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**Child abuse and psychopathy: Interplay, gender differences and biological correlates**

di Giacomo E *et al.* Child abuse and psychopathy

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**Abstract**

Child abuse is an important source of mental and physical adverse consequences for victims, their family, and their community. The impact of violence during childhood on the development of the victim is a very sensitive theme. Other than internalizing symptoms, it is interesting to analyze the possibility that a victim may assume the role of persecutor. With this aim, we evaluate Literature and examine the interplay among different types of child abuse (emotional neglect, emotional abuse, physical neglect, physical abuse and sexual abuse) and the development of psychopathy. We consider the role of post-traumatic stress disorder and that of personal environment as potential mediators between abuse and psychopathy. Furthermore, an in-depth analysis on possible differences due to the victim's gender is performed. Finally, analysis focused on genetic variants, such as the polymorphism of 5HTT and MAO-A, or a biological alteration, like the difference in daily cortisol levels that could be related to the development of psychopathy after a trauma.

**Key Words:** Child abuse; Sexual abuse; Physical abuse; Psychopathy; Neglect; Intergenerational transmission

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**Core Tip:** Childhood trauma and psychopathy are strictly related; emotional abuse, emotional neglect and physical abuse show stronger association with the development of psychopathy. Even if sexual abuse is more frequent in females, most researches did not find a significant correlation between psychopathy and sexual abuse in both genders. Furthermore, trauma is the hallmark of secondary psychopathy causing, in a fragile mind, the uprising of mental illness.

**INTRODUCTION**

Child abuse is a strong predictor of short and long term physical and mental illness. Five types of maltreatment are commonly recognized: Sexual, physical and emotional abuses (EAs) and physical and emotional neglect. Child sexual abuse is a serious concern with worldwide prevalence rates between 8%-31% for girls and 3%-17% for boys[1]. Every year, about 4%-16% of children are physically abused and one in ten is neglected or psychologically abused. During childhood, between 5% and 10% of girls and up to 5% of boys are exposed to penetrative sexual abuse, and up to three times higher numbers of children are exposed to any kind of sexual abuse[2].

Many research findings support the hypothesis that exposure to early life stress in the form of child abuse and/or neglect is associated with a huge increased vulnerability to major psychiatric and other medical disorders[3]. Research shows that children who have been physically or sexually abused have a greater risk of depression, suicidality, post-traumatic stress disorder, as well as antisocial personality disorder, psychopathic traits or psychopathy. Psychopathy is characterized by distinct interpersonal and affective traits (*e.g.,* manipulativeness, callousness), as well as a disinhibited, reckless lifestyle (*e.g.,* impulsivity, irresponsibility)[5].

The aim of the present narrative review is to evaluate the interplaybetween child abuse and psychopathy with special attention to gender differences and possible biological causes.

**PRIMARY AND SECONDARY PSYCHOPATHY**

An original theory differentiates the psychopathy in two subcategories: Primary psychopathy that have innate biological origins and could be characterized by low levels of anxiety and secondary psychopathy developed in response to adverse environmental experiences (Table 1). Primary psychopaths are incapable of emotions such as empathy and guilt, and so appear callous, cold, and lacking anxiety. In contrast, secondary psychopaths have a relatively normal capacity for emotional experience. Due to environmental stressors and trauma, however, they experience an excess of negative emotions and so exhibit high levels of anxiety and emotional distress, hostility, aggression, and impulsive behavior**.** Those differences would mirror the characteristics of the Psychopathy Checklist-Revised - PCL-R Factor 1 (F1; interpersonal and affective traits) and Factor 2 (F2; impulsive, antisocial, and chronically unstable lifestyle).

Dargis *et al*[5]studied the correlation between primary and secondary psychopathy (PCL:R) and trauma (Childhood Trauma Questionnaire-CTQ) in a sample of 110 psychopaths (PCL-R >30) *vs* 112 inmates (PCL-R < 30). The psychopaths were split in 2 subgroups: Low negative affect (LN, *n* = 72) and high negative affect (HN, *n* = 38). The HN subgroup scored significantly higher at the CTQ total score than the LN subgroup. In particular, the HN subgroup scored significantly higher in EA, PA, EN; while they did not differ for PN and SA. HN psychopaths scored higher than the other inmates at the CTQ total score and in all types of abuse except for SA. LN psychopaths significantly suffered more PA and PN than other inmates. The hallmark of the difference between secondary psychopathy (HN) and primary psychopathy (LN) was emotional neglect and EA that were significantly higher in HN compared to LN offenders suggesting that emotional maltreatment has specific associations with that subtype of psychopathy.

Schimmenti *et al*[6] evaluated the link between child abuse (CA) (measured with the Traumatic Experiences Checklist-TEC) and psychopathy (measured with Psychopathy Checklist-Revised - PCL-R) in 78 male prisoners. The EA was significantly related to the PCL-R total score, factor 1 (interpersonal/affective facets) and factor 2 (lifestyle/antisocial facets); while Physical abuse (PA) was linked only to factor 2. Furthermore PCL-R total scores were higher when EA occurred in childhood. As a consequence, the authors hypothesized a key role of EA in childhood; in fact, it was the best predictor of psychopathy scores and could distort the affective development of children, as implied in the construct of malignant narcissism, which has been theoretically proposed as a crucial dimension for understanding the inflated self-representation and lack of empathy among criminals.

Similarly, Borja *et al*[7] evaluated the relationship between several early traumatic events and psychopathy analyzing 194 male inmates with the PCL-R and the Early Trauma Inventory (ETI). They divided inmates in 3 subgroups: Those with low psychopathic levels (LP, *n* = 96, scoring 0-19 point at the PCL-R); inmates with medium psychopathy level (MP, *n* = 59, scoring from 20 to 29) and inmates with a high level of psychopathy (HP, *n* = 44, scores > 30). EA and SA were significantly higher in HP compared to LP group. Moreover PA was higher in MP *vs* LP and HP *vs* LP. After a regression analysis they found that early-life traumatic events and EA strongly influenced the PCL-R total score. Additionally HP and MP were exposed to more hostile environment than LP. Ometto and colleagues[8] underlined the relationship between abuse, detected through the CTQ, and the development of psychopathy (Psychopathy Checklist:Youth Version; PCL:YV) in 107 teenagers. The PCL:YV total score was positively correlated to the abuse and inversely correlated to the frequency of general social skill (measured with The Multidimensional Personality Questionnaire-Brief Form [MPQ-BF]). In the same study, Emotional neglect (EN) was positively related to the PCL:YV total factor and interpersonal, affective and lifestyle factors. PA was positively correlated to the PCL:YV total factor and affective, lifestyle and antisocial factors of the PCL:YV. Emotional and sexual abuse were not related to psychopathy. At a Multiple linear regression for the association of distinct types of maltreatment (CTQ) and social skills (Social Skills Inventory for Adolescents; SSIA) with psychopathic features (PCL: YV), EN was the only abuse related to psychopathy, especially with the interpersonal Factor.

Dargis *et al*[9] examined psychopathy (PCL:R) and trauma (CTQ) in 183 inmates and discovered a significant correlation between the CTQ total score and Psychopathy, in particular PA, PN, EN and EA were significantly related to the PCL:R but no significant relation with SA was found. Factor 2 (lifestyle and antisocial features load) was related to the CTQ total score while EA, EN, PA and Factor 4 (antisocial features) were related to PA and CTQ total score; no link between factor 1 and trauma was detected. Dargis and colleagues evaluated Antisocial Personality Disorder (ASPD), trauma and Conduct Disorder (CD): PA was the only form of trauma related to ASPD while CD was related exclusively to SA. With the same aim, Kolla *et al*[10] evaluated the link among ASPD, psychopathy (PCL-R) and trauma in 45 subjects divided in 3 subgroups: 10 inmates with ASPD and psychopathy (PCL-R > 25), 15 ASPD without psychopathy (PCL-R < 25) and 15 non offenders. The first group reported greater physical abuse during childhood but no more sexual or EAs than those without psychopathy.

**THE IMPACT OF POST TRAUMATIC STRESS DISORDER**

Another important variable that deserves consideration is the role of PTSD in the interplay between trauma and psychopathy; the work of Gobin *et al*[11] analyzed this variable in 88 inmates (51 females and 37 males) evaluating ASPD (Structured Clinical Interview for DSM Axis II Personality Disorders; SCID-II), trauma (CTQ), psychopathy (Psychopathic personality inventory; PPI) and PTSD (PTSD checklist civilian version). Physical and crime-related trauma were associated with ASPD, while sexual abuse was not. Victims of PA were 5.04 times more likely to be diagnosed with ASPD than those without history of PA. Likewise, inmates with history of crime related trauma were 2.92 more likely to be diagnosed with ASPD than those without. PA was confirmed as the only type of trauma related to psychopathy, whereas the severity of PTSD symptoms was not related to the PPI or ASPD. The role of PTSD was also examined by Woodfield *et al*[12] They underlined a relation between psychopathy (Self-report psychopathy scale-short Form; SRP-SF), trauma (The life events checklist; LEC-5) and PTSD (The Posttraumatic Stress Disorder-checklist Version 5). The total LEC-5 score was significantly related to both primary and secondary factors, but the secondary had a stronger correlation with trauma. More importantly, only the secondary facet of psychopathy had a correlation with PTSD, showing a key role in moderating the effect of trauma on the development of PTSD. Specifically, trauma exposure was positively associated with increased PTSD symptoms in individuals with low levels of secondary psychopathy, and negatively associated with PTSD symptoms with those with high levels of secondary psychopathy. These findings contribute to the understanding of the nature of the relationships between PTSD, psychopathic facets, and trauma exposure, as the association between trauma exposure and PTSD is explained by secondary but not primary psychopathic traits.

Craparo *et al*[13] examined the role of age in mediating the effect of trauma on the development of psychopathy. They measured traumatic experiences (TEC) and traits of psychopathy (PCL-R) in 22 male subjects and suggested that an early exposure to relational trauma in childhood can play a relevant role in the development of more severe psychopathic traits. Indeed, subjects with higher PCL-R score experienced relational traumatic events earlier in life compared to the rest of participants. There was also a significant negative association between age at first relational trauma and psychopathy scores.

**THE ROLE OF COMMUNITY VIOLENCE**

Another variable that needs to be taken in consideration is the role of violence in the community in the relationship between trauma and psychopathy.

Schraft *et al*[14]highlighted the effect of community violence (Community Experience Questionnaire; CEQ) on trauma (CTQ) and psychopathy (PCL:YV) in their work on 170 detained adolescents (147 males, 23 females). The CTQ total scorewas positively correlated to the PCL:YV total score and scores of the PCL:YV behavioral and antisocial factors. The CEQ total score positively correlated to the PCL:YV total scores, as well as to scores of interpersonal, behavioral, and antisocial factors. EA, PN and EN were associated with higher levels of psychopathic traits. Higher levels of traumatic exposure within home and community were associated with higher levels of psychopathic characteristics. Higher CEQ scores were related to higher scores in behavioral and antisocial facets of psychopathy.

**PSYCHOPATHY, TRAUMA AND DISSOCIATION**

Poythress *et al*[15] evaluated the role of Dissociative experiences (Dissociative experiences scale; DES) in the link between trauma (Child abuse and Trauma Scale; CATS) and psychopathy in 615 male inmates**.** Psychopathy, abuse, and dissociation scales were weakly but significantly associated one with another. Tests of correlation revealed that the lifestyle features of psychopathy were significantly more linked to abuse total scores than affective or interpersonal features. Furthermore, lifestyle feature of psychopathy was significantly more correlated to the DES total score than interpersonal features, but not to affective ones. Abuse was not related to interpersonal and affective features of psychopathy. In contrast, abuse exerted a direct effect on impulsive and irresponsible lifestyle, and that relationship was not mediated by dissociative experiences. Their research demonstrated that child abuse is positively linked, even if weakly, to psychopathy and moderately to the impulsive and irresponsible lifestyle of psychopaths without a significant mediation of dissociative symptoms.

**BIOLOGICAL CORRELATES**

Different studies analyzed the role of biological alterations that may link trauma and psychopathy (Table 2). Cima and colleagues[16] evaluated variations of salivary cortisol in 47 (24 psychopath and 21 non psychopath) inmates tested with the PPI scale for psychopathy, the CTQ for childhood trauma, compared to the group of non-psychopaths -control group (27 males). The salivary cortisol was analyzed four times a day at 8 am, 11am, 2pm and 4pm. Criminals, non-psychopathic as well as psychopathic, reported significantly more traumatic childhood experiences than the control group and the non-psychopathic criminals did not differ from psychopathic criminals except for PN, which difference was significant. Trauma and salivary cortisol were not related in the whole sample.

Nevertheless, they found a reduction on the Daily Average Cortisol (DAC) in psychopaths that was also significantly related to PA. Besides, the cortisol area under the curve (AUC) in that group was related to EA and EN, the diurnal cortisol slope was related to PN with a significant relation between the PPI total score and DAC. Traumatic experiences, in that group, was also positively related to impulsive nonplanfullness (fourth subscale of the PPI) and external blame attribution factor on the PPI, while there was a negative association between traumatic childhood experiences, cold-heartedness and stress immunity. The crucial finding of this study was the evidence of hypoarousal in psychopaths with a reduction of the diurnal cortisol compared to non-psychopaths. This finding fits with the notion that non-psychopathic offenders are more reactive, emotional delinquents, while psychopathic offenders are more instrumental and cold-blooded.

Two studies analyzed monoamine oxidase-A (MAO-A) and 5-hydroxyindoleacetic acid transporter (5HTT) alterations in connection to psychopathy and trauma. Sadeh *et al*[17] analyzed 237 inmates with the CTQ and the PCL:SV, and their genetic variations of 5HTT and MAO-A were detected from saliva samples. The PCL:SV factor 1 (interpersonal/affective facets) was higher in 5HTT long/Long allele *vs* short/short, but it was not found an etiological explanation linking trauma, psychopathy and genetic alterations. The PCL:SV factor 2 (lifestyle/antisocial facets) was higher in people with the MAO-A variant with low activity *vs* high activity moreover 5HTT long/Long have higher PCL:SV factor 2 than short/short. In particular MAO-A genotype was most consistently associated with the impulsive and irresponsible traits of the Lifestyle factor. Interestingly, no correlation was found between genetic alteration and the trauma-psychopathy link. Likewise, in the work of Hollebarch *et al*[18], which evaluated trauma (CTQ), psychopathy (Self-Reported Psychopathy scale) and the MAO-A uVNTR genotype in a sample of 2796 people, MAO-A uVNTR genotype was significantly associated to general psychopathy in women, meaning that women with the MAOA-L genotype had slightly higher levels of psychopathy compared to their MAOA-H counterparts, but they did not find the same in men. Childhood trauma was associated with psychopathic traits in adults, both in men and women. They did not find any interaction between MAOA uVNTR genotype and any traumatic factor on psychopathic traits. Their results suggest that psychopathy in general, and social deviance in particular, were associated with childhood trauma in men and women, and that psychopathic traits are subject to variation of the MAOA uVNTR genotype in women. Hollebarch and colleagues[18]discovered that the “childhood trauma” factor was not influenced by a variation of MAO-A in men, while women with MAOA-H genotype showed a slightly higher scores of PN, EN and EA. In general, no significant link that could explain the influence of trauma on psychopathy has been discovered yet. We could explain this result with the primary and secondary psychopathy theory, according to which the primary psychopathy has a genetic cause that determines the onset of the illness whereas the secondary psychopathy has traumatic and problematic environmental reasons as etiological causes. Further genetic study might explain the role of the genetic alterations that support the onset of psychopathy.

**GENDER DIFFERENCES IN THE RELATIONSHIP BETWEEN TRAUMA AND PSYCHOPATHY**

Watts *et al*[19] analyzed trauma (CTQ) and psychopathy (Levenson self-report psychopathy scale) in a non-forensic sample of 1169 subjects (73% female)(Table 3). They underlined two gender differences: the first one was the relation between boldness and childhood neglect that was negative or small to moderate in males but almost absent in females. The second was the relation between disinhibition, meanness and childhood maltreatment that was stronger for males than females. In their sample, men suffered more child abuse than women with the exception of sexual and EAs that were more frequent in females.

Thomson and colleagues[20] evaluated the role of sex differences in the association between the 4-facet model of psychopathy (PCL-SV) (interpersonal, affective, lifestyle, antisocial) and aggression (physical, verbal, and indirect), and LPA (Lifetime Physical Abuse) in a sample of 369 males and 204 females. The relation between physical aggression and affective facet of psychopathy was significant in both genders. High affective traits predicted physical aggression in women with a history of physical abuse but not in women without it. Instead, physical aggression was predicted by low affective traits in men with a history of physical abuse while lower levels of physical aggression were associated with low affective traits in men without a history of physical abuse. Moreover, verbal aggression was significantly related to the antisocial factor of psychopathy in women. Furthermore, high antisocial traits predicted verbal aggression exclusively in men who suffered from physical abuse.

Gender differences were also analyzed by Sevecke *et al***[**21]. They studied 170 male and 171 female adolescent detainees using the CTQ, the PCL-YV and the Dimensional Assessment of Personality Pathology Basic Questionnaire (DAPP-BQ) for personality assessment. They found that gender was a strong predictor of the PCL:YV total score and all four psychopathy dimensions; incarcerated male adolescents had a significantly higher PCL:YV total score as well as all four psychopathy dimensions than incarcerated female adolescents. The PA was related to the antisocial facet of the PCL-YV in both males and females and it was also related to the interpersonal facet in males. No relation was found between SA and psychopathy in both genders. Interestingly, the subjects who did not suffer from PA had a stronger association between emotional dysregulation and psychopathy than those who reported PA. Opposite to the study of Sveiche *et al* (no reference), Lansing *et al*[22] did not find any significant difference on the psychopathy scale in males compared to females. Women had higher frequencies of emotional and sexual abuse than men. In particular EA was the most frequent abuse for EOPD (Early onset persistent delinquent) girls while PA was the most common abuse among EOPD boys. Nearly half of the girls in their sample suffered from SA which was infrequently reported by boys. A significant correlation between psychopathy and abuse was documented only in women and it resulted particularly strong with EA. Lansing and colleagues supported a lack of significant relation between psychopathy and SA in men, and between PA and psychopathy in women. Kricher and colleagues[23]examined 185 adolescent inmates *vs* 98 students (control group) and discovered that abuse was more frequent among inmates than in the control group; women, in particular, reported significantly more emotional, sexual and physical abuses than men. Contrasting with previous studies, neither the PCL: YV total score, or any of its four factors significantly differed between abused and non-abused women except for the Factor 4 (antisocial psychopathy) that significantly correlated to Emotional Neglect in delinquent girls. Instead, boys that suffered PA had higher PCL-YV total scores as well as higher Affective and Antisocial Factors. Furthermore, they showed poorer Anger Control, more Irresponsibility and more Serious Criminal Behavior. Likewise, boys who reported EA were also characterized by significantly higher scores in the Antisocial Factor of the PCL-YV. Authors discovered a significant correlation between the Affective Factor 2 and Physical Abuse and between the Interpersonal Factor 1 of the PCL-YV and Emotional Neglect in male inmates. In contrast with Kricher *et al*[24], Farina and colleagues found a significant relation between trauma and psychopathy in both males and females. Their sample was recruited in 2 different penitentiaries: 253 inmates from Pennsylvania and 723 in Missouri, tested with the YPI and PPI-SF scale for psychopathy and the CTQ for trauma. In the Pennsylvania sample they found significantly more SA and EA in females than in males. Psychopathy was associated with physical and EAs in both male and female juvenile offenders with stronger association in girls. No correlation was found between SA and psychopathy in both genders. Another important variable they evaluated was the impact of PTSD in the relation between trauma and psychopathy in males and females. Blonigen *et al*[25]considered a sample of inmate women (26 of whom had a PCL-R > 30). Interpersonal and affective facets of psychopathy were unrelated to Potentially traumatic events (PET) or PTSD. Instead, they found a significant relation among antisocial facet and PET; furthermore, antisocial facet was uniquely associated with PTSD too. The lifestyle facet was preferentially linked to abuse in adulthood and antisocial facet to abuse in childhood. Moreover, both PTE and PTSD were related to the factor 2 of psychopathy, known as the externalizing spectrum of psychopathy. The theory of primary and secondary psychopathy was also investigated in the study of Hicks *et al*[26] They evaluated psychopathy (PCL-R) with a different cut off (25), splitting the sample in 2 groups: 70 psychopaths and 70 controls. Out of 70 psychopaths, 31 were primary and 39 were secondary psychopaths. The secondary psychopaths had personality traits of negative emotionality and low behavioral constraint, more substance use disorder, more violent behavior and more mental health problems including symptoms of post-traumatic stress disorder and suicide attempts than primary psychopaths. The secondary psychopaths suffered more PA than controls prisoners or primary psychopaths. Instead, primary psychopaths experienced significantly more SA than controls. Moreover, secondary psychopaths reported significantly more PTSD symptoms, history of mental health treatments and suicidal attempts than control or primary psychopaths. An interesting finding was that primary psychopaths had lower rates of suicide attempts, though those rates did not differ significantly from that of control prisoners.

**DISCUSSION**

Child abuse is a serious public concern with adverse short and long term consequences. The aim of the present narrative review is the identification of the development of psychopathic traits in victims, with a special attention to gender differences and biological reasons.

Primary psychopaths, who are those characterized by a low level of anxiety and lack of emotions and sense of guilt, suffer less emotional maltreatments than secondary psychopaths, thus confirming the development of that subtype of psychopathy (secondary) in response to adverse experiences. In accordance, EA and neglect are related to affective facet with higher level of psychopathy at the PCL-R if EA occurs during childhood.

The severity of psychopathy is also linked to the moment of exposure to relational trauma with more serious traits in case of early exposure during childhood. Traumatic exposure to domestic violence or violence in the community is linked to higher degrees of psychopathy. Dissociative symptoms as well as post-traumatic stress disorder demonstrate weak association in the development of psychopathy after a childhood trauma. Similarly, biological correlates that could justify the development of psychopathy in response to traumatic experiences have not been demonstrated yet, even if women show a variation in the MAOA uVNTR genotype might be associated with psychopathic traits in victims of childhood trauma. Generally speaking, men show stronger psychopathic traits at the PCL-R and all psychopathic dimensions. A strong gender-oriented difference among several abuses and the development of psychopathy has not been highlighted yet. Sexual abuse has not been linked to higher levels of psychopathy, but it is the only type of abuse that shows higher frequency in primary psychopaths. This evidence is controversial because the severe adverse consequences of sexual abuse are well documented. It is feasible that sexual abuse might be less reported or disclosed, especially by men, due to stigmatization often linked to this type of abuse.

Although some kinds of abuse are associated with increased risk of developing psychopathy, with gender-oriented differences, the lack of biological explanations still limit knowledge on primary psychopathy.

**CONCLUSION**

Our work highlights a significant relation between trauma and psychopathy: EA, emotional neglect and physical abuse are the most frequent types of abuse related to psychopathy in males and females. Sexual abuse was the only kind of abuse that did not show a significant relation with psychopathy in most studies that we analyzed even if it was more frequent in women than men. A biological background, able to promote the onset of psychopathy is plausible and should be further investigated. Trauma is the key etiological factor of secondary psychopathy.

The most frequent limitations we detected were evaluations with self-reported scales since psychopaths have a high inclination to lie. Moreover, almost every study investigates inmates, a population with a more frequent history of trauma that could biased the impact of trauma on psychopathy.

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**Footnotes**

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**Table 1 Primary and secondary psychopathy**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ref.** | **Sample (women, %)** | **Tests** | **Significant association** |
| Borja and Ostrosky[7], 2013 | 194 (0) | ETI - PCL-R | EA, SA (HP *vs* LP) and PA (HP, MP *vs* LP) |
| Craparo *et al*[13], 2013 | 22 (0) | TEC - PCL-R | Total score (early exposure) |
| Dargis *et al*[9], 2017 | 183 (0) | CTQ - PCL-R | Total score, EA, EN, PA and PN |
| Dargis *et al*[5], 2018 | 222 (0) | CTQ - PCL-R | Total score, EA, EN, PA, PN (HN); PA and PN (LH) |
| Gobin *et al*[11], 2015 | 88 (57.95) | CTQ - PPI | PA |
| Kolla *et al*[10], 2013 | 45 (0) | ETI - PCL-R | PA |
| Ometto *et al*[8], 2016 | 107 (43.92) | CTQ - PCL:YV | Total score, EN and PA  |
| Poythress *et al*[15], 2006 | 615 (0) | CATS - PPI | Total score |
| Schimmenti *et al*[6], 2015 | 78 (0) | TEC - PCL-R | EA and PA (only to factor 2) |
| Schraft *et al*[14], 2013 | 170 (15.64) | CTQ - PCL:YV | Total score, EA, EN, PN |
| Woodfield *et al*[12], 2016 | 101 (0) | LEC-5 - SRP-SF | Total score |

HN: High negative affect;LN: Low negative affect; LP: Low psychopathy levels; MP: Medium psychopathy level;HP: High psychopathy level; PA: Physical abuse; EN: Emotional neglect.

**Table 2 Different studies analyzed the role of biological alterations that may link trauma and psychopathy**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ref.** | **Sample (women, %)** | **Tests** | **Significant association**  | **Biological analysis** |
| Cima *et al*[16], 2008 | 47 (0) | CTQ - PPI | PN (Psychopath *vs* inmates not psychopath) | DAC (related to PN) reduction in psychopath; AUC related to EA, EN |
| Hollerbach *et al*[18], 2018 | 2796 (45.24) | CTQ- SRPS | Total score | Total score in women (MAOA-L); MAOA-L in women related to EA, EN and PN |
| Sadeh *et al*[17], 2013 | 237 (0) | CTQ-PCL:SV | ns | F1 (5HTT long/long *vs* 5HTT short/short; F2 (MAOA-L *vs* MAOA-H) |

DAC: Daily average cortisol; AUC: Cortisol area under curve; F1: Factor 1 of PCL:SV; F2: Factor 2 of PCL:SV; MAOA-L: MAO-A low activity; MAOA-H: MAO-A high activity.

**Table 3 Trauma and psychopathy in a non-forensic sample of 1169 subjects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ref.** | **Sample (women, %)** | **Tests** | **Significant association in men** | **Significant association in women** |
| Blonigen *et al*[25], 2012 | 226 (100) | PTE-PCL-R | / | Total score (AF)  |
| Farina *et al*[24], 2018 | 976(19.98); P:253 (45); M:723 (13) | MAYSI-2+ CTQ- YPI +PPI-SF | PA, EA | PA, EA |
| Hicks *et al*[26], 2011 | 140 (100); 31 Pr, 39 Sc | I-PCL-R | / | PA (Sc); SA (Pr19) |
| Krischer *et al*[23], 2008 | 283 (47.43) | CTQ- PCL:YV | PA (total score, AFC and AF); EA (AF) | EN (related with AF) |
| Lansing *et al*[22], 2018 | 107 (52.23) | CTQ- YPI | Ns | EA |
| Sevecke *et al*[21], 2016 | 341(50.14) | CTQ - PCL:YV | PA (related to AF and IF) | PA (related to AF) |
| Thomson *et al*[20], 2019 | 573 (35.60) | LPA + AQ - PCL-SV | PAG (affective facet of psychopathy); LATrelated to PAG in history of PA | PAG (related to AF); HATrelated to PAG; in history of PA; VA4 (related to ANF5) |
| Watts *et al*[19], 2017 | 1169 (73) | CTQ - LPS | Child abuse (more frequent in male) | EA, SA (more frequent in female) |

LPS: Levenson self-report psychopathy scale; HAT: High affective trait; PAG: Physical aggression; VA: Verbal aggression; ANF: Antisocial factor of psychopathy;LPA: Lifetime physical abuse;AQ: Aggression questionnaire; LAT: Low affective trait; AF: Antisocial factor of psychopathy; IF: Interpersonal factor of psychopathy; YPI: Youth Psychopathic Trait Inventory; AFC: Affective factor of psychopathy; MAYSI-2: Youth Screening Instrument Version 2 Traumatic Experiences Scale; PPI-SF: Psychopathic Personality Inventory-Short Form; P: Pennsylvania; M: Missouri; PTE: Potentially traumatic events; I: Interview, interview, prison file, and responses on the life events checklis;Pr: Primary psychopaths; Sc: Secondary psychopaths.