Incarcerated youths with high or low callous-unemotional traits:

A comparison controlling for age of crime onset

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Abstract

The aim of this study was to analyze the relevance of callous-unemotional (CU) traits in incarcerated juvenile delinquents. A sample of 160 incarcerated male youths was used. Results showed that youths with high CU traits had an earlier age of crime onset and of trouble with the law, and also had higher levels of conduct disorder. When controlling for age of crime onset, youths with high CU traits showed higher levels of general psychopathic traits and of psychopathy taxon membership as well as lower levels of prosocial behavior, but no differences were found for self-reported delinquency, crime seriousness, impulsivity-conduct problems, and general conduct problems. Also, no significant associations of CU traits with self-reported delinquency and crime seriousness were found when controlling for age of crime onset. Future studies of CU traits should take into account the specific importance of age of onset.

Keywords: juvenile delinquency; callous-unemotional traits; age of onset; psychopathic traits; conduct problems

Research has shown that adults with psychopathic traits tend to engage in more violent, aggressive, and persistent antisocial and criminal behaviors (e.g., Douglas, Vincent, & Edens, 2006; Porter & Woodworth, 2006). Consistent with the adult literature, more recent research has suggested that those youth with high levels of callous-unemotional (CU) traits are a particularly important subgroup of antisocial youth, i.e., this subgroup tends to engage in more severe, persistent, and aggressive types of behaviors and also show particularly poor treatment responses compared to antisocial youth with normative levels of CU traits (Edens, Campbell, & Weir, 2007; Frick, 2009; Frick & White, 2008; Kahn, Byrd, & Pardini, 2013; Salekin & Lynam, 2010). Additionally, there is evidence that this subgroup of antisocial youth has distinct causal processes that explain their antisocial behaviors compared to other antisocial youth. For instance, research consistently finds that antisocial youth with elevated levels of CU traits have diminished responses to negative emotions (e.g., signs of distress or fear in others) and are less responsive to cues of punishment, particularly when reward dominant response sets are primed (see Frick, Ray, Thornton, & Kahn, 2013 for a review). Therefore, CU traits probably have forensic and clinical relevance for identifying a subgroup of antisocial youth with unique etiologies and particularly severe and persistent behavior problems.

The research literature presently available encouraged the inclusion of CU traits as a specifier for Conduct Disorder in the Fifth Edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5; American Psychiatric Association, 2013). This specifier (designated "with Limited Prosocial Emotions" to avoid potential harmful labeling effects) will be used to identify those individuals who are diagnosed with conduct disorder and who also show two of four CU characteristics in two or more settings (e.g., school, home), namely: lack of remorse or guilt, callous-lack of empathy,

unconcern about performance in important activities, and shallow or deficient affect. Frick and Moffitt (2010) and Moffitt et al. (2008) highlight the need for research that focuses on advancing the measurement of CU traits. There have been several recent notable studies that have already began such endeavors (e.g., Hawes et al., 2013; Kimonis et al., 2014); however, more research is needed to better understand how to best capture these traits for forensic, clinical, and research purposes.

The age of onset of antisocial behavior has been consistently confirmed as one of the most critical pieces of information in understanding maladaptive behaviors, substance use, alcoholism, delinquency, and criminal justice system involvement; antisocial behaviors that emerge during childhood are often harbingers of sustained antisocial behavior that persists through adolescence and endures into adulthood (DeLisi, Beaver, Wright, & Vaughn, 2008; DeLisi, Neppl, Lohman, Vaughn, & Shook, 2013; McCuish, Corrado, Lussier, & Hart, 2014; Vaughn & Howard, 2005). Approximately 6% to 8% of males commit an estimated 50% to 70% of general crimes and an estimated 60% to 85% of the serious and violent crimes (e.g., Loeber, Farrington, & Waschbusch, 1998; Tolan & Gorman-Smith, 1998). It has been consistently demonstrated that this small group was different from other offenders and non-offenders, not only in the harm they imposed and in the age of initiation of criminal behavior but also in the likelihood of continuing criminal behavior into adulthood, increasing seriousness of their crimes.

Researchers who support the age of onset subtyping approach have identified two main groups of individuals: the "early starters" (Patterson, DeBaryshe, & Ramsey, 1989) or "life-course-persistent" (Loeber & Stouthamer-Loeber, 1998; Moffitt, 1993), who commit their first transgression early and persist in offending throughout the lifespan; and the "late starters" (Patterson et al., 1989), "adolescence-limited" (Moffitt,

1993), or "limited duration" (Loeber & Stouthamer-Loeber, 1998). Operational definitions of early onset of antisocial behavior generally specify a beginning before age 11 or 12 (Parker & Morton, 2009). The importance of the age-of-onset distinction is recognised by the two subtypes of Conduct Disorder (CD) present in the DSM-IV (American Psychiatric Association [APA], 1994) and in the more recent DSM-5 (APA, 2013): a childhood-onset type characterized by onset prior to age 10, and an adolescent-onset type characterized by onset after age 10.

It is known that childhood-onset individuals consistently show a more aggressive and stable pattern of antisocial behavior, more severe temperamental and neuropsychological risk factors, and higher rates of CU traits than adolescent-onset individuals (Bauer, Whitman, & Kosson, 2011; Brandt et al., 1997; Dandreaux & Frick, 2009; Moffitt, 2006; Silverthorn, Frick, & Reynolds, 2001). However, despite the recent evidence that CU traits are most promising for delineating a distinct subgroup of antisocial youth, it still remains unclear how these traits are related with the more traditionally established age of onset subtyping scheme and what exactly is their specific incremental relevance.

Some studies point to the utility of CU traits (see Frick & White, 2008), namely concluding that youths with childhood-onset of CD and with or without CU traits show statistically significant differences in terms of personality, cognitive, and emotional characteristics. Dadds, Fraser, Frost, and Hawes (2005), using a community sample of children (age range 4-9 years) revealed that CU traits formed a separate factor from conduct problems and predicted more severe antisocial behavior one year later controlling for the initial level of conduct problems. Viding, Blair, Moffitt, and Plomin (2005), using a community sample of 7-year old twins, showed that CU traits identified a distinct group of children within those with high conduct problems, concluding that

the group with CU traits had an higher genetic risk associated to their problem behavior. Loeber et al. (2005), using a community sample of high-risk preadolescents (age range 7-13 years) followed into adulthood, concluded that CU traits could significantly differentiate violent offenders from non-violent offenders.

A few recent important studies suggest that CU traits (or more general psychopathic traits) predicted more severe antisocial outcomes even when specifically controlling for age of onset. Vitacco, Caldwell, van Rybroek, and Gabel (2007), using a forensic sample of youths (age range 12-17 years, showed that CU traits were associated with extent of victim injury when controlling for the effects of age of onset (and also CD, and criminal versatility). Stickle, Kirkpatrick, and Brush (2009), using a forensic sample of youths (age range 11-17 years), demonstrated that CU traits explained self-reported aggression even after controlling for early onset of antisocial behavior (and impulsivity). McMahon Witkiewitz, Kotler, and The Conduct Problems Prevention Research Group (2010), using a high-risk community sample assessed in the 7th grade, showed that CU traits significantly predicted adult antisocial outcomes after controlling for childhood onset of CD (and also ADHD, CD, and ODD), i.e., those with both elevated CU traits and CD showed greater tendency than those with CD only for antisocial outcomes (e.g., arrests).

CU traits are rapidly becoming an important area of study, but there is a lack of research on this topic, especially with European samples (Frick et al., 2014). To our knowledge this is the first study examining the relevance of the specific interplay between CU traits and age of onset in a forensic sample of Portuguese adolescents. Considering the theoretical framework mentioned above, this study aimed to test two hypotheses: a) participants with higher CU traits show significantly higher values of self-reported delinquent behaviors, crime seriousness, general psychopathic traits,

psychopathy taxon membership, behavior problems, as well as lower values of prosocial behavior after controlling for age of onset; b) scores obtained from self-reported delinquent behaviors, crime seriousness, general psychopathic traits, psychopathy taxon membership, behavior problems, prosocial behavior are significantly associated with high or low CU traits after controlling for age of onset.

Method

Participants

The sample was made up of 160 participants ($M = 16.01$ years, $SD = 1.17$ years, range = 13-18 years) recruited from Juvenile Detention Centers; of this total, 88 participants formed the Low CU traits group ($M = 16.10$ years, $SD = 1.30$ years, range = 14-18 years) and 88 participants formed the High CU traits group ($M = 15.91$ years, $SD = 1.02$ years, range = 13-18 years). They were detained by the court's decision.

Instruments

The Antisocial Process Screening Device–Self-report (APSD-SR; Frick & Hare, 2001; Caputo et al., 1999) is a multi-dimensional 20-item measure designed to assess psychopathic traits in adolescents. It was modeled after the Psychopathy Checklist - Revised (PCL-R; Hare, 2003). Each item (e.g., "You lie easily and skillfully") is scored on a 3-point ordinal scale (0 = *Never*, 1 = *Sometimes*, 2 = *Often*); higher scores mean an increased presence of the traits in question. The total score, as well as each dimension score, is obtained by adding the respective items. Some studies (e.g., Frick et al., 1994) reported two main factors: callous/unemotional traits (CU, tapping interpersonal and affective dimensions of psychopathy, such as lack of guilt and absence of empathy) and an impulsivity/conduct problems factor (I-CP, tapping behavioral aspects of conduct

problems and impulse control problems). Frick, Barry, and Bodin (2000) in a community sample reported three main factors: callous/unemotional traits factor (CU) and an I-CP factor which is subdivided into two further factors, namely narcissism (Nar) and impulsivity (Imp). Higher scores indicate an increased presence of the characteristics associated with each factor. The Portuguese version of the APSD-SR was used (Pechorro, Marôco, Poiares, & Vieira, 2013). The internal consistency for the present study, estimated by Cronbach's alpha, was: APSD-SR total = .71, APSD-SR I-CP = .77, and APSD-SR CU = .59. Although rather low, the values obtained for the CU dimension were similar to those obtained by other studies (e.g., Colins, Bijttebier, Broekaert, & Andershed, 2014; Poythress et al., 2006).

The Child and Adolescent Taxon Scale (CATS; Quinsey, Harris, Rice, & Cormier, 2006) is an actuarial rating scale developed from variables related to childhood and adolescent antisocial and aggressive characteristics (e.g., "Childhood aggression problem"). This scale has eight items scored either 0 (*no*) or 1 (*yes*). The total score is obtained by adding the items. Higher scores mean higher psychopathic-like characteristics. Because the CATS is an actuarial scale no internal consistency was calculated.

The Strengths and Difficulties Questionnaire–Self-response (SDQ-SR; Goodman, Meltzer,& Bailey, 1998) is a short behavioral questionnaire aimed at pre-adolescents and adolescents made up of 25 items (e.g., "I am kind to younger children"), rated on a 3-point ordinal scale (0 = *Never*, 1 = *Somewhat true*, 2 = *Often*). The SDQ consists of five dimensions: Emotional symptoms (ES), Conduct problems (CP), Hyperactivity (H), Peer problems (PP), and Prosocial behavior (P). The scores for emotional symptoms, conduct problems, hyperactivity and peer problems are summed to generate a total difficulties score (TDS) ranging from 0 to 40; the prosocial score is

not incorporated into the TDS since the absence of prosocial behaviors is conceptually different from the presence of psychological difficulties. The official Portuguese translation of the SDQ-SR was used (Pechorro, Poiares, & Vieira, 2011). Internal consistency for the present study, estimated by Cronbach's alpha, was: SDQ-SR TDS = .64, SDQ-SR Prosocial = .69. These values are somewhat low but still acceptable for research purposes (DeVellis, 1991).

The Adapted Self-Reported Delinquency Scale (ASRDS; Carroll, Durkin, Houghton, & Hattie, 1996; Carroll, Houghton, Durkin, & Hattie, 2009) is a self-report measure consisting of 38 items (e.g., "Stolen and driven a car") which assess adolescent involvement in illegal and antisocial activities. The ASRDS score can be obtained by adding the items from a 3-point ordinal scale (0 = *Never*, 1 = *Sometimes*, 2 = *Frequently*), where higher scores signify greater involvement in criminal activities. A Portuguese version of the ASRDS was used (Pechorro et al., in press). Pechorro (2011) was able to demonstrate psychometric properties that justify its use with the Portuguese adolescent population in terms of factorial validity, internal consistency (Cronbach's α = .96), temporal stability (r = .88; $p \leq .01$), discriminant validity (Λ Wilks = .51; χ^2 = 508.88; $p \leq .001$), divergent validity (r = -.13; $p \leq .01$), convergent validity (r = .66; $p \leq .01$), concurrent validity (r_{pb} = .40; $p \leq .01$), retrospective validity (r = -.44; $p \leq .01$), cutoff score (CS = 16, sensibility = 86.4%, specificity = 85.5%, ROC = .86), corrected item-total correlation (range = .32 − .80) and average inter-item correlation (.38). The internal consistency, estimated by Cronbach's alpha, regarding this study was .91.

The delinquency seriousness classification of the official court reports was guided by the Sellin-Wolfgang Index of Crime Seriousness (ICS; Wolfgang et al., as cited in White et al., 1994). Level 0 consisted of no delinquency. Level 1 consisted of minor delinquency committed at home, such as stealing minor amounts of money from

mother's purse. Level 2 consisted of minor delinquency outside the home including shoplifting something worth less than €5, vandalism and minor fraud (e.g., not paying bus fare). Level 3 consisted of moderately serious delinquency such as any theft over €5, gang fighting, carrying weapons, and joyriding. Level 4 consisted of serious delinquency such as car theft and breaking and entering. Level 5 consisted of having performed at least two of each of the behaviors in level 4.

In addition, a questionnaire was constructed to describe the socio-demographic and criminal characteristics of the participants. This questionnaire included questions about participants' age, nationality, ethnic group, rural *versus* urban origin, years of schooling completed, socio-economic status, parents' marital status, nationality, number of siblings/half-siblings, taking of psychiatric drugs, age of first transgression, age of first problem with the law and age of first incarceration in a Juvenile Detention Center. Socio-economic status was measured by a combination of the parent's level of education and profession, appropriate to the Portuguese context (Simões, 1994).

Procedures

The age range for youth participation in the study was previously set between 12 and 20 years since this is the age range when young people are amenable to interventions under the Portuguese judicial system's Educational Guardianship Act (*Lei Tutelar-Educativa*) and can be diagnosed as having conduct disorder. We chose to use male participants only because very few girls are admitted to the Portuguese Juvenile Detention Centers (*Centros Educativos*). Each questionnaire was preceded by an informed consent form, in which participants were informed of the voluntary and confidential nature of their participation in the study.

Collection of questionnaires was carried out individually after obtaining authorization from the General Directorate of Reintegration and Prison Services – Ministry of Justice (*Direção-Geral de Reinserção e Serviços Prisionais – Ministério da Justiça*). All the detainees from the existing Juvenile Detention Centers managed by the Portuguese Ministry of Justice were informed about the nature of the study and asked to participate. The participation rate was around 91%. Not all young people agreed or were able to participate; reasons included refusal to participate (5%), inability to participate due to not understanding the language (2%) and inability to participate due to security issues (2%). The directors of each Detention Center collaborated personally with the main author of this study in order to motivate youths to participate in the study, clarifying any questions that arose regarding participation. All questionnaires of those who participated were appropriately completed. No material incentives to encourage participation were given. The measures were administered by means of individual face-to-face interviews in an appropriate setting. It was stressed that there were no right or wrong answers and that for each item the youth should consider what he generally thinks or feels. Some of the information (e.g., socio-demographic variables) was obtained from self-reports. Institutional files were used to complement the information obtained (e.g., prior criminal activity and detentions). The first author made the diagnosis of Conduct Disorder (American Psychiatric Association, 2013) on the basis of an interview with each youth and reading of the institutional case-files (which in some cases also included previous official psychiatric diagnosis and psychological assessments), while blind to posterior group membership.

Questionnaire data which were considered valid (i.e., appropriately completed by male participants within the selected age range) were analyzed using SPSS v22 (IBM SPSS, 2013). Following data entry, 50% of the questionnaires were randomly selected

so as to evaluate the quality of their entry; the quality was considered very good as practically no entry errors were detected. Then the two groups were formed based on the median score obtained by participants on the CU dimension of the APSD-SR. Thirty-nine participants (with a *Mdn* = 5) were excluded in order to maximise differentiation between high CU scorers (CU+: *n* = 88) and low CU scorers (CU-: *n* = 88). The remaining participants were then approximately matched *a posteriori* on age, socio-economic status and ethnicity to control for the possible confounding effects of these variables (i.e., to obtain no statistically significant differences between the groups with regard to these variables) and create equal group sizes; eighteen participants that could not be matched were also excluded.

The Chi-square test was used to compare nominal variables, and Mann-Whitney's *U* test was used when the variables were ordinal (Leech, Barrett, & Morgan, 2008). ANCOVAS were used to jointly analyze the multiple dependent variables, while controlling for the age of criminal onset covariable. The fact the group sizes were identical provided robustness to meet the homogeneous regression slopes and the homogeneous variance/covariance assumptions (Maroco, 2014). Point-biserial correlations and partial point-biserial correlations were used to analyze the association between dichotomous variables and scale variables.

Effect size and power calculations were made (as described in Marôco, 2014) to clarify the degree of accuracy/reliability of the statistical judgments and the strength of the relationship between the variables. The following values were obtained regarding the ANCOVAS: APSD-SR Total (η_p^2 = .20; power = 1); APSD-SR I-CP (η_p^2 = .00; power = .09); APSD-SR CU (η_p^2 = .75; power = 1); CATS (η_p^2 = .04; power = .73); SDQ-SR TDS (η_p^2 = .01; power = .23); SDQ-SR P (η_p^2 = .16; power = 1); ASRDS (η_p^2 = .01; power = .28); ICS (η_p^2 = .04; power = .31).

Results

In the initial phase of data treatment, variables of the socio-demographic questionnaire were analyzed. No statistically significant differences were found between the Low CU traits group and the High CU traits group regarding the variables age ($F = 1.031$; $p = .31$), ethnicity ($\chi^2 = 1.354$; $p = .73$), years of schooling completed ($F = 3.256$; $p = .07$), socio-economic level ($U = 2961.5$; $p = .22$), parents' marital status ($\chi^2 = 8.91$; $p = .06$), number of siblings/half-siblings ($F = .004$; $p = .95$), nationality ($\chi^2 = 1.444$; $p = .80$), rural *versus* urban origin ($\chi^2 = .00$; $p = 1$), and the taking of psychiatric drugs ($\chi^2 = 1.242$; $p = .35$). The criminal variables were then analyzed, with the results showing statistically significant differences between the Low CU traits group and the High CU traits group regarding age of crime onset ($F = 6.022$; $p \leq .05$), and age of first problem with the law ($F = 11.938$; $p \leq .001$), but not regarding age of first entry into a Juvenile Detention Center ($F = 2.767$; $p = .10$). Statistically significant differences were found in DSM-5's Conduct Disorder (APA, 2013) diagnosis ($\chi^2 = 7.828$; $p \leq .01$), with the High CU traits group having a greater proportion of diagnosed youths. In terms of the total sample a very high prevalence rate of CD was found, namely 91.3%.

Table 1 displays the results of the ANCOVAS controlling for the age of criminal onset covariable. Some statistically significant differences were found when comparing the Low CU traits and the High CU traits groups in terms of the measures used, but it is worth pointing out that the self-reported delinquency and crime seriousness variables became non-significant when controlling for age of criminal onset covariable.

Table 1

Descriptive statistics and ANCOVAS for the Low and High CU traits groups controlling for the age of criminal onset covariable

	Low CU traits group	High CU traits group	Covariable's F and p value	F and p value
APSD-SR total			$F = 8.059$	$F = 40.308$
M (SD)	12.28 (4.48)	17.35 (4.85)	$p \leq .01$	$p \leq .001$
APSD-SR I-CP			$F = 5.379$	$F = .358$
M (SD)	9.49 (4.18)	10.22 (4.69)	$p \leq .05$	$p = .55$
APSD-SR CU			$F = 5.228$	$F = 462.672$
M (SD)	2.79 (1.23)	7.13 (1.26)	$p \leq .05$	$p \leq .001$
CATS			$F = 23.839$	$F = 6.719$
M (SD)	6.19 (1.21)	6.79 (1.04)	$p \leq .001$	$p \leq .01$
SDQ-SR TDS			$F = 1.191$	$F = 1.511$
M (SD)	15.84 (5.55)	15.05 (3.89)	$p = .28$	$p = .22$
SDQ-SR P			$F = 3.759$	$F = 29.49$
M (SD)	8.27 (1.64)	6.56 (2.04)	$p \leq .05$	$p \leq .001$
ASRDS			$F = 51.670$	$F = 1.925$
M (SD)	27.96 (13.33)	33.05 (12.93)	$p \leq .001$	$p = .17$
ICS			$F = 54.673$	$F = 2.165$
M (SD)	2.20 (1.37)	2.75 (1.36)	$p \leq .001$	$p = .14$

Note. APSD-SR = Antisocial Process Screening Device Self-report; APSD-SR I-CP = Impulsivity-Conduct Problems dimension; APSD-SR CU = Callous-Unemotional dimension; CATS = Child and Adolescent Taxon Scale; SDQ-SR = Strengths and Difficulties Questionnaire–Self-report; SDQ-SR TDS = Total Difficulties Score; SDQ-SR P = Prosocial Behavior; ASRDS = Adapted Self-Report Delinquency Scale; ICS = Index of Crime Seriousness; *M* = Mean; *SD* = Standard-deviation

Table 2 presents the point-biserial correlations and also the partial point-biserial correlations controlling for age of criminal onset used to assess the individual associations of the Low or High CU traits groups membership (coded 0 = Low CU traits group, 1 = High CU traits group) with the other measures. Interestingly, the significant associations with self-reported delinquency and crime seriousness became non-significant when controlling for age of crime onset.

Table 2

Point-biserial correlations and partial point-biserial correlations controlling for the age of criminal onset with the Low and High CU traits groups

	r_{pb} CU traits group	p value	Partial r_{pb} CU traits group	p value
APSD-SR total	.48	$p \leq .001$	.45	$p \leq .001$
APSD-SR I-CP	.08	$p = .30$	.05	$p = .55$
APSD-SR CU	.87	$p \leq .001$	.86	$p \leq .001$
CATS	.26	$p \leq .001$	.20	$p \leq .01$
SDQ-SR TDS	-.08	$p = .30$	-.10	$p = .22$
SDQ-SR P	-.42	$p \leq .001$	-.40	$p \leq .001$
ASRDS	.19	$p \leq .05$	.11	$p = .17$
ICS	.20	$p \leq .05$	.12	$p = .14$

Note. r_{pb} = Point biserial correlation; CU = Callous-Unemotional; APSD-SR = Antisocial Process Screening Device - Self-report; APSD-SR I-CP = Impulsivity-Conduct Problems dimension; APSD-SR CU = Callous-Unemotional dimension; CATS = Child and Adolescent Taxon Scale; SDQ-SR = Strengths and Difficulties Questionnaire–Self-report; SDQ-SR TDS = Total Difficulties Score; SDQ-SR P = Prosocial Behavior; ASRDS = Adapted Self-Report Delinquency Scale; ICS = Index of Crime Seriousness

Table 3 displays the hierarchical binary logistic regression coefficients for the Low and High CU traits groups entering the age of crime onset as a covariate on the first step, and also self-reported delinquency (ASRDS) as a predictor on the second step. The crime seriousness variable was not included in the equation because of it was highly correlated ($r \geq .50$) with self-reported delinquency (Leech, Barrett, & Morgan, 2008). Note that when age of crime onset and self-reported delinquency were entered together on the second step they became non-significant.

Table 3

Hierarchical binary logistic regression coefficients for the Low and High CU traits groups

	B	SE	Wald	Exp(B)	*p value*
1st step					
ACO	-.193	.081	5.687	.825	$p \leq .05$
Constant	2.227	.949	5.501	9.269	$p \leq .05$
2nd step					
ACO	-.128	.093	1.905	.880	$p = .16$
ASRDS	.020	.014	1.882	1.020	$p = .17$
Constant	.887	1.354	.429	2.428	$p = .51$

Note. ACO = Age of criminal onset; ASRDS = Adapted Self-Report Delinquency Scale

Discussion

The aim of our study was to examine the relevance of the CU traits among incarcerated male Portuguese juvenile delinquents while controlling for age of onset. We hypothesized that participants with high CU traits would show significantly higher values of self-reported delinquent behaviors, crime seriousness, general psychopathic traits, psychopathy taxon membership, and behavior problems, as well as lower values of prosocial behavior after controlling for age of onset. We also hypothesized that scores obtained from self-reported delinquent behaviors, crime seriousness, general psychopathic traits, psychopathy taxon membership, behavior problems, and prosocial behavior would be significantly associated with high or low CU traits after controlling for age of onset.

When comparing the participants of the Low CU traits and High CU traits groups regarding socio-demographic variables no differences were found. Significant differences were found regarding the criminal variables: results showed that the participants from the High CU traits group had an earlier age of crime onset and were

younger when they had their first problem with the law, but only marginally significant differences were found in terms of age of first detention. These data are consistent with previous studies linking higher CU traits to earlier onset of antisocial activity and to earlier contacts with the police and other authorities (e.g., Dadds et al., 2005; Loeber et al., 2005), and reinforce the role of the interrelationship of CU traits with early criminal onset (e.g., Dandreaux & Frick, 2009; Rowe et al., 2010). We also found that the High CU traits group had a higher proportion of youths diagnosed with Conduct Disorder (APA, 2013), and the very high prevalence rate of conduct disorder we found in our total sample (91.3%) was in the higher range of what is typical of some forensic samples (Sevecke & Kosson, 2010).

In comparisons between the Low CU traits group and the High CU traits group regarding the psychometric measures some statistically significant differences were found when controlling for the age of crime onset covariable. The High CU traits group obtained significant higher values for general psychopathic traits (APSD-SR), CU traits (APSD-SR CU), and psychopathy taxon membership (CATS), as well as lower values for prosocial behavior (SDQ-SR P), but no differences were found in self-reported delinquency (ASRDS), crime seriousness (ICS), impulsivity-conduct problems (APSD-SR I-CP), and general conduct problems (SDQ-SR TDS). The fact that High CU group obtained a significantly higher values in terms of general psychopathic traits, CU traits, and psychopathy taxon membership, as well as low values in prosocial behavior was expected due to way the CU groups were formed (i.e., splitting the participants into high or low CU psychopathic traits). For example, the low values obtained in prosocial behavior were expected due to the fact that higher CU traits would imply low prosociality.

We found no differences in terms of self-reported delinquency, crime seriousness, impulsivity-conduct problems and general conduct problems when controlling for age of crime onset covariable. It is important to highlight the fact that, at least regarding self-reported delinquency and crime seriousness, significant differences were previously present when not controlling for age of crime onset, and that the presence of the covariable statistically affected those two dependent variables (i.e., they became non-significant). Our results do not corroborate previous studies in which CU traits predicted more severe antisocial behaviors and outcomes even after controlling for age of onset (McMahon et al., 2010; Stickle et al., 2009; Vitacco et al., 2007). The findings lead us to argue that additional research is needed when investigating the associations described in the literature between antisocial behaviors and psychopathic traits (e.g., Sevecke & Kosson, 2010; Van Baardewijk, Vermeiren, Stegge & Doreleijers, 2011), especially the CU dimension of psychopathic traits (e.g., Edens, Campbell, & Weir, 2007; Frick, 2009; Frick & White, 2008; Salekin & Lynam, 2010), namely taking into increased consideration the important role of early onset. Therefore we consider that the first hypothesis set was not supported.

With regard to the correlations and the partial correlations of the CU traits' group membership with the other psychometric measures and variables, the most surprising finding was the fact that the significant associations with self-reported delinquency and crime seriousness disappeared when controlling for age of crime onset. The hierarchical binary logistic regression model also showed that if we control for age of crime onset and include self-reported delinquency as a predictor both variables become non-significant. Again, this was not consistent with some previous studies (e.g., Stickle et al., 2009; Vitacco et al., 2007), and raises the possibility that the relation between CU traits and frequency, diversity and severity of antisocial and criminal

behaviors is moderated by age of crime onset. Therefore, also in this case, the hypothesis that was previously set was not confirmed.

Our study adds to the universality of the psychopathic construct among delinquent youth and specifically contributes to the research on juvenile CU traits in southern European samples. This is the first study examining the relevance of the specific interplay between CU traits and age of onset among incarcerated Portuguese male youths. It is, however, necessary to point out some limitations of our study. The use of self-report measures and the low internal consistency of some scale dimensions (e.g., APSD-SR CU) were limitations in terms of measurement reliability. Another limitation of our study was due to the fact we did not control for the number of CD symptoms, and we recommend that this should be done in future investigations.

We can conclude that the CU traits are useful in the characterization of delinquent male youths when age of crime onset is taken into consideration, allowing the variables analyzed from this perspective to highlight a number of problematic issues that characterize them. CU traits are important for the identification of young people at potential high risk and for the rigorous assessment of young people who have already come into contact with the judicial system, thus helping to identify unique etiological pathways in the development of antisocial behavior and promoting an empirically grounded basis to guide interventions (Frick & White, 2008; Kotler & McMahon, 2005). The identification of serious and persistent juvenile delinquents allows some space to improve the therapeutic interventions in terms of costs/benefits given that it becomes possible to focus particularly in them the sometimes scarce available resources.

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