



## Research article

## Attachment insecurity accounts for the relationship between maternal and paternal maltreatment and adolescent health

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## ABSTRACT

**Objectives:** Maltreatment is linked with poor health outcomes. Attachment and affect regulation may mitigate the long-term impact of these adverse experiences on health outcomes. Little is known about the relative impact of maternal versus paternal maltreatment and interparental violence (IPV) on general health status of female and male youth.

**Method:** The present study examined the impact of exposure to maternal and paternal emotional and physical maltreatment, neglect, IPV, and cumulative maltreatment exposure in adolescence on general physical health problems reported five years later. High-risk youth ( $N = 179$ ;  $Mage = 15.34$ ,  $SD = 1.53$ ; 46.4% female) self-reported maltreatment experiences, attachment insecurity, and affect dysregulation at Time 1; and affect dysregulation and physical health five years later at Time 2.

**Results:** Attachment insecurity accounted for the effect of maternal and paternal emotional maltreatment, and maternal and paternal cumulative maltreatment exposure, on physical health. Additionally, attachment insecurity accounted for the effect of paternal neglect on physical health. Further sex differences were found with regard to maltreatment type and are discussed.

**Conclusion:** Both maternal and paternal maltreatment in adolescence predicted poor general health five years later via attachment insecurity. Youth who lack a secure attachment with their parents are most vulnerable to these impacts.

## 1. Introduction

Research examining the detrimental impact of maltreatment and exposure to interparental violence (IPV) on physical health has produced equivocal results (Norman et al., 2012). Few studies have examined the unique effects of different types of these adverse experiences, most have used cross-sectional rather than prospective design, and literature reviews have often pooled across studies that assessed these experiences at vastly different ages. For example, Afifi and colleagues found that adult's retrospective reports of emotional and physical maltreatment, but not neglect, were linked to a general poor health-related quality of life (e.g., feeling tired; Afifi et al., 2007). Conversely, Jackson and colleagues found that exposure to sexual abuse and neglect, but not emotional or physical maltreatment, were related to increased hospitalizations among foster youth (Jackson et al., 2015). The diverse findings in the literature highlight the need to differentiate types of maltreatment and to examine factors that may mediate the impact of adversity on health (Raque-Bogdan, Ericson, Jackson, Martin, & Bryan, 2011).

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### 1.1. Adverse experiences to health outcomes: The role of attachment and affect regulation

Beyond its effect on mental and physical health, maltreatment disrupts development of core regulatory mechanisms, including the attachment system and affect regulation (Cyr, Euser, Bakermans-Kranenburg, & Van Ijzendoorn, 2010). There are many biological systems sensitive to early parent-child interactions (Pietromonaco & Powers, 2015; Taylor, 2010). For example, maltreatment disrupts hypothalamic-pituitary-adrenal (HPA) functioning causing system dysregulation, which has been shown to mediate the impact of attachment insecurity on later adjustment (Opendak & Sullivan, 2016). Consistent with findings, attachment insecurity in childhood has been shown to predict illness and poor physical health in adulthood (e.g., headaches; Puig, Englund, Simpson, & Collins, 2013). Additionally, evidence suggests that interventions designed to increase attachment security among maltreated toddlers produce lasting normalization of the HPA axis (Bernard, Dozier, Bick, & Gordon, 2015).

Children and adolescents acquire affect regulation skills within primary attachment relationships (Allen & Miga, 2010). Maltreated children show heightened attention and quicker identification of displays of anger (Pollak & Tolley-Schell, 2003). The trajectory of affect regulation skills among physically abused children appears to diverge as young as three months, with these infants displaying increased rates of fear and sadness during parent interactions compared with non-abused infants (Cicchetti & Ng, 2014). Given the significant impact of adverse experiences on attachment security and emotional development, it stands to reason that the effect of adversity on health outcomes is mediated through attachment security and the capacity for adaptive affect regulation.

### 1.2. Exposure to maternal versus paternal maltreatment and IPV

Some studies suggest that maltreatment perpetrated by mothers may be a stronger predictor of maladaptive outcomes relative to paternal maltreatment (Enns, Cox, & Clara, 2002; Moretti, Bartolo, Craig, Slaney, & Odgers, 2014). The greater impact of maternal over paternal maltreatment may be due to exposure to maternal care typical of gendered childcare in western societies and the primary attachment status of mothers (Rosenthal & Kobak, 2010). Less is known about whether maternal versus paternal maltreatment differentially affects female versus male youth. Research suggests that female populations may be more resilient to the effects of stress compared with their male counterparts (DuMont, Widom, & Czaja, 2007); however, this research tends to combine adversity type and has not considered the sex of the perpetrator.

### 1.3. A focus on adolescence

Studies on maltreatment and attachment during adolescence are limited compared with research examining these factors in infancy, childhood, and adulthood. Specifically, some research suggests that adversity occurring under the age of 3 years has a disproportionate impact on development (as measured by DNA methylation; Dunn et al., 2019). However, a core assumption of sensitive periods is that their consequences persist into later developmental periods (Takesian & Hensch, 2013). Further, it is also important to consider the specificity of their timing on neural substrates, such that certain sensitive periods impact certain mechanisms to a greater degree. To illustrate, there are many complex neurobiological and social-relational changes that occur during adolescence. For example, pubertal onset is a marked period for HPA development with importance to stress regulatory function (Viau, Bingham, Davis, Lee, & Wong, 2005). It is increasingly clear that these changes exacerbate vulnerability for mental health problems (Lee et al., 2014). Most important are the neurological transformations in the 'social brain network' that sensitize adolescents to social interactions (Crone & Elzinga, 2015). In this sense, adolescents who enjoy a secure attachment with caregivers may particularly benefit from its buffering protective effects in the context of adversity.

### 1.4. The present study

The present study examined the impact of exposure to emotional and physical maltreatment, neglect, and IPV on common physical health problems reported by at-risk youth five years later. We tested a dose-response relationship between the cumulative exposure to all forms of maltreatment and IPV experiences and health status, given past findings showing a strong relationship between cumulative adverse experiences and poor outcomes (Cecil, Viding, Fearon, Glaser, & McCrory, 2017). Examining cumulative adverse experiences reported in adolescence represents the youth's view of their lifetime adverse experiences with their homes. We also examined indirect pathways between maltreatment and IPV and health outcomes (see Fig. 1 and 2); testing our hypotheses that attachment insecurity and affect dysregulation would mediate the relationship between adversity and health status. Finally, we examined maternal versus paternal maltreatment (and maternal versus paternal attachment insecurity, respectively) separately given past work suggesting exposure to maternal maltreatment may particularly deleterious. We investigated effects on female and male youth separately to fully explore gendered relationships. As an outcome variable, we measured general health status rather than specific forms of disease given the fact that recent research with over 9000 youth (Mage = 15.9 years) demonstrated that self-reported health is stable over long periods of time and significantly predicts allostatic load (Vie, Hufthammer, Holmen, Meland, & Breidablik, 2014), which has been linked with physiological dysregulation and disease (McEwen, 1998).

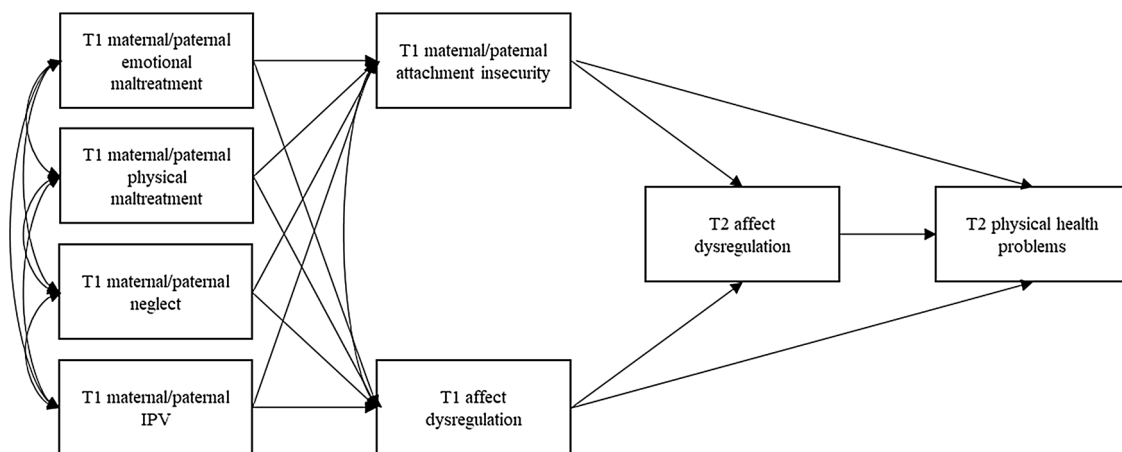


Fig. 1. Structural model of the effect of experiences of maltreatment on physical health problems through T1 attachment insecurity and T1 and T2 affect dysregulation. T1 = time 1/enrollment; T2 = time 2/five-years' follow up; IPV = interparental violence.

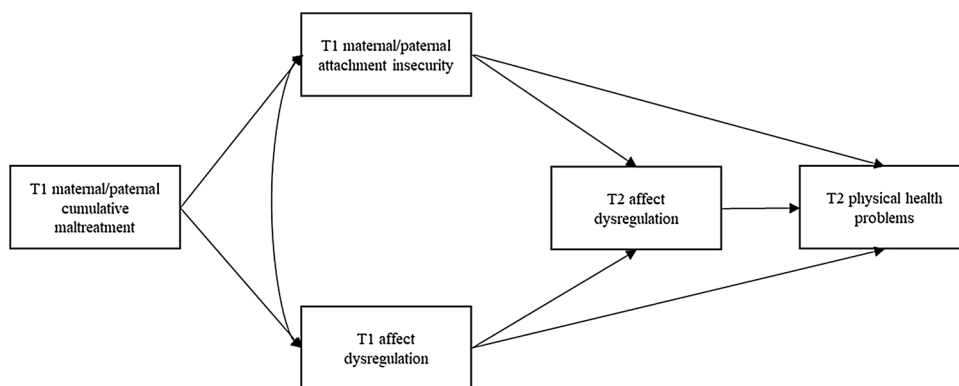


Fig. 2. Structural model of the effect of experiences of cumulative maltreatment on physical health problems through T1 attachment insecurity and T1 and T2 affect dysregulation. T1 = time 1/enrollment; T2 = time 2/five-years' follow up.

## 2. Method

### 2.1. Participants and procedure

Participants were 179 adolescents (*M*<sub>age</sub> = 15.34, *SD* = 1.53; 46.4% female) recruited from a youth forensic center (53%), a provincial mental health facility for adolescent mental health (45%), and probation offices (2%). Most youth were in care of their biological parents (61.9%), and those that were not still had contact.<sup>1</sup> Exclusionary criteria included an IQ below 70 and/or the presence of Axis I psychotic symptomology. All research protocols and procedures received approval from the University Office of Research Ethics. Parental consent and youth assent were received at each time point of data collection until youth reached age 19, at which point they provided consent themselves. Measures in the current study were first completed at enrolment (Time 1 [T1]) when youth were on average 15.34 years and again at five years follow up (Time 2 [T2]) when youth were on average 19.93 years (*SD* = 1.59). The sample consisted of predominantly Caucasian (66%) youth with a significant minority identifying as Indigenous in heritage (23%).

<sup>1</sup> Analyses were repeated for the full sample of youth in care of their biological parent (*n* = 104) and for those who were not (*n* = 64). Among those youth in care of their biological parent, attachment insecurity accounted for the effect of emotional maltreatment (*B(SE)* = .18(.13), 95% CI [.02, .46]), and neglect (*B(SE)* = .15(.11), 95% CI [.02, .37]), on physical health. Additionally, attachment insecurity accounted for the effect of maternal cumulative maltreatment (*B(SE)* = .05(.03), 95% CI [.00, .10]), and paternal neglect (*B(SE)* = .09(.09), 95% CI [.01, .27]), on physical health. Among those youth out of care of their biological parent, there were no significant indirect effects for any form of maltreatment.

## 2.2. Measures

### 2.2.1. Maltreatment experiences

The Family Background Questionnaire (FBQ; McGee, Wolfe, & Wilson, 1997) consists of 20 items measuring lifetime experiences (i.e., across childhood and including adolescence), each rated separately for maternally versus paternally perpetrated maltreatment on a 4-point scale (0 'never happened' to 3 'happened often or very often') at T1. Mean subscale scores were computed for total, maternal, and paternal perpetration of physical maltreatment (3 items), emotional maltreatment (8 items), neglect (5 items), and IPV (4 items). Scores were winzorized to three standard deviations. Internal consistency was acceptable to good for the subscales: emotional maltreatment ( $\alpha = .86$ ), physical maltreatment ( $\alpha = .78$ ), neglect ( $\alpha = .79$ ), and IPV ( $\alpha = .79$ ). We also calculated the cumulative number different types of adverse experiences. For each item, youth who endorsed exposure "a few times" to "happened often or very often" were given a score of 1 otherwise they received a score of 0, for a total of 1 for each subscale which was subsequently summed across subscales. Total scores ranged from 0–8, summing across experiences perpetrated by their mother (0–4) and father (0–4).

### 2.2.2. Attachment insecurity

The Adolescent–Parent Attachment Inventory (APAI; Moretti & Obsuth, 2009) is a 36-item measure of adolescent parent attachment adapted from the Experiences in Close Relationships (ECR; Brennan, Clark, & Shaver, 1998). Youth reported on their relationship with their mother and father over the past 6 months on a 7-point scale (1 'strongly disagree' to 7 'strongly agree') at T1. Internal consistency was adequate ( $\alpha = .78$ ). Similar adaptation of the ECR have been shown to possess strong psychometric qualities (Brenning, Soenens, Braet, & Bosmans, 2011; Feddern Donbaek & Elklit, 2014).

### 2.2.3. Affect dysregulation

The 12-item Affect Regulation Checklist (ARC; Moretti & Craig, 2013; Moretti, Obsuth, Craig, & Bartolo, 2015) was developed to evaluate three factors (i.e., affect dysregulation (4-items), affect suppression (5-items), and adaptive reflection (3-items)) related to affect regulation in adolescents (Gross & John, 2003). Items are scored using a 3-point scale that ranges from (0 'a lot like me' to 2 'not like me') inquiring about experiences of affect regulation. In the present study only the affect dysregulation (i.e., lack of control) scale was used at T1 and T2, with good internal consistency ( $\alpha = .86$  and  $.81$ , respectively).

### 2.2.4. Physical health

Physical health problems was assessed with the Child Health and Illness Profile–Adolescent Edition (CHIP-AE; Starfield et al., 1993) at T2. This 25-item subscale includes common symptoms of health problems that lead people to seek medical care (e.g., 'how often did you have a sore throat'; 'how often did you have a stomach ache'). Youth indicated the frequency of each symptom over the past four weeks on a 5-point scale from 0 ('no days') to 4 ('15–28 days'). Internal consistency was good ( $\alpha = .88$ ).

## 2.3. Statistical analyses

Descriptive statistics were conducted using SPSS version 24 (IBM Corp., 2016); all other analyses were conducted using Mplus 7.1 (Muthén & Muthén, 2013). Models were estimated using full-information likelihood (FIML) to handle missing data (Rubin & Little, 2002). Model fit criteria included chi-square ( $\chi^2$ ) value, Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI). Models with non-significant  $\chi^2$  value, RMSEA less than .06, and CFI greater than .90 indicate adequate fit (Hu & Bentler, 1999). First, we modelled all forms of maltreatment (i.e., emotional and physical maltreatment, neglect, IPV) as a total, maternal, and paternal (and attachment insecurity total, maternal, and paternal, respectively). Next, we modelled cumulative maltreatment total, maternal, and paternal (and attachment insecurity total, maternal, and paternal, respectively). Direct and indirect associations of attachment insecurity and affect dysregulation were examined between maltreatment and physical health using the product of coefficients method with 1000 bootstrapped samples to obtain 95% confidence intervals of the mediated effect (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Indirect effects were considered significant if the confidence intervals did not include a 0 value. The product of coefficients approach with bootstrapped confidence intervals is recommended for testing indirect effects (Fairchild & MacKinnon, 2014; MacKinnon et al., 2002). In contrast to traditional mediation analysis (Baron & Kenny, 1986), a significant association between the predictor and outcome variable is not required for establishing an indirect effect.

## 3. Results

### 3.1. Self-reported rates of maltreatment and exposure to IPV

Summing across all types of maltreatment and IPV, almost half of youth reported between one and two experiences (49.0% maternal; 48.8% paternal); however, a substantial proportion reported between three or four experiences (43.5% maternal; 48.0% paternal); and only a minority reported no experiences (7.5% maternal; 3.1% paternal). More specifically, the majority of youth reported emotional maltreatment (84.4% maternal; 84.9% paternal) followed by neglect (57.1% maternal; 72.2% paternal), physical abuse (49.7% maternal; 53.6% paternal), and lastly IPV (34.0% maternal; 36.5% paternal).

**Table 1**  
Descriptive Statistics and Correlations between Study Variables.

	1	2	3	4	5	6	7	8	9	10	11
<i>Variables</i>											
1. T1 Emotional maltreatment	1										
2. T1 Physical maltreatment	.57***	1									
3. T1 Neglect	.17	.27**	1								
4. T1 IPV	.48***	.50***	.30**	1							
5. T1 Cumulative maltreatment	.62***	.67***	.17	.61***	1						
6. T1 Insecure attachment	.49***	.28**	.18	.21*	.36***	1					
7. T1 Dysregulated affect	.25**	.16	.06	.13	.20*	.33***	1				
8. T2 Dysregulated affect	.29*	.24	.07	.13	.25*	.23*	.41***	1			
9. T2 Physical health problems	.43**	.34**	-.05	.37**	.32**	.42***	.16	.30*	1		
<i>Covariates</i>											
10. Age	-.01	.14	.04	.07	.16	.03	-.04	-.18	-.05	1	
11. Sex (male)	-.15	-.15	-.11	-.21*	-.14	-.23**	-.11	-.32**	-.44***	.09	1
<i>Descriptives</i>											
<i>M</i>	.74	.55	1.32	.32	5.06	2.94	3.84	3.44	1.91	15.34	.54
<i>SD</i>	.56	.62	.53	.49	1.93	1.09	2.43	2.32	.60	1.53	.50
<i>Range</i>	.00-2.43	.00-2.48	.71-2.93	.00-1.84	1.00-8.00	1.00-6.19	.00-8.00	.00-8.00	.96-3.54	12-18	0-1
<i>α</i>	.84	.79	.78	.69	.88	.67	.86	.81	.88	-	-

Note: T1 = time 1/enrollment; T2 = time 2/five-years' follow up; IPV = interparental violence. \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ .

### 3.2. Maltreatment, attachment insecurity, & affect dysregulation

Means, standard deviations, and correlations of main study variables are presented in Table 1. Youth who reported higher levels of emotional maltreatment, physical maltreatment, exposure to IPV, and a greater cumulative number of all forms of maltreatment went on to report significantly higher levels of physical health problems five years later. Reports of neglect were not significantly associated with later physical health problems. Exposure to all types of maltreatment, with the exception of neglect, was significantly associated with higher levels of attachment insecurity. Emotional maltreatment and the cumulative number of maltreatment experiences were associated with T1 and T2 affect dysregulation. These relationships differed across sex: among female youth emotional maltreatment and the cumulative number of maltreatment experiences were associated with physical health; whereas for male youth, maltreatment was not associated with physical health but neglect was associated with attachment insecurity.

### 3.3. Structural models

#### 3.3.1. 3.3.1 Maltreatment on attachment insecurity, affect dysregulation, and physical health

The model of maltreatment on attachment insecurity, T1 and T2 affect dysregulation, and physical health provided adequate fit to the data ( $\chi^2(4) = 3.91, p = .42, CFI = 1.00, RMSEA = .00, 90\% CI[.00, .11]$ ). Attachment insecurity accounted for the effect of emotional maltreatment on physical health ( $B(SE) = .17(.08), 95\% CI[.07, .32]$ ). The model of cumulative maltreatment on attachment insecurity, T1 and T2 affect dysregulation, and physical health provided slightly poorer fit to the data ( $\chi^2(1) = 2.43, p = .12, CFI = .98, RMSEA = .10, 90\% CI[.00, .27]$ ); however, attachment insecurity accounted for the effect of cumulative maltreatment on physical health ( $B(SE) = .03(.01), 95\% CI[.01, .06]$ ).

The model of maltreatment examining sex differences provided adequate fit to the data ( $\chi^2(8) = 8.58, p = .38, CFI = .99, RMSEA = .03, 90\% CI[.00, .13]$ ); however, there were no significant indirect effects for female and male youth. Additionally, the model of cumulative maltreatment examining sex differences provided slightly poorer fit to the data ( $\chi^2(2) = 3.32, p = .19, CFI = .97, RMSEA = .10, 90\% CI[.00, .28]$ ), and there were no significant indirect effects for female and male youth.

#### 3.3.2. Maternal maltreatment on attachment insecurity, affect dysregulation, and physical health

The model of maternal maltreatment on attachment insecurity, T1 and T2 affect dysregulation, and physical health provided adequate fit to the data ( $\chi^2(4) = 2.48, p = .65, CFI = 1.00, RMSEA = .00, 90\% CI[.00, .09]$ ). Attachment insecurity accounted for the effect of maternal emotional maltreatment on physical health ( $B(SE) = .11(.06), 95\% CI[.02, .24]$ ). The model of maternal cumulative maltreatment on attachment insecurity, T1 and T2 affect dysregulation, and physical health provided slightly poorer fit to the data ( $\chi^2(1) = 5.32, p = .02, CFI = .94, RMSEA = .18, 90\% CI[.06, .33]$ ); however, attachment insecurity accounted for the effect of maternal cumulative maltreatment on physical health ( $B(SE) = .05(.03), 95\% CI[.00, .09]$ ).

The model of maternal maltreatment examining sex differences provided adequate fit to the data ( $\chi^2(8) = 5.24, p = .73, CFI = 1.00, RMSEA = .00, 90\% CI[.00, .09]$ ); however, there were no significant indirect effects for female and male youth. Additionally, the model of maternal cumulative maltreatment examining sex differences provided slightly poorer fit to the data ( $\chi^2(2) = 4.43, p = .11, CFI = .95, RMSEA = .13, 90\% CI[.00, .30]$ ), and there were no significant indirect effects for female and male youth.

### 3.3.3. Paternal maltreatment on attachment insecurity, affect dysregulation, and physical health

The model of paternal maltreatment on attachment insecurity, T1 and T2 affect dysregulation, and physical health provided adequate fit to the data ( $\chi^2(4) = 3.07, p = .55, CFI = 1.00, RMSEA = .00, 90\% CI[.00, .10]$ ). Attachment insecurity accounted for the effect of paternal emotional maltreatment ( $B(SE) = .17(.08), 95\% CI[.06, .32]$ ) and neglect ( $B(SE) = .09(.05), 95\% CI[.03, .19]$ ) on physical health. The model of paternal cumulative maltreatment on attachment insecurity, T1 and T2 affect dysregulation, and physical health provided adequate fit to the data ( $\chi^2(1) = 1.05, p = .31, CFI = 1.00, RMSEA = .02, 90\% CI[.00, .23]$ ), and attachment insecurity accounted for the effect of paternal cumulative maltreatment on physical health ( $B(SE) = .04(.03), 95\% CI[.00, .09]$ ).

The model of paternal maltreatment examining sex differences provided adequate fit to the data ( $\chi^2(8) = 4.98, p = .76, CFI = 1.00, RMSEA = .00, 90\% CI[.00, .09]$ ), and attachment insecurity accounted for the effect of paternal emotional maltreatment on physical health among female youth ( $B(SE) = .30(.18), 95\% CI[.08, .65]$ ). There were no significant indirect effects for male youth. Finally, the model of paternal cumulative maltreatment examining sex differences provided adequate fit to the data ( $\chi^2(2) = 2.31, p = .31, CFI = .99, RMSEA = .05, 90\% CI[.00, .25]$ ); however, there were no significant indirect effects for female and male youth.

## 4. Discussion

Extensive research has examined the impact of early-life adversity on later-life mental and physical health outcomes, but the majority of this work aggregates different types of maltreatment experiences. The present study had two primary goals. First, we extended past research by examining the impact of different forms of maltreatment on physical health problems and we explored differential effects for maternally versus paternally perpetrated maltreatment on female versus male youth. Findings were driven by emotional maltreatment, over other forms of maltreatment, in line with prior research suggesting that emotional maltreatment is a core component of all forms of abuse that has equivalent, if not greater, negative consequences than physical or sexual abuse (Mills et al., 2013). Second, we investigated the mechanisms that may underlie the effects of maltreatment on health, namely attachment insecurity and affect dysregulation. We argued that effects of maltreatment on later physical health status are mediated by disruption in attachment security.

### 4.1. Direct and indirect effects of maltreatment: The role of attachment and affect regulation

Our finding of an indirect effect of maltreatment on physical health through attachment insecurity is consistent with prior research demonstrating that maltreatment disrupts the parent-child attachment relationship (Cyr et al., 2010), compromising the availability of the caregiver to provide safe haven and comfort. The lack of a secure attachment deprives children and adolescents from a 'regulating other'. These children are caught in a 'paradox' whereby their presumed source of comfort may also be maltreating (Hesse & Main, 2006). Such experiences increase threat-sensitivity, which can lead to habitual hyperarousal and emotion dysregulation (Shields & Cicchetti, 1998). We did not find any significant indirect effects of affect dysregulation; however, our bivariate correlations indicated significant associations between affect dysregulation and emotional and cumulative maltreatment, attachment insecurity, and physical health. Thus, the nonsignificant indirect findings of affect dysregulation may be due to the presence of attachment insecurity in our structural model. Such that, while affect dysregulation is associated with poor physical health, attachment insecurity has a greater impact on the development of later physical health. However, we did find that cumulative maltreatment experiences were linked to affect dysregulation among female but not male youth. Further research should continue to examine the disruption of attachment as a fundamental regulatory mechanism, linked to bio-behavioral stress regulation, for increasing risk for a range of poor health outcomes.

### 4.2. Maternal versus paternal maltreatment on female and male health status

Past research confirms that maternal maltreatment may have specific deleterious effects on affect dysregulation and internalizing symptoms (Moretti & Craig, 2013). The present findings showed that both maternal and paternal emotional maltreatment, and the cumulative number of maltreatment experiences, were related to physical health complaints through attachment insecurity. Additionally, we also found that paternal neglect was associated with poor physical health, through attachment insecurity, but not maternal neglect; and neglect was associated with attachment insecurity among male but not female youth. Recent evidence has found that among men and women with a history of childhood maltreatment and similar symptoms of psychopathology, hippocampal volume (implicated in experiences of stress and linked to poor physical health; Anand & Dhikav, 2012) was more greatly reduced among men than women (Samplin, Ikuta, Malhotra, Szeszeko, & DeRosse, 2013). While replication of these findings is important, the current findings support greater biological impact of stress on male youth than female youth at least in some health domains. Further research is also needed examining the unique effects of maternal versus paternal maltreatment within the home.

### 4.3. Strengths and limitations

While there are several limitations which warrant caution in the interpretation of these findings, this study does have a number of important strengths. First, this longitudinal study examines the impact of maltreatment on general physical health five years later, representing an advantage over retrospective studies that make up the majority in this literature and are prone to unreliable reporting

(Greger, Myhre, Lydersen, & Jozefiak, 2015). Second, we examined specific types of maltreatment perpetrated by mothers versus fathers and effects on female and male youth, adding greater specificity to prior literature. Finally, we investigated potential underlying mechanisms that are indirectly involved in determining the impact of adverse experiences on health outcomes, namely attachment security and affect regulation, adding new findings to the field and suggesting avenues to pursue in intervention.

Nonetheless, our findings must be considered within the context of several methodological limitations. First, our measure of maltreatment is based on adolescent self-reports of experiences across childhood and including adolescence, and we did not assess the age of onset of maltreatment. Thus, we were unable to compare the impact of maltreatment in early childhood versus adolescent development on physical health. Additionally, we did not examine reports of sexual abuse as concerns about collecting this information in clinical and forensic facilities limited our research protocol. As well, measures including attachment, affect regulation, and physical health were based on self-report information. Although future research should include records of physician assessment, there is evidence that youth are in an advantageous position to report on their experiences in these domains (Abar, Jackson, Colby, & Barnett, 2015; Chen, Ho, Lee, Wu, & Gau, 2017). Second, we did not assess pubertal stage, which may have been important to include as a covariate given its link with HPA activity (Viau et al., 2005). While controlling for health status upon entry in the study is important, clear and significant relationships between main study variables emerged. Relatedly, we focused on common physical health problems; however, the frequency of common health problems have been shown to be stable over long follow-up periods (11 years) and are predictive of allostatic load which is linked with physiological dysregulation and disease (Scott et al., 2011). Thus, this is a robust indicator of health status, unencumbered by low base rates of specific diseases that often can take years to emerge. Identification of early physical symptomatology in the form of common health complaints associated with experiences of adversity may have practical implications for early preventive measures.

#### 4.4. Conclusion

Experiences of maltreatment have been linked with poor physical health; however, little research has investigated the mechanisms through which this occurs. The present study demonstrated attachment insecurity may be an important mechanisms in the relationship between maltreatment and health problems. Attachment based interventions may hold promise in preventing or mitigating the health impacts of maltreatment given our findings that attachment plays a significant role in the relationship between maltreatment and health (Moretti, Pasalich, & O'Donnell, 2018). Because attachment is closely linked to the development of appropriate affect regulation strategies, focusing on attachment issues may improve youth resiliency to adversity and stress, and promote healthier mental and physical health outcomes.

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#### Conflicts of interest

The authors have no conflicts of interest relevant to this article to disclose.

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