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# Secure attachment predicts lower societal cost amongst severely antisocial adolescents

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## Abstract

**Background** Social and economic costs associated with antisocial behaviour are well-established, but little is known about the potential costs savings/benefits of secure attachment in this high-risk group. We aimed to provide the first test of attachment quality as a distinct predictor of economic costs.

**Methods** 111 adolescents (10–17 years of age,  $M = 15.0$ ,  $SD = 1.6$ ; 71% male) referred to young offender services due to high levels of antisocial behaviour were included. Costs were measured by detailed service-use interview, and attachment security to mother and father elicited through the Child Attachment Interview. The level of antisocial behaviour and callous-unemotional traits were assessed. Cost predictors were calculated using generalised linear models.

**Results** Mean 12-months service costs were £5,368 ( $sd$  5,769) per adolescent, with justice system and educational service costs being the main components. After adjusting for covariates, economic costs were predicted by attachment quality to fathers, with a difference of £2,655 per year between those with secure (£3,338) versus insecure attachment (£5,993); significant cost effects were not found for attachment quality to mothers. Higher levels of callous-unemotional traits, lower verbal IQ, higher levels of antisocial behaviour, and older age were also significant cost predictors.

**Conclusions** Secure attachment to fathers is a predictor of reduced public cost in adolescents with severe antisocial behaviour. This novel finding for severely antisocial youth extends previous findings in less antisocial children and underscores the public health and policy benefits of good caregiving quality and the value of population-level dissemination of evidence-based interventions that improve caregiving quality.

**Keywords** Antisocial behaviour, Attachment, Callous-unemotional traits, Economic cost, Parenting, Youth

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## Introduction

Antisocial behaviour, which is marked by persistent disruptive and aggressive symptoms, and shows a large overlap with the psychiatric concept of “conduct disorder” (CD), is a frequent condition in children and adolescents. Its prevalence is about 5%, and it is often accompanied by psychiatric comorbidity, including attention-deficit/hyperactivity disorder, depression, substance use disorder, and anxiety disorders [1, 2]. Moreover, children and adolescents with antisocial behaviour typically show reduced psychosocial functioning which can lead to poor interpersonal relationships, social exclusion and school dropout; in turn, such an antisocial trajectory carries a greatly increased risk for numerous problems in adulthood, including impaired physical and mental health, difficulties in education, homelessness, drug misuse, criminal offenses, and imprisonment [3–7].

Beyond unfavourable health and psychosocial outcomes, antisocial behaviour also has significant economic consequences, which affect many different sectors of society. High levels of early antisocial behaviour have been shown to be particularly associated with increased public sector justice costs in adulthood [8]. Similarly, longitudinal data from the UK demonstrated that by age 28, public sector costs for children with a diagnosis of CD were nine times higher (mean: 70,019 GBP) than in those without any antisocial behaviour in childhood (mean: 7,423 GBP). In these studies, the majority of costs were associated with criminal activity [9]. Another study estimated that by age 20, mean costs associated with criminal convictions are about 500,000 USD, with the majority of costs occurring during mid-to-late adolescence, and antisocial behaviour being one of the strongest risk factors [10].

In youths with antisocial behaviour, older age, male sex, higher levels of antisocial behaviour, and lower socioeconomic status have so far been identified as risk factors for higher costs at follow-up [9, 11, 12]. Recently, attachment insecurity and low parental sensitivity have also been shown to predict increased cost in children exhibiting only moderate levels of antisocial behaviour [13, 14]. These recent findings are important for several reasons. Most notably, whereas most predictors of cost are associated with child or adolescent personality traits or social conditions that may not be readily amendable to intervention, attachment quality, as an outcome of early caregiving quality, is a common and highly plausible intervention target. Relatedly, whereas previous research on economic costs has focused on risks for greater costs, a focus on (secure) attachment quality could potentially identify, more directly, sources of cost savings.

The aim of this study was to extend prior research by testing the hypothesis that attachment quality of adolescents to their parents might predict economic costs for

society in a high-risk sample of adolescents who were already showing substantial levels of antisocial behaviour.

## Methods

### Participants

We used data from the Study of Adolescents’ Family Experiences (SAFE), a randomised controlled trial of Functional Family Therapy (FFT), which was carried out in the UK from 2008 to 2011 [15]. Participants of the SAFE trial were 111 adolescents (10–17 years of age (mean: 15.0 (SD=1.63) years); 71% male), who had been recruited through Youth Offending Services, Targeted Youth Support Services, and other crime prevention agencies in two English counties. All participants had been sentenced for offending or were receiving agency intervention following contact with the police for antisocial behaviour. The adolescents and their families were allocated to either Functional Family Therapy (FFT) plus Management As Usual (MAU) (N=65), or to MAU alone (N=46). In addition to recording socio-demographic data, clinical and cost data (from a societal perspective; excluding cost of the RCT intervention) were recorded for the 6 months prior to randomization (baseline), and for the 6 months after randomization (6 months follow-up). Assessments included interviews and questionnaires of parenting behaviours, youth antisocial behaviour, IQ, conduct disorder, and adolescent antisocial psychopathy.

### Measures

#### Family characteristics

A structured interview with the primary caregiver assessed details about family structure and income, ethnicity and parental education.

#### Conduct disorder symptoms

CD and Oppositional-Defiant Disorder (ODD) symptoms according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) were assessed using the *Adolescent Parent Account of Child Symptoms* (APACS), a semi-structured diagnostic interview administered to parents [16]. The mean single-measure ICC reliability on 20 randomly selected cases for ODD and CD criteria was 0.95, for ODD symptom count 0.99 and for CD symptom count 0.98 [15].

#### Antisocial behaviour

Antisocial acts were reported by the young people using the *Self-Report Delinquency* (SRD) questionnaire [17]. This consists of 19 items covering a range of antisocial acts divided into three scales (home problems, school misbehaviour, substance abuse). The SRD has good psychometric properties (internal consistency in the SAFE

sample:  $\alpha=0.87$  [15]) and correlates substantially with official police arrests [18].

#### **Callous-unemotional (CU) traits**

These were assessed using parent reports from the “callous-unemotional traits” subscale of the Antisocial Process Screening Device (APSD) [19]. The APSD is a well-validated instrument for the screening of adolescent psychopathy [20].

#### **Cognitive ability**

Participants' IQ was assessed by a trained examiner using the *Wechsler Abbreviated Scale of Intelligence (WASI)* [21].

#### **Attachment security**

Adolescents' attachment security was assessed using the *Child Attachment Interview (CAI)* [22]. The CAI is a well-validated, semi-structured interview designed to elicit young people's mental representations of their parental attachment figures through asking them a series of questions about specific experiences of caregiving; it has been applied in diverse clinical settings. Responses were coded according to a manual, and ratings were made separately for each parent. Attachment data could be assessed for 103 mothers, and for 75 fathers. The higher rate of missing data on fathers was due to the adolescent having had no contact with the father for several years, or their being uncontactable, an approach previously validated for this instrument [22]. For the purpose of this study, the Secure versus Insecure designation was used. Two coders were trained by the instrument developers, and the reliability on 20 training cases for the Secure–Insecure split was 90% agreement ( $\kappa=0.79$ ). The coders were blind to other data collected on the youths and did not conduct the interviews.

#### **Parenting style**

Parents completed the short version of the Alabama Parenting Questionnaire, the APQ-15. The 15 items are classified into five domains: Involvement, Positive Parenting, Poor Monitoring/Supervision, Inconsistent Discipline, and Corporal Punishment. The APQ-15 has good reliability and validity [23], and the internal consistency in this sample was  $\alpha=0.74$  [15].

#### **Service use and costs**

Societal costs for a period of 12 months were calculated using the Client Service Receipt Inventory (CSRI) [24]. The CSRI is a well-established semi-structured interview where parents are asked about health, educational and social care services used by their child, or by family members related to the child's behaviour over a specified time period. Costs for each type of service use were then

calculated based on unit costs at 2010 prices (Appendix 1). The unit costs were taken from official sources where possible [25, 26] or else from a compilation [27]. The unit costs (per appointment, per contact) were multiplied by frequency and duration of service use for each agency. Where data on the length of the contact was missing we used typical contact lengths where these were available, or as taken from the study data. Where necessary we assumed 30-minute appointments, except for ‘talking therapies’ (family therapist, psychologist, counsellor and social worker) where we assumed one hour per contact.

#### **Statistical analysis**

All statistical analyses were performed using SPSS 27.0. Total cost was the dependent variable. Due to the left-skewness of the cost data, a Tweedie distribution was assumed and data were analysed using generalised linear models which do not assume a normal distribution [28]. Based on previous literature and a priori assumptions, several covariates were included: maternal education and eligibility for free school meals to indicate socio-economic status; youth sex, age and IQ; antisocial behaviour level (self-report); CU traits indexed from APSD parent reports. Treatment arm of the underlying study was included as a covariate in analyses to examine if attachment security predicted independently of treatment condition and other covariates. Separate analyses were conducted for attachment to mother and father. For the comparison of means, Mann-Whitney-U tests were used.

#### **Results**

Table 1 shows the characteristics of the sample. 71% of youths were male; more than half of the sample were eligible for free school meals (as a proxy for low family income), and their mean IQ at 84 was nearly one SD below average. Nearly two-thirds of mothers had left school by 16 years (60%, vs. national norm 18%), and more than 50% of families were single-parent families.

The rate of self-reported delinquent acts was very high, as were CU personality traits. Rates of attachment security (both to mothers and to fathers) were significantly lower than in normal risk samples.

Table 2 provides bivariate associations between variables. Total cost was significantly correlated with severity of antisocial behaviour, treatment arm of the original trial, and lower verbal IQ; higher levels of antisocial behaviour showed a significant correlation with CU traits, poor parental monitoring, and eligibility for free school meals. There was substantial agreement in adolescents' attachment to mothers and fathers; of the 29 adolescents who were classified as having a Secure attachment to mother, 13 were classified as having a Secure attachment to father. Inversely, of the 17 adolescents who were classified as having a Secure attachment

**Table 1** Demographic and clinical characteristics of participants

| Characteristic  | SAFE sample (N = 111) | National norms/ Unaffected sample |
|---|-----------------------|-----------------------------------|
| Adolescent age in years (mean, SD)                                | 15.0 (1.6)            | ---                               |
| Adolescent male   | 71% (79/111)          | 51% [49]                          |
| Adolescent ethnic minority  | 10% (11/111)          | 11% [49]                          |
| Adolescent Full IQ (mean, range)                                  | 84 (range: 56–116)    | 100 [49]                          |
| Family structure (single parent)                                  | 55% (61/111)          | 32% [49]                          |
| Maternal education (left school by age 16)                        | 60% (67/111)          | 18% [49]                          |
| Free school meals   | 52% (56/108)          | 17% [49]                          |
| Antisocial behaviour level (self-reported delinquency) (mean, SD) | 61.5 (35.3)           | 2.6 (3.7) [34]                    |
| Callous-unemotional traits (mean, SD)                             | 5.8 (2.3)             | 2.4 (2.1) [50]                    |
| Secure attachment to mother                                       | 40% (41/103)          | 68% [41]                          |
| Secure attachment to father                                       | 23% (17/75)           | 55% [41]                          |

to father, 13 were classified as having a Secure attachment to mother.

Table 3 shows costs according to attachment security to mother and father without considering covariates. Adolescents who were securely attached to their fathers cost £3,338 per year, whereas those insecurely attached cost £5,993 per year. Regarding mothers, securely attached youths cost £5,315 per year, whereas insecurely attached youths cost £5,380 per year. The largest cost component were costs for the justice system, followed by education services, and by social care services.

A generalised linear model was carried out to determine whether or not the difference in cost between securely and insecurely attached youth was significant after controlling for covariates (Table 4). Attachment insecurity to fathers predicted highly significant increased cost (p=0.001), as did CU traits. Further predictors of cost were older age, youth with a lower IQ, and those with higher delinquency level. None of the other covariates (family structure, parental monitoring, parental educational attainment, youth ethnicity) was significantly associated with cost and including them in the model did not substantively alter the prediction from attachment security to father (data not shown).

An additional analysis was carried out on the subset of families in which we had attachment quality data for both mothers and fathers (Table 5); secure attachment to both parents was used as a predictor. Results indicated that

**Table 2** Correlation between measures (Spearman's rho)

|                      | Treat-ment arm | Age      | Sex    | Ethnicity | Verbal IQ | Maternal education | Free school meals | Family structure | Poor monitoring | Antisocial behaviour | CU traits | Attachment to mother | Attachment to father |
|----------------------|----------------|----------|--------|-----------|-----------|--------------------|-------------------|------------------|-----------------|----------------------|-----------|----------------------|----------------------|
| Age                  | -0.023         |          |        |           |           |                    |                   |                  |                 |                      |           |                      |                      |
| Sex                  | -0.011         | -0.003   |        |           |           |                    |                   |                  |                 |                      |           |                      |                      |
| Ethnicity            | 0.096          | 0.012    | -0.153 |           |           |                    |                   |                  |                 |                      |           |                      |                      |
| Verbal IQ            | -0.127         | 0.078    | -0.122 | 0.072     |           |                    |                   |                  |                 |                      |           |                      |                      |
| Maternal education   | -0.103         | -0.014   | 0.069  | 0.088     | 0.479**   |                    |                   |                  |                 |                      |           |                      |                      |
| Free school meals    | -0.025         | -0.269** | 0.003  | -0.142    | -0.338**  | -0.052             |                   |                  |                 |                      |           |                      |                      |
| Family structure     | 0.015          | -0.060   | -0.010 | -0.075    | -0.183    | -0.012             | 0.358**           |                  |                 |                      |           |                      |                      |
| Poor monitoring      | 0.090          | 0.037    | -0.113 | 0.057     | 0.028     | 0.012              | 0.170             | 0.105            |                 |                      |           |                      |                      |
| Antisocial behaviour | 0.126          | -0.016   | 0.188  | -0.097    | 0.169     | 0.134              | -0.245*           | -0.121           | -0.453**        |                      |           |                      |                      |
| CU traits            | 0.051          | -0.071   | -0.051 | -0.046    | 0.025     | 0.003              | -0.139            | -0.136           | -0.270**        | 0.305**              |           |                      |                      |
| Attachment to mother | -0.150         | -0.136   | 0.127  | -0.003    | -0.113    | -0.106             | -0.030            | 0.095            | 0.007           | -0.064               | 0.120     |                      |                      |
| Attachment to father | 0.028          | -0.159   | 0.159  | 0.010     | -0.218    | -0.008             | 0.000             | 0.055            | -0.109          | 0.028                | 0.170     | 0.420**              |                      |
| Total cost           | 0.208*         | 0.152    | 0.167  | -0.167    | -0.256**  | -0.103             | -0.056            | 0.183            | -0.084          | 0.263**              | 0.008     | -0.061               | 0.209                |

Annotation: \*, correlation significant at p < 0.05; \*\*, correlation significant at p < 0.01

**Table 3** Cost domains (in £) per individual, by attachment security to mother and father

| Cost type  |             | Total sample<br>(N = 111) | Attachment to mother |                      |       | Attachment to father |                      |       |
|--|-------------|---------------------------|----------------------|----------------------|-------|----------------------|----------------------|-------|
|  |             |                           | Secure<br>(N = 41)   | Insecure<br>(N = 62) | p     | Secure<br>(N = 17)   | Insecure<br>(N = 58) | p     |
| <b>Total costs</b>   | <b>Mean</b> | <b>5,368</b>              | <b>5,315</b>         | <b>5,380</b>         | 0.535 | <b>3,338</b>         | <b>5,993</b>         | 0.072 |
|  | Median      | 3,333                     | 4,202                | 3,107                |       | 2,386                | 3,425                |       |
|  | Maximum     | 30,121                    | 16,212               | 30,121               |       | 16,212               | 30,121               |       |
| <b>Justice system costs</b><br>(young offender support, youth justice)                   | <b>Mean</b> | <b>3,157</b>              | <b>3,645</b>         | <b>3,059</b>         | 0.346 | <b>2,261</b>         | <b>3,637</b>         | 0.591 |
|  | Median      | 1,128                     | 1,188                | 1,270                |       | 944                  | 1,244                |       |
|  | Maximum     | 27,778                    | 15,399               | 27,778               |       | 15,399               | 27,778               |       |
| <b>Education services costs</b><br>(educational support, behaviour support at school)    | <b>Mean</b> | <b>1,341</b>              | <b>1,047</b>         | <b>1,527</b>         | 0.844 | <b>584</b>           | <b>1,605</b>         | 0.057 |
|  | Median      | 418                       | 443                  | 326                  |       | 75                   | 568                  |       |
|  | Maximum     | 19,692                    | 5,944                | 19,692               |       | 2,890                | 19,692               |       |
| <b>Social care services costs</b>  | <b>Mean</b> | <b>425</b>                | <b>247</b>           | <b>323</b>           | 0.394 | <b>80</b>            | <b>295</b>           | 0.049 |
|  | Median      | 0                         | 0                    | 10                   |       | 0                    | 10                   |       |
|  | Maximum     | 16,176                    | 1,911                | 2,139                |       | 735                  | 2,139                |       |
| <b>Health services costs</b><br>(primary care, hospital, mental health services)         | <b>Mean</b> | <b>239</b>                | <b>227</b>           | <b>262</b>           | 0.396 | <b>372</b>           | <b>241</b>           | 0.934 |
|  | Median      | 92                        | 48                   | 111                  |       | 124                  | 86                   |       |
|  | Maximum     | 3,739                     | 3,739                | 1,852                |       | 3,739                | 1,852                |       |
| <b>Costs for family members</b><br>(primary caregiver services, other relative services) | <b>Mean</b> | <b>206</b>                | <b>149</b>           | <b>208</b>           | 0.577 | <b>41</b>            | <b>215</b>           | 0.186 |
|  | Median      | 0                         | 0                    | 0                    |       | 0                    | 0                    |       |
|  | Maximum     | 3,820                     | 1,492                | 3,820                |       | 417                  | 3,820                |       |

Annotation: p = significance value for difference in medians by Mann-Whitney U test

**Table 4** Predictors of costs (generalised linear model)

| Predictor                  | Attachment to mother<br>(N = 98) |       | Attachment to father<br>(N = 70) |        |
|----------------------------|----------------------------------|-------|----------------------------------|--------|
|                            | Wald Chi Square                  | p     | Wald Chi Square                  | p      |
| Treatment arm              | 1.102                            | 0.294 | 0.061                            | 0.805  |
| Adolescent age             | 3.762                            | 0.052 | 14.111                           | <0.001 |
| Adolescent male sex        | 1.350                            | 0.245 | 0.448                            | 0.503  |
| Adolescent verbal IQ       | 7.272                            | 0.007 | 7.895                            | 0.005  |
| Free school meals          | 1.385                            | 0.293 | 3.369                            | 0.066  |
| Antisocial behaviour level | 7.544                            | 0.006 | 11.498                           | <0.001 |
| Callous-unemotional traits | 3.315                            | 0.069 | 10.666                           | 0.001  |
| Attachment to father       |                                  |       | 8.953                            | 0.003  |
| Attachment to mother       | 0.056                            | 0.813 |                                  |        |

**Table 5** Predictors of costs (generalised linear model), including attachment to both parents (N = 70)

| Predictor                         | Wald Chi Square | p      |
|-----------------------------------|-----------------|--------|
| Treatment arm                     | 0.003           | 0.957  |
| Adolescent age                    | 14.191          | <0.001 |
| Adolescent male sex               | 0.681           | 0.409  |
| Adolescent verbal IQ              | 7.424           | 0.006  |
| Free school meals                 | 2.203           | 0.138  |
| Antisocial behaviour level        | 14.350          | <0.001 |
| Callous-unemotional traits        | 13.767          | <0.001 |
| Secure Attachment to both parents | 10.492          | 0.001  |

secure attachment to both parents predicted further cost savings than to father alone (p=0.001; Table 5).

### Discussion

This study analysed predictors of societal cost in a sample of adolescents, all of whom were severely antisocial and had come into contact with agencies dealing with young delinquents. We found that secure attachment to father was associated with significant reduction in costs in this very high-risk adolescent sample. Whilst attachment security to mother was not a predictor of cost on its own, lack of a secure attachment to both parents was associated with increased costs to society. The cost benefit of a secure attachment was independent of other factors, including other significant predictors of cost, i.e. higher levels of CU traits, more severe antisocial behaviour, lower IQ and older age. This is the first demonstration of the economic benefits of a secure attachment, a modifiable risk, in a very high-risk sample of adolescents.

The reduction in costs attributable to secure attachment, in descending order of amount, were incurred through less involvement with the justice system, less extra educational provision, and reduced need for social care services, health services and fewer personal costs to the family. The same order of costs was reported by Scott et al. [9], who studied public sector costs of by 142 10-year-old children with antisocial behaviour who were then followed up to age 28 years. The important observation from these analyses is the broad-based costs that constitute the economic benefits implied by a secure attachment in the current study.



To our knowledge, this is the first paper to show that attachment security predicts reduced cost to society within a sample with high levels of antisocial behaviour. A previous paper from our team has shown that attachment security predicts costs in children with less severe levels of antisocial behaviour, where security to the father was also found to be more strongly predictive of costs than was secure attachment with mother [14]. It is therefore noteworthy that the same processes hold true at the extremes of the distribution of antisocial behaviour, particularly given the popular and scientific presumptions about the difficulty of improving the life chances of this population. Furthermore, the prediction of costs from attachment security was independent of three factors that are well known to be associated with increased offending – older age, higher level of antisocial behaviour, and lower verbal IQ [9, 12, 29–32]. Intervention studies commonly target attachment quality, including in adolescence [33], and there is now evidence that even children with a history of severe abuse and neglect can form secure attachments in adolescence [34]. Collectively, this evidence suggests the modifiability of attachment security and the possibility that attachment-based interventions may yield behavioural and economic benefits. It is exceedingly rare for observational studies and uncommon in interventional studies of caregiving quality to include formal cost analyses. Our findings suggest that including cost analyses may offer substantial opportunities to place caregiving and parenting studies in a broader public health and economic context. Moreover, such an approach might yield policy-oriented evidence to support parenting programmes like e.g. The Incredible Years, or Parent-Child Interaction Therapy (PCIT), for which there is sufficient evidence regarding their effectiveness in improving both parenting and children's behavioural outcomes [35–38].

The underlying mechanism linking attachment security to father and reduced costs is not clear. It could, for example, reflect internalisation of adaptive behaviours and cognitions and emotional regulation strategies from fathers who are experienced as emotionally available and supportive [39]. There is some evidence that secure paternal attachment may improve emotional regulation abilities [40], which in turn might lead to more resilience and better coping strategies, thus reducing the need of support by justice or education system services. The findings might also be related to poorer monitoring by the father which may accompany insecure attachment [41]. Attachment insecurity is known to be associated with a wide range of poorer social, emotional and behavioural outcomes in children and adolescents [40, 41]. The current study on economic costs is part of a growing set of studies that assess the benefits of Secure attachment – as a reflection of caregiving quality – that extend beyond

traditional bounds of psychological and behavioural health to physical, occupational, and social health and well-being [42].

Although not directly demonstrated in this report, the quality of the parenting environment is a crucial determinant of attachment security, with sensitive responding being particularly implicated. This association is not just true for infancy and early childhood, but also holds in adolescence, so is likely to be important here [43]. Moreover, longitudinal studies suggest that less sensitive responding in childhood is associated with greater financial cost to society in adolescence [13]. The implication is that economic costs of parenting likely extend to attachment-based and sensitive parenting-based models and methods. In this context, it is notable that economic costs were not reliably associated with measures from a widely-used parenting questionnaire (APQ-15), suggesting that not all dimensions and methods of measuring parenting may be associated with economic costs. Detecting cost benefits of parenting quality may require the kind of clinically-sensitive and time-intensive approach that was used in the current study.

This is also the first paper to report that CU traits are associated with higher costs, even after accounting for level of delinquency and other covariates, including IQ and socio-economic condition. CU traits are associated with less empathy, more offending, higher teacher/student conflict [44], less concern about school performance, less remorse, and poorer treatment response [45]. It may be that the prediction from CU traits is not simply a reflection of severity but of type of severe disturbance. The higher costs associated with CU traits may also reflect the possibility that these adolescents may be more likely to come to the attention of authorities [46, 47], evoke increased likelihood of intervention, and have a higher need for ongoing support in various domains of their life [48], which in turn would lead to higher costs.

### Strengths and limitations

This study has several strengths: The sample was characterised in terms of socio-demographic and clinical characteristics, and these characteristics were assessed using a multi-method, multi-informant approach, which included investigator ratings from semi-structured parent interviews, an extensive service use interview, youth self-reports, psychometric assessments, and blinded coding of attachment security. Furthermore, in the statistical analyses considerable adjustments were made for potential confounders. The credibility of the findings is increased by previous studies finding father attachment to be an important predictor of cost in less severe samples [14], and follow-up studies showing broadly the same distribution of agencies involved in extra costs [9].

In terms of limitations, this study employed a cross-sectional design, which prohibits causal attributions between costs and predictors. Also, because of the nature of the sample, with many adolescents coming from non-intact families, attachment data were not available for mothers and fathers for all adolescents. Additionally, the study population was very high-risk and already in the social care system in the UK; the findings and costs obtained in this study may not generalise to other samples and settings.

**Conclusions**

The study indicated that attachment security in adolescence remains an important predictor of costs to society in a notably antisocial sample. Likewise, CU traits increased costs over and above the level of antisocial behaviour. Both of these characteristics are amenable to evidence-based parenting programmes delivered in childhood. Wider provision of programmes to support parental sensitivity and child attachment quality may improve the well-being of the individual child and their family and save money for society.

**Appendix 1: Unit cost for each service at 2009–2010 prices**

| Service                       | Unit Cost        | Notes                           |
|-------------------------------|------------------|---------------------------------|
| <b>Justice system</b>         |                  |                                 |
| <b>Young offender support</b> |                  |                                 |
| YOT case worker               | £131/visit       |                                 |
| <b>Youth justice</b>          |                  |                                 |
| Reprimand &/or final warning  | £188/case        | £389 when including police cell |
| Lawyer                        | £114/hour        |                                 |
| Attendance centre             | £27.4/visit      |                                 |
| Police station                | £24/visit        |                                 |
| Court appearance              | £480/appearance  |                                 |
| Police cell-nights            | £352/night       |                                 |
| Youth custody-nights          | £223/night       |                                 |
| Prison-nights                 | £79/night        |                                 |
| Electronic surveillance tag   | £2,536/tag       |                                 |
| <b>Education services</b>     |                  |                                 |
| <b>Educational support</b>    |                  |                                 |
| Smaller group lessons         | £5/hour          |                                 |
| Classroom assistant           | £16/hour         |                                 |
| Individual tuition            | £52/hour         |                                 |
| School mentoring              | £49/hour         |                                 |
| After school club             | £3/hour          |                                 |
| Home-school liason            | £121/hour        |                                 |
| Extra home tuition            | £78/hour         |                                 |
| School doctor                 | £32/consult      |                                 |
| School nurse                  | £10/consultation |                                 |
| Connexions advisor            | £49.5/hour       | 0.5 h estimated time            |

| Service  | Unit Cost          | Notes                |
|--|--------------------|----------------------|
| <b>Behaviour support</b>                           |                    |                      |
| Behaviour management class                         | £9/hour            |                      |
| Key worker-school consultation                     | £73.5/consultation |                      |
| Psychiatrist                                       | £156/hour          |                      |
| Psychologist                                       | £80/hour           |                      |
| Educational social worker                          | £50/consult        |                      |
| Educational psychologist                           | £54/hour           |                      |
| School counsellor                                  | £49/hour           |                      |
| <b>Health services</b>                             |                    |                      |
| <b>Primary health care</b>                         |                    |                      |
| GP   | £32/consultation   |                      |
| GP nurse   | £18.5/hour         | 0.5 h estimated time |
| Repeat prescription                                | £8.8/prescription  |                      |
| Other community nurse                              | £24/consult        |                      |
| <b>Hospital</b>                                    |                    |                      |
| Hospital inpatient                                 | £447/bed day       |                      |
| Outpatient clinic                                  | £149/visit         |                      |
| A&E or Minor Injuries Unit                         | £76/treatment      |                      |
| Specialist doctor                                  | £71/hour           |                      |
| <b>Mental health services</b>                      |                    |                      |
| Family therapist                                   | £69/hour           |                      |
| Psychiatrist                                       | £156/hour          |                      |
| Psychologist                                       | £80/hour           |                      |
| Psychiatric nurse                                  | £24/hour           |                      |
| Counsellor   | £44/consultation   |                      |
| <b>Social care services</b>                        |                    |                      |
| Social worker                                      | £147/hour          |                      |
| Key worker   | £147/hour          |                      |
| <b>Family (primary caregiver, other relatives)</b> |                    |                      |
| GP   | £32/consultation   |                      |
| Practice nurse                                     | £10/consultation   |                      |
| Hospital outpatient                                | £152/visit         |                      |
| Counsellor   | £44/consultation   |                      |
| Alternative therapy                                | £41/hour           |                      |
| Self-help/support group                            | £8/session         |                      |
| Phone helpline                                     | £13/consultation   |                      |
| Parenting programme                                | £98/visit          |                      |

*Unit cost sources: Education.gov.uk; Beecham J, Bauer A, Stevens M. EPP Unit Costs, Working paper 5v2. not publicly available; 2011; Curtis L. Unit Costs of Health and Social Care 2010. Canterbury Personal Social Services Research Unit, University of Kent; 2010.*

*Where supports were reported over a longer period than that requested on the questionnaire, these have been adjusted to reflect the one-year period. Where a service has been used but there is no response on the number of contacts, we assume one contact only.*

**Abbreviations**

|           |  |
|-----------|--|
| APACS     | Adolescent Parent Account of Child Symptoms  |
| APQ-15    | Alabama Parenting Questionnaire, short version                                       |
| APSD      | Antisocial Process Screening Device  |
| CAI       | Child Attachment Interview   |
| CD        | Conduct Disorder   |
| CU        | Callous-unemotional  |
| CSRI      | Client Service Receipt Inventory   |
| DSM-IV-TR | Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision |
| FFT       | Functional Family Therapy  |
| ICC       | Intraclass Correlation Coefficient   |

|      |  |
|------|--|
| MAU  | Management As Usual                                  |
| ODD  | Oppositional-Defiant Disorder                        |
| SAFE | Study of Adolescents' Family Experiences             |
| SD   | Standard Deviation                                   |
| SPSS | Statistical Package für Social Sciences              |
| SRD  | Self-Report Delinquency                              |
| UK   | United Kingdom of Great Britain and Northern Ireland |
| WASI | Wechsler Abbreviated Scale of Intelligence           |

#### Author contribution

CJB was responsible for data analysis and writing of the manuscript. SH was responsible for implementing the research design, data collection and analysis, and editing of the manuscript. MS was responsible for collection of economic data, provision of costing metrics to analyse data, and editing of the manuscript. TGO was responsible for overseeing data analysis, and writing of the manuscript. SS was responsible for writing of grant, planning of research design, overseeing data collection and analysis, and writing of the manuscript.

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#### Data availability

The data that support the findings of this study are available from the senior author, SS, upon reasonable request.

#### Declarations

##### Competing interests

The authors declare no competing interests.

##### Consent for publication

Not applicable.

##### Ethics approval and consent to participate

The study was approved by the research ethics committee of King's College London, and written informed consent was obtained from parents and youths.

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#### References

- National Institute for Health and Care Excellence. Antisocial behaviour and conduct disorders in children and young people: recognition and management. Clinical guideline [CG158]. 2013. Last updated 2017.
- Polier GG, Vloet TD, Herpertz-Dahlmann B, Laurens KR, Hodgins S. Comorbidity of conduct disorder symptoms and internalising problems in children: investigating a community and a clinical sample. *Eur Child Adolesc Psychiatry*. 2012;21(1):31–8.
- Mordre M, Groholt B, Kjelsberg E, Sandstad B, Myhre AM. The impact of ADHD and conduct disorder in childhood on adult delinquency: a 30 years follow-up study using official crime records. *BMC Psychiatry*. 2011;11:57.
- Moffitt TE, Caspi A, Harrington H, Milne BJ. Males on the life-course-persistent and adolescence-limited antisocial pathways: follow-up at age 26 years. *Dev Psychopathol*. 2002;14(1):179–207.
- Healey A, Knapp M, Farrington DP. Adult labour market implications of antisocial behaviour in childhood and adolescence: findings from a UK longitudinal study. *Appl Econ*. 2004;36(2):93–105.
- Moffitt TE. Life-course-persistent versus adolescence-limited antisocial behaviour. In: *Developmental Psychopathology Vol 3: Risk, Disorder and Adaptation* 2nd edn. Edited by Cicchetti D, Cohen DJ. Hoboken: John Wiley; 2006.
- Erskine HE, Norman RE, Ferrari AJ, Chan GCK, Copeland WE, Whiteford HA, Scott JG. Long-term outcomes of attention-deficit/hyperactivity disorder and conduct disorder: a systematic review and meta-analysis. *J Am Acad Child Adolesc Psychiatry*. 2016;55(10):841–50.
- D'Amico F, Knapp M, Beecham J, Sandberg S, Taylor E, Sayal K. Use of services and associated costs for young adults with childhood hyperactivity/conduct problems: 20-year follow-up. *Br J Psychiatry*. 2014;204(6):441–7.
- Scott S, Knapp M, Henderson J, Maughan B. Financial cost of social exclusion: follow up study of antisocial children into adulthood. *BMJ*. 2001;323(7306):191.
- Koegl CJ, Farrington DP. Estimating the monetary cost of risk factors for crime in boys using the EARL-20B. *Psychol Serv*. 2021;18(4):441–53.
- Gerhardt H, Heinzl-Gutenbrunner M, Bachmann C. Differences in healthcare costs in youths with conduct disorders in rural vs. urban regions: an analysis of German health insurance data. *BMC Health Serv Res*. 2018;18:714.
- Rissanen E, Kuvaja-Köllner V, Elonheimo H, Sillanmäki L, Sourander A, Kankaanpää E. The long-term cost of childhood conduct problems: Finnish nationwide 1981 Birth Cohort Study. *J Child Psychol Psychiatry*. 2022;63(6):683–92.
- Bachmann C, Beecham J, O'Connor TG, Briskman J, Scott S. A good investment: longer-term cost savings of sensitive parenting in childhood. *J Child Psychol Psychiatry*. 2022;63(1):78–87.
- Bachmann C, Beecham J, O'Connor TG, Scott A, Briskman J, Scott S. The cost of love: financial consequences of insecure attachment in antisocial youth. *J Child Psychol Psychiatry*. 2019;60(12):1343–50.
- Humayun S, Herlitz L, Chesnokov M, Doolan M, Landau S, Scott S. Randomized controlled trial of Functional Family Therapy for offending and antisocial behavior in UK youth. *J Child Psychol Psychiatry*. 2017;58(9):1023–32.
- Taylor E, Chadwick O, Heptinstall E, Danckaerts M. Hyperactivity and conduct problems as risk factors for adolescent development. *J Am Acad Child Adolesc Psychiatry*. 1996;35(9):1213–26.
- Smith DJ, McVie S. Theory and method in the Edinburgh Study of Youth Transitions and Crime. *Br J Criminol*. 2003;43(1):169–95.
- McCara L, McVie S. The usual suspects? Street-life, young people and the police. *Criminal Justice*. 2005;5(1):5–36.
- Frick PJ, Hare RD. The antisocial process screening device. Toronto: Multi-Health Systems; 2001.
- Kahn RE, Frick PJ, Youngstrom EA, Kogos Youngstrom J, Feeny NC, Findling RL. Distinguishing primary and secondary variants of callous-unemotional traits among adolescents in a clinic-referred sample. *Psychol Assess*. 2013;25(3):966–78.
- Wechsler D. Wechsler Abbreviated Scale of Intelligence. New York, NY: The Psychological Corporation: Harcourt Brace & Company; 1999.
- Target M, Fonagy P, Shmueli-Goetz Y. Attachment representation in school-age children: the development of the child attachment interview. *J Child Psychother*. 2003;29(2):171–86.
- Scott S, Briskman J, Dadds MR. Measuring parenting in community and public health research using brief child and parent reports. *J Child Fam Stud*. 2011;20(3):343–52.
- Beecham J, Knapp M. Costing psychiatric interventions. In: *Measuring Mental Health Needs* 2nd edn. Edited by Thornicroft G. Bideford: Gaskell; 2001: 200–224.
- Curtis L. Unit costs of Health and Social Care 2010. Canterbury Personal Social Services Research Unit, University of Kent; 2010.
- Department of Health and Social Care. NHS reference costs 2009–2010. London: Department of Health and Social Care; 2011.
- Beecham J, Bauer A, Stevens M. EPP Unit Costs, Working paper 5v4. Not publicly available; 2011.
- Kurz CF. Tweedie distributions for fitting semicontinuous health care utilization cost data. *BMC Med Res Methodol*. 2017;17(1):171.
- Romeo R, Knapp M, Scott S. Economic cost of severe antisocial behaviour in children – and who pays it. *Br J Psychiatry*. 2006;188(6):547–53.
- Rivenbark JG, Odgers CL, Caspi A, Harrington H, Hogan S, Houts RM, Poulton, Moffitt TE. The high societal costs of childhood conduct problems: evidence from administrative records up to age 38 in a longitudinal birth cohort. *J Child Psychol Psychiatry*. 2018;59(6):703–10.
- Parsonage M, Khan L, Saunders A. Building a better future: the lifetime costs of childhood behavioural problems and the benefits of early intervention. London: Centre for Mental Health; 2014.
- Cohen MA, Piquero AR. New evidence on the monetary value of saving a high risk youth. *J Quant Criminol*. 2009;25(1):25–49.
- Barone L, Carone N, Costantino A, Genschow J, Merelli S, Milone A, Polidori L, Rugliani L, Moretti MM. Effect of a parenting intervention on decreasing adolescents' behavioral problems via reduction in attachment insecurity: a longitudinal, multicenter, randomized controlled trial. *J Adolesc*. 2021;91:82–96.
- Joseph MA, O'Connor TG, Briskman JA, Maughan B, Scott S. The formation of secure new attachments by children who were maltreated: an observational study of adolescents in foster care. *Dev Psychopathol*. 2014;26(1):67–80.



35. O'Connor TG, Matias C, Futh A, Tantam G, Scott S. Social learning theory parenting intervention promotes attachment-based caregiving in young children: randomized clinical trial. *J Clin Child Adolesc Psychol*. 2013;42(3):358–70.
36. Scott S, Briskman J, O'Connor TG. Early prevention of antisocial personality: long-term follow-up of two randomized controlled trials comparing indicated and selective approaches. *Am J Psychiatry*. 2014;171(6):649–57.
37. Steele H, Steele M. *Handbook of attachment-based interventions*. Guilford Press; 2017.
38. Donohue MR, Hoyniak CP, Tillman R, Barch DM, Luby J. Callous-unemotional traits as an intervention target and moderator of parent-child Interaction therapy - emotion Development Treatment for Preschool Depression and Conduct problems. *J Am Acad Child Adolesc Psychiatry*. 2021;60(11):1394–403.
39. Kochanska G, Woodard J, Kim S, Koenig JL, Yoon JE, Barry RA. Positive socialization mechanisms in secure and insecure parent-child dyads: two longitudinal studies. *J Child Psychol Psychiatry*. 2010;51(9):998–1009.
40. Allen JP, Porter M, McFarland C, McElhanev KB, Marsh P. The relation of attachment security to adolescents' paternal and peer relationships, depression, and externalizing behavior. *Child Dev*. 2007;78(4):1222–39.
41. Scott S, Briskman J, Woolgar M, Humayun S, O'Connor TG. Attachment in adolescence: overlap with parenting and unique prediction of behavioural adjustment. *J Child Psychol Psychiatry*. 2011;52(10):1052–62.
42. Moss E, St-Laurent D. Attachment at school age and academic performance. *Dev Psychol*. 2001;37(6):863–74.
43. O'Connor TG, Woolgar M, Humayun S, Briskman JA, Scott S. Early caregiving predicts attachment representations in adolescence: findings from two longitudinal studies. *J Child Psychol Psychiatry*. 2019;60(9):944–52.
44. Roslyne Wilkinson H, Jones Bartoli A. Antisocial behaviour and teacher-student relationship quality: the role of emotion-related abilities and callous-unemotional traits. *Br J Educ Psychol*. 2021;91(1):482–99.
45. Blair RJ, Leibenluft E, Pine DS. Conduct disorder and callous-unemotional traits in youth. *N Engl J Med*. 2014;371(23):2207–16.
46. Frick PJ, Stickle TR, Dandreaux DM, Farrell JM, Kimonis ER. Callous-unemotional traits in Predicting the Severity and Stability of Conduct problems and delinquency. *J Abnorm Child Psychol*. 2005;33(4):471–87.
47. Herpers PC, Klip H, Rommelse NN, Greven CU, Buitelaar JK. Associations between high callous-unemotional traits and quality of life across youths with non-conduct disorder diagnoses. *Eur Child Adolesc Psychiatry*. 2016;25(5):547–55.
48. McMahon RJ, Witkiewitz K, Kotler JS. Predictive validity of callous-unemotional traits measured in early adolescence with respect to multiple antisocial outcomes. *J Abnorm Psychol*. 2010;119(4):752–63.
49. Office of National Statistics. *Social Trends*. London; 2009.
50. Frick PJ, Bodin SD, Barry CT. Psychopathic traits and conduct problems in community and clinic-referred samples of children: further development of the psychopathy screening device. *Psychol Assess*. 2000;12(4):382–93.

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