access to health services), lifestyle (e.g., diet, alcohol and substance use) or other family factors (e.g., maternal depression) associated with poverty (Bradlyn & Corwyn, 2002). However, the effect for parent-reported CU traits predicting greater uncontrollable life events over time remained significant after controlling for SES in the models.

Anxiety may be a confounding factor in the relationship between life events and CU traits. Whereas anxiety is positively associated with negative life events (Kendler, Hettema, Butera, Gardner, & Prescott, 2003), it tends to be either negatively or uncorrelated with CU traits (Frick

et al., 1999). Complicating the issue, some psychopathy theories propose the existence of a secondary variant of psychopathy that is distinguished from its primary counterpart by high levels of anxiety and negative affectivity (Karpman, 1941, 1948; Porter, 1996). Secondary psychopaths are believed to develop their callous interpersonal styles as a result of exposure to harsh, stressful life circumstances relative to "primary [psychopathy], in which neither neurotic motivations, hereditary taint, nor dissocial nurture seem to be determining factors" (Lykken, 1957, p.6). The existence of a theoretically consistent high-anxious secondary psychopathy variant, which is supported by empirical work (Blagov et al., 2011; Poythress et al., 2010), may explain inconsistent correlations reported among measures of psychopathy and anxiety. Moreover, incarcerated boys scoring high on measures of CU traits and anxiety (i.e., secondary variants) reported exposure to significantly more negative life events than primary variants and nonpsychopathic youth (Sharf, Kimonis, & Howard, in press). Unfortunately, our sample size was not sufficient to consider the influence of anxiety. As a result, it will be important for future research to examine whether bidirectional effects between CU traits and life events differ between primary and secondary psychopathy variants to inform the field's understanding of different developmental pathways to psychopathic traits.

An important strength of this study was its use of both parent and child report of CU traits, consistent with diagnostic methods for assessing these traits specified in the DSM-5 that stresses the importance of a multi-informant approach (APA, 2013). However, results were not consistent across raters and some results were contrary to expectations for parent-reported CU traits. Further, there were several limitations to the study that need to be considered when interpreting the results. First, measures of negative life events were completed only by the child, such that associations with self-report measures of CU traits are likely to be inflated due to shared method

variance. However, youth tend to be the best reporters of many life events—and particularly those that are controllable (e.g., romantic and peer relationships)—that parents are less likely to have observed or which rely on individual interpretation of terms such as 'increased arguments between parents' (Allen et al., 2012). Second, like other studies using the self-report APSD (Poythress et al., 2006), internal consistencies for the CU scale were low in the present study (Cronbach's αs = .50 - .60). It will be important for future studies to replicate these findings using newer and internally consistent measures of CU traits, such as the 24-item Inventory of Callous-Unemotional Traits (ICU; Kimonis et al., 2008). The ICU was designed to improve upon the APSD CU scale by selecting the four items loading consistently on this scale in clinic and community samples, including a greater and equal number of both positively- and negatively-worded items for each stem, and using a four point Likert-type response format (Not at all true, Somewhat true, Very true, Definitely true) to increase the range and variability of responses and prevent against response bias and an exact middle rating. Finally, the results also need to be interpreted in light of the relatively small sample size and relatively short follow-up period, both of which may have limited our power to detect significant reciprocal effects.

Within the context of these limitations, our results inform developmental theory by suggesting that children with CU traits may be at greater risk for encountering controllable negative life events that may influence their later development of CU traits (at least according to child report), independent of the child's level of conduct problems. These results are not consistent with the view that youth high in CU traits are relatively insensitive to environmental influences and highlight the importance of reciprocal influences between child CU traits and environmental factors (Waller et al., 2013). Our findings suggest that policy and interventions targeting life events would be helpful in preventing a potentially self-perpetuating cycle of

symptoms and stressors. This includes broader societal policy to address poverty and neighbourhood disadvantage, factors known to increase risk for adversities linked with CU traits and antisocial behaviour including violence exposure, parent distress, harsh parenting and poor parental supervision (Fanti & Centifanti, 2014; Howard et al., 2012; Muñoz et al., 2011). Some life events are essentially acts of fate (e.g., natural disasters, terrorist attacks) and thus may be difficult to prevent. The focus would therefore shift to helping youth cope with the distress caused by the life event or to avoiding adverse circumstances that may consequently arise (e.g., poverty or homelessness following a natural disaster). Therapies that enhance problem solving and encourage prosocial means of achieving personal goals may be particularly useful for reducing interpersonal conflict for high CU youth (e.g., cognitive-behavioral therapies). Likewise, family interventions that improve parenting practices, parent-child relationships and communication may help address parent-child conflict. In short, future research needs to evaluate whether interventions that are effective in reducing the frequency of negative life events may also lead to improved outcomes for antisocial children high in CU traits.

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Tables & Figures

Table 1. Percentage of participants who endorsed life events items across time points.

Item No.	Abbreviated Item	% Yes T2	% Yes T3	% Yes T4
Uncontrollable				
11	Relative die	28.6	17.3	16.3
4	Changed schools	19.4	28.6	9.2
24	Sibling in trouble	15.3	7.1	6.1
30	Moved to new house	13.3	17.3	13.3
12	Family financial problems	11.2	4.1	9.2
33	Separation or divorce	9.2	2.0	6.1
14	Parents argued	8.2	5.1	3.1
20	Sibling ill	6.1	4.1	3.1
21	Parent lose job	6.1	2.0	7.1
3	Ill parent	5.1	4.1	7.1
13	Parent leave home	5.1	6.1	3.1
25	Parent remarry	5.1	5.1	5.1
29	Sibling leave home	5.1	9.2	9.2
19	Friend die	3.1	7.1	7.1
27	Sibling die	1.0	1.0	0.0
10	Parent die	1.0	0.0	1.0
Controllable				
15	Poor grades	41.8	35.7	27.6
31	Trouble with homework	34.7	33.7	23.5
2	Argued with friend	33.7	27.6	31.6

17	Argued with sibling	33.7	30.6	23.5
18	Argued with boy/girlfriend	26.5	23.5	27.6
28	Argued with parents	14.3	13.3	18.4
16	Not liked by others	25.5	19.4	17.3
32	Problems with friends	20.4	11.2	7.1
7	Flunked grade	17.3	20.4	17.3
1	Suspended from school	11.2	9.2	10.2
22	Not accepted on team	9.2	6.1	9.2
34	Ill or injured	7.1	6.1	6.1
23	Run away	5.1	1.0	1.0
Unclassifiable				
8	Braces or glasses	21.4	13.3	17.3
6	Pet die	25.5	12.2	14.3
5	Moved in with others	4.1	4.1	6.1
9	Victim of crime	2.0	4.1	5.1
26	Family victims of violence	2.0	3.1	4.1

Note: Life events are organized into uncontrollable (i.e., child-independent), controllable, and unclassifiable types (see Luthar, 1991). Within these categories, life events are ordered from most to least frequently occurring in the sample at Time 2.

Table 2. Correlations among main study variables and across time points.

	2	3	4	5	6	7	8	9	10	11	12
1. Age	.00	-.06	.08	.08	-.10	.03	.08	.10	-.09	-.11	-.05
2. Gender (1=female)		0.20	-0.16	-0.19	-0.32**	-0.20	-0.22*	-0.12	0.15	0.01	-0.02
3.SES		-	-0.16	-0.31**	-0.22*	-0.26*	-0.36**	-0.48***	-0.30**	-0.20	-0.12
4. T2 CR CU			-	0.51***	0.48***	0.51***	0.50***	0.53***	0.27*	0.29**	0.16
5. T3 CR CU				-	0.58***	0.46***	0.55***	0.31**	0.46***	0.43***	0.30**
6. T4 CR CU					-	0.38***	0.42***	0.33**	0.34**	0.27*	0.29**
7. T2 PR CU						-	0.72***	0.69***	0.32**	0.40***	0.30**
8. T3 PR CU							-	0.68***	0.31**	0.41***	0.19
9. T4 PR CU								-	0.37***	0.30**	0.12
10. T2 Life Events									-	0.62***	0.55***
11. T3 Life Events										-	0.69***
12. T4 Life Events											-
Mean	-	46.67	2.7	2.96	2.97	2.38	2.34	2.59	9.98	8.74	8.56
SD	-	19.86	1.65	1.85	1.77	2.02	2.00	1.94	7.34	6.75	7.06

Note: *$p < .05$; **$p < .01$; ***$p < .001$; SES = Measured with Duncan's Socioeconomic Index; CR = Child-report; PR = Parent-report; CU = Callous-unemotional traits; CP = Conduct Problems.

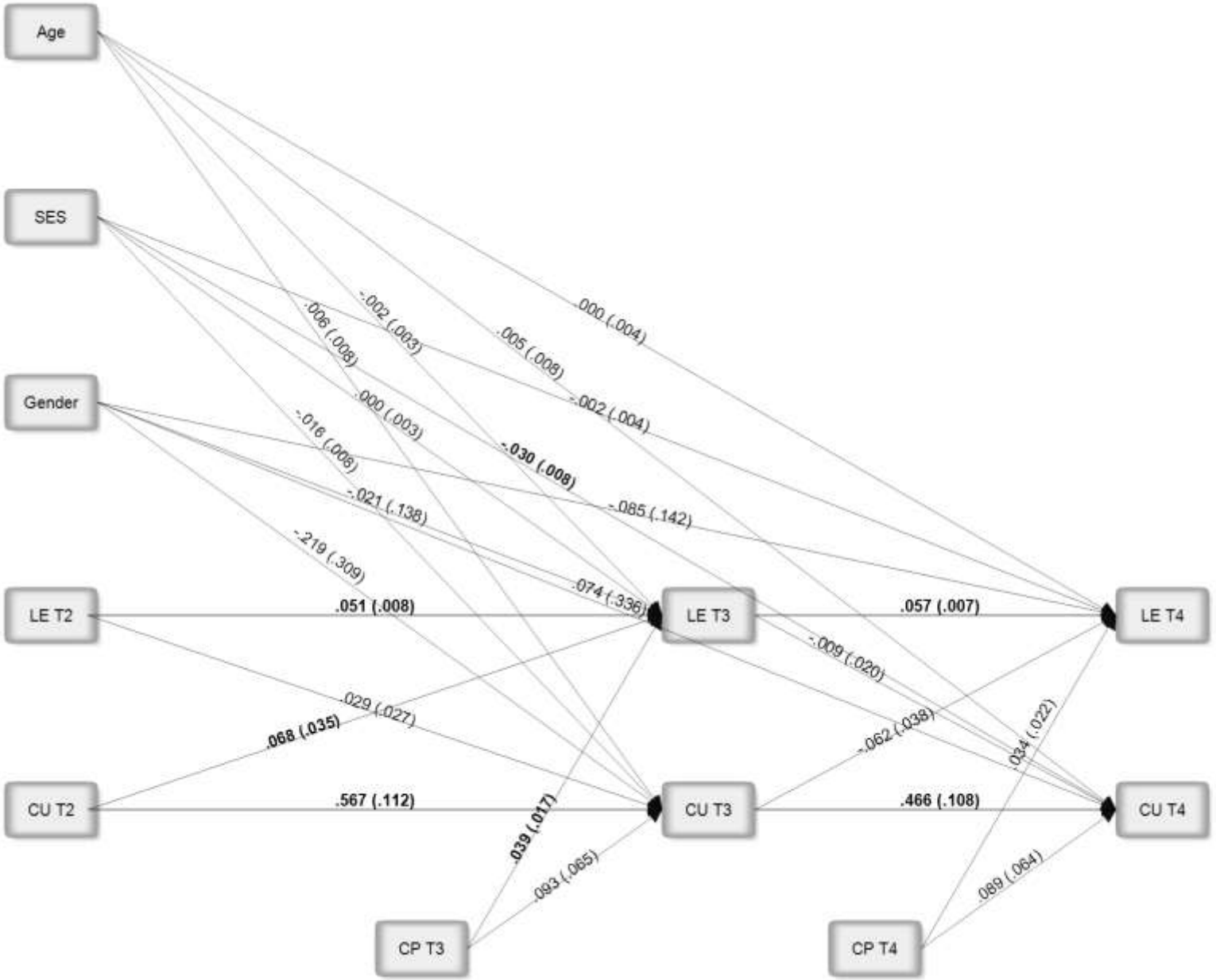
Age
SES
Gender
LE T2
CU T2
CP T3
LE T3
CU T3
CP T4
LE T4
CU T4
.000 (.004)
-.002 (.003)
.005 (.008)
-.002 (.004)
.006 (.008)
.000 (.003)
-.016 (.008)
-.030 (.008)
-.085 (.142)
-.021 (.138)
-.219 (.309)
.074 (.336)
.051 (.008)
.057 (.007)
-.009 (.020)
.029 (.027)
.068 (.035)
-.062 (.038)
.034 (.022)
.567 (.112)
.466 (.108)
.039 (.017)
.093 (.065)
.089 (.064)

Figure 1. Cross-lagged model (estimates (SE)) with parent-report of callous-unemotional (CU) traits, negative life events (LE), and parent-report of conduct problems (CP) as a time-varying covariate.
Note: Bolded values denote significance at .05.

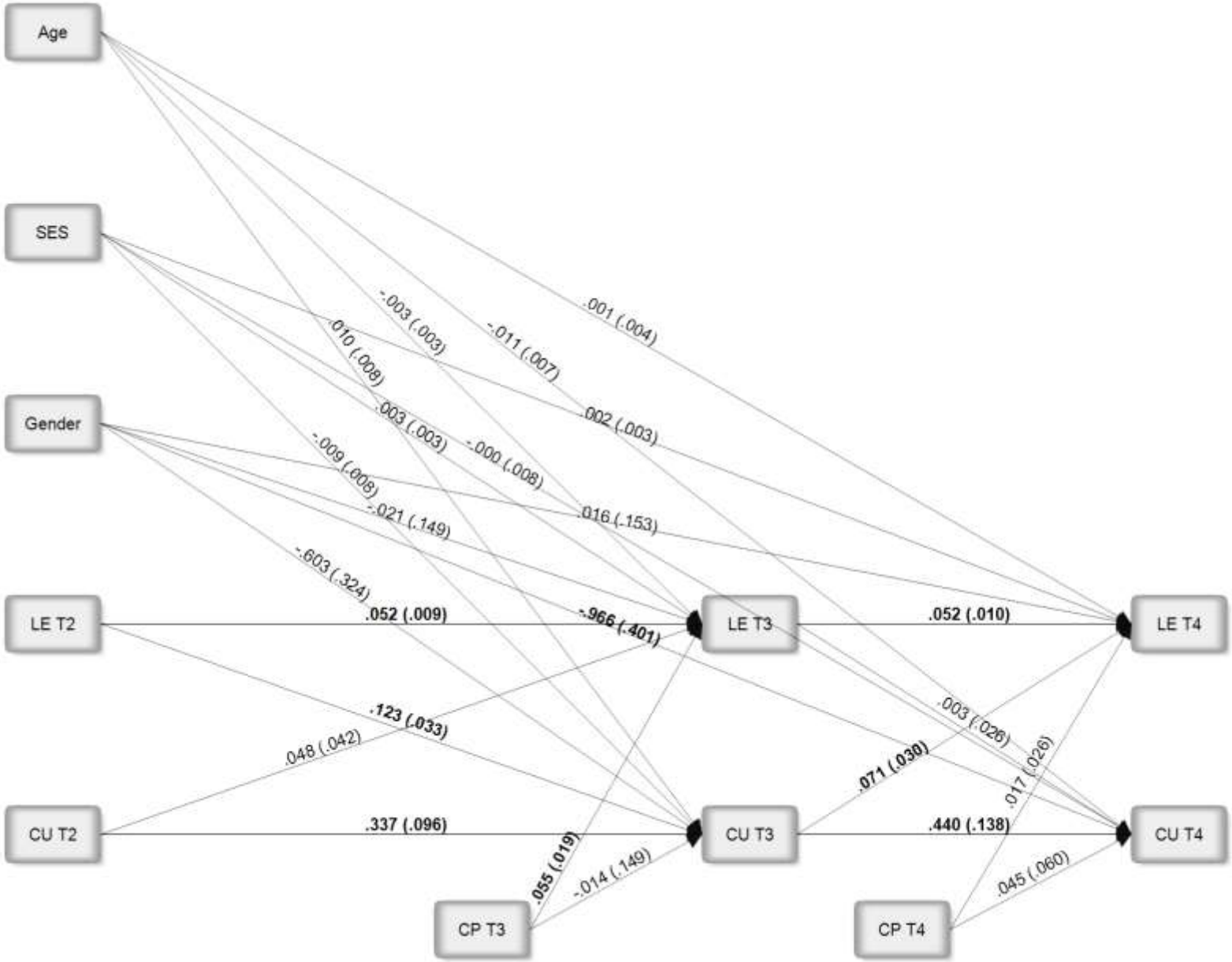
Age
SES
Gender
LE T2
CU T2
CP T3
LE T3
CU T3
CP T4
LE T4
CU T4
.001 (.004)
-.003 (.003)
-.011 (.007)
.010 (.008)
.002 (.003)
.003 (.003)
-.000 (.008)
-.009 (.008)
.016 (.153)
-.021 (.149)
-.603 (.324)
.052 (.009)
-.966 (.401)
.052 (.010)
.003 (.026)
.123 (.033)
.048 (.042)
.071 (.030)
.017 (.026)
.337 (.096)
.440 (.138)
.055 (.019)
-.014 (.149)
.045 (.060)

Figure 2. Cross-lagged model (estimates (SE)) with child-report of callous-unemotional (CU) traits, negative life events (LE), and child-report of conduct problems (CP) as a time-varying covariate.
Note: Bolded values denote significance at .05.

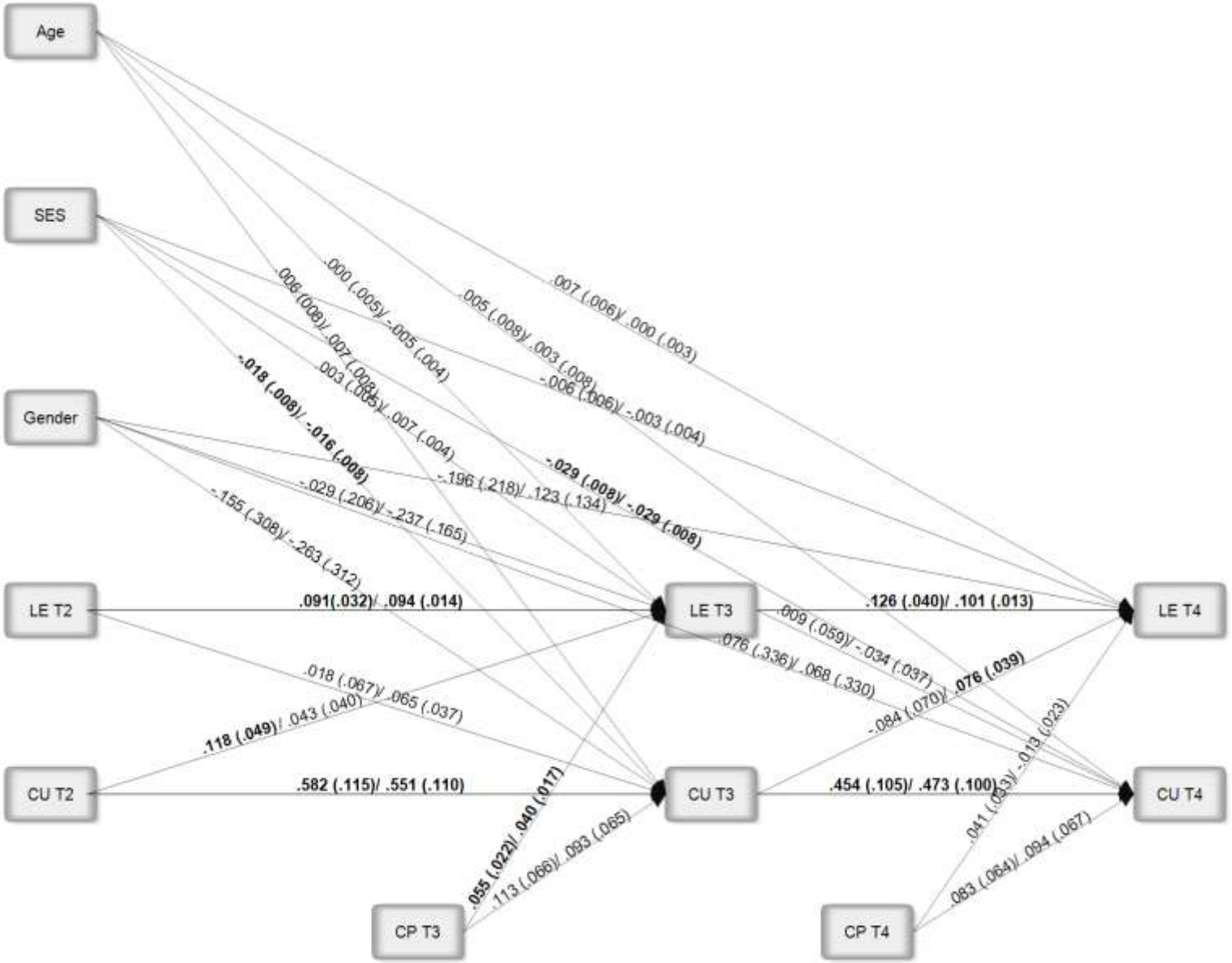
Age
SES
Gender
LE T2
CU T2
CP T3
LE T3
CU T3
CP T4
LE T4
CU T4
.007 (.006)/ .000 (.003)
.005 (.008)/ .003 (.008)
.000 (.005)/ -.005 (.004)
.026 (.008)/ .027 (.008)
-.006 (.006)/ -.003 (.004)
.003 (.005)/ .007 (.004)
-.018 (.008)/ -.016 (.008)
-.029 (.008)/ -.029 (.008)
-.196 (.218)/ .123 (.134)
-.029 (.206)/ -.237 (.165)
-.155 (.308)/ -.263 (.312)
.091(.032)/ .094 (.014)
.126 (.040)/ .101 (.013)
.009 (.059)/ -.034 (.037)
.076 (.336)/ .068 (.330)
.076 (.039)
-.084 (.070)/
.018 (.067)/ .065 (.037)
.118 (.049)/ .043 (.040)
.582 (.115)/ .551 (.110)
.454 (.105)/ .473 (.100)
.055 (.022)/ .040 (.017)
.113 (.066)/ .093 (.065)
.041 (.053)/ -.013 (.023)
.083 (.064)/ .094 (.067)

Figure 3. Cross-lagged model (estimates (SE)) with parent-report of callous-unemotional (CU) traits, negative life events (LE; uncontrollable LE left of diagonal; controllable LE right of diagonal), and parent-report of conduct problems (CP) as a time-varying covariate.
Note: Bolded values denote significance at .05.

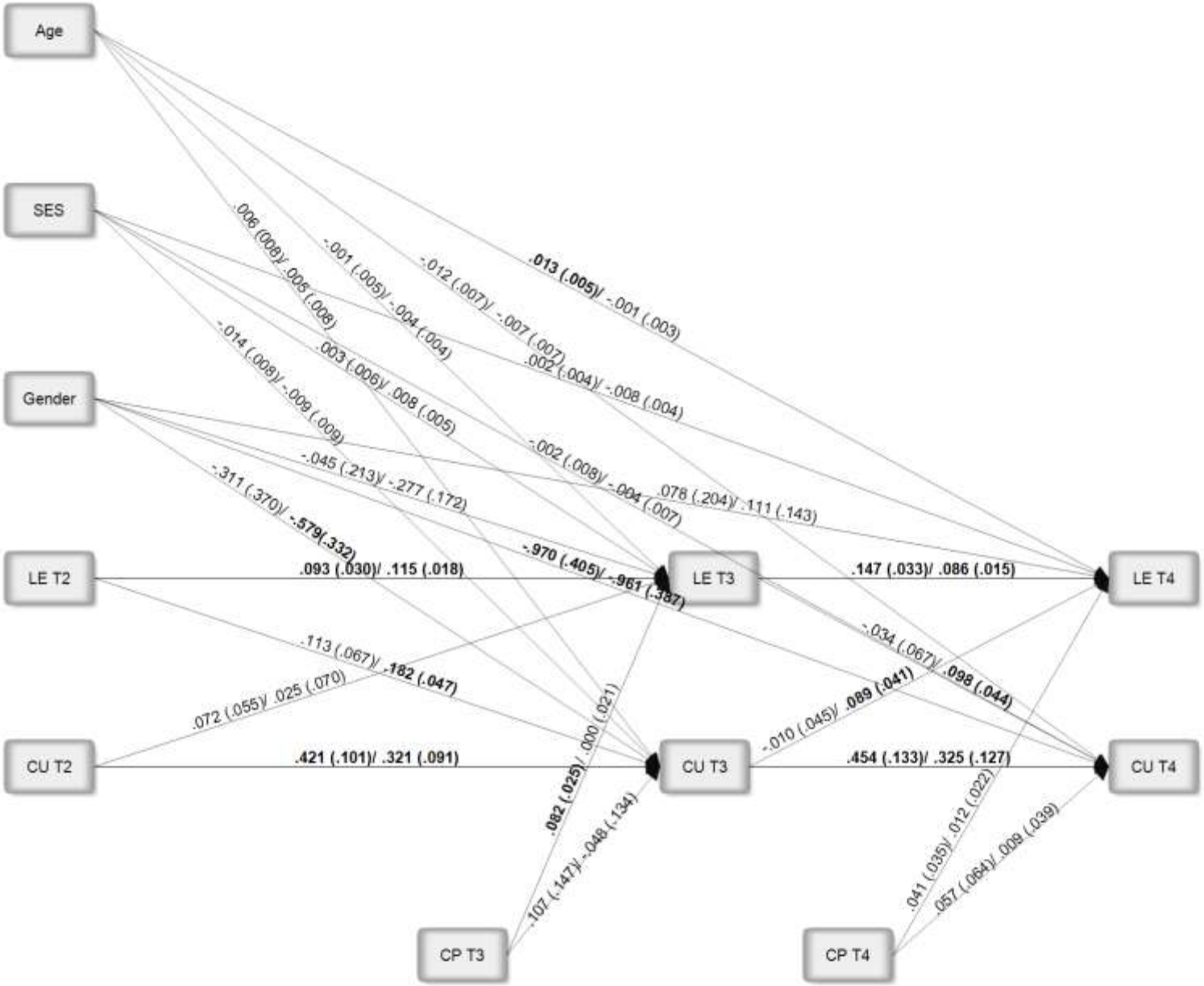
Age
SES
Gender
LE T2
CU T2
CP T3
LE T3
CU T3
LE T4
CU T4
CP T4
.013 (.005)/ -.001 (.003)
-.012 (.007)/ -.007 (.007)
-.001 (.005)/ -.004 (.004)
.006 (.008)/ .005 (.008)
.002 (.004)/ -.008 (.004)
-.014 (.008)/ -.009 (.009)
.003 (.006)/ .008 (.005)
-.002 (.008)/ -.004 (.007)
.078 (.204)/ .111 (.143)
-.045 (.213)/ -.277 (.172)
-.311 (.370)/ -.579(-.332)
-.970 (.405)/ -.961 (-.387)
.093 (.030)/ .115 (.018)
.147 (.033)/ .086 (.015)
-.034 (.067)/ .098 (.044)
.113 (.067)/ .182 (.047)
.072 (.055)/ .025 (.070)
-.010 (.045)/ .089 (.041)
.421 (.101)/ .321 (.091)
.454 (.133)/ .325 (.127)
.082 (.025)/ .000 (.021)
.107 (.147)/ -.048 (-.134)
.041 (.035)/ .012 (.022)
.057 (.064)/ .009 (.039)

Figure 4. Cross-lagged model (estimates (SE)) with child-report of callous-unemotional (CU) traits, negative life events (LE; uncontrollable LE left of diagonal; controllable LE right of diagonal), and child-report of conduct problems (CP) as a time-varying covariate.
Note: Bolded values denote significance at .05.