DOCTOR OF CLINICAL PSYCHOLOGY

Early Identification and Treatment of Subgroups of Sibling Bullies whose Aggression Persisted Over Contexts and with a Degree of Callousness.

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Introductory Chapter: Thesis Overview

Bullying has been associated with long-term problems in terms of health, academic and/or psychological wellbeing for both the perpetrator and victims (Crapanzano et al., 2011; Gower & Borowsky, 2013; Nakamoto et al., 2010; Nansel et al., 2001; Sourander et al., 2007) and there are subgroups of bullies which engage in more persistent and severe aggression (Frick & White, 2008; Kuay et al., 2017; Waller et al., 2015). Yet bullying has been reported to be a common experience for children. It has been reported that as many as fifty percent of children have experienced bullying as either a bully, victim, or bully/victim (Gower & Borowsky, 2013). It was believed that boys were more involved in bullying than girls, however, further research has suggested that is not the case (Wang et al., 2009). This misconception may be due to differences in the types of bullying behaviours and differences in the profiles of those children who bully. Therefore, it is important to develop a better understanding of the types of subgroups of bullies that occur within the population and to be able to understand how the bullying behaviour develops and persists over time. Identifying subgroups of bullies who are at high risk of more persistent problems for early interventions is imperative to reduce the harm to the bully, the victim and to wider society.

Sibling bullying is thought to be the most common type of bullying within the home (Eriksen & Jensen, 2006; Purcell et al., 2014) however, it is under researched (Skinner & Kowalski, 2013). There has been a link found between sibling bullying and later antisocial behaviour (Datachev & Wolke, 2019), and antisocial behaviour is known to have a wide impact on the individual (Shepherd et al., 2004) and society (National Audit Office, 2006). Sibling aggression is related to substance misuse, delinquency, and aggression, even after controlling for other forms of family violence (Button & Gealt, 2010). Victims of sibling bullying are at increased risk of nicotine dependence (Dantchey & Wolke, 2019), depression, anxiety, and self-harm (Bowes et al., 2014). Therefore, both the bully and the victim are at risk of negative long-term effects which may impact on the wider society. Therefore,

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this is an important subgroup of bullies which need to be better understood both in terms of how it develops and how it persists over time.

Children with Callous Unemotional (CU) behaviours are an important subgroup within those who engage in bullying. CU behaviours are defined as having a lack of guilt, an absence of empathy, and a callous use of other people (Frick & White, 2008). In the criteria outlined in the DSM-5, understanding the development of CU behaviours and how they relate to aggression is needed to target these children for intervention. CU behaviours found in children as young as three years of age have been successfully used to predict problem behaviours later in childhood, such as aggression (Waller et al., 2015; Willoughby et al., 2014) and future CU behaviours (Waller et al., 2015). Therefore, children who engage in CU behaviours are a subgroup of children whose problematic behaviours are likely to continue throughout childhood. Additionally, adolescents who engage in CU behaviours are known to engage in a severely aggressive form of antisocial behaviour, which tends to be stable over time (Frick & White, 2008). The earlier in childhood that the aggressive behaviour starts, the more likely it will continue into adulthood (Moffitt, 1993). Aggression which persists over time and across context is likely to result in a greater impact on the person and the wider society. Therefore, children with CU behaviours require interventions that target their bullying.

There are educational (Horan et al., 2016), social and legal (Frick et al., 2014; National Audit Office, 2006) costs associated with childhood CU behaviours. For group-based parenting training the cost of bringing an average child into non-clinical range is estimated to be between £952-£2078 as of 2008 and brings a saving to society of around £16, 435 per family across 25 years (Bonin et al., 2011). Previous research has found that the earlier intervention occurs for children at risk of later antisocial behaviours, the more likely that there will be a positive outcome (Greenwood, 1995; Kazdin, 1987; Patterson et al., 1992). This would often mean interventions need implementing before children's behaviours leads to a referral to services. Therefore, it is important to identify the children most at-risk and to understand the life factors that precede the child's difficulties. Identifying children early in this

way would allow services to offer effective interventions prior to issues developing. This, in turn, would increase the likelihood of a positive outcome. It would also mean intervening before further harm was caused to the child who is bullying (such as impacting on their education), the victim or wider society.

It is important that there are interventions available, which can be low cost and easily accessible to reach a greater number of at-risk children. This is important to avoid serious outcomes for the young people and society, such as criminal behaviours, substance misuse, gang membership and violent crimes (Cicchetti & Nurcombe, 1993; Lynam, 1996; Mayer, 1995; Walker et al., 1995). In terms of at-risk children, it is known that children with CU traits are at higher risk of developing antisocial behaviour which persists into adulthood. In addition, children with CU behaviours do not always respond to the standard parenting measures. For example, discipline-based interventions or strategies do not tend to be successful with children who engage in CU behaviours (Pasalich et al., 2016). However, children with CU behaviours are known to respond better to reward based strategies (Hawes and Dadds, 2005; Hawes & Dadds, 2007). Usefully, all children respond to reward, making it possible to prioritize reward and incentives within whole schools rather than using targeted interventions (Baker & Simpson, 2020). Within the home, when parents use warm, positive parenting that is attuned to children's emotions, children experience fewer conduct disorder (CD) symptoms and fewer callous-unemotional (CU) traits (Goulter et al., 2020; Centifanti et al., 2016). Therefore, the most successful interventions may involve the primary caregiver.

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Chapter 1: Empirical Paper

Latent Profile Analysis of Sibling Bullies with Callous-Unemotional Traits: Evidence for a 'Generalist' Aggressive Subgroup.

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Article intended for submission to the Journal of Abnormal Child Psychology for peer review. The journal has a template for authors to convert papers into the correct format prior to submission.

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Keywords

Callous-unemotional

Sibling bullies

Antisocial behaviour

Fearful temperament

Lack of parental engagement

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Abstract

Background: There is a proposed theory that there are two subgroups of bullies: generalists (across contexts) and specialists (e.g., siblings or peers). Children with callous-unemotional (CU) behaviours are at risk of developing severe aggressive form of antisocial behaviour, that occurs across contexts and persists over time. Sibling bullying is an important marker or contributing factor along the developmental pathway which leads to antisocial behaviour. The study aimed to identify subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness, and to identify precursors. ***Methods:*** The study took cross-sectional observations at 9 month, 3, 5, 7, 11 and 14 years old. Participants were approximately 19, 000 children recruited as part of the Millennium Cohort Study. Latent profile analysis identified subgroups of bullies. Multilevel mixed-effects regression investigated the change in social development over time. A multinominal logistic regression predicted the bullying classes based on temperament and parenting factors. ***Results:*** A four-class model was selected: non-bullies, occasional bullies, generalist bullies and sibling bullies. The level of CU behaviours appeared to increase as the frequency of sibling bulling increased. The sibling bullies had a lack of fear (new people or situations) and experienced less parental engagement. All the bullying subgroups experienced more harsh parenting compared to non-bullies. The bullying subgroups had less prosocial behaviours at 14 years old than the non-bullies. The children that bullied more frequently and had high levels of CU behaviours also had more externalising and internalising behaviours at 14 years old. ***Conclusions:*** Children with high CU behaviours tended to bully their siblings more. CU behaviours develop early in childhood. Further research into sibling bullying could explore other factors which may be contributing, such as dynamics between siblings, attachment difficulties which influence the sibling's relationship, differing relationships with parents or differences in sibling temperaments.

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Introduction

Siblings are the most common victim of young people's aggression within the home (Eriksen & Jensen, 2006; Purcell et al., 2014). Sibling bullying is linked to adult emotional problems and aggression, even after controlling for contributing factors (Mathis & Mueller, 2015). Sibling bullying is under researched (Skinner & Kowalski, 2013), particularly within an aggressive subgroup of youths who lack in empathy for others (i.e., those with callous-unemotional (CU) behaviours). Kuay et al. (2017) found that youths in Mental Health Services and Forensic Services showed aggression towards both parents and siblings, but they did not look at how this might relate to the use of aggression in the home. Importantly, the earlier in childhood that the aggressive behaviour starts, the more likely it will continue into adulthood (Moffitt, 1993). Aggression that persists over time and across context is likely to result in a greater impact on the person and the wider society, and so identifying precursors to 'generalist' bullying is necessary to aid prevention.

A model has been proposed that claims that children who bully can be classified into two subgroups of bullies: 'Specialists', who are aggressive in a particular setting, and 'Generalists' who are aggressive in a variety of settings such as towards parents, peers, siblings (Kuay et al., 2017). Generalists' aggressive behaviour is more persistent, occurs across contexts, and their behaviour is difficult to change (Kuay et al., 2017). Identifying a subgroup of sibling bullies who are generalists is important, because it has been proposed by Kuay et al. (2017), that this group of children are more likely to act aggressively in adulthood. Persistent aggression is likely to have a longer lasting impact on the individual and on the wider society. When no environment provides the child or youth an opportunity to practice prosocial acts, it means there is no opportunity for mutually respectful interactions, which limits the ability to form close friendships and model appropriate behaviour. This can lead to entrenched forms of behaving when encountering peers or even when forming romantic relationships. Individuals who engage in aggression across multiple contexts are also at increased odds of engaging in antisocial behaviour, criminal behaviour, or illicit drug use (Dantchev & Wolke, 2019).

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Sibling bullying is a marker or contributing factor along the developmental pathway which leads to antisocial behaviour (Dantchey & Wolke, 2019). It has been proposed to be an important part of the development of antisocial behaviours and that it involves parent-child interactions. A lack of parental warmth and engagement and/or harsh parenting can reduce positive interactions, and so prevent the back-and-forth mirroring of emotions between a parent and their young children which facilitates the development of empathy and conscience (Viding et al., 2014; Wagner et al., 2015). A review by Datachev and Wolke (2019) found that individuals who engaged in sibling bullying were more likely to engage in antisocial behaviour. However, attempting to predict later antisocial behaviour during childhood has proven to be difficult. Most offenders display behavioural problems in childhood, but not all children with behavioural problems go on to offend (Kretschmer et al., 2014). Therefore, it is important to understand why for some children, aggressive behaviour continues over time. Understanding this will allow clinicians, schools, and other professionals to identify those most likely to continue to be aggressive and offer them interventions.

Children with CU behaviours are an important subgroup within those who engage in bullying. CU behaviours are defined as having a lack of guilt, an absence of empathy, and a callous use of other people (Frick & White, 2008; Muñoz et al., 2011). Aggression in children with CU behaviours is believed to persist over time (Frick & White, 2008) and across contexts (DSM-5), although there is variation in how consistent they are into late adolescence (Burke et al., 2007; Lynam et al., 2008). Therefore, CU behaviours might be important when understanding a generalist profile of bullying that involves peers and siblings. However, sibling bullying in relation to CU behaviours has not been investigated thus far. Therefore, it is important to develop more understanding regarding the profile of sibling bullies and the link between this type of bullying and the development of future antisocial behaviours.

CU behaviours are an important marker within children who bully, because CU behaviours are associated with the most severe and aggressive patterns of antisocial behaviour (Frick & White,

2008; Porter & Woodworth, 2007), which tends to be stable over time (Frick & White, 2008). Severe acts of aggression can include violent acts of aggression, such as homicide (Porter & Woodworth, 2007). Additionally, adolescents who engage in CU behaviours are related to aggression towards peers (Fanti et al., 2009) and bullying (Munoz et al., 2011). Children who engage in CU behaviours can be identified as early as three years old (Waller et al., 2015; Willoughby, Mills-Koonce, Gottfredson & Wagner, 2014) and without any intervention it is highly likely that the CU behaviours will persist (Waller et al., 2015). Therefore, children who engage in CU behaviours are a subgroup of children whose problematic behaviours are likely to continue throughout childhood. This subgroup need interventions that target their bullying in the home as much as within schools. This is especially important given what is known about the importance of the parental role in children's emotional development, such as empathy and a conscience (Viding et al., 2014; Wagner et al., 2015) and the impact when parents lack skills, such as mind-mindedness, which is required to model prosocial behaviours (Centifanti et al., 2016).

Klomek et al. (2015) suggest the use of large-scale longitude studies would enable researchers to understand the mechanisms underlying why childhood bullying leads to negative outcomes in adulthood. According to Frick and White (2008) internal characteristics (such as variances in temperaments and biological differences) and external characteristics (such as difficulties within the family), can impact on children's development. It is necessary to see whether there are any subgroups of children whose aggression is more persistent and who share similar experiences and internal characteristics. Focusing on traits which fit a generalist bully profile may help identify children whose aggression is likely to persist over time and occur across context. There is evidence that development of a child's CU behaviours is due to both heritable and environmental factors (Waller & Hyde, 2018). Adoption studies found that both the biological parents (Hyde et al., 2016) and adoptive parents' behaviour is important in predicting child engagement in CU behaviours (Waller, Gardner & Hyde, 2013). These children tend to show temperamental and parenting difficulties early in childhood. Parenting difficulties include inconsistent and lax parenting (Muñoz et al., 2011). Parenting has been

linked to the development of empathy and prosocial behaviour in children (Brownell, 2013; Dunn, 2006; Eisenberg et al., 2015). Secure attachment styles predict children with more empathy (Carlo et al., 2011), and parental warmth and sympathy predicted later prosocial behaviours in children (Eisenberg et al., 2015). Moreover, harsh parenting is related to CD for those without CU traits (Goulter et al., 2020).

Furthermore, young children who later engaged in CU behaviours have been found to have a fearless temperament, lack of warmth (Waller & Hyde, 2018), and to have early empathy and behavioural problems (Centifanti et al., 2016). Thus, this suggests that both environmental factors, (such as parenting styles) and heritable factors (such as the child's temperament) are important for identifying children at risk of engaging in CU behaviours. Young children who have a fearless temperament may be more susceptible to developing CU behaviours, particularly when there is a lack of parental warmth (Goulter et al.,2020). These children may be less responsive to discipline but are still responsive to reward-based strategies (Pasalich et al., 2016; Hawes & Dadds, 2005; Hawes & Dadds, 2007). Fleming et al. (2020) found that children with both high and low levels of CU behaviours had reductions in their CD behaviours, but that there was a greater change for children with high levels of CU behaviours. Therefore, parental warmth is likely to be an important contributor to the development of antisocial behaviours for children with CU behaviours. Children with emotional dysregulation tend to elicit more negative responses from parents, such as harsher discipline (Carpenter & Drabick, 2011). This can further impact on the child's emotional regulation (Gottman et al., 1996) and increase aggression and impulsivity (Steinberg & Drabick, 2015). There is a lack of knowledge regarding emotional dysregulation in children with CU behaviours, but it is believed there is a difference in emotional regulation between children with or without CU behaviours (Frick & White, 2008). In addition, children with CU behaviours display less of a physical reaction to punishment (Blair, 2010; Frick & White, 2008; Sterzer et al., 2005).

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Objectives

The current study, therefore aimed to classify children based on CU behaviours, and whether they engage in sibling bullying or/and peer bullying. The study then aimed to explore whether there are groups of children who fit with a generalist profile who bully across context (peer and sibling) and have CU behaviours. This is important to ensure that these children can be offered early interventions, such as parent-child interaction therapy, which has been specifically designed for children with CU behaviours (Kimonis et al., 2019) to prevent later development of persistent and severely aggressive behaviours.

Hypothesis

The study tested which factors early in life (ages 3, 5, and 7) related to membership in different subgroups or latent classes (identified at age 11 years) who show varying levels of CU behaviours, sibling bullying, and peer bullying and tested whether problem behaviours persist three years later (age 14 years) for the different groups identified. It was predicted that the group high on CU and all forms of bullying (bullying/CU+) would persist in problem behaviours over time. It was also predicted that there would be another class of children who bully in just one setting (siblings or peers) and who would be low on CU behaviours (bullying/CU-) and their early life factors are proposed to be different (see Table 1).

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Table 1. *Hypothesises for the bullying subgroups*

	bullying/CU+	**bullying/CU-**	**Low bullying/CU-**
Life experiences	Greater early life difficulties	Less early life difficulties	Less early life difficulties
Parent-child relationship	Less parent-child closeness Less parental emotional and verbal responsiveness Less parental engagement	More parent-child conflict More harsh punishment.	Less parent-child difficulties and a more positive parent-child relationship.
Temperament	Lack of fear when introduced to a new person or situation (approach & adaptability). Good emotion regulation.	Problems with emotional dysregulation. Harder to soothe (mood).	less emotional problems
Behavioural difficulties	Low on the cooperation. high scores for internalised and externalised problem and low scores for prosocial behaviour	High scores on internalised and internalised problems compared to the low bullying groups.	Low scores on internalising and externalising behaviours and high scores on prosocial skills.
Social development: externalising. Internalising and prosocial behaviours.	Start with similar scores to the Bullying/CU- group but there would be no change over time. By 14 there would be a bigger difference between the two bullying subgroups.	An improvement over time, with internalising and externalising behaviours reducing and prosocial behaviours increasing.	Improve over time,

Methods

Design

The study was a longitudinal cohort study. The study took cross-sectional observations at key internals (9 months, 3, 5, 7, 11 and 14 years old). Using data from the millennium cohort study (MCS) data allowed for the study aims to be completed within a reasonable length of time and provided a feasible way to gather the data in large enough quantities to make the study generalisable to the wider population.

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Participants/sampling/access

Secondary data analysis was conducted on participants who were recruited as part of the MCS. Approximately 19,000 children were recruited at birth from September 2000 to January 2002 (Hansen, 2014). The minimum sample size for Latent Profile Analysis (LPA) (Nylund et al., 2007) and logistic regression (Bujang & Bakar, 2018) should be approximately 500 participants, so the current sample size met and exceeded the power requirements. The data was also weighted to ensure that the sample population was representative of the wider population being studied. This was done using the weight variable created for data collected when the child was 11 years old and the overall weighted variable for the rest of the analysis, due to the data being from different time points. The MCS has been monitoring children from birth until adulthood by collecting information regarding a wide range of topics, such as parenting, child behaviour, cognitive development, child and parent physical/mental health and economic status. The information was gathered from the child, their siblings, parents, and teachers. The study aimed to provide a sample of the population that was representative of England, Scotland, Northern Ireland, and Wales. The sample procedure was probability methods combined with stratification and clustering. Samples were taken from children and their parents or caregivers at 9 months, 3, 5, 7, 11 and 14 years old (Hansen, 2014). The UK Data Service (2019) has a three-tier access policy; open, safeguarded and controlled. Open data is not personal, has few restrictions and requires no registration. Safeguarded data is not personal, but there is a risk of disclosure from linkage to other data and so requires registration/authentication. Controlled data includes identifiable information, but this study did not use this data type.

Ethical and Consent Procedures

The Department of Social Security (DSS) recruited children with appropriate birth dates within the correct wards. The child's primary caregiver gave explicit written consent to all parts or a specific element of a survey before being involved in the MCS. Ethical approval was sought at each follow-up time point. The appropriate procedures for ethical review and consent were followed by those involved in gathering the information from participants, including ethical approval from the

United Kingdom's (U.K.) National Health Service (NHS) Research Ethics Committee (REC) system. The procedure for gaining informed consent has been consistent across the MCS. Letters and leaflets were sent prior to surveys, requiring written consent for participation of parents and cohort members. All participants were informed of their right to withdraw from the study at any time and can refuse to participate in any part of the study by affirming their wish to do so, whilst still being able to participate in other parts as per their wishes. Written consent was obtained before gathering information from economic, health and education records at various time points (see appendix A), as well as prior to contacting teachers. When the child was nine months-old consent was gained from the birthmother for the researcher to gather information about the pregnancy and baby's birth from health records. In addition, parental consent was requested to link to the National Health Service Central Register (NHSCR), so that the researchers can keep track of the child should contact be lost. When the child was three years-old consent was requested for: the parental interview; the cohort child regarding assessments, measurements, collection of oral fluids and hospital admissions; permissions to collect data from the relevant authorities from the school records regarding older siblings. When the child was five years-old in addition to the consent for the parent and child participation and access to health and school records, permission was also requested to approach the child's teacher. The MCS also required that the children agreed and comply with any aspects they are involved in. Therefore, oral consent was obtained from the children who were aged seven years-old or above. Further details on this can be found in Shepherd (2012) MCS document on ethics and consent.

Measures

Bullying Behaviours

Sibling Bullying: At 11 and 14 years old, the children were asked "how often do you hurt or pick on your brothers or sisters on purpose?" (Johnson et al., 2012).

Peer Bullying: At 11 and 14 years old, the children were asked "how often do you hurt or pick on other children on purpose?" (Johnson et al., 2012).

For both measures, the children responded on a six-point scale (most days, approximately once a week, approximately once a month, every few months, less often and never). Higher scores showed more bullying. Sibling and peer bullying behaviours at age 11-years old were used as latent variables for the LPA. The multilevel mixed-effects regression outcome variables were questions about peer and sibling bullying at age 14-years old.

Callous-Unemotional Behaviours.

At 11 years old, the children were asked four questions about CU behaviours, which were taken from the youth version of the Inventory of Callous-Unemotional Traits (ICU youth version; Essau et al., 2006). The questions were: "I care about how well I do at school", "I feel bad or guilty when I have done something wrong", "I do not show my emotions to others", and "I am concerned about the feelings of others". Children responded on a 4-point scale (not at all true, somewhat true, very true, definitely true). Higher scores showed more CU behaviours. The whole scale has been shown to have good internal consistency, with a coefficient alpha of 0.77 (Konting et al., 2009). These four questions were used to create a Callous-Unemotional Behaviours measure. The question, "I do not show my emotions to others" negatively correlated with the other three questions, because of how it was phrased. Prior to combining the four items, they all needed to be positively correlated and so question which was negatively correlated had the scores reversed using transform compute. This involved swapping the scores on the 4-point scale (1=4, 4=1, 2=3, 3=2). The final four items all were all scored so that high scores meant high levels of CU behaviours. The four-items were then combined using transform compute and the mean.3 function. This function calculated the mean based on there being at least 3 sets of scores available. If there was missing data for more than one of the CU behaviour questions for a single case, then scores were recorded as missing by SPSS. This ensured that the new measure retained as much internal consistency as possible. The Callous-Unemotional behaviour measure was then used as a latent variable for the LPA.

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Temperament.

The primary caregiver completed the Carey Infant Temperament Scale (CITS; Carey & McDevitt, 1977) when the child was nine-months old. The CITS has four subscales as follows: Mood (scored 0 to 20) which has five items and measures the tone of the child's overall affect. Regularity (scored 0 to 16) which has four items and measures the predictability of the child's daily functions. Approach (scored 0 to 12) which has three items and measures the child's initial response to novelty. Lastly, adaptability (scored 0 to 8) which has two items and measured the child's behavioural flexibility. Items were measured on a five-point scale based on frequency of behaviour (see table 2 below for details on what scores mean for each variable). The scale has demonstrated acceptable internal consistency, with a coefficient alpha of 0.65 (Konting et al., 2009). Primary caregivers also completed the Child Social Behaviour Questionnaire (CSBQ; Johnson et al, 2012), used on the Effective Provision of Pre-School Education (EPPE) projects for seven and 10-year-olds (Sammons et al., 2004; Melhuish at al., 2004) when the child was aged three. The CSBQ is based on the adaptive social behaviour inventory (Hogan, et al., 1992) which has demonstrated good internal consistency (comply $\alpha = 0.79$, express $\alpha = 0.79$ and disrupt $\alpha = 0.71$). Three subscales were created: independence and self-regulation, emotional dysregulation (both when the child was 3 years old) and cooperation (when the child was 5 years old). Mean scores ranged from 1-3. There were five-items per subscale.

Parent-Child Conflict and Closeness.

The mother or primary caregiver completed the Pianta Child-Parent Relationship Scale when the child was three years old (Driscoll & Pianta, 2011; Pianta, 1995). The caregiver was asked about their feelings and beliefs towards their child and the child's behaviour towards the caregiver (see table 2 for meaning of high scores). Two subscales were used: parent-child conflict (eight items, range 8 to 40) and parent-child closeness (seven items, range 7 to 35). In the present study, the internal consistency was good (conflict $\alpha = 0.79$; closeness $\alpha = 0.70$).

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Parent Emotional and Verbal Responsivity.

A short version of the Home Observation for Measurement of the Environment Scale (HOME) was administered when the child was three years old (Bradley & Caldwell, 1984). This was a combination of researcher observation in the home and caregiver questions (see Table 2 for meaning of high scores). In the present study, the internal consistency was acceptable (α =0.63).

Parental Engagement.

Caregivers were asked six questions when their child was five years old. Questions inquired about the frequency of parent-child activities (book reading, telling stories, musical activities, drawing/painting, physical activities, and outdoor games/activities). Scores ranged from 0 to 30 (see Table 2 for meaning of high scores). Factor analysis confirmed that the items loaded onto a single factor of 'parental engagement' (Stewart, 2017), and in the present study the internal consistency of the measure was good (α =0.70).

Harsh Discipline.

When the child was aged five, caregivers were asked to complete the Conflict Tactics Scale (Straus & Hamby, 1997). The scale consists of six items, measuring how the caregiver deals with conflict with the child. Sum scores were generated and range 6 to 30 (see table 2 for meaning of high scores). The internal consistency of the measure was good (α =0.71).

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Table 2. *Information regarding the meaning of scores on the temperament and parenting measures.*

Variable name	**Meaning of high scores on this measure.**
Mood	Less pleasant, content & calm as an infant.
Approach/withdrawal	More fearful/fretful of new people as an infant.
Adaptability	More fearful/fretful of new situations as an infant.
Regularity	Less regularity in terms of routine as an infant.
Emotional dysregulation	The child was observed to have more emotional dysregulation (at three years old).
Independence & self-regulation	The child was observed to have less independence & self-regulation observed (at three years old).
Cooperation	The child was observed to be less cooperative (at five years old).
Parent verbal & emotional responsivity	Less verbal/emotional responsivity observed in the parent (when the child was three years old).
Parental engagement	More parental engagement reported (when the child was
Parent-child closeness	Less parent-child closeness reported (when the child was)
Parent-child conflict	More parent-child conflict reported (when the child was)
Harsh punishment	More harsh punishment reported (when the child was)

Strengths and Difficulties Questionnaire

Social-Emotional Difficulties: Parent-report on the Strengths and Difficulties Questionnaire (SDQ, Goodman 1997; Goodman, 2001) was used to measure social-emotional outcomes when the children were 3, 5, 7, 11 and 14 years old. Internal consistency was good (α: 0.73). Each of the four difficulties subscales peer, emotion, conduct, and hyperactivity were examined separately. The scores for each subscale ranges from 0 to 10, and higher scores indicate more difficulties. Pro-sociality: The prosocial subscale of the SDQ was completed by the primary caregiver when the child was 3, 5, 7, 11 and 14 years old. Internal consistency was acceptable (α: 0.67). The subscale ranged from 0 to 10, and higher levels of pro-sociality were indicated by higher scores. The strengths and difficulties sub-scales at ages 3, 5 and 7 years old were used as the predictor variables for the multilevel mixed-effects regression and the same subscales were used at age 14 as the outcome variables (see table 3).

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Covariant variables

The covariant variables included gender and socio-economic status. The socio-economic status (SES) variable included: job status, income, and highest academic achievement. This information was gathered from the parent interview information when the child was three years old. These three variables were used to create an average score for SES using SPSS transform and selecting the mean function. Both gender and SES were entered as covariates for both the LPA and multilevel mixed-effect regression analyses.

Table 3. *Information about the measures being used in specific analyses.*

What is being measured	Name of measure being used	Age of child	Who completed the measure (observation, parent or child)	Analysis the measure was used for.
Sibling bulling	Specific questions around sibling bullying	11 years old	child	LPA
Peer bulling	Specific questions around peer bulling	11 years old	child	LPA
Callus-unemotional behaviours	Items from the inventory of callus-unemotional traits	11 years old	child	LPA
Temperament	Carey infant temperament scale	9 months	parent	Predictor variable: Multinomial logistic regression
Temperament	Child social behaviour questionnaire	9 months	parent	Predictor variable: Multinomial logistic regression
Parent-child conflict and closeness	Pianta child-parent relationship scale	3 years	parent	Predictor variable: Multinomial logistic regression
Parent emotional & verbal responsivity	Home observations for measurement of the environment scale	3 years	observations & parents	Predictor variable: Multinomial logistic regression
Parental engagement	Specific questions around parental engagement	5 years	parent	Predictor variable: Multinomial logistic regression
Harsh punishment	Conflict tactics scale	5 years	parent	Predictor variable: Multinomial logistic regression
Social-emotional difficulties	Strengths and difficulties questionnaire	3, 5, 7, years	Parent	Predictor: Multilevel mixed-effects regression
Pro-sociality	Strengths and difficulties questionnaire	3, 5, 7, years	Parent	Predictor: Multilevel mixed-effects regression
Social-emotional difficulties	Strengths and difficulties questionnaire	14 years	parent	Cross-sectional validity of LPA and The outcome variables: Multilevel mixed-effects regression
Pro-sociality	Strengths and difficulties questionnaire	14 years	Parent	Cross-sectional validity of LPA and The outcome variables: Multilevel mixed-effects regression
Sibling bulling	Specific questions around sibling bullying	14 years old	Child	The outcome variables: Multilevel mixed-effects regression
Peer bulling	Specific questions around peer bulling	14 years old	Child	The outcome: Multilevel mixed-effects regression

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Statistical analysis

A statistical Package for the Social Sciences (SPSS) version 25 was used for running tests of normality and to prepare the data for Mplus. Microsoft Excel was used to create line graphs for each model and bar charts. Latent Profile Analysis (LPA) is an extension of Latent Class Analysis which allows for continuous indicators; this was conducted using Mplus version 7.3 (Muthen & Muthen, 2012). Data used for the LPA and multilevel mixed-effects regressions needed to be prepared for use in Mplus. This was to ensure that data had been uploaded correctly and had the same descriptive statistics. Multinominal logistic regression models were run to investigate which factors predicted membership of the bullying classes (see the temperament and parenting measures in Table 2). Jamovi (which is similar to SPSS but has more features) was used for the multinominal logistic regression models.

The LPA was used to determine if there are meaningful groups of children sharing similar patterns of bullying involvement with callous-unemotional behaviours. Values from the sibling bullying, peer bullying, and callous-unemotional traits were entered into the LPA. Gender and socioeconomic status were entered as covariates. The fit of six models were assessed (two-profiles to seven-profiles). The chosen solution was based on model fit indices, interpretability, and previous literature. Model selection was based on decision steps recommended by Ram and Grimm (2009). This included inspect estimation outputs for error messages, out-of-bound parameters, and theoretical plausibility. The researchers compared models using relative fit information: Bayesian information criterion (BIC) and Akaike information criterion (AIC), selecting the models with the lowest figures. Models were evaluated with respect to confidence with which individuals have been classified as belonging to one group or another by selecting models with an entropy of above 7. Researchers also based decisions on theoretical & content-related considerations (Gabriel et al., 2015; Hirschi & Valero, 2017; Vermunt & Magidson, 2002; Woo et al., 2018) and any models with small sized subgroups (<3%) were removed.

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The multilevel mixed-effects regressions were run using Mplus version 7.3. This was to investigate the mean change in social development over time and whether it differed between the bullying subgroups. The outcome variables were externalising behaviours (hyperactivity-inattentive and conduct problems), internalising behaviours (emotional problems and peer problems) and pro-sociality. The predictors in the fixed part of the model were linear time (when the child was 3 5, 7 and 14 years old), the chosen latent profile predicted group values (contrast groups, see Table 4 below), the interaction between linear time and latent profile predicted group values. Socioeconomic status when the child was 3 years old, and gender were included as covariates. Participant ID and linear time were included in the random part of the model. Contrast groups were created so that it was possible to compare subgroups of bullies within the regression analyses. This was done using SPSS transform data function to compare the subgroups from model chosen (see Table 2). The first contrast was used to compare the non-bullying profile with the other three profiles. The second contrasts compared the generalist bully profile with the sibling bully profile and the third compared the generalist bully profile with the occasional bully profile.

Table 4. ***Orthogonal contracts coding for the four bullying subgroups.***

Bullying profile	Profile number	None	Sibling	Occasional
Non-bully	2	-3	0	0
Occasional bullies	1	1	0	-1
Generalist bullies	4	1	1	1
Sibling bullies	3	1	-1	0

Normality of Data and Test Assumptions

Due to the large sample sizes, it was not possible to test for normality using a statistical normality test, such as the Shapiro-Wilk test (Royston, 1992). The histograms (see appendix C) show that for the sibling bullying and callous unemotional there were no ceiling or floor effects. Whereas for peer bullying the histogram shows that a floor effect was present for the peer bullying latent variable, and so this variable was entered into the analysis as a categorical variable. The heterogeneity of the observed distributions was confirmed using bar charts to examine the distribution of these known sub-distributions (socioeconomic status & gender) within the latent profiles (see appendix D).

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For the multinomial logistic regression, the variables were tested for multicollinearity. It was found that the predictor variables were all correlated, but that the correlations (<0.8) suggested there was no multicollinearity. The skewness and kurtosis statistics (see Table 3), histograms, Q-Q plots, and box plots (see appendix E) were run to test for normality, consider the distribution and to identify outliers. The statistics and histograms suggested that given the large data set there were no issues round the data distribution.

The multilevel mixed-effects regression models run normally and did not violate the assumptions. The variables were tested for normality of distribution using statistics for skewness and kurtosis (see table 5), histogram, Q-Q plots, and box plots (see appendix F). The variables which were not normally distributed were transformed using log10 and square root functions on SPSS. The transformations which brought the variables closest to the bell curve distribution (skewedness ≤0.5 and kurtosis <3.0) were selected (see histograms and Q-Q plots in appendix F). The skewness and kurtosis were included in the descriptive statistics table (see appendix B). After transformation, all variables had skewness of below 2 and kurtosis of less than 7 as required for large data sets (Kim, 2013). The final transformed predictor variables were deemed to meet the assumptions for the analysis. The boxplots showed outliers for both the multinominal logistic regression (see appendix E) and the multilevel mixed mode regression (see appendix F). The outliers appear to be due to a natural variation within a large data set used and therefore were not removed.

Results

Classification of the bullying subgroups

The six-profile model had the lowest AIC and BIC; it also had an entropy greater than the 7 required (see table 6). The five-profile model had the next lowest AIC and BIC but had an entropy below 8 so was excluded. The four-profile model had a similar AIC and BIC to the five-profile model and had an entropy score of greater than 7. Models six and seven had error messages which suggested

non-identification. The error messages appear to be due to the distribution not having much variance, which makes it more difficult to create subgroups that vary reliably. The seven-profile model has some small subgroup sizes which accounts for only 1% and 2% of the population.

Table 7. *Information used for Profile Selection: Free Parameters, Log Likelihood, AIC, BIC, Entropy, and Profile Sizes.*

No of profiles	No. of free parameters	Log likelihood	AIC	BIC	Entropy g2	Number of cases (proportions) per profile.						
						1	2	3	4	5	6	7
2	17	-42057.34	84148.68	84275.79	0.90	5012 (0.38)	8043 (0.62)					
3	25	-41597.72	83245.43	83432.36	0.87	3973 (0.30)	1879 (0.14)	7204 (0.55)				
4	33	-41403.23	82872.45	83119.19	0.86	1871 (0.14)	6065 (0.46)	1078 (0.08)	4041 (0.31)			
5	41	-41163.33	82408.66	82715.21	0.77*	815 (0.05)	3180 (0.24)	1830 (0.14)	929 (0.07)	6301 (0.48)		
6	49	-17163.96**	34425.91	34792.28	0.94	3189 (0.24)	1543 (0.12)	1031 (0.08)	4039 (0.31)	844 (0.07)	2410 (0.18)	
7	57	-37237.84**	74589.68	75015.87	0.90	2480 (0.19)	3886 (0.30)	1889 (0.15)	2892 (0.22)	158 (0.01)	1527 (0.12)	224 (0.02)

*entropy < 8.

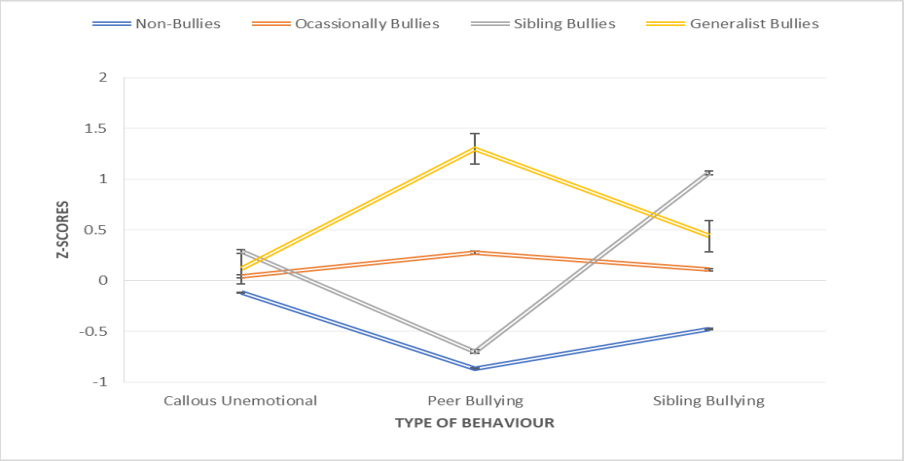
** log likelihood deemed unreliable by Mplus and did not improve after increasing random starts.

Each model profile was also plotted on a line graph (see appendix I), so that the changes between each model in terms of the subgroups and disruptions of children would be considered. Models four and five both include subgroups of specialist (sibling) bullies as well as some generalist bullies (peer and siblings), but the five-profile model splits the generalist subgroup into a high and a medium sub-group, which did not add anything meaningful to the model. The six-profile mode has very little difference between any of the subgroups, which appear to increase across all the latent variables equally. This would mean subgrouping children based on simply the severity of the bullying and callous-unemotional behaviours, which would not require a model. The seven-profile model is similar to the six-profile model.

Therefore, after considering model fit statistics, entropy, theoretical and content factors the four-profile model was deemed to be the most suitable. The subgroup names were chosen based on each subgroup profile (see figure A). The line graph depicts that there are two groups which do not or

rarely bully peers, but that one of these groups' bullies' siblings. There are also two subgroups that bully both peers and siblings. However, only one subgroup appears to bully in both contexts on a regular basis (generalist subgroup), with the other group bullying every few months or less than that (occasional bully subgroup). The graph also suggests that the more CU behaviours a subgroup of children have the more frequent that subgroup bullies their siblings.

Figure A. *Four Profile Model: Comparing CU Behaviours, Peer Bullying and Sibling Bulling for Each Bullying Subgroup.*



The means for each subgroup was also considered alongside the Likert scale for each measure when attempting to label and make sense of each subgroup (see table 7). For the bullying subgroup the labels were based on the nearest label based on the mean average. The Kruskal-Wallis non-parametric one-way ANOVA was significant for peer bullying $F(3) = 7988.674$, $P<0.001$, sibling bullying $F(3) = 3836.483$, $P<0.001$ and CU behaviours $F(3) = 407.899$, $p<0.001$. All pairwise comparisons were significant ($p<0.05$ and adjusted $p<0.05$). Therefore, there was a significant difference between the subgroups scores on CU behaviours, sibling bullying and peer bullying.

Table 8. *Four Profile Model: Bullying Profiles for Each of the Four Subgroups.*

Measures	Non-bullies	Occasional bullies	Sibling Bullies	Generalist Bullies
Peer Bullying	Never	Every few months	Never	Daily to weekly
Sibling Bullying	Never	Less often	Once per month	Every few months
Z-scores for CU Behaviours	-0.1121	0.003	.2489	.1298

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The Development Trajectory of Children's Prosocial, Externalising, and Internalising Behaviours.

The Pearson chi-squares were all non-significant ($p<0.05$), which suggests that the models are a good fit for the data as there is no significant difference between the expected and observed model.

The Development Trajectory of Prosocial Behaviours.

The slope of the trajectory of children's prosocial behaviours across different ages suggests that there is an overall change in prosocial behaviours over time (see table 10). Prosocial behaviours increase over time from three years old and the mean prosocial behaviours are different at each time point (when the child was three, five, seven and 14). A line graph (see appendix J) depicts that overall prosocial behaviour increases sharply between the ages of three and five, then again between the age of five and seven, decreasing slightly at the age of 14 years old.

Comparing the Development Trajectory of Prosocial Behaviours in Subgroups of Children (Bullies & Non-bullies).

The non-bullies had more prosocial behaviours (at each time point and overall) when compared with the bullying subgroups. The line graph comparing the bulling subgroups (see appendix K) shows that this continues across time. There is no significant difference in prosocial behaviours between the other contrasts. The residual variances and r-square values (see table 10) suggest that there is still a large proportion of the variance unexplained by the model, particularly for prosocial behaviour at a younger age, as age increases the proportion of the variance which is unexplained decreases and the r-square increases.

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Table 10. *Standardised model results for the regression for limited prosocial behaviours*

Parameter	Estimate	Standard error	Z-ratio	P-Valu
Regression of limited prosocial behaviour intercept				
When the child was 3 years old.	0.568	0.008	70.816	<0.001
When the child was 5 years old.	0.622	0.010	61.099	<0.001
When the child was 7 years old.	0.606	0.010	61.617	<0.001
When the child was 14 years old.	0.563	0.010	57.692	<0.001
On non-bullies' and bullies' contrast	0.119	0.017	6.974	<0.001
On sibling and generalist bullies' contrast	-0.028	0.025	-1.149	0.250
On occasional and generalist bullies' contrast	0.024	0.043	0.485	0.628
Regression of limited prosocial behaviour slope				
When the child was 3 years old.	0.000	0.000	999.000	999.00
When the child was 5 years old.	0.088	0.017	8.213	<0.001
When the child was 7 years old.	0.172	0.021	8.268	<0.001
When the child was 14 years old.	0.439	0.054	8.126	<0.001
On non-bullies' and bullies' contrast	0.125	0.035	3.563	<0.001
On sibling and generalist bullies' contrast	0.018	0.046	0.400	0.689
On occasional and generalist bullies' contrast	0.021	0.043	0.485	0.628
Overall regression slope and intercept	-0.173	0.045	-3.891	<0.001
Mean of SES	0.029	0.012	2.538	0.011*
Thresholds of gender	0.000	0.012	0.012	0.990
Intercept	2.438	0.046	52.505	<0.001
Slope	-0.771	0.114	-6.784	<0.001
Residual variances for limited prosocial behaviours				
When the child was 3 years old.	0.678	0.009	74.439	<0.001
When the child was 5 years old.	0.623	0.010	65.118	<0.001
When the child was 7 years old.	0.635	0.008	80.218	<0.001
When the child was 14 years old.	0.567	0.030	18.650	<0.001
Intercept	0.987	0.004	277.072	<0.001
Slope	0.980	0.009	103.216	<0.001
R-SQUARED				
When the child was 3 years old.	0.322	0.009	35.408	<0.001
When the child was 5 years old.	0.377	0.010	39.430	<0.001
When the child was 7 years old.	0.365	0.008	46.087	<0.001
When the child was 14 years old.	0.433	0.030	14.225	<0.001

The Development Trajectory of Externalising Behaviours in Children.

The intercept of the mean for externalising behaviours at three years old and the slope trajectory of the children's externalising behaviours across the different ages, suggests that there is a change in externalising behaviours over time (see table 11). The slope trajectory intercept of the mean externalising behaviours for each time point suggests that there is a change in the trajectory over time, which is different at each time point (see table 11). The graph (appendix J) shows that the biggest change occurs between the ages of three and five years old.

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The Development Trajectory of Externalising Behaviours, Comparing Subgroups of Children that Bully.

The mean intercept for each of the contrasts suggests there was difference in externalising behaviours between each of the contrasts. The trajectory of the slope suggested that the bullies had more externalising behaviours than the non-bullies. The sibling bullies had more externalising behaviours than the generalist bullies and the generalist bullies had more externalising behaviours than the occasional bullies. The graph depicting the trajectory of externalising behaviours for the various subgroups of bullies (see appendix K) shows that the differences between the subgroups relates to the frequency of bullying and CU behaviours (both specialist and generalist). Therefore, the non-bullies and occasional bullies had low amounts of both CU behaviours and externalising behaviours. Whereas the sibling bullies and generalist bullies had higher amounts of both CU behaviours and externalising behaviours. This difference is consistent across time. The difference between the infrequent and frequent bullies appears to increase as the children get older. The residual variances and r-square values (see table 11) suggest that there is still a proportion of the variance unexplained by the model, particularly for externalising behaviour at a younger age, as age increases the proportion of the variance which is unexplained decreases and the r-square increases. However, a large proportion is explained by the model, especially externalising behaviours at the age of 14 years old (see the graph in appendix K).

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Table 11. *Standardised model results for the regression for externalising behaviours*

Parameter	Estimate	Standard error	Z-ratio	P-Valu
Regression of externalising behaviour intercept				
When the child was 3 years old.	0.717	0.005	132.808	<0.001
When the child was 5 years old.	0.820	0.007	124.058	<0.001
When the child was 7 years old.	0.801	0.007	113.410	<0.001
When the child was 14 years old.	0.751	0.009	81.861	<0.001
On non-bullies' and bullies' contrast	0.104	0.014	7.516	<0.001
On sibling and generalist bullies' contrast	-0.077	0.020	-3.808	<0.001
On occasional and generalist bullies' contrast	0.123	0.018	6.657	<0.001
Regression of externalising behaviour slope				
When the child was 3 years old.	0.000	0.000	999.000	999.00
When the child was 5 years old.	0.103	0.007	14.395	<0.001
When the child was 7 years old.	0.202	0.014	14.603	<0.001
When the child was 14 years old.	0.520	0.037	14.158	<0.001*
On non-bullies' and bullies' contrast	0.056	0.025	2.272	0.023*
On sibling and generalist bullies' contrast	-0.086	0.036	-2.391	0.017*
On occasional and generalist bullies' contrast	0.072	0.033	2.188	0.029*
Slope and intercept	-0.249	0.024	-10.529	<0.001
Mean of SES	0.029	0.012	2.538	0.011*
Thresholds of gender	0.000	0.012	0.013	0.990
Intercept	4.299	0.048	89.455	<0.001
Slope	-0.788	0.067	-11.714	<0.001
Residual variances for externalising behaviours				
When the child was 3 years old.	0.487	0.009	62.931	<0.001
When the child was 5 years old.	0.357	0.008	43.633	<0.001
When the child was 7 years old.	0.395	0.008	52.491	<0.001
When the child was 14 years old.	0.352	0.023	15.241	<0.001
Intercept	0.982	0.003	287.683	<0.001
Slope	0.995	0.003	299.083	<0.001
R-SQUARE				
When the child was 3 years old	0.513	0.008	66.404	<0.001
When the child was 5 years old	0.643	0.008	78.629	<0.001
When the chid was 7 years old	0.605	0.008	80.370	<0.001
When the child was 14 years old	0.648	0.023	28.111	<0.001

The Development Trajectory of Internalising Behaviours in Children.

The intercept of the mean for internalising behaviours at three years and the slope trajectory of reports of children's internalising behaviours across different ages, suggests that there is an overall change in children's internalising behaviours over time (see table 12). The slope trajectory changes and intercepts at the age of three, five, seven and 14 years old, suggests that there is a change in the trajectory of internalising behaviours which is different at each time point. The graph (appendix J) shows that internalising behaviours reduce between the ages of three and five years old, and then increase between five and 14 years old, with the biggest overall change in the trajectory of internalising behaviours being an increase between the ages of seven and 14 years old.

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

The Development Trajectory of Internalising Behaviours, Comparing Subgroups of Children that Bully.

The intercept of the contrast between occasional bullies and generalist bullies, suggests that the generalist bullies having more internalising behaviours (see table 12). The slope trajectory of reported internalising behaviours suggests that the generalists reported internalising behaviours increases more over time compared with the occasional bullies (see table 12). There was no significant overall difference in internalising behaviours between the other bullying subgroup contrasts. However, there was a significant difference between the trajectory of the slope of internalising behaviours for sibling bullies verse generalist bullies, which suggests that the sibling bully's trajectory of internalising behaviours increased more over time compared with the generalist bullies. For the contrast between non-bullies and bullies the trajectory of the slope of reported internalising behaviours suggests no significant difference. The graph (see appendix K) depicting the trajectory of internalising behaviours for the various subgroups of bullies shows that the differences between the subgroups relates to the frequency of bullying and CU behaviours (both specialist and generalist). The graph (see appendix K) shows that generalists tend to have more internalised behaviours at 3 years old, but over time these changes, and by the time the children are 14-years old the sibling bullies tend to have the highest amount of reported internalising behaviours. The residual variances and r-square values (see table 12) suggest that there is still a large proportion of the variance unexplained by the model, particularly for internalising behaviour at age 7 years old, as age increases the proportion of the variance which is unexplained decreases.

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Table 12. *Standardised model results for the regression for internalising behaviours.*

Parameter	Estimate	Standard error	Z-ratio	P-Valu
Regression of internalising behaviour intercept				
When the child was 3 years old.	0.681	0.007	101.878	<0.001
When the child was 5 years old.	0.714	0.008	92.431	<0.001
When the child was 7 years old.	0.679	0.008	87.739	<0.001
When the child was 14 years old.	0.618	0.008	73.941	<0.001
On non-bullies' and bullies' contrast	0.016	0.015	1.041	0.298
On sibling and generalist bullies' contrast	-0.004	0.023	-0.170	0.865
On occasional and generalist bullies' contrast	0.046	0.020	2.264	0.024*
Regression of internalising behaviour slope				
When the child was 3 years old.	0.000	0.000	999.000	999.00
When the child was 5 years old.	0.135	0.006	20.749	<0.001
When the child was 7 years old.	0.256	0.012	21.028	<0.001
When the child was 14 years old.	0.642	0.031	20.534	<0.001
On non-bullies' and bullies' contrast	0.004	0.021	0.197	0.843
On sibling and generalist bullies' contrast	-0.116	0.031	-3.807	<0.001
On occasional and generalist bullies' contrast	0.144	0.029	4.951	<0.001
Slope and intercept	-0.256	0.023	-11.179	<0.001
Mean of SES	**0.029**	**0.012**	**2.538**	**0.011***
Thresholds of gender	0.000	0.012	0.013	0.990
Intercept	2.097	0.031	68.563	<0.001
Slope	0.451	0.031	14.371	<0.001
Residual variances for internalising behaviours				
When the child was 3 years old.	0.536	0.009	58.952	<0.001
When the child was 5 years old.	0.521	0.008	61.658	<0.001
When the child was 7 years old.	0.561	0.007	76.168	<0.001
When the child was 14 years old.	0.405	0.025	16.051	<0.001
Intercept	0.998	0.001	733.379	<0.001
Slope	0.990	0.004	245.609	<0.001

Predicting Subgroups of Bullies Based on Parenting Styles and Child Temperaments

The multinomial logistic regression overall model fit test was significant ($X^2(36) = 256$, $p<0.001$), therefore, the model was able to reject the null hypothesis that there is no effect from including the predictor variables. The model coefficient contrasts compared bullying subgroups for differences in terms of the children's temperament and parenting style (see table 13).

Temperament

The model predicts that occasional bullies will be less calm and content at 9 months old (mood), but to be less emotionally dysregulated at 3 years old compared to the non-bullies. Generalist bullies are predicted to have more difficulties with emotional dysregulation at three years old, compared with occasional bullies. The sibling bullies were less fearful in new situations (adaptability)

when they were nine-months old, than the generalist bully subgroup. Additionally, sibling bullies were less fearful of new situations (adaptability) and with new people (approach/withdrawal) at 9 months old, than the occasional bully subgroup.

Parenting punishment

The bullying subgroups (generalist, sibling and occasional bullies) were all predicted to experience more harsh punishment, compared with the non-bullying subgroup.

Parental engagement and verbal/emotional responsivity

The model predicts that sibling bully's subgroup experience more parental engagement, than the occasional bully's subgroup, and less parent verbal/emotional responsivity than the non-bullying subgroup. The model predicts that the generalist subgroups and occasional bully's subgroups both experiences less parental engagement, than the non-bullying subgroup.

Table 14. Model coefficients for the contrasts between the bullying subgroups.

Bullying subgroup contrasts	Predictor	Estimate	95% Confidence Interval		P
			Lower	Upper	
Occasional bullies-Non-bullies	Intercept	-2.836	-4.105	-1.567	<0.001***
	Mood	0.193	0.022	0.364	0.027*
	Approach/withdrawal	-0.434	-1.175	0.306	0.250
	Difficulty Adapting	0.032	0.018	0.082	0.205
	Regularity	0.033	-0.336	0.401	0.861
	Independent Self-Regulation	-0.014	-0.251	0.224	0.909
	Emotional Dysregulation	-0.071	-0.128	-0.015	0.013*
	Cooperation	-0.322	-1.574	0.929	0.614
	Parent Emotional/Verbal Responsivity	0.024	-0.366	0.415	0.903
	Parental Engagement	-0.024	-0.047	-0.002	0.033*
	Harsh Punishment	0.083	0.056	0.110	<0.001***
	Parent-Child Conflict	0.058	-0.140	0.255	0.567
	Parent-Child Closeness	-0.214	-0.578	0.150	0.249
Sibling bullies-Non-bullies	Intercept	-4.317	-5.909	-2.726	<0.001***
	Mood	0.013	-0.199	0.224	0.908
	Approach/withdrawal	-0.754	-0.157	1.665	0.105
	Difficulty Adapting	-0.076	-0.138	-0.014	0.016*
	Regularity	-0.006	-0.461	0.448	0.978
	Independent Self-Regulation	0.095	-0.199	0.388	0.528
	Emotional Dysregulation	-0.009	-0.079	0.062	0.813
	Cooperation	1.025	-0.515	2.566	0.192
	Parent Emotional/Verbal Responsivity	0.514	0.042	0.099	0.033*
	Parental Engagement	0.009	-0.020	0.037	0.553
	Harsh Punishment	0.076	0.044	0.109	<0.001***
	Parent-Child Conflict	-0.034	-0.275	0.207	0.783
	Parent-Child Closeness	0.037	-0.396	0.469	0.868
Generalist bullies-Non-bullies	Intercept	-2.831	-3.785	-1.877	<0.001***
	Mood	0.035	-0.093	0.163	0.595
	Approach/withdrawal	0.137	-0.415	0.689	0.626
	Adaptability	0.097	-0.028	0.047	0.610
	Regularity	0.184	-0.091	0.459	0.190
	Independent Self-Regulation	0.067	-0.111	0.246	0.461
	Emotional Dysregulation	-0.005	-0.047	0.038	0.832
	Cooperation	0.514	-0.418	1.447	0.280

	Parent Emotional/Verbal Responsivity	0.247	-0.042	0.536	0.093[a]
	Parental Engagement	-0.018	-0.034	-8.55e-4	0.039[*]
	Harsh Punishment	0.066	0.047	0.086	<0.001[**]
	Parent-Child Conflict	0.104	-0.043	0.250	0.165
	Parent-Child Closeness	0.072	-0.190	0.335	0.590
Occasional bullies-Generalist Bullies	Intercept	-0.005	-1.342	-1.332	0.994
	Mood	0.158	-0.022	0.338	0.086[a]
	Approach/withdrawal	-0.572	-1.350	0.207	0.150
	Difficulty Adapting	0.023	-0.030	0.075	0.397
	Regularity	-0.151	-0.538	0.236	0.445
	Independent Self-Regulation	-0.081	-0.538	0.236	0525
	Emotional Dysregulation	-0.067	-0.126	-0.008	0.027[*]
	Cooperation	-0.836	-2.149	0.476	0.212
	Parent Emotional/Verbal Responsivity	-0.222	-0.631	0.187	0.287
	Parental Engagement	-0.286	-0.664	0.092	0.138
	Harsh Punishment	0.017	-0.011	0.045	0.237
	Parent-Child Conflict	-0.046	-0.253	0.161	0.663
	Parent-Child Closeness	-0.286	-0.664	0.092	0.138
Sibling bullies-Generalist bullies	Intercept	-1.488	-3.132	0.156	0.076[a]
	Mood	-0.022	-0.242	0.197	0.842
	Approach/withdrawal	0.617	-0.325	1.558	0.199
	Difficulty Adapting	-0.086	-0.149	-0.022	0.008[*]
	Regularity	-0.190	-0.660	0.279	0.427
	Independent Self-Regulation	0.028	-0.276	0.331	0.858
	Emotional Dysregulation	-0.004	-0.076	0.069	0.917
	Cooperation	0.507	-1.084	2.098	0.532
	Parent Emotional/Verbal Responsivity	0.267	-0.220	-0.754	0.282
	Parental Engagement	0.026	-0.003	0.055	0.077
	Harsh Punishment	0.010	-0.023	0.044	0.553
	Parent-Child Conflict	-0.138	-0.387	0.111	0.278
	Parent-Child Closeness	-0.035	-0.480	0.410	0.876
Sibling bullies-Occasional bullies	Intercept	-1.483	-3.332	0.366	0.116
	Mood	-0.180	-0.428	0.067	0.153
	Approach/withdrawal	1.188	0.123	2.254	0.029[*]
	Difficulty Adapting	-0.108	-0.180	-0.036	0.003[*]
	Regularity	-0.039	-0.057	0.491	0.885
	Independent Self-Regulation	0.109	-0.234	0.451	0.534
	Emotional Dysregulation	0.063	-0.019	0.145	0.130
	Cooperation	1.344	-0.456	3.143	0.143
	Parent Emotional/Verbal Responsivity	0.490	-1.044	0.066	0.084[a]
	Parental Engagement	0.033	-0.066	-2.28e-4	0.048[*]
	Harsh Punishment	-0.007	-0.045	0.031	0.731
	Parent-Child Conflict	-0.092	-0.374	0.191	0.524
	Parent-Child Closeness	0.251	-0.261	0.763	0.337

[**] <0.001 highly significant

[*] < 0.05 significant

[a] Marginally significant

Discussion

Classification of the bullying subgroups

The latent profile analysis suggested a four-class model for the bullying subgroups; there was a subgroup which bullied frequently across contexts and a subgroup of bullies that bullied in only one

context, bullying siblings. This finding provides evidence for the proposed model that there are subgroups of generalist and specialist bullies (Kuay et al., 2017). Additionally, there was found to be another subgroup that bullied occasionally. This was not a subgroup which had been considered in terms of the study hypotheses. However, infrequent bullying has also been found to have detrimental effects on both bullies and victims (Nansel et al., 2001). Research has found that infrequent bullies are at a higher likelihood of problems during adolescence, including tobacco use (Nansel et al., 2001), substance misuse, physical fighting, emotional distress, self-harm, and suicidal ideation (Gower & Borowsky, 2013). The current study found the subgroups followed similar patterns to what has been found in previous research. For example, sibling bullying had the lowest economic status and male children bullied more overall and had higher CU behaviours. Previous research which found that children from low socio-economic status were slightly more likely to bully or be bullied (Tippett & Wolke, 2014), which is mediated by parenting style (Hoff & Laursen, 2019). Compared to females, the male children engaged in more aggressive (Hyde, 1984) and callous-unemotional behaviours (Fanti et al., 2009, Kimonis et al., 2014).

In terms of the findings regarding CU behaviours, it appears that these behaviours more related to sibling bulling, rather than bulling across context. It was found that the children who bullied their siblings more frequently tended to have higher reported CU behaviours. This may explain why previous researchers (Kuay et al., 2017) have found that sibling bullying is related to longer term antisocial behaviour and aggression. This may be linked to the fact that CU behaviours are believed to develop in part due to early life factors which occur within the home, such as inconsistent parenting (Lynam et al., 2008) or lack of parental warmth (Waller et al., 2015). These difficulties which occur within the home may lead to aggressive behaviour with those individuals who are available and present during the child's early life. This suggests that the generalist subgroups previously studied likely engaged in sibling bulling or some form of bullying within the family. Therefore, as hypothesised there was a subgroup of children that bullied across context (generalist bullies) and who had high scores on CU behaviours. There was also a subgroup that bullied in only one context (sibling bullies)

as hypothesised, but the sibling bullies had the highest score on CU behaviours compared with the other subgroups which were identified.

Persistency of Problem Behaviours Over Time

It was expected that there would be a subgroup of children who bullied frequently and had high levels of CU and a group who bullied frequently and had low levels of CU. It was also hypothesised that would have early behavioural difficulties, and so would score high on conduct problem symptoms compared to the low bullying groups. Furthermore, there was expected to be a subgroup that bullied frequently and had low levels of CU which was expected to have more hyperactivity, inattention, and impulsivity, but there was not a subgroup who bullied frequently and had low CU behaviours. The results showed that both subgroups of children who bullied frequently, also had high levels of conduct problems and hyperactivity (externalising problems) compared with the non-bullying groups. There were no significant differences between the generalist subgroup and sibling subgroup in terms of externalising behaviours at three years old, yet the sibling bullies did have higher levels of CU behaviours. At 14 years old the group with the higher levels of CU (sibling bullies), also had higher levels of externalising behaviours. This result seems to fit with previous research that has shown CU behaviours in early life are linked to later problem behaviours, such as antisocial behaviours (Frick et al., 2014) and externalising behaviours.

The generalist bullies were a subgroup group who bullied frequently and had the lower levels of CU behaviours (when compared with the sibling bullies), and as hypothesised these children had more early emotional difficulties, and scored higher on internalising behaviours, as compared to the sibling bullies (high bullying/high CU behaviour subgroup) or the non-bullies and occasional bullies (low bullying subgroups). However, Gower and Borowsky (2013) also found that infrequent bullies are at risk of internalising behaviours but found that those that bullied more frequently had more emotional problems. Therefore, this may suggest that the more bullying the more internalising behaviours which will occur, but that CU behaviours mitigate the emotional impact on the individual. This may

fit with the theory that some people develop a lack of empathy to cope with trauma (Chaitin & Steinberg, 2008) and so CU behaviours may initially develop as a strategy to cope with adversity.

The multilevel mixed model regressions were used to predict prosocial behaviour, externalising behaviours, and internalising behaviours at 14 years old based on children's scores on these measures at three, five and seven years old and their bulling subgroups. It was hypothesised that there would be no change in social development over time for the bullying/CU+ classes but there would be change within the bullying/CU-. Overall, the regression model for prosocial behaviours predicted that children's prosocial behaviour and externalising behaviours decreased over time, whereas internalising behaviour increase. Therefore, overall, there was a change in social development over time which occurred in the children between the ages of three and 14 years old. Contrasts were then made between bullying subgroups to explorer whether the change in social development was the same for different subgroups of bullies.

Overall, the CU+ children who bullied frequently also scored high on the externalizing problems and had difficulties with prosociality. The high bullying/CU+ subgroup also had scores which were remained more similar at 3 and 14 years old, when compared with the low bullying/CU- behaviour subgroups. However, there were some changes over time for both prosociality and externalising behaviours, and this change were just smaller for the bullying/CU+ classes. Difficulties with internalising behaviours increased further for the bullying/CU+ classes when compared with the bullying/CU- classes. Furthermore, for the bullying/CU- classes it was hypothesised that scores measuring externalizing problems and internalising problems would reduce and scores on prosociality measures would increase. Overall, externalising behaviours decreased for all children over time, and for the CU- classes this reduction was just bigger. In addition, all the children had an increase in internalising behaviours, but this increase was just less for the CU- classes. For prosociality, the bullying/CU+ classes had less change in prosocial behaviours then the non-bullying/CU- subgroup as hypothesised. However, the occasional bully subgroup also had low CU behaviours and this subgroup also had less of an

increase in prosocial behaviours. This suggested that those children who do not bully have larger increases in prosocial behaviours in adolescence compared with those children who do bully. Therefore, patterns occurred within the groups as expected for externalising and internalising behaviours but the overall pattern of changes in social development was different to expected. In addition, it appears that for prosociality there is something other than CU behaviours which is related to bullying behaviour influencing the changes which occur over time.

Overall, the graphs also showed that for prosocial behaviour the decrease occurred between the age of three and five and then start to increase again. The increase in prosociality between 3 and 14 years old fits with research that has found prosocial behaviours increase as children develop self-concept clarity (Crocetti et al., 2016) and the slight dip that occurred has also been seen in previous research (Crocetti et al., 2016; Carlo et al., 2015; Van der Graaff et al., 2018) and has been found to be followed by a further increase which continues until adolescences are around 16 to 17 years old (Van der Graaff et al., 2018). Furthermore, regression analyses predicted that children who bully are likely to engage in less prosocial behaviours at the age of 14, when compared with children who do not bully, but that there is typically some improvement in prosocial behaviours between the ages of seven and 14 years old for all children. Research that suggests that prosocial behaviours are linked to having higher levels of empathy (Van der Graaff et al., 2018). Higher levels of affective empathy would likely also prevent or reduce bullying behaviour (Stavrinides et al., 2010). Therefore, this may explain why the non-bullies developed more prosocial behaviours over time, as these may be children who already had higher levels of empathy and so they developed more prosocial behaviours over time.

The current study found that as hypothesised the children who bullied more frequently and had high levels of CU behaviours had less change in externalising behaviours at the age of 14 years old. The graphs showed that much of the decrease in externalising behaviours occurred between the age of three and five. The decrease between the ages of three and five fits with research that suggest

that hyperactivity (Connor, 2002) and a 'moderate level of disruptive behaviour' in young children's normal (Tremblay et al., 2004). However, usually these externalising behaviours are either at a low level or will decrease as the child gets older, with only a small percentage of children externalising behaviours remaining consistent over time (Campbell et al., 2010; Côté et al., 2007). The current study's regression model predicted that children who bully more frequently and have higher levels of CU behaviours are more likely to have higher levels of externalising behaviours at age 14 years old. This is important because research has found that externalising behaviours which are consistent over time are a major risk factor for later youth delinquency, adult criminality, and violent behaviour (Betz, 1995; Farrington, 1989; Moffit, 1993). Therefore, identifying which subgroup of children are likely to have externalising behaviours that remain high at age 14 years old is important, in order to target at-risk children for interventions.

In contrast to what was hypothesised, the study also found that the subgroup of children who bullied occasionally and had low levels of CU behaviours, had less change in their internalising behaviours compared to the generalist and sibling bullies. Internalising behaviours initially decrease between the ages of three and five and then rise again in adolescence. This finding aligns with previous research which found that internalising behaviours tend to develop between late childhood and early adolescence, reaching a peak in middle to late adolescences (Nilsen et al., 2018). Internalising behaviours include symptoms of depression and anxiety and are amongst one of the strongest factors impacting on health services World Health Organisation (WHO).

The current study found that generalist bullies have more internalising behaviours, than occasional bullies, and this is also consistent across the time periods (see graph in appendix). Whereas sibling bullies had more of an increase compared with generalist bullies in internalising behaviours by age 14 years. However, the contrast between bullies and non-bullies was non-significant, and the graph also shows that the occasional bullies have lower levels of internalising behaviours than the

non-bullies. Therefore, although the subgroups with higher CU behaviours generally had fewer internalising behaviours, this was not consistent. This suggests there may be other factors which have impacted on the different subgroups internalising behaviours in some way. For example, the non-bullying subgroups may be victims of bullying, which may increase internalising symptoms such as anxiety and depression.

Early childhood experiences of harsh discipline, inconsistent parenting or lack of parent engagement may lead to children struggling more with their mental health, and so lead to an increase in internalising behaviours. Research proposes that factors such as trauma and adversity can lead to post-traumatic growth and that this can lead to increased compassion and prosocial behaviours (Lim & DeSteno, 2016; Vollhardt & Staub, 2011). This would explain why the non-bullying subgroup may have higher levels of internalising behaviours than the occasional bullies as children who chose not to bully at all may have other adversity which has not been measured for within the present study. This may also give some indication as to why there is more unexplained variance within the internalising regression model, as life experiences may have a big influence on internalising behaviours, but this can lead to either an increase (Lim & DeSteno, 2016; Vollhardt & Staub, 2011) or decrease in empathy (Chaitin & Steinberg, 2008). Therefore, trauma and adversity may be influencing internalising behaviour in both the children who do and do not bully frequently.

Early Life Factors

It was also expected that the children who bully in just one setting (siblings bullies) and who are low on CU behaviours (bullying/CU-), would have different early life factors. There was no subgroup which met those criteria. However, there were three subgroups that bullied. One (occasional bullies) subgroup that bullied less frequently and had low levels of CU behaviours, two (sibling bullies and generalist subgroups) that bullied more frequently and had a high level of bullying behaviours. These three subgroups of bullies did have different early life factors when compared to each other and when compared with the non-bullying subgroups.

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Research is inconsistent on whether CU is related to more negative home experiences (see Centifanti et al., 2015; Wagner et al., 2015; Glenn, 2018). Therefore, it was expected that the bullying subgroup with lower CU behaviours would show more conflict and harshness early on with parents than the subgroup who bully and has higher levels of CU behaviours. However, the sibling bully, generalist bully and occasional bully subgroups were all more likely to have experienced more harsh punishment from parents, when compared with the non-bullying subgroup. Therefore, this suggests that the experiences around harsh parenting impact more on bullying behaviour in general, regardless of whether there were CU behaviours. It has been proposed that harsh parenting styles may lead to a lack of empathy and conscience in children as parents do not enable the developmental of these skills via their interactions with their children (Wagner et al., 2015). The impact on a child may vary, with some children being simply less empathic and so more likely to bully, whereas other children may develop CU behaviour and may then be at risk of more frequent and persistent bullying behaviours.

The subgroups who bully and have high levels of CU behaviours were expected to have less positive home experiences. Both generalist and occasional bullies had higher levels of CU behaviours, compared with the non-bullying subgroups, and these children were more likely to have experienced a lack of parental engagement, than the non-bullying subgroup, this would fit with the hypothesis around children with high CU behaviours having experienced a lack of warmth, especially given the findings around lack of parental engagement. The lack of parental engagement may therefore prevent the back-and-forth mirroring of emotions between parent and young children which is proposed to facilitate the development of empathy and prevent CU behaviours (Viding et al., 2014).

Temperament

It was hypothesised that the bullying/CU- class is hypothesized to be harder to soothe and the bullying/CU- class would show a lack of fear when being introduced to new caregivers or new situations. The sibling bully subgroup had the highest scores on CU behaviours, therefore, as hypothesised this subgroup were less fearful when introduced to new people and/or new situations at 9-months old.

This may suggest as proposed by Beaver et al., (2014) that these children were more sensitive to parenting styles due to their temperament. The subgroups with CU+ generally experienced less parental engagement, when compared with CU- subgroups. However, the sibling bully subgroup actual had more parental engagement, compared with the occasional bullies (bullying/CU-), but less parental verbal and emotional responsivity. Therefore, the sibling bullies' parents engaged in more activities with the children, then the occasional bullies, but that the quality of that engagement may not have been as strong. This parenting style may have facilitated the development of CU behaviours within this subgroup of children who had a fearless temperament. There may be other factors which influenced the development of CU behaviours in the sibling bullies, such as the relationship between their other siblings and their parents, which may have influenced the parents' ability to be verbally and emotionally responsivity.

The children from the occasional bully subgroup are more likely to be less calm and content at 9 months old (mood), and less easy to soothe. Therefore, these children would not be as sensitive to parenting styles (Wagner et al., 2015) and so may be less likely to develop CU behaviours. The generalist bullies had more problems with emotionally dysregulation at 3 years old, compared to the occasional bullies. This emotional dysregulation may develop due to the inconsistent parenting, especially as this subgroup had high CU behaviours, and so would be expected to be more sensitive to parenting styles. Finally, the non-bullies were found to have more emotional dysregulation at three-years old, compared with the occasional bullies. However, it is unclear why this may be. There may be other unknown factors, however, empathy is known to develop at high levels due to post-traumatic growth (Lim & DeSteno, 2016; Vollhardt & Staub, 2011), so some of the non-bullies may be more dysregulated due to some early childhood adversity. Finally, it was not possible to disprove the null hypothesis regarding children's cooperation. This variable did not significantly contribute to the overall regression model and there was no significant contribution for any of the contrasts, therefore, it was not possible to predict the bullying subgroups using the children's scores on cooperation.

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The current study used the millennium cohort study data, this provided a very large longitudinal data set (>15, 000 participants). This gave the researchers the opportunity to make predictions in terms of identifying children as well as understanding regarding the consistency of problem behaviours. This is important when attempting to identify subgroups of children who may be at risk of later antisocial behaviour and delinquency. However, there are also limitations when using this type of data set, as there are limited options regarding the measures which can be used. The measure for CU behaviours only included four items. Nevertheless, the CU behaviours measure does have acceptable internal consistency, with a coefficient alpha of 0.77, which suggests that this measure is suitable for measuring CU behaviours. It also demonstrated face validity in terms of the items and predictive validity in terms of how CU behaviours were higher in males than females, and lowest in children who did not bully compared with those who bullied more.

Clinical implications

The current study has demonstrated that sibling bullies are a subgroup of children who are at-risk of later antisocial behaviour, particularly as this group of children also seem to be at risk of developing CU behaviours. It is known that earlier intervention occurs for children at risk of later antisocial behaviours, the more likely that there will be a positive outcome (Greenwood, 1995; Kazdin, 1987; Patterson et al., 1992). The current study has provided evidence that these children can be identified at a very young age successfully. Therefore, the current study highlights a need to use our existing knowledge to identify and intervene early. However, the social political context within the UK will likely have an impact on the services ability to target the correct children and intervene early.

The UK is the sixth richest country in the world, yet its wealth is unequally distributed compared with other rich countries. The total income is distributed disproportionately, with only 1% of the total income going to the poorest 10th and 31% going to the richest 10th (Haddat 2013). Therefore, there is also a likely divide in the ability of families to access any support or interventions so that they can get early help. It is worth considering that in the UK social policy has been overshadowed since

2010 by austerity measures and welfare reforms (Lambie-Mumford & Green, 2017). This has led to an increase in food-bank use (Loopstraet al., 2015), changes to benefits (Steward, 2015; De Agostini et al., 2014), freezes on public sector pay, and a reduction on funding for provisions (Buch, 2016). Additionally, changes in tax and benefits have impacted on families of young children distortional (Ridge 2013; Stewart 2015). Meanwhile the cost of living has increased, with big increases particularly in heating costs and fuel, which has been further exasperated by COVID-19 (Kotak & Chappell, 2021).

Considering this in the context of Maslow's hierarchy of needs, this may mean that parents are unable to meet the basic physiological and safety needs of their families if they do not have enough money for food, warmth, shelter, warm clothes. This may impact on the parents' ability to focus on other needs such as love/belonging and esteem and be less likely to provide their children with the skills needed to develop empathy and a conscious. Therefore, austerity may lead to an increase in CU behaviours, and persistent antisocial behaviour. However, there are long-term social, educational, and legal costs associated with childhood CU behaviours and conduct problems (Frick et al., 2014; Horan et al., 2016; National Audit office, 2006). In addition, antisocial behaviour is known to have a wide impact on the individual (Shepherd et al., 2004) and society (National Audit Office, 2006). As a result, there has been found to be a great yearly financial cost to the U.K. in dealing with antisocial behaviour (National Audit office, 2006), and so the savings from austerity may bring a false economy.

The impact on service provisions will also likely mean these families have less access to the support needed and interventions which would help these children and families. The Sure Start program for example, provides an intervention for pre-school children and the benefits have been since in children as young as 9-months. The program started in the late 1999s to provide services to families within the most deprived and disadvantages areas via provisions provided within sure start centres (Lewis, 2011). These centres have been shown to increase young children's ability to self-regulate and to reduce negative parenting styles (Melhuish, Belsky, & Leyland, 2008). However, austerity cuts

have led to many councils closing or downgrading Sure Start provisions (Hayes, 2015). In April 2013, Sure Start went from providing a service to all, which was providing 'stay and play' services, to focusing on the families with the greatest need (Goy, 2018). According to Goy (2018) this led to big reductions on the uptake of the provision and that service was no-longer bringing communities together. In addition to the parents being able to develop more positive parenting skills at sure start, they would likely have gained much from the community support network. The Sure Start programmes may be a vital resource which could target children at the crucial age needed (pre-school) to ensure parents enable their children to develop empathy and conscious. The current study could also aid such centres by highlighting which children are most in need of these provisions.

Conclusion

The LPA identified three subgroups of children who bully, one group which bullied infrequently and had low levels of CU behaviours, and two groups of bullies that bullied frequently and had higher levels of CU behaviours, a specialist (sibling bullies) and a generalist subgroup (peers and siblings). Sibling bullies are known to be at risk of developing CU behaviours. However, there is limited research into sibling bullying and CU behaviours to help to understand why this is, therefore the current research provides important findings that suggest a strong association between CU behaviours and sibling bullying. This aligns with what is known about the development of CU behaviours from previous research being due to temperament and parenting styles, as CU behaviours develop early in childhood when siblings are likely to be one of the main sources of peer relationships. Moreover, the current study found that the Sibling bully subgroup had the temperament and early life factors most associated with the development of CU behaviours. The findings suggested that social development does change over time for all groups of children, consistent with the development of other constructs such as self-concept and empathy. However, the current study found there are differences within subgroups of children in terms of the amount of change that occurs at various key time periods. The change that occurs appears to be complex and linked to multiple factors. Some of these factors may be

linked to the development of bullying and CU behaviours. This appears to include factors such as typical patterns of child and adolescence development, trauma, temperament, and parenting styles. Therefore, it appears to be important to consider more factors when conducting further research into social development and how CU behaviours are involved in this process.

The current study has highlighted the importance of further research into sibling bullying and the development of CU behaviours. This could involve research to explore other factors which may be contributing. For example, there may also be other factors involving the dynamics between siblings which have influenced both the development of the bullying and CU behaviours, such as attachment difficulties which influence the sibling's relationship, differing relationships with parents or differences in sibling temperaments. Finally, this research highlights the crucial role that provisions for families with young children, such as Sure Start, provide.

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Chapter 2: Systematic Literature Review

A Systematic Review of the Interventions that Target Reducing Callous Unemotional Behaviours in Children (under 13 years old) by Working with the Primary Caregiver: Considering Effectiveness, Early Intervention and Accessibility.

Word Count: 9, 967

(exc. References)

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Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Keywords

Callous-unemotional behaviours

Parenting intervention

Children (0 to 12)

Emotional skills

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Abstract

The current study aimed to conduct a systematic literature review to see which parenting interventions are effective at reducing callous-unemotional behaviours in young children (under 13 at pre-assessment). The review identified 20 papers which covered 13 separate studies, including seven Random Control Trial (RCT), one non-equivalent control group, one case control study and four single case designs. Each study was quality assessed using the Critical Appraisal Skill Programme (CASP) for the RCTs, non-equivalent control group and case control study, and the Single-Case Experimental Design (SCED) Scale (Tate et al., 2008) for the single case design studies. There was diversity in participant demographics, in terms of social-economic status, nationality, and ethnicity. However, there were no intervention studies conducted in the United Kingdom. The most effective, accessible and cost effective appear to be the studies, which all had large effect size, were time limited and group-based interventions and are evidenced to be effective when used with children as young as three years old. Additionally, the study by Kjøbli et al. (2018) had a medium effect size, suggesting it may be less effective, however, it was also suitable for children as young as three years old and had the benefit of being designed for large groups of parents, making it more cost effective. Future research should attempt to develop an effective internet-based intervention to target reducing CU behaviours in young children. There is also a need for RCTs to test the effectiveness of these interventions within the United. Kingdom population, as this has not yet been tested.

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Introduction

Callous Unemotional (CU) behaviours are related to an increase in conduct problems such as Conduct Disorder (CD) and Oppositional Defiant Disorder (ODD) (Crum at al., 2015). CU behaviours are a meaningful specifier in subtyping CD for more severe antisocial and aggressive behaviours in adult psychopathology (Pisano et al., 2017). Children who engage in CU behaviours are known to engage in a severely aggressive form of antisocial behaviour (Frick et al., 2014). Therefore, it is important to identify interventions which can reduce CU behaviours. However, children with CU behaviours require specialist interventions, specifically, children are known to respond better to reward based strategies, rather than discipline (Pasalich et al., 2016). In addition, children with CU behaviours are believed to have experienced a lack of parental warmth (Goulter et al., 2020) and therefore have failed to develop emotional skills, such as empathy and a conscience. Therefore, interventions often also include strategies that train parents on how to enable the development of these skills in children (e.g., Dadds et al., 2019).

There are long-term social, educational, and legal costs associated with childhood CU behaviours and conduct problems (Frick et al., 2014; Horan et al., 2016; National Audit office, 2006), which suggests that parenting groups would be very cost-effective. However, most cost effectiveness estimates are based round CD behaviours and not CU behaviours. Nevertheless, the estimates round CD behaviours, give some indication. Hawes and Dadds (2005; 2007) found that children with CU behaviours tended to have higher levels of CD or ODD compared to children without. Therefore, it is likely that bringing these children's CU behaviours and CD or ODD into non-clinical range would likely take longer and so would cost more. However, individuals with CU behaviours engage in antisocial behaviour, and whose aggression is severe, occurs across context and is persistent over time (Frick & White, 2008; Frick et al., 2014). Additionally, there is a great yearly cost to the U.K. in dealing with antisocial behaviour (National Audit Office, 2006). Therefore, there is a potential for great financial

savings for governments such as the U.K. in implementing interventions aimed at reducing CU behaviours. In addition, there is a personal cost to individuals in terms of their education (Horan et al., 2016) as well as impacts on victims of aggression, such as bullying (Gower & Borowsky, 2013). There is already evidence regarding the cost of implementing similar interventions for children with CD. For group-based parenting training the cost of bringing an average child with conduct problems into non-clinical range is wide ranging and dependent on the severity (Stevens, 2014) with children on the severity end costing as much as £5486 as of 2007 (Edwards et al, 2007). It is estimated that the average costs per family is between £952-£2,078 as of 2008, however, this means the average savings to society over 25 years are estimated at £16,435 per family (Bonin et al, 2011). Additionally, these costs are likely to be outdated and underestimated.

Previous research has found that the earlier intervention occurs for children who are at risk of later antisocial behaviours, the more likely that there will be a positive outcome (Greenwood, 1995; Kazdin, 1987; Patterson et al., 1992; Reid, 1993). CU behaviours found in children as young as three years of age have been successfully used to predict problem behaviours later in childhood, such as aggression (Waller et al., 2015; Willoughby et al., 2014). Therefore, intervening at that earliest point would bring the greatest success. It would also mean intervening before further harm was caused to others, such as other children who may be bullied. This is important to avoid serious negative long-term outcomes for the child and wider society, such as criminal behaviours, substance misuse, gang membership and violent crimes (Cicchetti & Nurcombe, 1993; Lynam, 1996; Mayer, 1995; Walker et al., 1995). Therefore, it is important that there are interventions which can be low cost and easily accessible to reach a greater number of at-risk children. In addition, it is important to focus on young children, as there is a benefit to focusing on parenting interventions. Whereas, with teenagers and older children, there is likely to be a great deal more independence, and so parenting interventions would likely look different and would be less successful.

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There is evidence that CU behaviours develop due to both heritable and environmental factors (Waller & Hyde, 2018). Parenting has been linked to the development of empathy and prosocial behaviour in children (Brownell, 2013; Dunn, 2006; Eisenberg et al, 2015). Parental warmth and sympathy can predict later prosocial behaviours in children (Eisenberg et al., 2015). Furthermore, research has demonstrated that adoptive parents' behaviour is important in predicting a child engaging in CU behaviours (Waller et al., 2013). Therefore, this review focused on interventions that involved the primary caregiver. Parenting interventions are important as it is known that the parents are an important part of how CU behaviours develop. Parental harsh punishment and lack of parental warmth have been associated with child and adolescent conduct disorder (CD) symptoms and CU traits (Goulter et al., 2020).

There are several interventions which have been used to treat behavioural problems such as CD and CU behaviours. Parent management training (PMT) is a programme for children which has shown large effect sizes in meta-analysis reviews (Chronis et al., 2006). PMT is based on operant conditioning and uses similar approaches to the positive behavioural support strategies described above. This intervention has previously been offered with other behaviour management strategies which are included along with the parent-training components (see Smith et al., 2010). Another intervention used for children with CU behaviours is the Parent Management Training Oregon Model (PMTO), which has been used with both young children and teenagers (Patterson et al., 1975). It is based on coercion theory and parents are taught to adopt five core strategies: positive engagement with their child, social/tangible reinforcers, setting limits, problem-solving and monitoring/supervision. Another widely used intervention is parent-child interaction therapy (PCIT). It is aimed towards children aged two to seven years old and is based on theories around social learning and attachment (Thomas et al., 2017). It focuses on using coaching via the use of a bug in the ear device to help improve the parent-child relationship (Thomas et al., 2017). PCIT has 2 sequential phases: child-directed interaction

(CDI) and parent-directed interaction (PDI). There are skill sessions prior to specific coaching sessions to facilitate parental learning. The coaching encourages positive communication skills, so that parents reinforce their child's positive behaviours, and ignore negative behaviours.

The Hikashrut intervention (Somech & Elizur, 2012) is based on the theory that children are more receptive to change while young and more responsive to their parents or caretakers. This intervention encourages parenting which facilitates cooperative and positive responsive relationships. This often involves a more away from coercive cycles. The Coping power programme includes both parent-based and child-based modules. The parent modules aim to increase positive parent attention, family communication, rewarding good behaviour, ignoring minor disruptions, and responding with effective consequences when appropriate. Additionally balanced rules and boundaries for the child that are age appropriate are put in place, applying effective consequences to negative child behaviours and reduce parents own stress level.

This review will focus on identifying, quality assessing and reviewing the effectiveness and accessibility of interventions for CU behaviours. The review will focus on time limited intervention/treatment studies which compared children's (0 to 12 years old) CU behaviours/traits pre and post intervention. The review considered that CU behaviours are sometimes termed Limited Prosocial Emotions or CU behaviours because of the stigmatising terminology around CU behaviours. In addition, this review considered that previous studies have claimed that as many as 90% of children with CD also meet the criteria for attention deficit hyperactivity disorder (ADHD), and so, it is likely that a proportion of children with CU behaviours will also meet the criteria for ADHD (Haas & Waschbusch, 2012). Therefore, children who have been given a label of ADHD, CD or ODD were not excluded. In addition, the cultural changes in parenting styles and attitudes were incorporated in the present review. For example, parents in the 1990s, are likely to have grown up in the 1970s, a time

when attitudes towards use of physical and coercive discipline was different to those of modern parents today. It was felt that this would influence the outcomes of the interventions. For this systematic review to be of relevant use and 'in touch' with modern parenting, only research from 2000 and onwards was included.

Aims

The review aimed to gather evidence regarding the effectiveness of parenting interventions that target CU behaviours in children. We aimed to determine how effective interventions were at reducing CU behaviours and whether any improvements were stable over time. The outcome of interest the effectiveness of interventions or treatment that reduce CU behaviours in children under 13 years of age. The review aimed to consider how accessible these interventions are and to consider whether they would be suitable to implemented on a wider scale within the community. The review planned to determine whether there are interventions, which can be easily implemented.

Methods

Scoping searches

We searched the following four electronic bibliographic databases: PsychInfo, Scopus, Ovid MEDLINE, Web of Science Core Collection. The search strategies included the following terms which were searched for in the document title and abstract:

callous* OR unemotional* OR 'limited AND prosocial' OR psychopathy OR psychopathic OR psychopath

AND

train* OR teach* OR interve* OR treatment OR therap* OR program* OR strategy OR educa*

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AND

parent* OR mother OR father OR caregiver OR guardian

AND

infan* OR child* OR young OR youth OR adolescen* OR teenag*

The review excluded all studies in which the mean age of the children was 13 years or older at the start of the intervention. However, the search terms of adolecen* and teenag* were included in the search terms, so that children who turned 13 years of age during the intervention timeframe, or where the age at follow-up is 13 were still able to be included. Only articles written in English were included. Peer reviewed articles, conference proceedings, theses, and dissertations were all included within searches.

Types of study included:

The review included studies with designs such as pre-post-test or randomised controlled trails that test before and after levels of CU behaviours. Single case studies were also included as although it would not be possible to access the effectiveness in a way that could be generalised, we did not wish to exclude interventions which might be suitable and useful. Instead, the case studies were reviewed with the aim of considering how they may influence further research. At the level of full-text screening, dissertations, conference proceedings and theses were removed. There were both comparators (children with low CU behaviours and children with high CU behaviours) and interventions/treatment studies (treatment as usual or an alternative treatment option) included within the review. We considered a range of interventions which aim to reduce CU behaviours in children, such as parent-child interaction therapy, multisystem therapy or parent training, and social-emotional skills training. All interventions included were required to have parent involvement.

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Participants/population

Inclusion criteria.

Interventions aimed at children (under 13 years old at the start of treatment) who have CU behaviours, with measurements at two points or more.

Intervention or treatment studies that involve parents.

Studies with pre-post measure of CU behaviours, limited prosocial or antisocial traits and aim to test effectiveness for this client group.

Follow up studies.

Exclusion criteria.

Children/adolescents with chronic health conditions if noted (diabetes, cancer, chronic pain, etc.), as this group of children would bring further complexities in terms of treatment.

Studies in which the mean age of the children was 13 years or above at the start of the intervention (pre-measure).

No pre and/or post measures of CU behaviours. This was to make sure that it is possible to measure whether CU behaviours reduced after receiving the intervention.

Medication as the only treatment.

Interventions that targeted children with an intellectual disability (LD) or autism spectrum disorder (ASD), if noted. These children would need interventions adapting and so the adapted interventions would likely not be suitable for children who do not have ASD and/or an LD. In addition, it is important to differentiate between children with CU behaviours and children with ASD. Children with CU behaviours struggle with affective empathy, which is the ability to empathise and feel what other people feel, whereas children with autism struggle with cognitive empathy, which means they struggle to understand another person's perspective.

Studies conducted prior to 2000, due to the potential influence of cultural and social opinions and attitudes on the use of physical discipline.

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Screening Procedure

The screening process was broken down into four stages: 1. electronic screening, 2. manual screening of titles, 3. manual screening of abstracts and 4. full text screening. A systematic procedure was used at each stage, to ensure consistency and ease of replication (see table 14). The table detailed inclusion, exclusion, and methods for removing duplicates at each stage. In addition to duplicates, method sections were checked to consider whether studies used the same data. This was done by checking for exact figures on statistics, such as sample sizes as well as demographical information.

Table 14: *Screening procedure at four stages: electronic screening, screening of the study title, abstract and full text screening.*

Stage 1: Electronic screening.
Include: based on scoping terms **Exclude**: limit time period from 2000 to present (2021). If not written in English. Use Zotero to screen for duplicates and combine them manually.
Stage 2: Screening the title. **Include:** Any papers with mention of CU, antisocial, psychopathy, CP, ODD, CD, ADHD. **Exclude:** ASD, LD, physical health conditions. If not written in English. Title is clear that it is not an intervention or treatment study. Screen for duplicates manually via organising by date.
Stage 3: screening abstract. Include: Intervention/treatment study. Children mean age under 13 years old. Mention of CU behaviours. Exclude if children have a diagnosis of ASD, LD or medication mentioned as part of main treatment. If not written in English. Screen for duplicates.
Stage 4: Screening full text.
Consider all of the exclusion and inclusion criteria. Screen for duplicates as well as identifying any studies which are linked, such as follow up studies which use the same data.

Data Extraction (Selection and Coding)

Based on the inclusion and exclusion criteria, the first author (LT) first screened titles and abstracts of identified papers obtained from the systematic search. A sample of these identified papers

(10%) were then checked against the inclusion criteria by a second researcher (JD). Consensus between the two researchers was reached by discussion and a final decision on which articles should be read in full was made. Should there have been difficulty in reaching a consensus, then it was agreed that the primary supervisor (LC) would have been consulted and a final decision made. The full texts of articles which were identified in the first stage were then obtained and screened against the inclusion/exclusion criteria by the author and a sample (10%) was again screened by JD. The reference lists of selected articles were also reviewed by the researcher, although none met inclusion criteria aside from the studies already present in the original search. There was, however, a protocol paper which was part of a study already included. The protocol paper did not present any new data but gave more details of the study methodology. As the author did not include any additional studies, it was not necessary for JD to screen any of the papers from the reference sections of the papers which had already been included.

Key study findings and characteristics were presented using a standardized form (Cochrane review group form) which was adapted to meet the specific aims of this review, and this was then used to extract data. The data that was extracted based on the main study characteristics. This included the author, year and location of the study, parent, and child characteristics (age, gender, ethnicity), parent income and education level data and sampling methods used. The second stage of data extraction extracted study aims, the type of intervention, the method of analysis, and outcome (effect sizes and/or p-value). The main findings of the extraction and quality assessment were presented in three tables which were separated into quality assessment information, demographic information, and the studies main intervention and findings (see appendix M).

Risk of Bias (Quality) Assessment

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The review used the Critical Appraisal Skills Programme (CASP) checklist for use with Randomised Controlled Trials (CASP, 2021) and Case Control Studies (CASP, 2018). The SCED Scale was used for single case designs within this review. Discrepancies were resolved through discussion of quality or bias with the researcher (JD). The quality assessment ratings were converted into percentages so that comparisons could be made between studies using different designs.

Strategy for Data Synthesis

The systematic review aimed to include between seven and thirty studies for final data synthesis. The quality assessment measures, and data extraction measure were used to assess the variables of interest (treatment/interventions effectiveness at reducing CU scores) and the populations of interest (e.g., children under 13 years with CU behaviours), which were then synthesised. Findings were summarised using the narrative synthesis framework due to the heterogeneity of studies.

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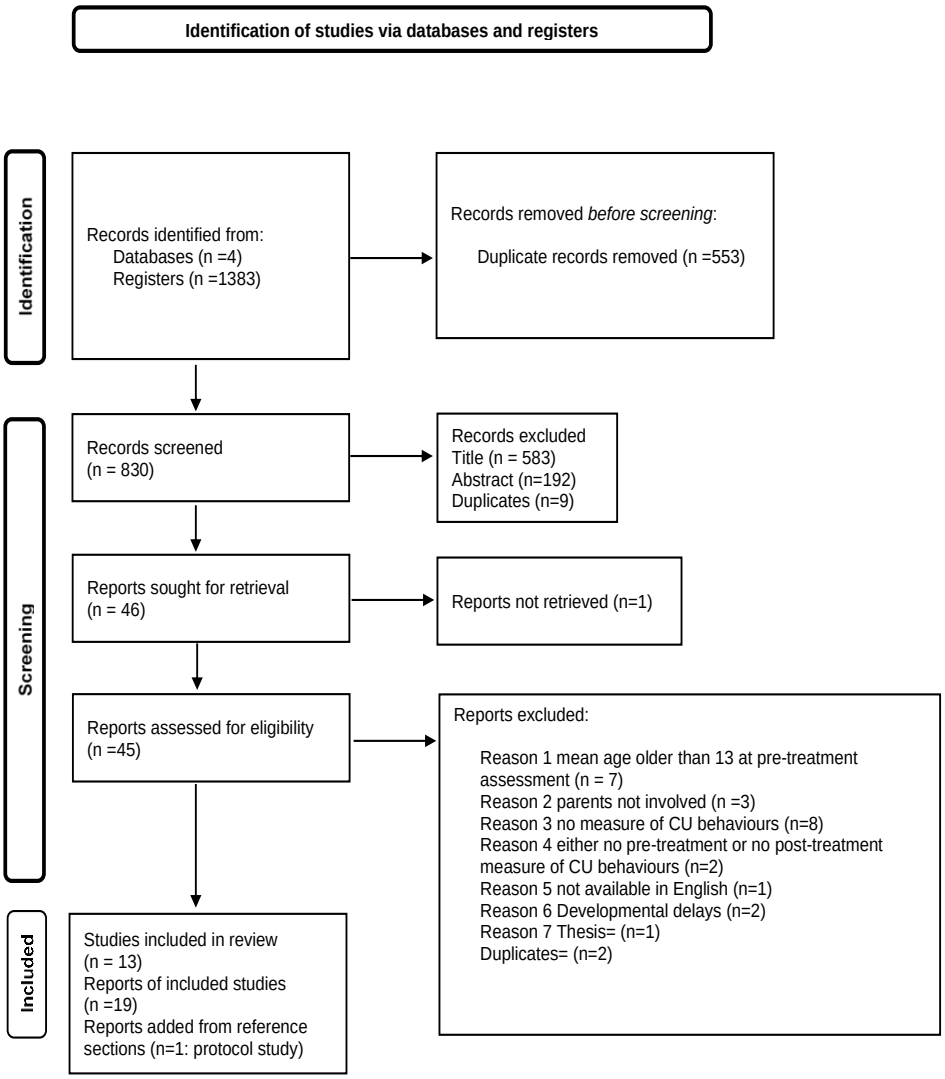

Figure B. *Prisma Flow Diagram for Scoping Search (Page et al., 2021).*

Results

The PRISMA flow diagram for the systematic search (see figure B) details that the initial searches resulted in 1383 papers. Of these, 553 duplicates were removed, which resulted in 830 remaining reports. After title and abstract review, 775 did not meet the inclusion criteria and a further 9 duplicates were found. The remaining 46 were selected to be retrieved for full screening, although it was not possible to retrieve one paper. After the full screen, 27 papers were removed. Seven papers

were removed due to the children being 13 years or older at pre-treatment, three did not include parenting interventions, eight had no measurement of CU behaviours. A further four had either no pre or no post measure of CU behaviours, which meant it was not possible to measure whether the intervention had led to reductions in CU behaviours. Two papers were removed due to the children having developmental delays, one was removed due to being a thesis, and two further duplicates were removed. One paper was not in English, and it was not possible to acquire a version in English.

A total of 19 papers met the inclusion criteria. A paper which detailed the protocol for a study already included in two of the selected papers was identified from review of reference sections. This paper included further information and details, which were needed to quality assess the study. There were several other papers which were linked and used the same data set and interventions, such as follow-up studies or papers which completed further statistical analysis. In total, from the 20 papers included in the review, there were 13 separate studies.

The papers that used the same data were presented together as one study, to ensure that information was not duplicated and that certain interventions were not given disproportionately weight. All papers with the same participants and data were therefore grouped together as one study within the relevant the tables which display the study demographics, quality and methodology and findings (appendix L) which detailed all references found linked to that study within that specific table column. Linked studies included two studies which had three papers each, and three studies which had two papers each. There were eight studies that only had one paper. Of the 13 included studies: seven were random control trials (RCTs), one was a non-equivalent control group design, one was a case control study (CCS) and four were single case studies. In terms of therapeutic interventions there were nine types of interventions used, which included Parent Child Interaction Therapy (PCIT), Parent Management Training (PMT), Behavioural Parent Training (BPT), Parent Management Training Oregon (PMTO) model, Power Coping, Hitkashrut Programme, Manualised Parent Training Intervention,

Strongest Family Smart Website (SFSW) and Child-Parent Family Therapy. However, each study had some variation to the intervention used via the use of additional modules or use of other delivery methods (e.g., virtual).

Demographics

The full details of various studies demographic information were included in table (see appendix L: Table 25). Many of the studies were conducted in North America (N=6) and Australia (N=3). In addition, there were studies conducted in Israel (N=1), Norway (N=1), Finland (N=1) and Italy (N=1). The data for the studies was collected between 2002 and 2018, although for two of the RCT studies here was no information regarding the data collection period and none of the single case studies detailed the time frame of their interventions.

Ethnicity & nationality

The papers included a wide range of participants from different countries. In terms of countries the review papers included covered studies with participants from Israel, Europe (Norway, Sweden, Finland, Italy, and non-specified Europe), North America, South America, and Australia. There was also a range of races, including white, black, Hispanic/Latino, and biracial. One study based in Washington, USA had a high proportion of white participants and a lower proportion of black or ethnic minority participants (Donohue et al., 2021). Whereas, another study, based in Alabama, USA reported that 68% of its participants were African American study (Lockman et al., 2018) and a study based in Pittsburgh, USA reported that 48.97% of its participants were of an ethnic minority (Kolko et al., 2009). There were also some studies that had over 90% of participants from their own ethnic majority, including a Norwegian study (Kjøbli et al., 2018), Finland (McGrath et al., 2013; Sourander et al., 2016; Sourander et al., 2018). In terms of the singe case studies, one study did not state the ethnicity, one child was biracial, and two children were white. Of the case studies, two were in Australia

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(Fleming et al., 2017; Kimonis & Armstrong, 2012; Datyner et al., 2016) and two were in USA (Agazzi et al., 2020; Mills et al., 2018).

Ages (Child/Parent) and Gender

Overall, no more than two thirds of the children within RCTs were male (means: male=71.9% and female= 28.1%). The percentage of children that were female ranged from 13.67% to 40.6%, and the percentage of children that were male ranged from 59.4% to 86.33%. The case control study only included male participants. Three out of four (75%) of the single case studies participants were male children. Overall, the mean age of the children in all the studies at pre-treatment was 6.79 years old. The mean age of the children for the RCT, case control and non-equivalent control studies was 6.88 years old. The mean age for the single case studies was 6.6 years old. The age of the children ranged from three to 12 years old. Four of the RCT studies had children as young as three-years old, two RCT studies had children who were four-years old. Only two studies had children aged 12 years old at pre-treatment and three had children which were aged 11 years old. Only four studies reported parent ages; the mean age of parents across those four studies was 35 years old, when assessed at the pre-treatment stage. Only three studies stated ages of parents separately, of these the mean age of the mothers was 34 years old (ranging from 30 to 38 years old), and the mean age of the fathers was 36 years old (ranging from 32 to 40 years old).

Socio-economic Status

Four studies reported on socio-economic status (SES) using a range of measures. There was a wide range of rankings from lower to advantaged: one study found the average SES score was in the lower class (Hollingshead index score=28), for another the average score to be in the lower to middle class (36.8%), for another the majority (40%) of its participants were in the middle class range (class III), and a final study found the average participant was in the 'advantaged' range (SEIFA: 8.65 out of

10). Six studies also reported figures regarding parent educational achievements and for all these studies it was reported that the majority (mode) of the participants attended high school education or higher (ranging from 40% to 70% of the parents in the studies), with two studies reporting that most parents had achieved college level or higher. Only three studies reported figures on household income: One study found that the majority (mode=25% of participants) of the participants had an income of between 10,001 and 15,000 New Israeli Sheqel (ILS), which was the third highest income bracket within the options given and equates to between £2234 and £3350 in British pounds. Another study found that the average income was $88,815, which equates to £7201.36, and places this group of participants within the upper-middle income level for that country. The final study reported that the majority (mode= 55% of participants), earned over $50,000, which equates to £26521.46. The inconsistency in how this was reported presented challenges to the researchers.

Methodological Quality

Overall, there was variation in methodological quality between the included studies and there appeared to be barriers to maintaining quality of the studies. All 13 studies included an intervention which included a parenting intervention, and all had pre-post measures of CU behaviours, although reducing CU behaviours was not always a primary aim of the intervention. Of all the studies, 10 out of 13 had a primary aim of reducing CU behaviours. However, for one of these interventions' CU behaviours was amongst several traits and behaviours being measured. Two of the 13 studies measured for reductions in CU behaviours as a secondary aim. One study measured CU behaviours, to test whether CU behaviours impact on intervention outcomes on conduct problems, however, changes in CU behaviours were also measured and so the study was still included.

The 13 studies used a variety of measures for CU behaviours, all of which were measures with substantial research verifying their validity and reliability (see table 15). In terms of CU measures, four studies used items from more than one scale and nine studies used a single scale to

measure CU behaviours (Dadds et al., 2019; Hawes & Dadds, 2005; Hawes & Dadds, 2007; Somech & Elizur, 2012; Elizur et al., 2017; Elizur & Somech, 2018). Nine studies used a single measure of CU behaviours: Donohue et al. (2021) used five items from the CBCL/$1^1/_2$-5; Kjøbli et al. (2018) used 15 items from Merrell's behaviour scales (Merrell at al., 2001); two studies (Kolko et al., 2009; Lockman et al., 2013) used six items of callous/unemotional traits from the teacher reported version of the Antisocial Processes Screening Device (APSD; Frick 1994); five studies: one RCT (McGrath et al;, 2013; Sourander et al., 2016; Sourander et al., 2018) and four single case studies (Agazzi et al., 2020; Kimonis & Armstrong, 2012; Datyner et al., 2016; Fleming et al., 2017; Mills et al., 2018) used the 24-item Inventory of Callous Unemotional Traits (ICU-Parent Preschool version; Frick, 2004). All the measures used for CU behaviours (see Table 15) had Cronbach alphas which were in the adequate to excellent range (Konting et al., 2009). The measures used described evidence of their construct validity. Therefore, this suggests that the studies all had an adequate standard in terms of the measures used to monitor changes in CU behaviours.

Table 15. Intervention outcome measures: *Measures of CU behaviours*.

CU measure	**Reliability level: Coefficient of Cronbach alpha**	**Construct validity**
15-items (three subscales) from Merrell's Home and Community Social Behaviour Scale (HCSBS) (Merrell et al., 2001).	Acceptable & good: 0.77 to 0.83 (Kjøbli et al., 2018)	Strong positive correlations with measures of externalizing behaviours problems, modest positive correlations with measures of internalizing and atypical behaviours problems, and strong negative correlations with measures of social skills and adaptability (Merrell et al., 2001).
24-item Inventory of Callous-Unemotional Traits (ICU: Frick, 2004).	Acceptable to excellent: 0.72 to 0.93 (Agazzi et al., 2020; Murator et al., 2015; 2019)	Several studies have tested the construct validity of the ICU using factor analyses and reported that the best-fitting model tends to be a three subfactors: callousness (capturing a lack of empathy and remorse), uncaring (capturing an uncaring attitude about performance on tasks and others' feelings), and unemotional (Frick & Ray, 2015).

UNSW system: ASPD and Strengths & Difficulties Questionnaire (SDQ) measure. Items from both measures are pooled to make distinct CU and antisocial factors.	Acceptable & good: 0.79 (Hawes & Dadds, 2005; 2007)	Meaningfully similar constructs correlating in the low positive range (e.g., teacher anxious/shy with parent Emotional Symptoms, r = .21) and meaningfully dissimilar constructs failing to converge (e.g., teacher anxious/shy with parent Prosocial Behaviour, r = -.03).
Six-items of CU from the Antisocial Process Screening Device (APSD; Frick, 1994).	Acceptable & good: 0.70 to 0.79. (Lockman et al., 2013) (Murator et al., 2015; 2019)	Vitacco et al. (2003) found support for the three-factor model (Non-normed Fit Index = .93, Comparative Fit Index = .94) and its applicability to adolescent offenders.
Five-items from the CBCL/1 ½-5 which have been found to differentiate CU behaviours from other externalising problems.	Adequate: 0.69 (Donohue et al., 2021)	CU behaviours items correlated with lower levels of empathy, prosocial trait, and guilt (see Supplement 1, Table S3 online; Donohue et al., 2021).
11-items in CU behaviours: Eight items from the ICU, parent report version and three items from the APSD prekindergarten items from Dadds et al. (2005) community study.	Good: 0.82 (Somech & Elizur, 2012; Elizur et al., 2017; Elizur & Somech, 2018).	Scores on the parent- and teacher-reported ICU were internally consistent and combined CU scores showed expected associations with an alternate measure of CU traits and measures of empathy, prosocial behaviours, conduct problems, and aggression. (Kimonis et al., 2015)

Researchers from one study (Murator et al., 2015; Murator et al., 2019**)** stated that it was not possible to conduct randomisation in an optimal way and so the study opted for a less robust methodology of a non-equivalent control group design. Nevertheless, the non-equivalent control group design was randomised and met the other two requirements of an RCT (see below), although the method of randomisation may not have been sufficient to eliminate systematic bias. To combat this the study ensured the intervention and control groups were similar in terms of demographics. Therefore, due to its similarities to an RCT and the lack of an alternative quality assessment tool, this study was quality assessed using the CASP RCT quality assessment tool.

Out of the RCTs (n=7), the non-equivalent control group design studies (n=1) and the control study (n=1), seven addressed a clear focused research question, explaining hypothesises. However,

Dadds at el. (2019) study was less detailed and clear in terms of the aims, objectives, and hypothesis, although the methods and analysis made this easy to infer. Another study stated a clear hypothesis but not the aims or objective explicitly (Lockman et al., 2013). Four out of seven RCTs included a consort diagram, which depicted the attrition of participants (e.g., inclusion and drop-outs). The non-equivalent control group design study and all the RCTs (n=7) considered and analysed for group differences in terms of both attrition and demographics analysis. Six of the studies found no group differences. One study (Kolko et al., 2009) found group differences of IQ and SES between the healthy control group and the two intervention groups. Another study (Kjøbli et al., 2018) found the main intervention group had higher CU behaviours. Both the studies with group differences stated that this was accounted for within the analysis.

The experimenters and participants were blind to the group assignments in five of the studies and were not blind in three of the studies. Six of the studies reported that the groups were treated the same aside from the intervention being delivered. However, one study had no follow-up measures for the control group, and another study had some follow-up measures, but no measure for CU behaviours in the control group at follow-up. The RCTs and the non-equivalent control group design study reported the effects of the intervention comprehensively, with all of them reporting p-values and effect sizes, as well as other relevant statistics. Four of which reported confidence intervals and four did not. The control study (Hawes & Dadds, 2005; Hawes & Dadds, 2007) included clear and comprehensive analysis but did not include effect sizes or confidence intervals.

Case Control Study

The case control study explored the mechanisms within a parent training intervention that bring successful outcomes (reward and discipline) for both children with and without high CU behaviours. This could help shape interventions to suit these two groups to children's needs. There were no significant differences in terms of demographics. Additionally, the experimenters selected two groups of children with similar characteristics, and they attempted to control for confounding variables within

the regression analysis. This allowed for experimenters to measure group differences in when improvements are made and allows all participants to have the full intervention. Recruitment appeared to be appropriate: selecting children who met the inclusion and exclusion criteria after families self-referred or were referred by community health services.

There were some limitations as there were only 56 participants. For logistic regression, it is recommended that the sample size be 500 or more (Bujang & Bakar, 2018). In addition, general recommendations for regression analysis are that this type of analysis requires 10 cases per predictor variable (Hair et al., 2014), which again would bring the number above 56. Thus, it appears the sample size may be too small. Additionally, the measurement used parent measures only and did not include any measures from other sources such as teachers.

Single Case Studies

Five papers reported details on single case studies included in the review; these five papers included a total of four studies (Luca, Luke, Matthew, and Amy). Four of the papers (detailing three studies: Luca, Luke, and Matthew) appeared to be linked in terms of researchers but were kept separate as each discussed a separate case. Luca was given Parent–Child Interaction Therapy for Callous Unemotional Traits (PCIT-CU), in which parents had coached him to use the PRIDE and "E-Enjoy" skills, which was adapted in PCIT-CU to emphasize "Emotional Expression." (Agazzi et al., 2000). Luke was given PCIT (Kimonis and Armstrong, 2012), followed by a brief adjunctive treatment called Coaching and Rewarding Emotional Skills (CARES; Datyner et al., 2006). Matthew was given PCIT sessions conducted over video teleconference (Fleming et al., 2017). Amy was offered BPT as a first-line intervention. All four case studies had a detailed history and details of demographics. Parent and teacher ratings were taken for CU behaviours using a valid and reliable measure (see above). Medication and ADHD problems were reported as possible confounding variables which may have

affected the results for Luca, Luke, and Matthew, whereas Amy's family had refused medication as treatment.

All four studies used an AB design, the case study for Amy did not use multiple baselines to work round the issues associated with the AB design, but the other three studies did. This appears to be the most ethical way to conduct a single case study on this population. Measures were repeatable and measurable, although CU behaviours were not measured at follow-up for Luca or Amy. For Luke follow-up measures for CU were taken at 1 week, 5 weeks, 5 months following PCIT and 24 months after CARES, whereas for Mathew there was at the 3-month follow-up assessment after the final intervention. Luca, Luke, and Matthew's outcomes were assessed at pre-treatment, weekly during treatment and post treatment, whereas Amy's outcomes were assessed at pre-treatment, mid-treatment, and post treatment. All studies had sufficient samples at baseline and treatment, with raw data recorded and plotted on a graph and displayed in the respective papers. No statistical tests were mentioned and so reductions in CU behaviours may not be significant. It was not possible for researchers to be blind to any of the conditions.

There were some inconsistencies in the results for the single case studies. Both Lucas and Amy's scores on ICU were not consistent across different rates, which may suggest that their behaviours may change across settings. Lucas ICU parent ratings were 32 at the start of treatment, 23 at the end of treatment, showing a reduction of nine, whereas his teacher ratings were 31 at the start of treatment and 30 at the end of treatment, suggesting a reduction in CU behaviours had been noticed by parents but not by Lucas's teacher. There was no report of follow-up scores on CU trait for Matthew, but his teacher reported his pre-treatment ICU score was 57, which dropped to 38 at the 3-month follow-up assessment. However, there were inconsistencies in how Matthew's family and teacher rated him in terms of ICU scores at the start of treatment, with his mother and father rating him low (mother=13 and father=15 and his grandmother and teacher rating him higher (grandmother=40 and teacher= 57). In terms of Luke, there were significant improvements, but these reductions did not

seem to be as consistent across time. However, there was a rise in Luke's ICU score at the 24 months follow-up at which time his mother rated his ICU at 25, when they had previously been as low as 19. Nevertheless, his scores were still far lower than the 52 pre-treatments. For Amy there were reductions of 13 and 15 on the ICU according to both parent ratings but this still left Amy being rated highly (ICU=32) by both parents post treatment.

Quality Assessment Rating

Seven studies were quality assessed using the CASP for RCT, which rates out of a possible 13, one was quality assessed using the CASP for case control studies which rates out of a possible eight and four were quality assessed using the SCED scale for single case studies which rates out of a possible 11. The scores were converted into percentages so comparisons could then be made between all the studies (see appendix L: Table 26). Overall mean quality assessment score was 70.84%, with scores ranging from 92.2% to 46.15%. The overall mean for RCT, case control and non-equivalent control studies was 78.07% and the overall mean for the single case studies was 54.55%. Two of the RCT studies scored the highest overall 92.2% (12 out 13), a further two RCTs scored 84.62% (11 out of 13). The case control study score 87.5% (7 out of 8). (87.5%) Score of 6 out of 11. (54.55%) and the non-equivalent control group study scored 69.23% (9 out of 13). All the single case studies scored the same (Score of 6 out of 11; 54.55%) and had the same layout and were similar in terms of both strengths and had limitations.

Effectiveness of Interventions

Six of the interventions in the systematic review were only used in one study (see table 16), whereas the PMT, PCIT and Power Coping were all used by multiple studies. All the studies were unique due to the use of additional modules, such as emotional skills training or booster modules. The

interventions all demonstrate a reduction in CU behaviours between pre and post measures. Of the interventions from the RCT studies, three of the interventions found a large effect size, five of the interventions found a medium effect size and one study found a small effect size. The study with a small effect size was the only RCT which was implemented virtually, which suggests that there is currently not strong evidence for an effective remote based intervention for CU behaviours. The case-control study found a medium effect size. The Power Coping intervention (Murator et al., 2015) and Power Coping intervention with a Booster module (Lockman et al., 2018) both had similar effect sizes, which suggests the booster module did not increase the effectiveness. Three out of four of the singe case studies used PCIT and the other used BPT.

Table 16. *Details of the Interventions Used by Each Study: Including Additional Modules Used and Outcomes.*

Name of intervention	Number of studies	Study Authors	Study type	Additional modules added	Outcome effect sizes	Follow-up
Parent Management Training (PMT)	2	1. Dadds et al. (2019) 2. Kolko et al. (2009)	1. RCT 2. RCT	1. Emotional engagement (EE) or child centre play (CCP) 2. CBT, PMT, family therapy/school programming, community activities development and case management	1. Large effects. 2. Medium. d=0.44	1. Maintained at 3 months 2. Medium d=.0.48 at 3-year follow-up
Behavioural Parent Training (BPT)	2	1. Kjøbli et al. (2018) 2. Mills et al. (2018)	1. RCT 2. Single case study	1. None 2. None	1. Medium. d=0.32 2. N/A	1. No follow-up 3. No-follow up.
Parent Child Interaction Therapy (PCIT)	4	1. Donohue et al. (2021) 2. Agazzi et al. (2020) 3. Kimonis & Amstrong (2012); Dayer et al. (2016) 4. Fleming et al. (2017)	1. RCT 2. Single case study 3. Single case study 4. Single case study	1. Emotional Development (ED). 2. For Callous-Unemotional (CU) 3. Adjunctive token economy system & Coaching and Rewarding Emotional Skills (CARES) at follow up. 4. Virtual Teleconference.	1. Large d=0.74 2. N/A 3. N/A 4. N/A	1. No control at follow-up 2. CU not measured at 4-month follow-up 3. Maintained at 2-year follow-up. 4. Maintained at 3-month follow-up.

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Hitkashrut	1	Somech & Elizur (2012) |Elizur et al. (2017). Elizur & Somech (2018)	1. RCT	1. None	1. Large d=0.76	1. Medium. d=0.63 at 6-month follow-up
Power Coping	2	1. Lockman et al. (2018). 2. Murator et al. (2015 and 2019).	1. RCT 2. RCT	1. Booster intervention or without. 2. None	1. Medium. d=0.41 2.Medium d=0.42	1. Maintained at 3-year follow-up. 2. Maintained at 6-year follow up.
Parent Management Training Oregon Model (PMTO)	1	Kjøbli et al. (2018)	RCT	None	Medium. d=0.39	Maintained at 6-month follow-up. d=0.48.
Manualised Parent Training Intervention based on Sanders and Dadds (1993)	1	Hawes & Dadds (2005, 2007)	Case control study	None	Medium. d=0.49	Maintained at 6-month follow-up. Medium effect. d=57
Strongest Family Smart Website (SFSW) intervention with telephone	1	McGrath et al. (2013) Sourander et al. (2016)	RCT	none.	Small 0.19	Reductions in CU maintained at 12 months but not 24
Parent/child/family therapy	1	Kolko et al (2009)	RCT	CBT, PMT, family therapy/school programming, community activities development and case management	Medium 0.44	3 years follow up. Medium 0.48

All the interventions which had a follow-up period demonstrated that effects were maintained at the initial follow-up (see table 16). However, there was no follow-up measurement of CU behaviours for four of the interventions. In addition, for the SFSW interventions (McGrath et al., 2013; Sourander et al., 2016), effectiveness at reducing CU behaviours were not maintained at 24 months follow-up. There were also variety of follow-up lengths; two interventions had evidence of effect sizes being maintained at 3-month follow-up, three interventions with effect sizes which were maintained at 6-month follow-up and two interventions were maintained at a three-year follow-up. The coping power without a booster intervention had the longest follow-up period, with effect sizes being maintained at six-year follow-up. This inconsistency made it difficult to draw comparisons between studies.

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Cost Efficiency and Accessibility

Overall, the interventions ranged from requiring 50 hours of therapy (over 34 sessions) to as little as 10 hours (over 6 sessions). Four interventions involved only parent interventions, whereas five involved both the parents and child. The Hitashrut program (Somech & Elizur, 2012; Elizur et al., 2017; Somech & Elizur, 2018) had the shortest intervention, requiring only 6 sessions, over 10 hours, this study only involved the parents and group sessions could include five or six families. This intervention also had a large effect size which was maintained after 6-months, suggesting this study would be the most cost effective and easiest to implement on a wider scale. This was followed by PMT with EE (Dadds at al., 2019) which requires 15 hours; involving both the parents and child. This study also had a large effect size which was maintained at three-months and so it can be expected that this intervention would bring CU behaviours to pre-clinical levels quicker than any of the medium effect studies which may be shorter. Therefore, this study may also be feasible to implement on a larger scale. Similarly, PCIT with ED (Donohue et al., 2021) requires 20 hours of training involving both parents and the child, and this study also found a large effect. However, there was no control group at follow-up to test whether improvements were maintained.

Of the studies that found a medium effect, the Manualized Parent Training Intervention, which requires just 11 hours of training would be efficient and cost effective (Hawes and Dadds, 2005; 2007). The manualised aspect might also make improvements easier to replicate. The PMTO intervention (Kjøbli et al., 2018) requires 30 hours of parent only groups, but as these groups can include up to 16 people at once, this study would be cost effective and easier to implement when compared to smaller groups. The improvements were maintained at 6-month follow-up. Therefore, making this a good option when attempting to find an intervention to implement on a wide scale. The coping power interventions require the greatest number of sessions, needing as many as 50 hours, or 34 hours for the abbreviated version. This involves both the parent and child. Therefore, although this intervention had a medium effect, making it less cost effective and more difficult to implement then most of the other studies reviewed (Lockman et al., 2018; Murator et al. 2015 and 2019).

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Early Interventions

PMT with EE modules (Dadds et al., 2019), PCIT with an ED module (Donohue et al., 2021), Hitkashrut (Somech & Elizur, 2012; Elizur et al., 2017; Somech & Elizur, 2018) and PMTO (Kjøbli et al., 2018) were all found to be effective for children as young at three years old. Importantly, these effects were maintained at follow-up. Therefore, these would be useful for early interventions to target children with CU behaviours or at risk of developing them.

Manualized Parent Training Intervention (Hawes & Dadds, 2005; 2007) and PCIT for CU (Agazzi et al., 2020) were both effective at reducing CU behaviours in children who were four years old. PCIT with CARES (Kimonis & Armstrong, 2012; Datyner et al., 2016) and PCIT with virtual teleconference (Fleming et al., 2017) were effectively used on children who were 5 years old. Therefore, these interventions have been tested on children of a young age. However, the three PCIT intervention were tested on a single case design and so findings may not be generalisable. In addition, the Manualised Parent Training Intervention (Hawes and Dadds, 2005; 2007) was a case control study and so not the gold standard for testing effectiveness. The PMT intervention with additional interventions (Kolko et al., 2009) recruited children as young as six years old. The power coping intervention has been shown to be effective on children as young as eight years old (Lockman et al., 2018), although the Muratori et al. (2015 and 2019) study only used this intervention with children aged 11 years old or older.

Discussion

This review aimed to gather evidence regarding the effectiveness of early parenting interventions that target CU behaviours in children. The 13 included studies all produced reductions in CU behaviours, but only 12 were maintained at follow-up. Many of these interventions drew on knowledge regarding the development of CU behaviours, such as the lack of parental warmth (Goulter et al.,2020), and children's tendency to respond better to reward based strategies, rather than discipline

(Pasalich et al., 2016). Dadds et al. (2019) offered PMT, followed by emotional engagement skills, in which parents were trained to use shared eye gaze with their child. It is believed that shared eye-gaze can help develop children's empathy and conscience back-and-forth mirroring of emotions between a parent and their young children, which facilitates the development of empathy and conscience (Viding et al., 2014; Wagner et al., 2015). The review concluded that there are several effective parenting interventions for treating CU behaviours in children under that age of 13 years old and the improvements made tended to be stable over-time. The single case studies were able to test out adaptions which could later be tested on a RCT. In addition, the case control study (Hawes & Dadds, 2005; 2007) was useful in testing out specific constructs to further develop understanding regarding how to reduce CU behaviours and related problems such as CD.

For internet-based interventions, the SFSW intervention did not maintain the improvements at follow-up, although offering a short booster did appear to prolong the improvement to 12 months (McGrath et al., 2013; Sourander et al., 2016, 2018). However, one case study provided some evidence that internet-based interventions may be able to provide reductions in CU behaviours, although the follow-up period was short. However, the SFSW intervention (McGrath et al., 2013; Sourander et al., 2016, 2018) may have been more successful using an alternative intervention or by making some adaptions to the current intervention. Research suggests that internet-based parent interventions have been effectively used as a parental intervention for CD (Enebrink et al., 2012) and communication difficulties in children with autism (Meadan et al., 2016). Therefore, it may be possible to provide internet-based treatment for CU behaviours, with the right intervention. This would significantly improve access and availability of these intervention, especially for families who do not live near services. However, more research would need to be conducted, preferably an RCT, to evaluate the effectiveness of PCIT-I or another internet-based intervention for treating CU behaviours.

For face-to-face parenting interventions, Agazzi et al. (2020), Kimonis & Armstrong (2012) and Flemming et al. (2017) all used PCIT. Additionally, Donohue et al. (2021) used an adapted PCIT

intervention but included an eight-session emotional development module. Kjøbli et al. (2018) used parent Management Training, Oregon Model and then had a Brief Parent training intervention and a child intervention of social skills as control conditions. Kolko et al. (2008) used seven interventions, two of which were parent interventions. One was PMT; an intervention which was also used by Dadds et al. (2019). Kolko et al. (2008) also include parent–child/family therapy which aimed to reduce issues such as coercion or physical force. There were four interventions that were used in multiple studies, this included BPT, PMT, Coping Power programme and PCIT (see table 16 for further details).

Several of the interventions included skills for parents to enable a more positive relationship between the parent and child (Histashrut, PCIT, & PMTO). In addition, the coping power programme aims to increase positive parent attention and family communication. There were also three studies that had additional modules with an aim of increasing emotional skills. Datyner et al. (2016) used the Coaching and Rewarding Emotional Skills (CARES). Findings indicated short-term improvements in empathic responding and emotion recognition with CARES and provided preliminary support for supplementing parent training with a brief adjunctive intervention to improve socioemotional behaviour and CU traits. Dadds et al. (2019) study also included an additional module which aimed to improve emotional engagement (EE) between the child and parent. Donohue et al. (2021) used an emotional development (ED) adaption to the PCIT. Both the skills which aim to develop the parent-child relationship and the modules which aimed at developing the child's emotional skills to are particularly important for children with CU behaviours. Building on those skills would enable participants to develop empathy and a conscience, through positive interactions with parents.

Accessibility

The review found that parenting groups were frequently offered, which could be offered on a wide scale to the families of children who are known to be at risk of developing CU behaviours. Most of these were also short time-limited interventions. Therefore, given that these interventions were

time-limited and groups, several of them would be easy to administer widely within the community. However, there were also some interventions which had multiple parts (Kolko et al., 2009) or were long (e.g., coping power programme: Lockman, 2013; Muratori 2015; 2018); those interventions would not be accessible for many families. The internet-based interventions would be useful for some families; however, it seems more research and adaptions are needed to be confident of being able to roll out a wide scale option for an intervention over the intervention.

Cost Effectiveness

Most interventions would be considered cost effective, especially when considering the cost to society of not treating this group of at-risk children. For example, adults with psychopathic traits (of which CU behaviours are part of) are 20-25 times more likely than other adults enter the criminal justice system (Kiehl & Hoffman, 2011). Furthermore, the cost of antisocial behaviour in England and Wales is approximately £3.4 billion per year (National Audit Office, 2006). This suggests that there is a high cost to society in not offering children with CU behaviours interventions. In addition, it is known that those children who develop CU early are most at risk of developing behaviours which persist into adulthood (Moffitt, 1993). Therefore, this suggests that it is vital that children are identified early and are offered effective interventions which can maintain reductions in CU behaviours over time, so that the children most at risk can receive early treatment.

Limitations

Overall, the single case studies cannot be generalised, as the findings used an AB design, although they provide some additional evidence and a starting point for further research. The inconsistencies across rates on ICU and difficulties in maintaining reductions in CU behaviours suggest that it is vital for researchers to use multiple people to rate CU behaviours, such as father, mother, and teacher ratings across time periods to ensure behaviours across settings are captured. In addition, long follow-ups are needed for research into CU interventions, as improvements are not always maintained

after a longer follow-up prior as can be seen in Luke's case study (Kimonis & Armstrong, 2012; Datyner et al., 2016) and in the SFSW (McGrath et al., 2013; Sourander et al., 2016 & 2018) neither of which currently are able to provide evidence of long-term effectiveness. There are several weaknesses in terms of generalisability. Firstly, Hitkashrut interventions only included two parent families (Somech & Elizur, 2012; Elizur et al., 2017; Elizur & Somech, 2018), and so the intervention untested on single parent families. Similarly, one studies which used the power coping intervention had low levels of involvement from both parents (Lockman et al., 2013). It is also important to note that none of the studies were based in the U.K., this made it impossible to know if the findings for any of the interventions are generalisable to the U.K. population. However, there were a wide range of studies conducted across a wide variety of cultures, ethnic background, and countries, and all but one of these studies had medium to large effects. Therefore, there is a need for further research to replicate these studies within the U.K. and this may be especially urgent, given the Government report identifying a high cost to society (National Audit Office, 2006) as well as the known impact on individuals with CU behaviours (Shepherd et al., 2004) and victims of their acts of bullying or violent behaviour (Gower & Borowsky, 2013).

Clinical implications and applications

The cost to society of not treating this group of at-risk children is high. There are negative long-term outcomes for the individual with much higher rates of entering the criminal justice system. There is cost of approximately £3.4 billion per year in England and Wales (National Audit Office, 2006). Children who develop CU early in life, are most at risk of engaging in antisocial behaviours, which persist into adulthood (Moffitt, 1993). There is more likely to be a positive outcome if services intervene early (Greenwood, 1995; Kazdin, 1987; Patterson et al., 1992). Therefore, this suggests that it is vital that children are identified early and are offered effective interventions which can maintain reductions in CU behaviours over time, so that the children most at risk can receive early treatment.

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The current evidence suggests that these children can be treated as young as three-years old successfully. However, the social political context within the UK will likely have an impact on the services ability to target the correct children and intervene early.

Within the U.K. there have been major well-fare reforms and austerity measures since 2010, which have influenced social policies (Lambie-Mumford & Green, 2017). Since these changes the use of food-banks have increased (Loopstraet al., 2015), there have been benefits changes (Steward, 2015; De Agostini et al., 2014), freezes on public sector pay, as well as a reduction on funding for provisions (Buch, 2016). Additionally, changes in tax and benefits have impacted on families of young children (Ridge 2013; Stewart 2015). This has led to some parents being unable to meet their children's basic physiological and safety needs, as they do not have enough money for food, warmth, shelter, warm clothes. Therefore, parents will be focused on the basic needs, which will impact on their ability to acquire and provide love/belonging and esteem (Maslow's Hierarchy of Needs, 1943, 1954). This may prevent children being able to develop skills needed to develop empathy and a conscious via the back-and-forth mirroring of parents' gaze. Therefore, this suggests that the changes in social policies within the U.K. may lead to an increase in CU behaviours, and persistent antisocial behaviour, which may make investing in interventions which target CU behaviours even more vital. In addition, the current study provides some evidence that it is cost effective to spend public money on interventions for young children at risk of developing CU behaviours. Otherwise, we may see an increase in the financial cost to the U.K. in dealing with antisocial behaviour overtime, and so the savings from austerity may bring a false economy.

The impact of austerity on public services may mean that families have less access to the support needed and interventions which would help these children and families. Services such as the sure start programme have been impacted. The sure start programme aimed to provide a service for preschool children and their families, serving the whole community inclusively. This service benefits children as young as 9-months. The program provides services to families within the most deprived

and disadvantages areas via provisions provided within sure start centres (Lewis, 2011). Sure start programmes have been found to decrease negative parenting styles and to enable young children to improve in their ability to self-regulate (Melhuish, Belsky, & Leyland, 2008). Unfortunately, many councils have closed or downgraded their sure start centres due to austerity cuts (Hayes, 2015). Sure start now only has provisions to focus on the families with the greatest need (Goy, 2018). The service is no-longer viewed as a service for all, and so is unable to bring communities together as it once did (Goy, 2018). There has been a large reduction in the number people wanting to access the provision. The sure start programs may be a vital resource which could target children at the crucial age needed (pre-school) to ensure parents enable their children to develop empathy and conscious.

The current study could also aid sure start centres by aiding them to adapt and improve the interventions offered. The current study suggests that interventions involving both the parent and child, as well as those which include some kind of social/emotional skills training are most effective. Currently there is evidence to support the use of PCIT with ED modules, PMT with EE modules and the Hitkashrut program with children as young as three-years old. All three of these interventions were also brief time-limited interventions. Therefore, the recommendation would be to trial one or more of these interventions within sure start centres, with the aim of widening access to these interventions cross the country. In addition, the findings of this study suggest that it is vital that provisions for families and young children do not continue to have restricted and reduced funding, so that at risk children can be given the support at this critical point in their childhood.

Conclusion

There were effective studies which could be implemented on a wide scale within the U.K. The most effective and most accessible and cost effective appear to PMT with an Emotional Engagement module (Dadds et al., 2019), PCIT with an Emotional Development Module (Donohue et al., 2021), and the Hitkashrut program (Somech & Elizur, 2012; Elizur et al., 2017; Somech & Elizur,

2018), which all had large effect size, were time limited and group-based interventions and are evidenced to be effective when used with children as young as three years old. Additionally, the PMTO (Kjøbli et al., 2018) had a medium effect size, suggesting it may be less effective, however, it was also suitable for children as young as three years old and had the benefit of being designed for large groups of parents, making it more accessible. There may also be the possibility of developing an effective internet-based intervention. Prior to implementing interventions on a wide scale to tackle CU behaviours within the U.K., research should test the effectiveness of these interventions within the U.K. population, who currently remain under-researched in this area.

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Bridging Chapter: Overall Conclusions of Thesis and Reflections

Overall, the findings of this research have developed a method for early identification of an at-risk subgroup of children who bully, who would benefit from early intervention. The finds of the empirical study suggest that sibling bullies are an important subgroup of children who are likely to have high levels of CU behaviours and to engage in aggressive behaviour over time. Additionally, some of these children also bully across context, although the current study suggests that the frequency of the sibling bullying is a better indicator, as opposed to bullying across context in terms of identifying the most at-risk children. In other words, generalist and specialist bullies may be equally at risk of developing persistent antisocial behaviour, and outcomes seem to be more dependent on the frequency of sibling bullying and CU behaviours, rather than whether the child bullies in multiple contexts.

Sibling bullying is likely an important indicator due to the fact that children with CU behaviours develop their problems early in life (Waller et al., 2015; Willoughby et al., 2014) and these problems develop as a result of fearless temperament and lack of parental warmth (Barker et al., 2011), something which was replicated in the current study as the sibling bully subgroup were found to be fearless when introduced to new situations and people. In addition, children with CU behaviours are known to have experienced a lack of parental warmth (Goulter et al., 2020) and so these children do not develop emotional skills, such as empathy and a conscience. The current study also found that the sibling bully subgroup experienced a lack of parental engagement which may suggest that this group of children did not experience consistent parenting or enough parental warmth to develop empathy and conscious, which explains this subgroups higher CU behaviours. Given that children with CU behaviour problems start early and are because of problems within the home it makes sense that siblings would be at a higher risk of experiencing aggression from the children with CU behaviours. It appears that children may simply be more prone to bully their siblings as those are the peers that are available and in close contact with the child when they start to develop the CU behavioural problems.

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The systematic literature search found that there was not a large body of research to evidence the effectiveness of interventions which aim to reduce CU behaviours. However, the literature review found high quality RCT studies which showed large effect sizes which were upheld at follow-up, even as far as three years post intervention. These interventions were short, time-limited interventions, which would be easily to implement to large groups of parents. In addition, these interventions have been shown to be effective on children as young as three, and the current study showed that it is possible to identify at risk subgroups of children as young as three (via considering child temperament). In addition, the current study found that at age 11 years the subgroup which is most at risk is children who bully their siblings and have CU behaviours, and so, it is likely that children who bully their siblings prior to 11 years old, may also be at risk, however, this needs to be explored further.

Therefore, future research should focus on exploring how early the sibling bullying behaviours can be identified in this subgroup. This may be an easy way to identify at risk children at a young age, even before parents, teachers or services are likely to notice and identify the CU behaviours. This would allow for earlier identification and interventions. Furthermore, future research should also consider the development of more effective internet interventions for children with CU behaviours. Finally, researchers should consider replicating the intervention studies which were identified in this review within the U.K. population. This would ensure there are no cultural differences between the countries that have researched parenting interventions for CU behaviours and the U.K., to ensure any differences do not impact on the outcomes. This would be an important step to complete before wide scale implementation of strategies to combat CU behaviours using parenting interventions. However, the use of such interventions could be of great benefit to the children involved, those close to them and to society.

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Reflective Piece

When I first decided on this topic of research, I had some reservations regarding the term callous-unemotional traits. My identity as a psychologist means I tend to dislike the idea of diagnosis for the most part and prefer to use assessment and formulations to make sense of a person's problems. For the most part this involves making sense of childhood experiences. I have often work with clients who have engaged in aggressive behaviours and even adults who had been assessed for psychopathy while working in forensic services. I was always aware of the client's early life experiences, and this helped me to hold empathy and understanding. I often felt that labels such as 'psychopathy' and 'CU traits' could lead to judgements and stigma. I still believe this to be the case and believe that this can be very damaging. Particularly as it is known that trauma can impact on empathy and so often people given these labels also have a difficult past.

During this research process I have attempted to mitigate any stigmatising where possible. During a discussion I had with my primary supervisor, she spoke of some researchers using the wording CU behaviours instead of CU traits. For me this offered slightly less stigmatising language, as it feels less like labelling the person, and instead identifying a set of behaviours that an individual is engaging in. Furthermore, what interested me most about this project was the possibility of being able to improve the lives of the children, their families and even benefit wider society. This for me gives hope that callous-unemotional behaviours do not have to be life long and can be reduced. I found that being able to identify a subgroup of children who were at risk of having longer-term problems, while also exploring how those behaviours developed felt more compassionate and worthwhile. In addition, being able to also work on a literature review of the interventions which would reduce the callous-unemotional behaviours felt more worthwhile to me, as I could see that both early identification and effective, accessible, and cost-effective interventions are equally important. Often in services I have spoken to clients who have spent many years struggling before receiving treatment and even when they present with serious difficulties, they are often not given the support needed. Therefore, I really see a benefit to identifying children as early as possible.

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I have also found that during this process I have been able to reflect on some of my early life experiences and see other peoples' perspectives in a way I was not able to before. I have been a victim of bullying. I have learnt more about the reasons why someone might become a bully and that there are often negative outcomes for the bully as well as the victim. I found myself feeling a sense of sadness and empathy for some of the people I have known who bullied, and I have been able to see that those negative outcomes occur on more than one occasion. I found myself seeing that in a sense both the victim and bully have difficult paths, and in my case it's the bullies that have experienced the more negative outcomes later in life and have vulnerabilities of their own.

I have also learnt through this process that there are benefits to having commonly used key terms in research and even sometimes when implementing interventions. Without the term CU behaviours researchers would not be able to build on knowledge and understanding, and importantly develop effective specialist interventions. Given that many interventions do not work with children who have CU behaviours, it seems that there is some need to use this term, at least for research and interventions. I also believe that this can be done without giving a permanent label to a child. The fact that CU behaviours can reduce, demonstrates that these difficulties do not have to be permanent, however, this also is the case with many mental health problems. In terms of research, there is little need for children to be labelled beyond the research, and the child is not identified within the research itself, so the impact of stigma can easily be reduced. Even interventions can be given based on 'behaviours' rather than needing to give a specific label. However, I am aware that it is likely that services and researchers will probably continue to label children and adults in this way, and often sadly these labels are given for life. However, for me this is a wider issue than just CU behaviours. The priority for me is that this research shows there is hope for improving the lives of these children and the people around them.

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

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Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix A: Information regarding informed consent requests taken from teachers, parents and cohort members when the children were 9-months, 3, 5, 7, 11 and 14 years old.

Table 15. *Inform consent requested when the cohort members were aged 9-months for MCS data to be linked to birth registration and hospital records.*

	Babies	Consent	Percent
Birth registration	18,818	17,019	90.4
Hospital records	18,818	16,889	89.8

Table 16. *Informed consent requested when the cohort members were aged 3-years old.*

	Eligible	Number	Percent
Main interview and self-completion:			
a) Interview	15586	15446	99.1
b) Self-completion	15414	14846	96.3
Consent for the cohort child:			
Assessments:			
a) Bracken Basic Concepts Scale - knowledge of colours,	15808	14969	94.7
b) British Ability Scales - Naming Vocabulary	15808	15167	95.9
Measurements:			
c) Standing height	15808	14638	92.6
d) Body weight	15808	14814	93.7
Sample of saliva	12471	11034	88.5
Information from NHS records on date and reason for hospital admission and treatment of cohort member from birth to age 7	15809	13022	82.4
Consent for older siblings			
Part A: School records	11868	10296	86.8
Part B: Older siblings self-completion questionnaire for children aged 10-15 years	2170	2092	96.4

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Table 17. *Informed consent requested when the cohort members were aged 5-years old.*

	Target	Number	Percent
Parent1 interview and self-completion			
a) Answering questions put to me by the interviewer	15246	15185	99.6
b) Completing a questionnaire			
Age 5 Child: Assessments and Measurements [b]			
a) Story of Sally & Anne	15549	15196	98.3
b) Picture similarities			
c) Naming vocabulary			
d) Pattern construction			
e) Height	15549	15236	98.6
f) Weight			
g) Waist circumference against skin OR			
h) Waist circumference over clothing			
Parent 2 interview and self-completion			
a) Answering questions put to me by the interviewer	12219	10778	80.1
b) Completing a questionnaire			
Parental consent to release child information from NHS records	15459	14905	96.4
Parental consent to release child information from school records	9884	9210	94.2
Teacher Survey (Northern Ireland, Scotland and Wales only)	5495	3332	60.6
Parental consent to place older sibling questionnaire	2633	2493	94.7

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Table 18. *Informed consent requested when the cohort members were aged 7-years old.*

	Target	Number	Percent
Part A: Interview and self-completion			
a) Answering questions put to me by the interviewer	13857	13797	99.6
b) Completing a questionnaire			
Part B: Health and economic records			
Permission to release information from routine health records	13797	11977	86.8
Permission to release information from routine economic records	13797	11063	80.2
Age 7 Child: Assessments and Measurements	14043	13835	98.5
a) Story of Sally & Anne			
b) Word Reading			
c) Progress in Maths			
d) Pattern Construction			
e) Height	14043	13873	98.8
f) Weight			
g) Waist circumference against skin OR			
i) Body fat percentage			
h) Waist circumference over clothing			
Age 7 Child: Physical activity and monitoring			
Consent to wear an activity monitor to have their physical activity measured	14043	12854	91.5
Age 7 Child: Self-completion questionnaire	14043	13244	94.3
	Target	**Number**	**Percent**
Part A: Teacher survey	14043	12655	90.1
Part B: Health and education records			
information from health records	14043	13047	92.9
information from education records	14043	13170	93.8
Health and education records – SIBLINGS (For up to 4 children)			
information from health records	17356	15487	89.2
information from education records	17356	15482	89.2

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Table 20. *Informed consent requested when the cohort members were aged 14-years old.*

	Target	Number	Percent
Parent 1 interview, cognitive assessment, and saliva sample			
a) Interview	11726	11595	98.9
b) Cognitive assessment (word activity)	11726	11068	94.4
c) Saliva sample	11578	9634	83.2
Parent 2 interview, cognitive assessment, and saliva sample			
a) Interview	8840	7268	82.2
b) Cognitive assessment (word activity)	8501	6890	81.0
c) Saliva sample	7215	5202	72.1
Parental consent to approach the young person (age 14) to ask for their consent for all survey elements			
a) Young person self-completion questionnaire	11884	11840	99.6
b) Cognitive assessments (word activity and decision-making activity)	11884	11812	99.4
c) Height, weight and body fat percentage	11884	11810	99.4
d) Time use record	10337	10127	98.0
e) Activity monitor	10337	10127	98.0
Parental consent for young person to provide a saliva sample	11884	11021	92.7
Young person consent			
a) Young person self-completion questionnaire	11840	11535	97.4
b) Cognitive assessments (word activity and decision-making activity)	11812	11049	93.5
c) Height, weight and body fat percentage	11810	11408	96.6
d) Time use record	10127	9240	91.2
e) Activity monitor	10127	9184	90.7
f) Saliva sample	11021	9758	88.5

Appendix B. Descriptive statistics for the variables used in the latent profile analyses, multilevel mixed effect regression and multinominal logistic regressions.

Table 21. *Descriptive statistics for the latent variables and covariant variables used in the latent profile analysis.*

Latent variables	N	Minimum	Maximum	Mean	Standard Error	Standard Deviation	Variance	Skewness	Kurtosis
Sibling Bullying	12054	1	6	4.00	0.017	1.817	3.302	-0.387	-1.386
Peer Bullying	12972	1	6	5.53	0.009	0.967	0.936	-2.676	7.440
Callous Unemotional Behaviour	12820	1	4	3.17	0.005	0.517	0.267	-0.601	0.352
Covariant variables									
gender	12805	1	2	1.50	0.004	0.500	0.250	0.019	-2.000
Socio Economic Status	10551	-2.07	1.93	-.035	0.008	0.799	0.639	-0.001	-0.123

Table 22. *Descriptive statistics for the multinomial logistic regression predictor variables.*

Predictor variables	N	Minimum	Maximum	Mean	Standard. Error	Standard Deviation	Variance	Skewness	Kurtosis
Mood (SQRT)	10955	1.00	4.80	2.5953	.00648	.67784	.459	-.108	-.143
Approach/withdrawal (Log10)	10931	.30	1.20	.7465	.00152	.15934	.025	.164	-.373
Adaptability	10954	1.00	15.00	8.0411	.02283	2.38906	5.708	.081	.082
Regularity (Log10)	10951	.00	1.15	.3758	.00303	.31674	.100	.208	-1.092
Independence & Self-regulation (SQRT)	9836	1.00	3.74	1.9118	.00510	.50629	.256	.081	-.194
Emotional Dysregulation	9837	1.00	15.00	9.1290	.02347	2.32801	5.420	.043	-.551
Cooperation (Log10)	14949	.00	.48	.1401	.00081	.09902	.010	.242	-.559
Parent-Child Closeness (log10)	13991	.00	1.53	.3499	.00289	.34158	.117	.583	-.576
Parent-Child Conflict (SQRT)	13992	1.73	6.40	4.2293	.00564	.66754	.446	.161	-.448
Harsh punishment	9872	4.00	45.00	26.4487	.04727	4.69706	22.062	-.205	.429
Parental engagement	14931	1.00	35.00	21.7097	.04240	5.18126	26.845	-.402	.171
Parent verbal & emotional responsivity (Log10)	14490	.00	1.36	.2997	.00247	.29725	.088	.656	-.348

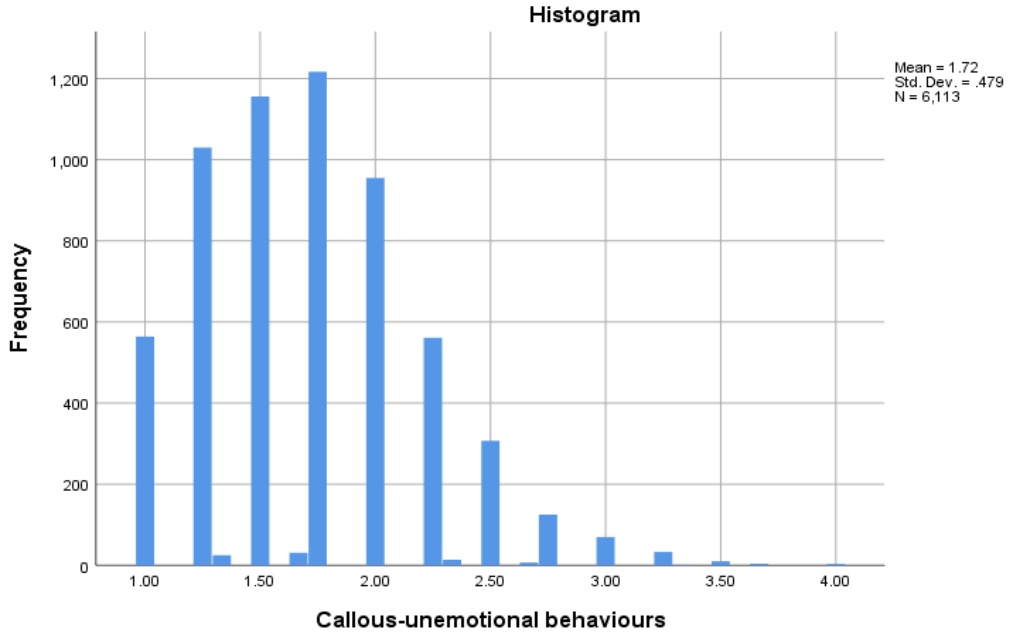
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

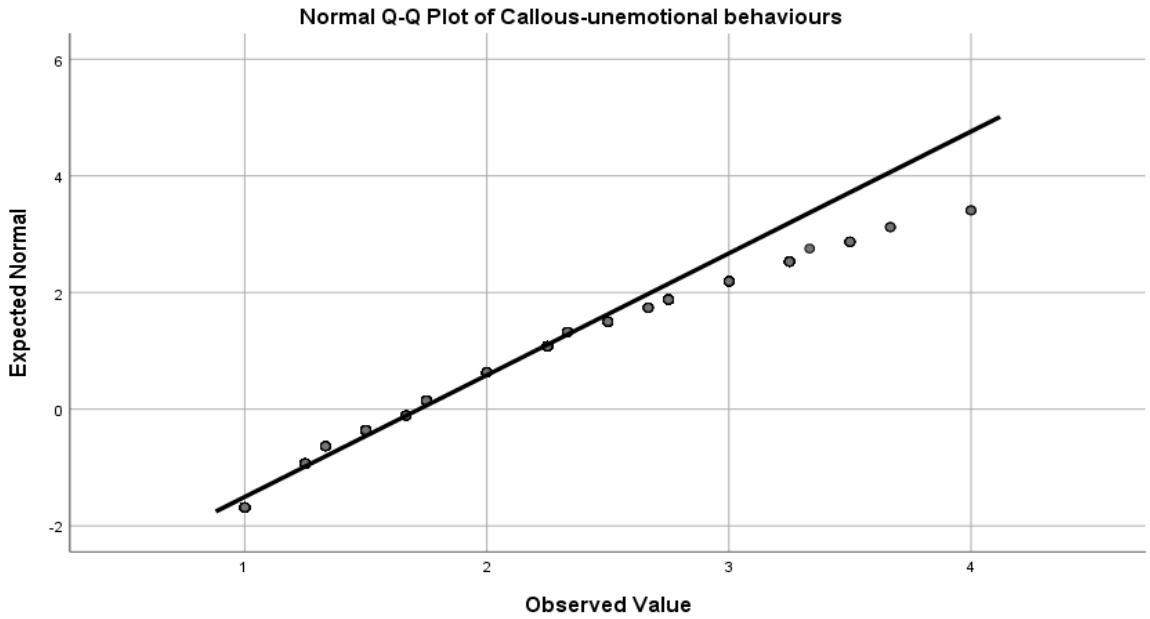
Table 23. *Descriptive statistics for the Multilevel mixed-effects regression predictive variables.*

Predictor variables	N	Minimum	Maximum	Mean	Standard Error	Standard Deviation	Variance	Skewness	Kurtosis
Pro-sociality at 3 years old (Log10)	14844	0	1.04	0.493	0.002	0.259	0.067	-0.550	-0.548
Pro-sociality at 5 years old (Log10)	14922	0	1.04	0.332	0.002	0.276	0.076	0.120	-1.216
Pro-sociality at 7 years old (Log10)	13630	0	1.04	0.294	0.002	0.277	0.077	0.334	-1.166
Pro-sociality at 14 years old (Log10)	11464	0	1.04	0.333	0.003	0.288	0.083	0.221	-1.167
Externalising behaviours at 3 years old (SQRT)	14973	1	4.47	2.681	0.006	0.708	0.501	-0.081	-0.383
Externalising behaviours at 5 years old (SQRT)	14929	1	4.47	2.300	0.006	0.718	0.516	0.130	-0.485
Externalising behaviours at 7 years old (SQRT)	13633	1	4.47	2.277	0.007	0.756	0.571	0.176	-0.565
Externalising behaviours at 14 years old (SQRT)	11354	1.00	4.00	2.178	.00689	.73397	.539	.185	-.586
Internalising behaviours at 3 years old (LN)	14990	.00	2.94	1.156	.00550	.67282	.453	-.218	-.705
Internalising behaviours at 5 years old (LN)	14938	.00	2.94	1.032	.00574	.70211	.493	.009	-.866
Internalising behaviours at 7 years old (LN)	13633	.00	2.94	1.064	.00631	.73646	.542	.014	-.930
Internalising behaviours at 14 years old (LN)	11468	.00	3.00	1.303	.00707	.75695	.573	-.217	-.772

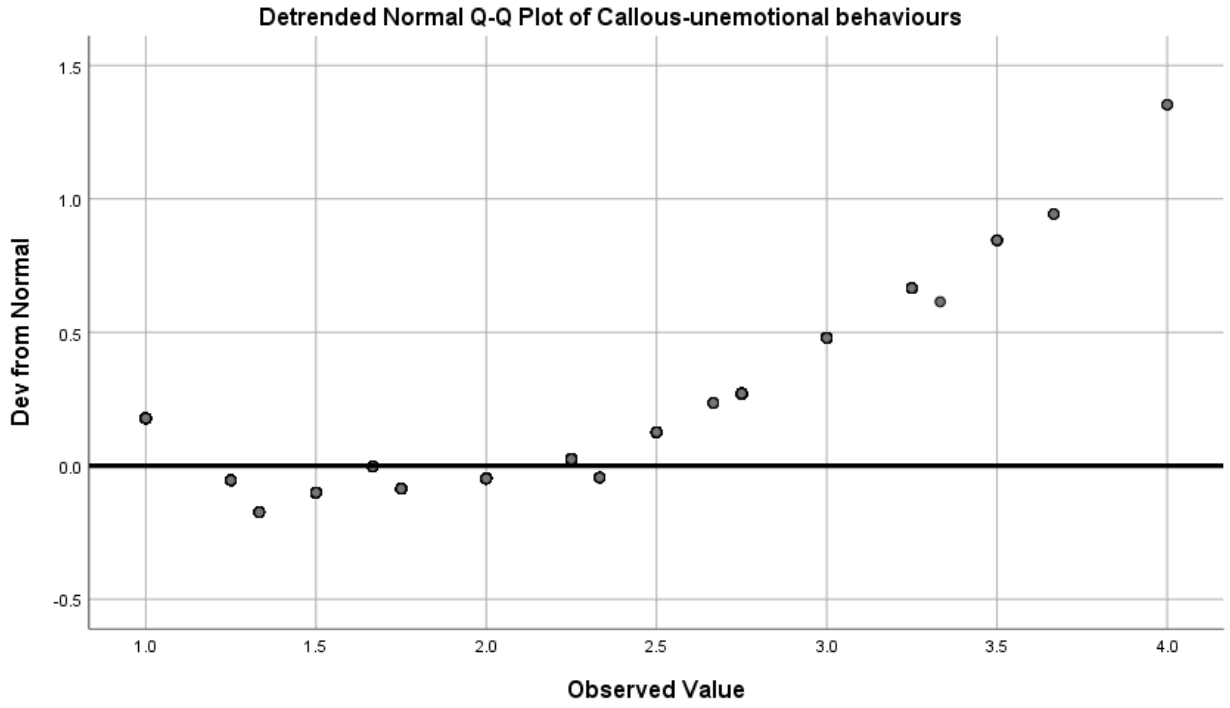
Appendix C. Latent profile analysis: Histograms and Q-Q plots for the latent variables (callus-unemotional behaviours, sibling bullying & peer bullying) and covariant variable (SES).

Histogram and Q-Q plots for the callous-unemotional behaviours measure.

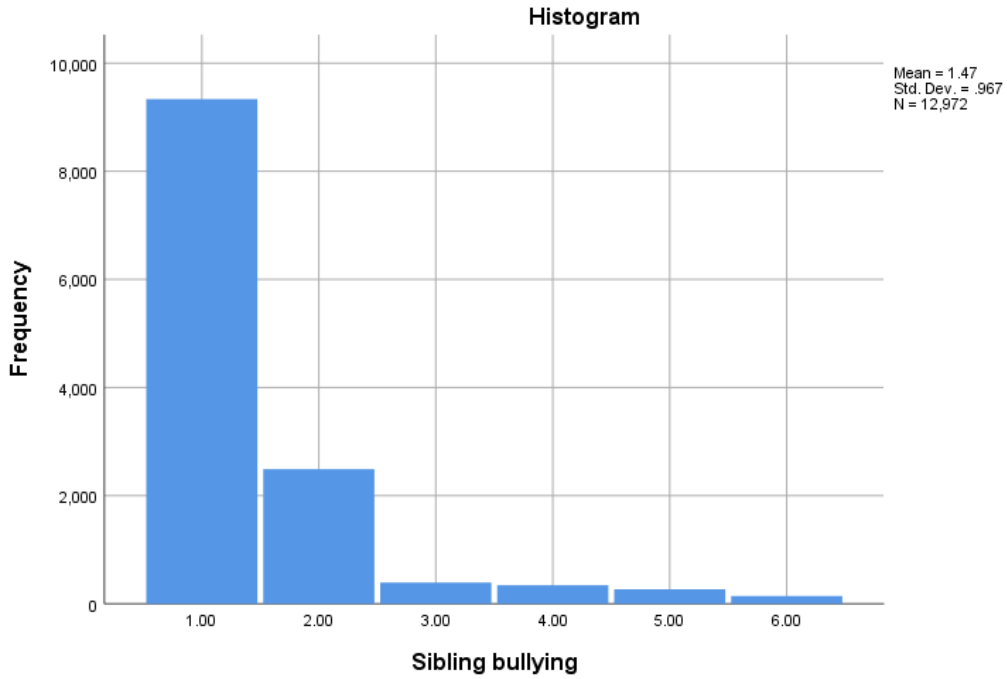




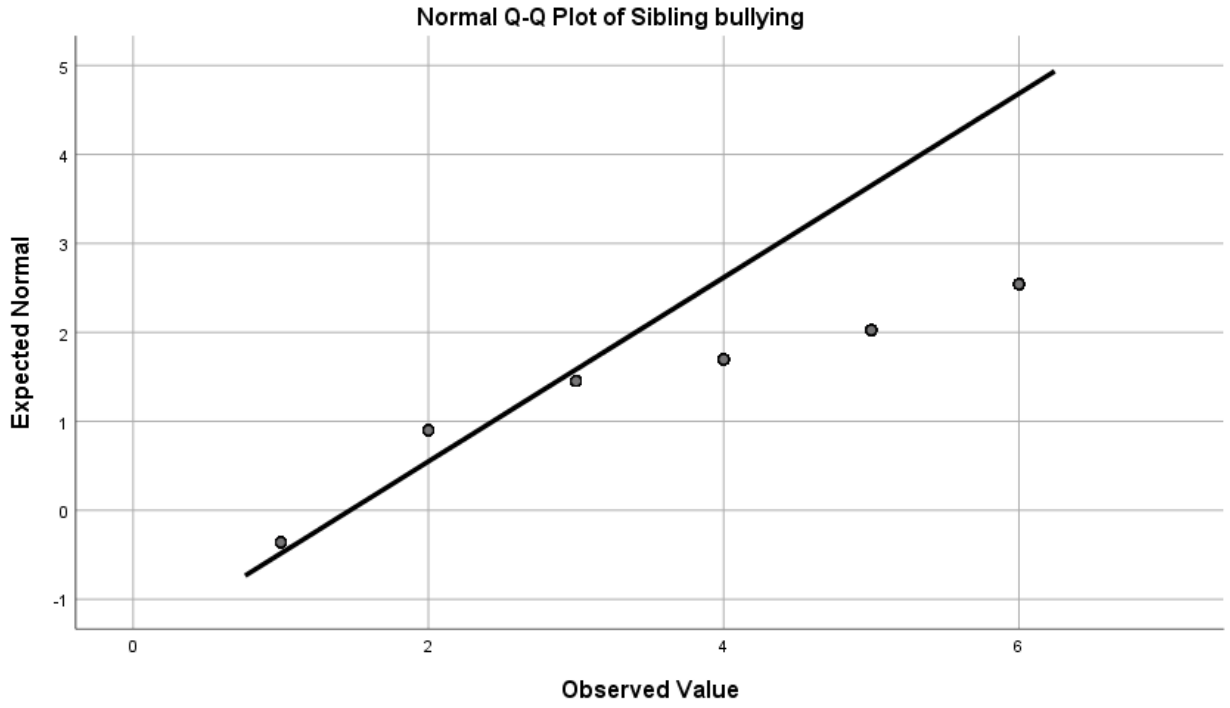
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

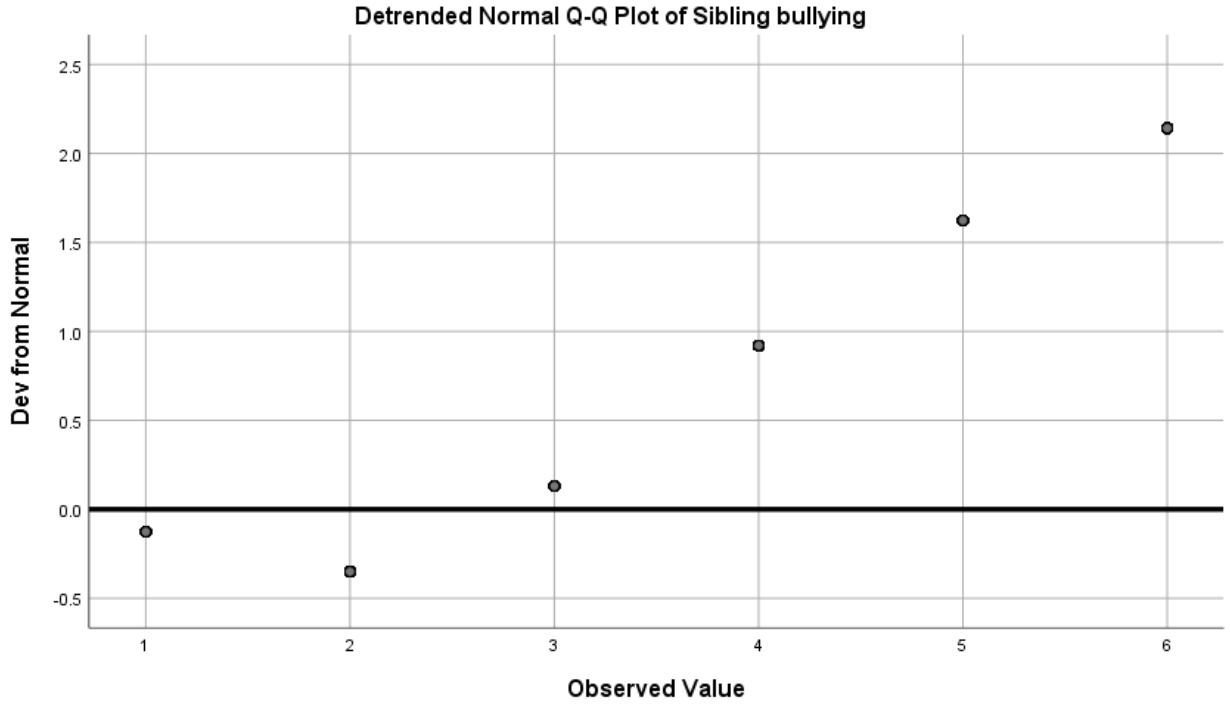


Histogram and Q-Q plots for the sibling bullying measure.



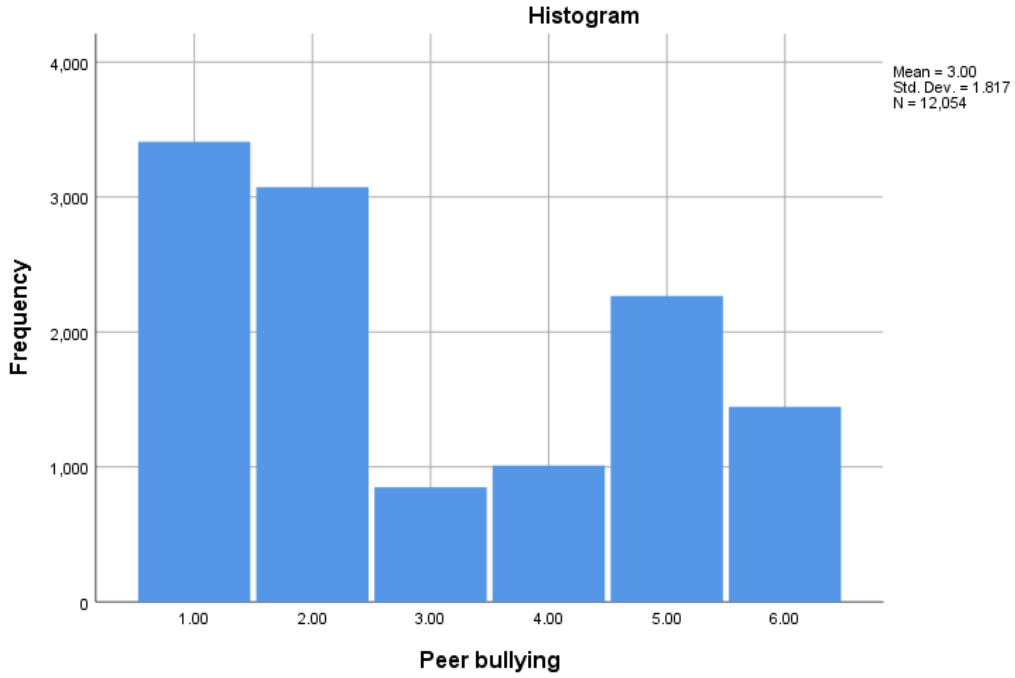
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

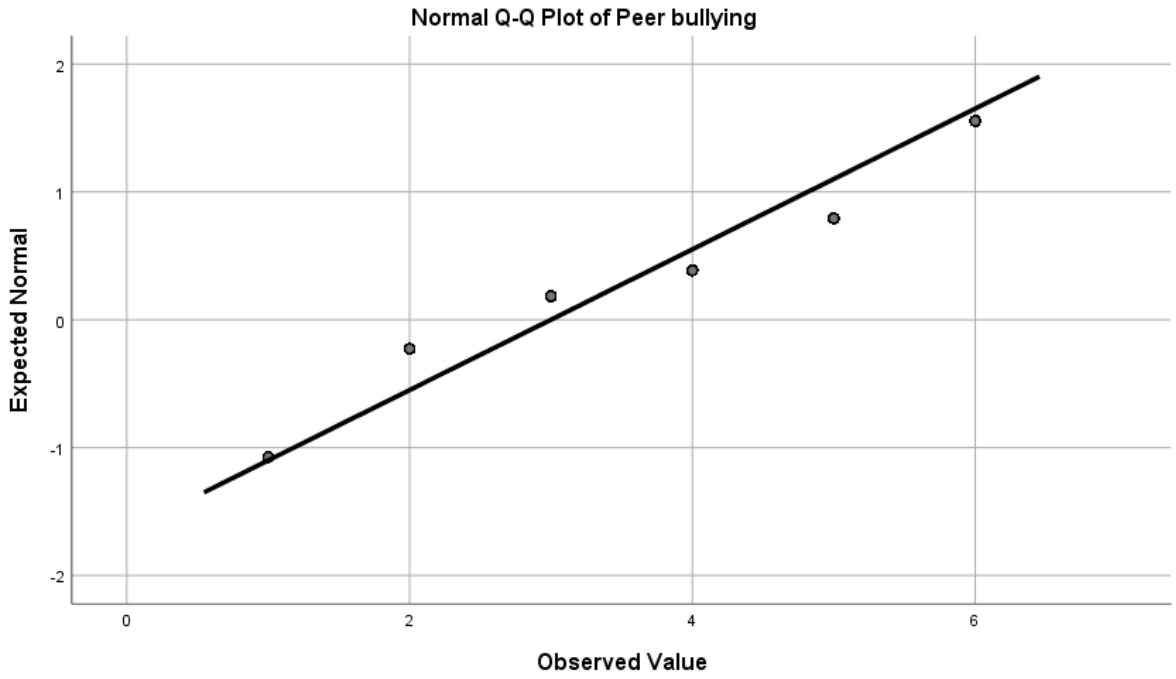




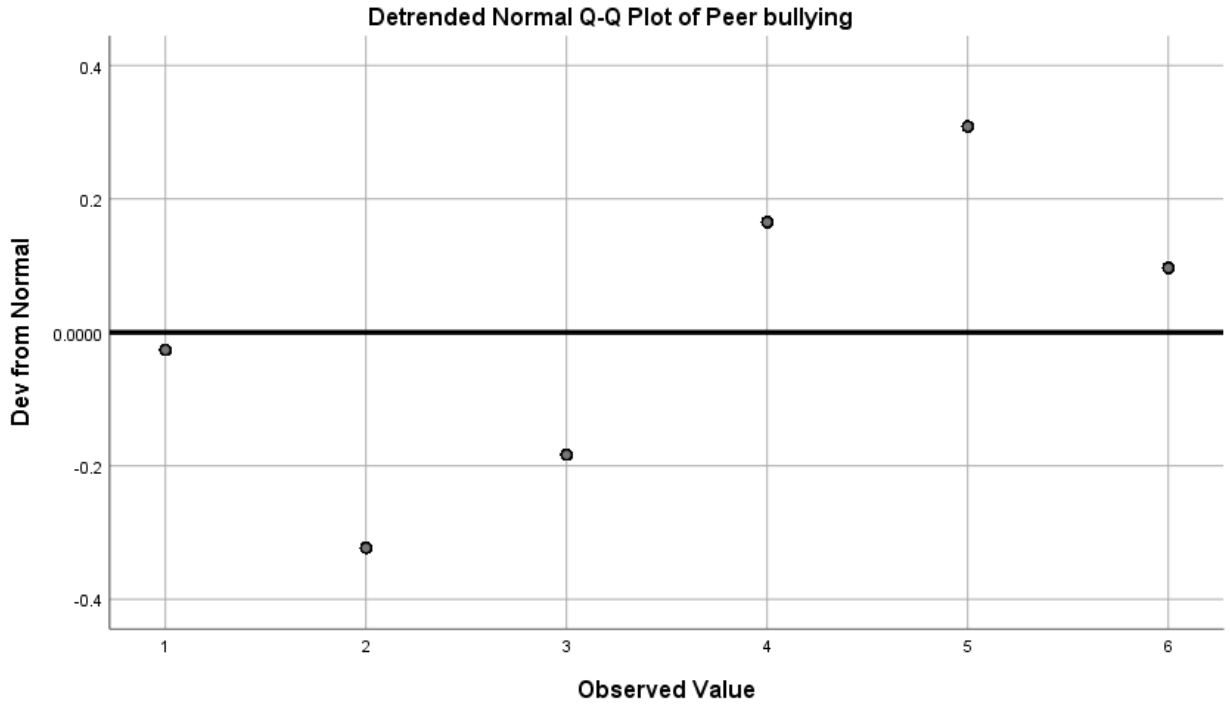
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Histogram and Q-Q plots for the for the peer bullying measure.

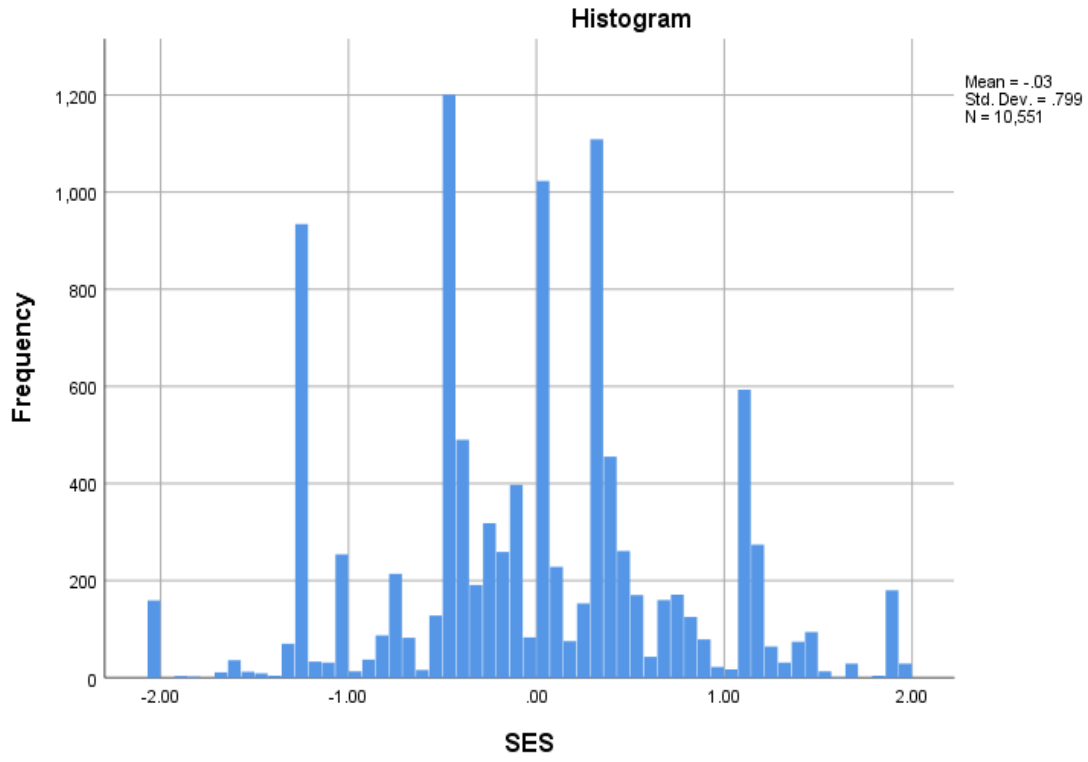


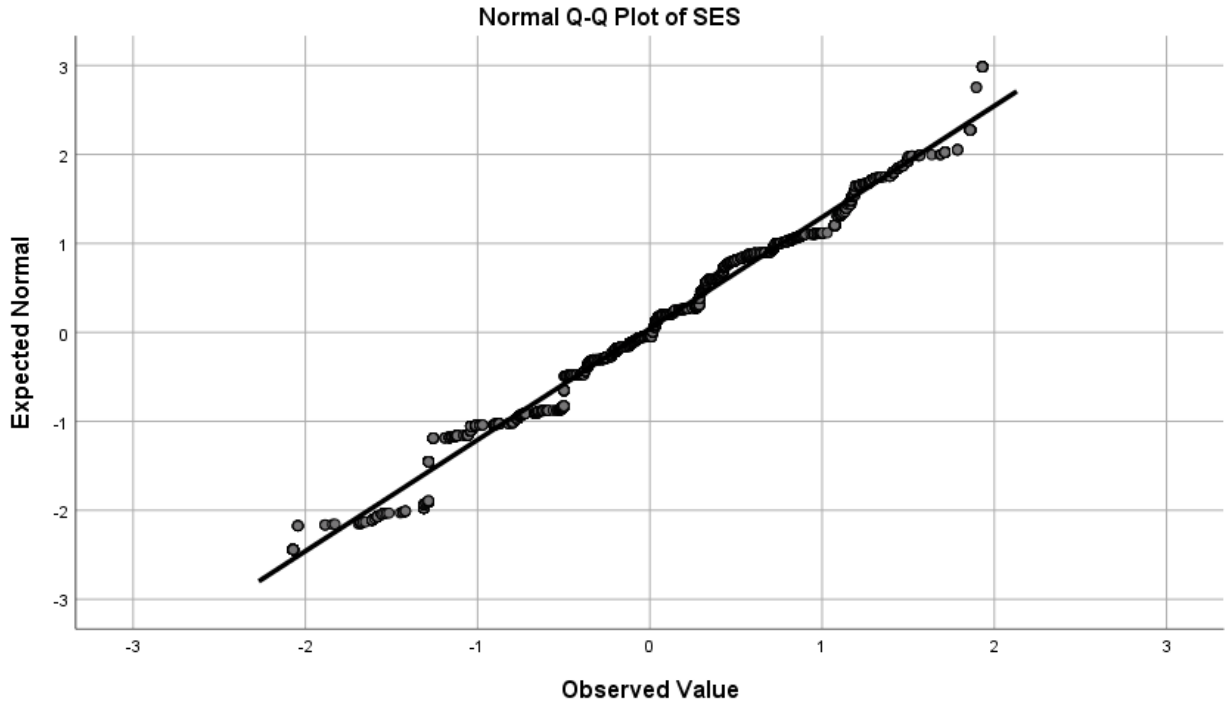


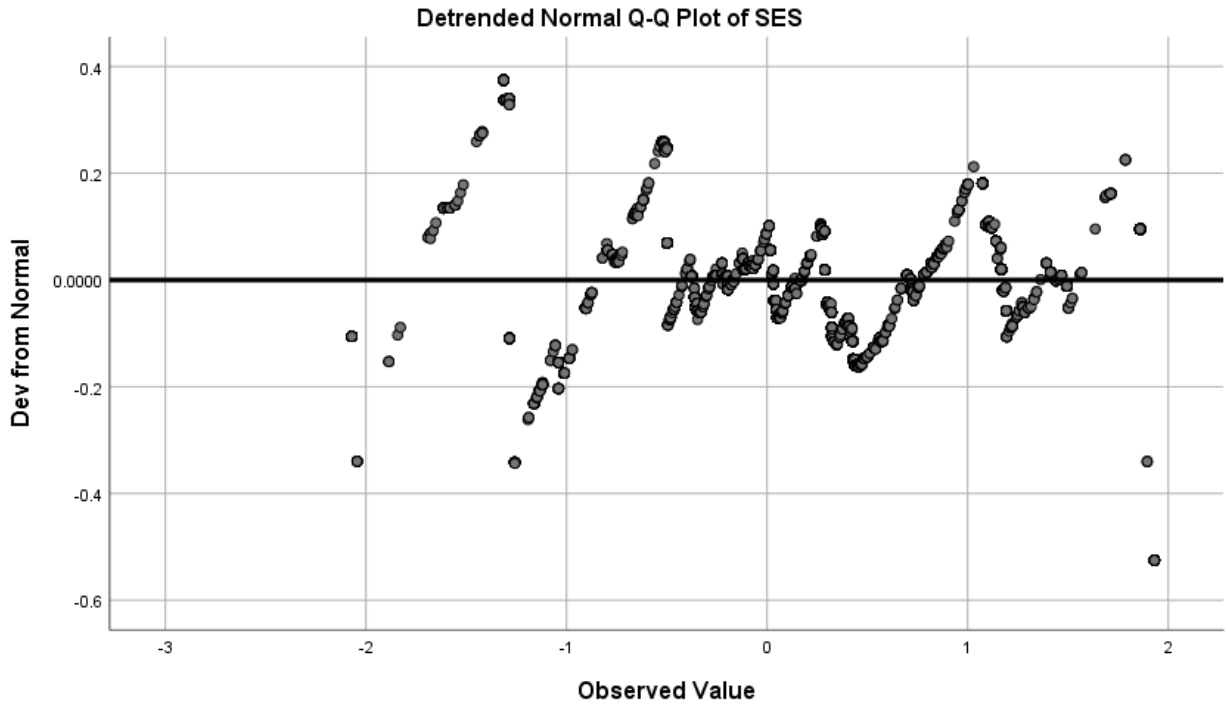
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



Histogram and Q-Q plots for the socioeconomic status measure.




Normal Q-Q Plot of SES
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3


Detrended Normal Q-Q Plot of SES
Dev from Normal
Observed Value
0.4
0.2
0.0000
-0.2
-0.4
-0.6

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix D. Bar charts comparing the distribution of known sub-distributions (gender & SES)

within the latent profiles.

Figure C. *Pie chart for female cohort members: comparing subgroup proportions.*

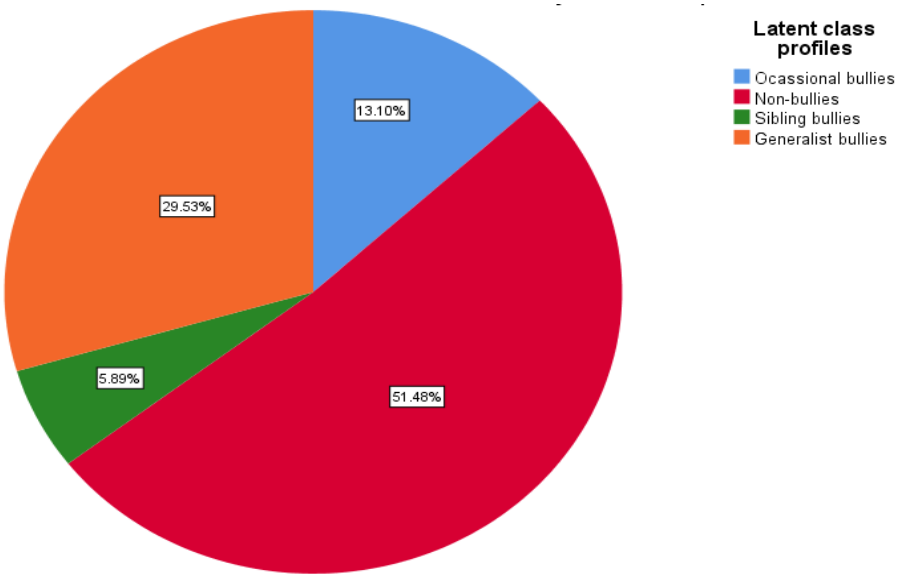
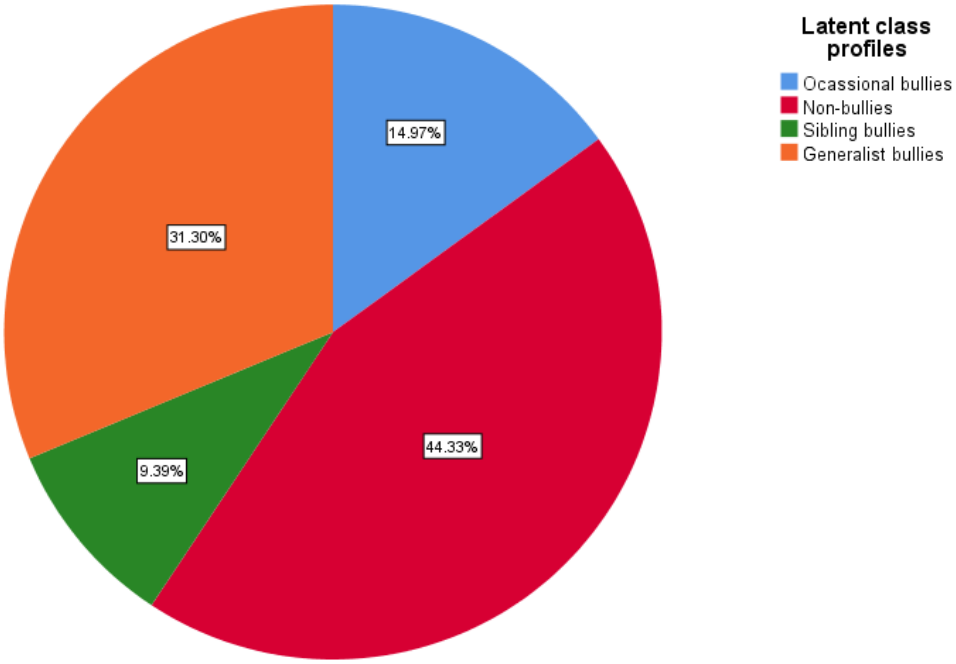


Figure D. *Pie chart for male cohort members: comparing subgroup proportions.*



Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Figure E. *Bar chart for both genders: comparing latent class profile subgroups by their socio-economic status and callous-unemotional behaviours.*

Figure F. *Bar chart for male cohort members: comparing latent class profile subgroups by the socio-economic status and callous-unemotional behaviours.*

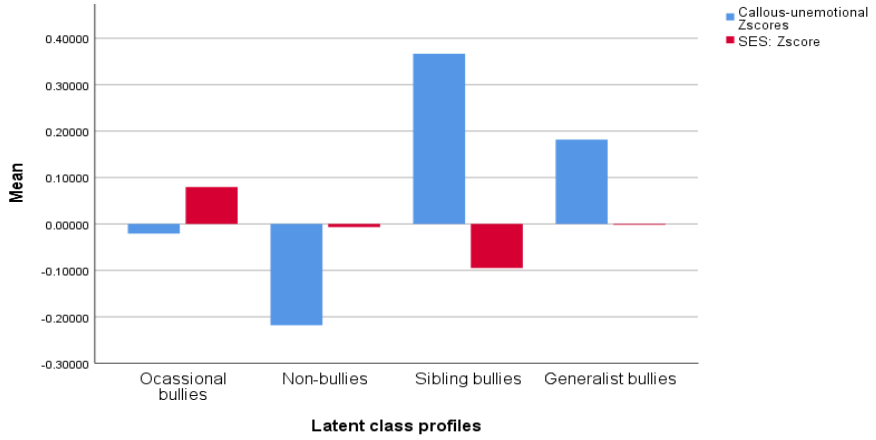
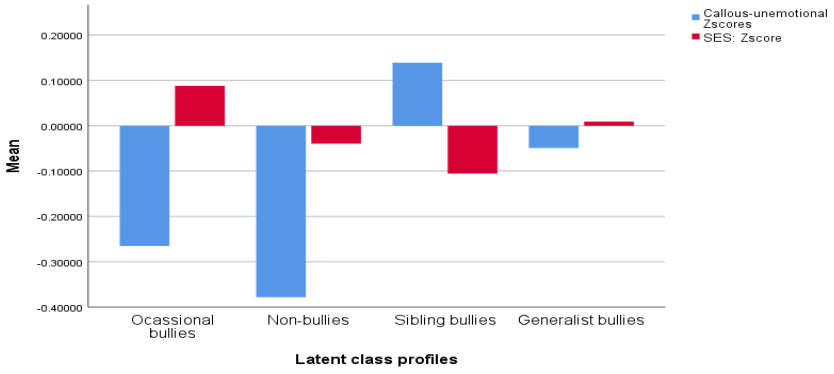
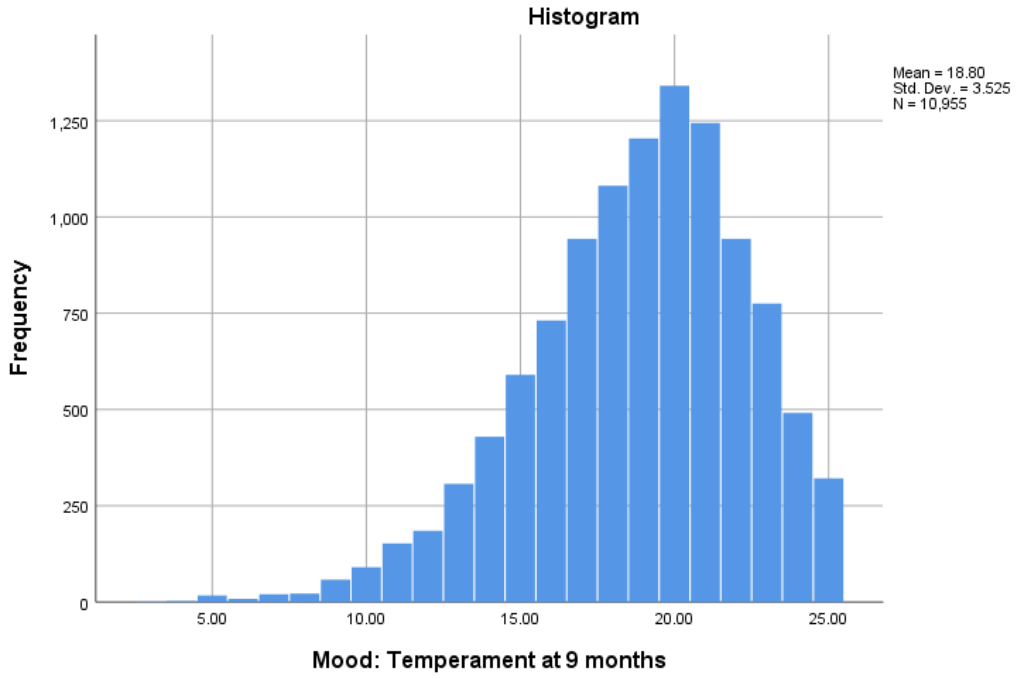


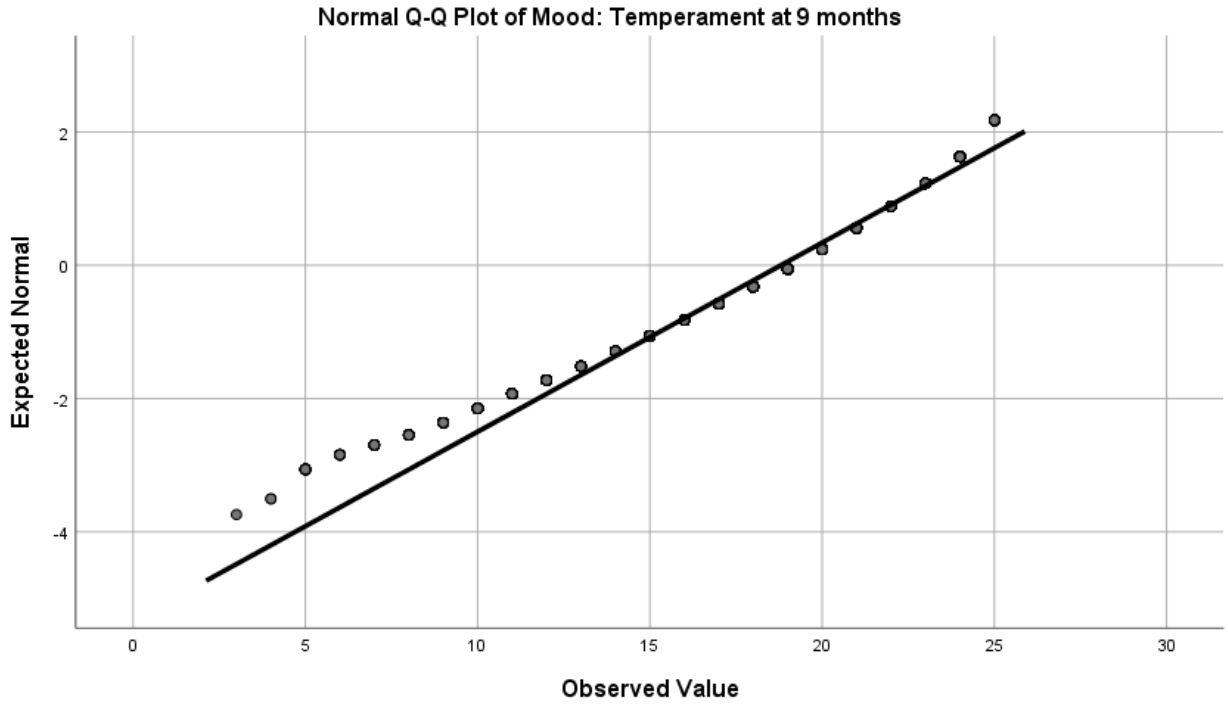
Figure G. *Bar chart for female cohort members: comparing latent class profile subgroups by the socio-economic status and callous-unemotional behaviours.*

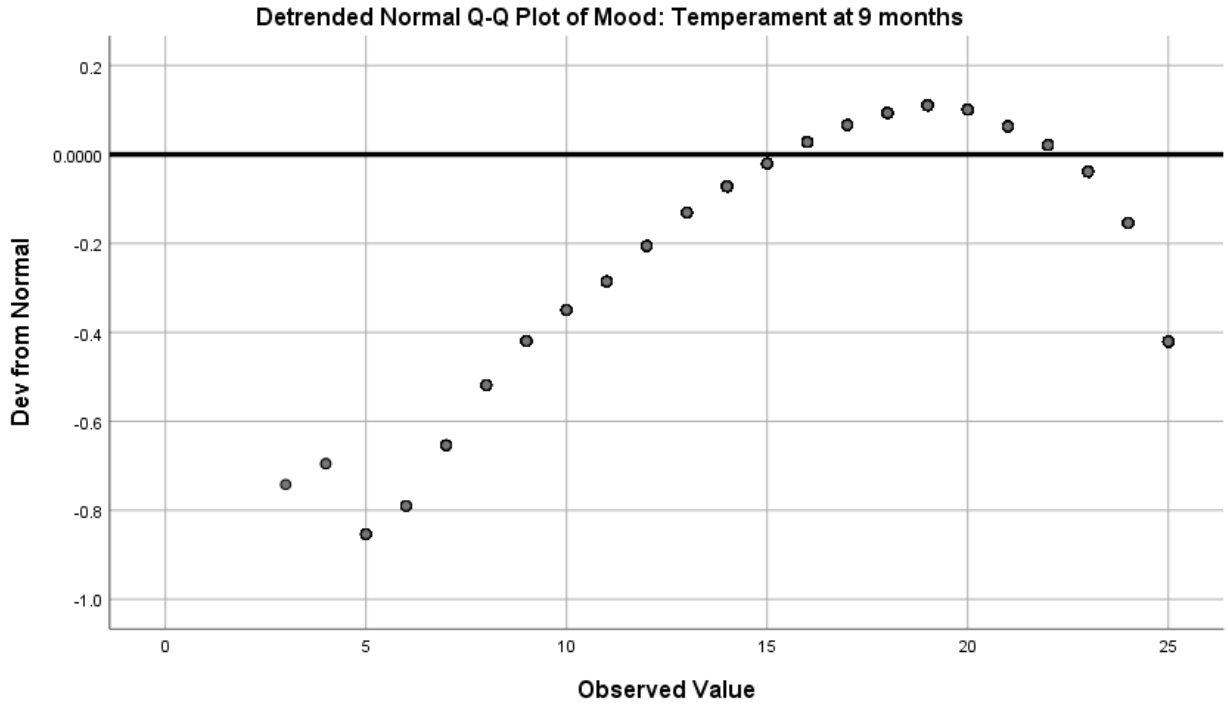


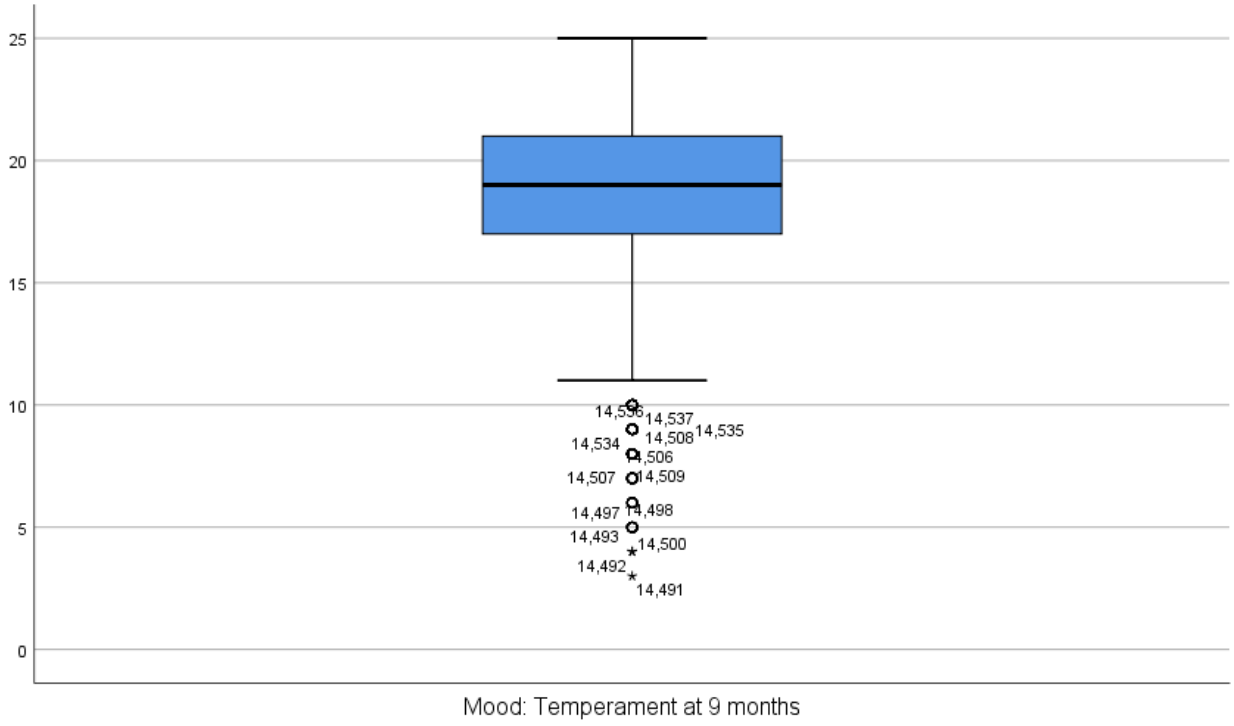
Appendix E. Histograms, Q-Q plots and box plots to test for the multinomial logistic regression predictor variables: prior to variables being transformed.

Histogram, Q-Q plots and box plots for the predictor variable mood prior to transformation.



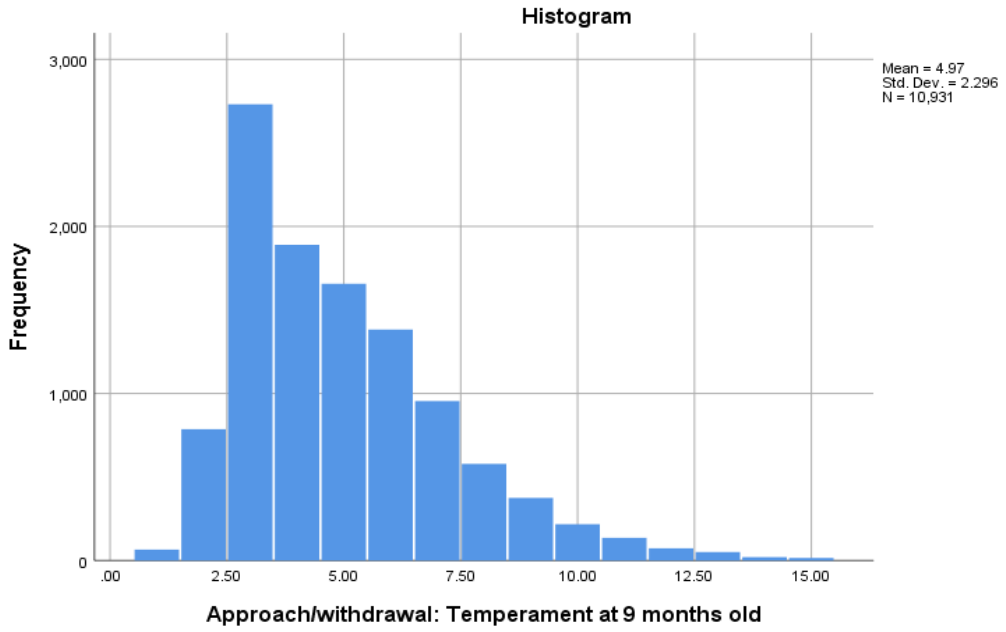


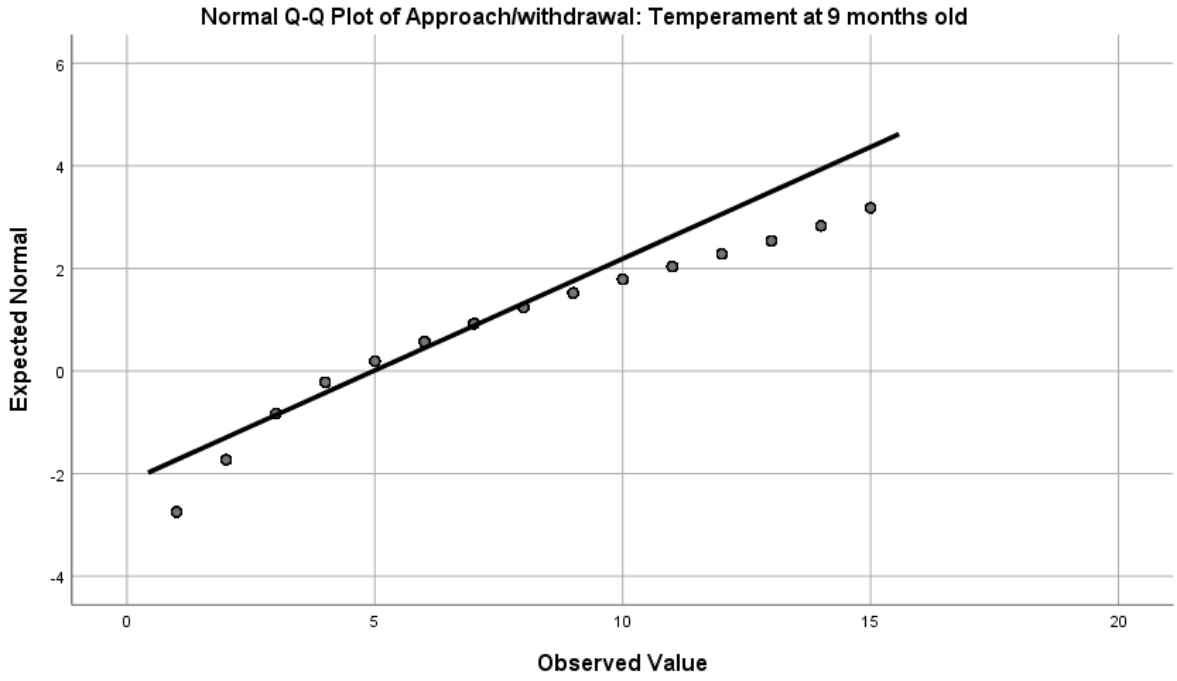

Detrended Normal Q-Q Plot of Mood: Temperament at 9 months
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
0
5
10
15
20
25
Observed Value


25
20
15
10
5
0
14,536
14,537
14,508
14,535
14,534
14,506
14,507
14,509
14,497
14,498
14,493
14,500
14,492
14,491
Mood: Temperament at 9 months

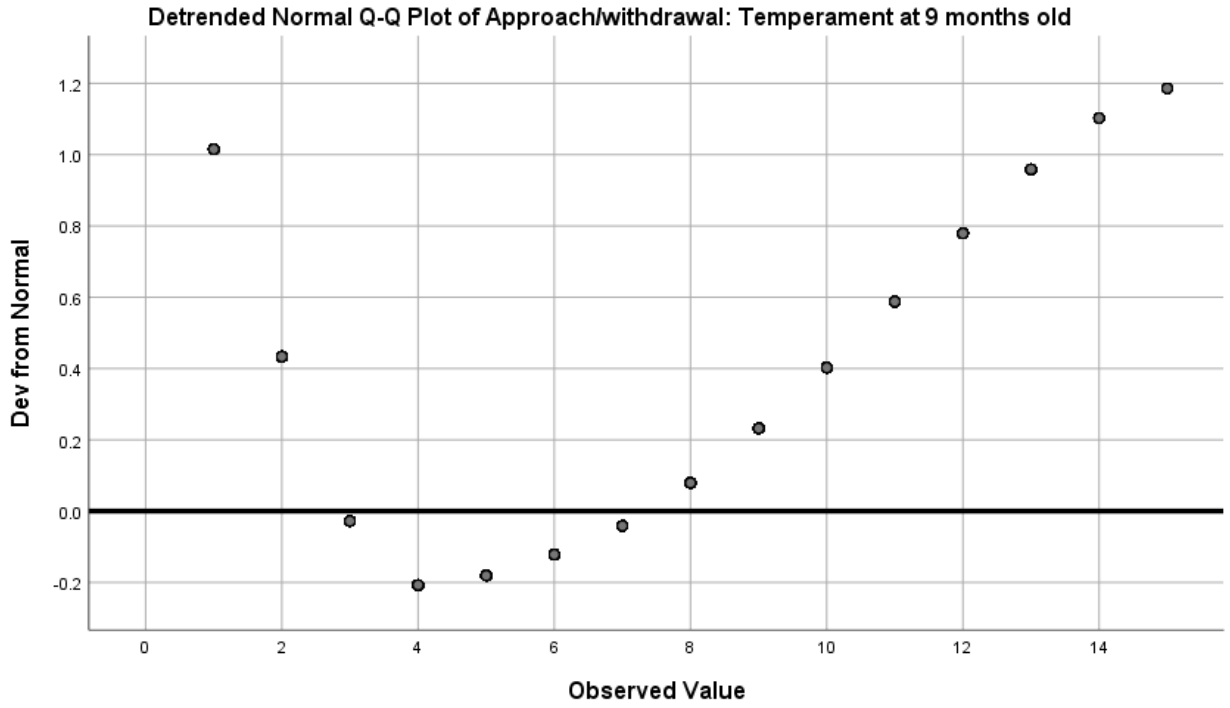
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

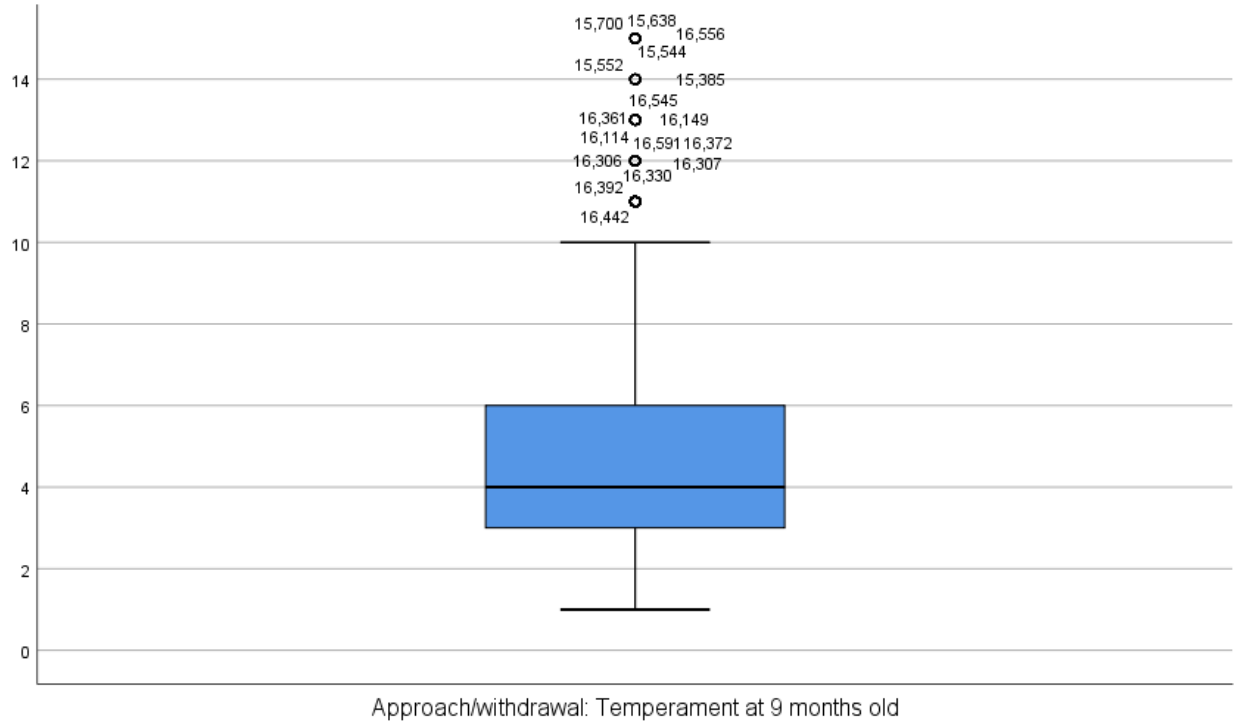
Histogram, Q-Q plots and box plots for the predictor variable approach/withdrawal prior to transformation.





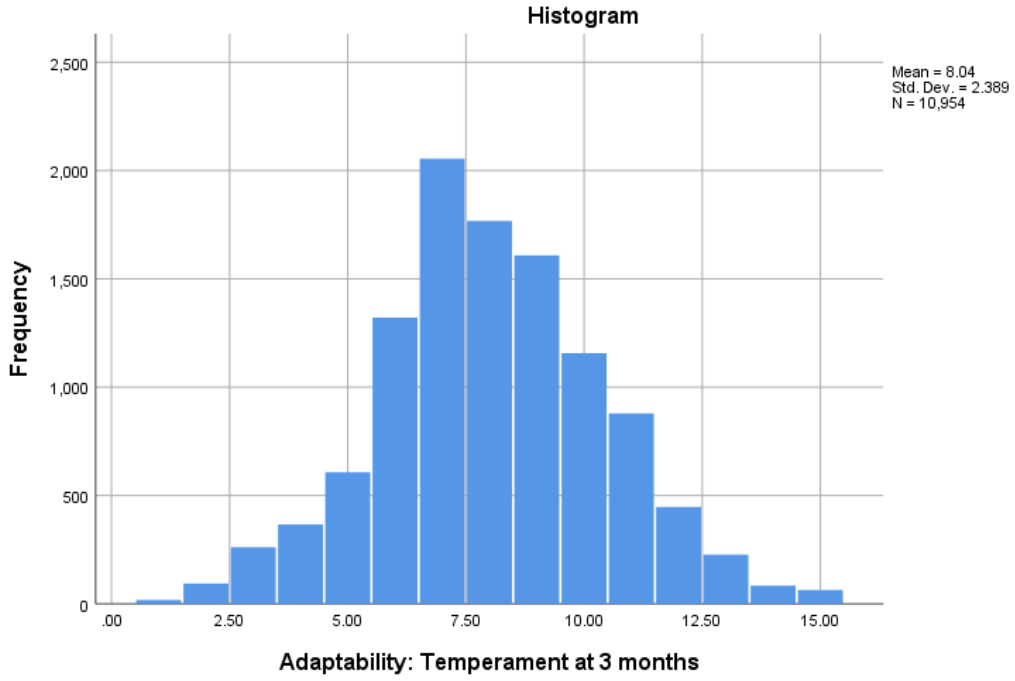
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

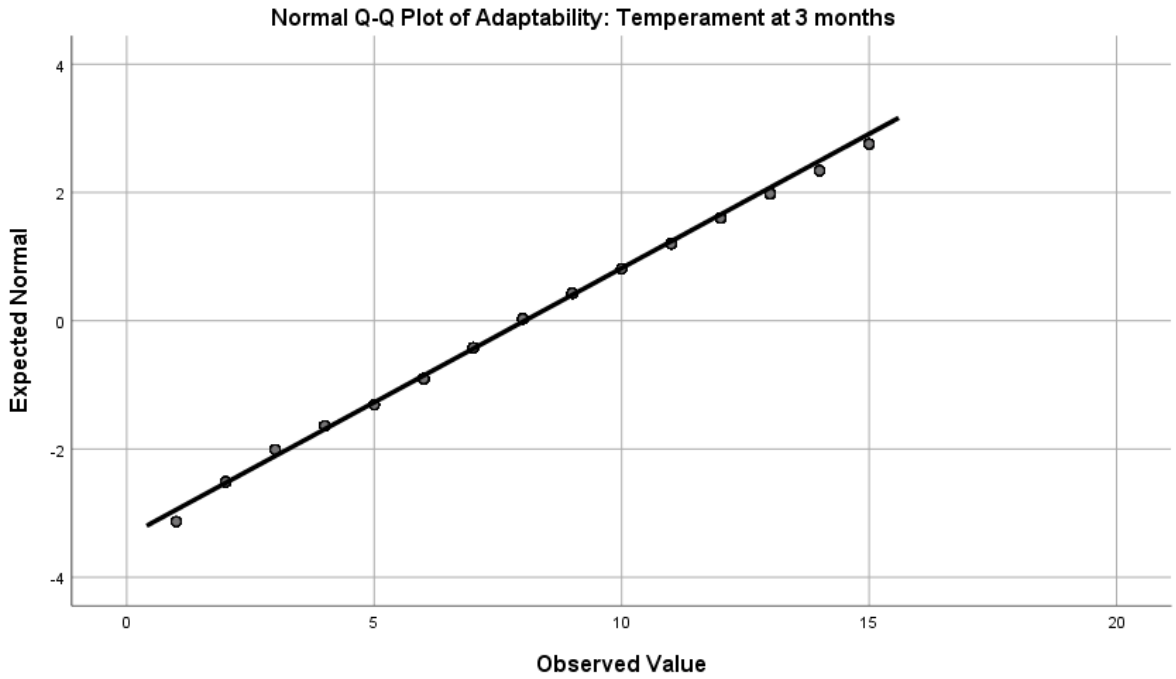




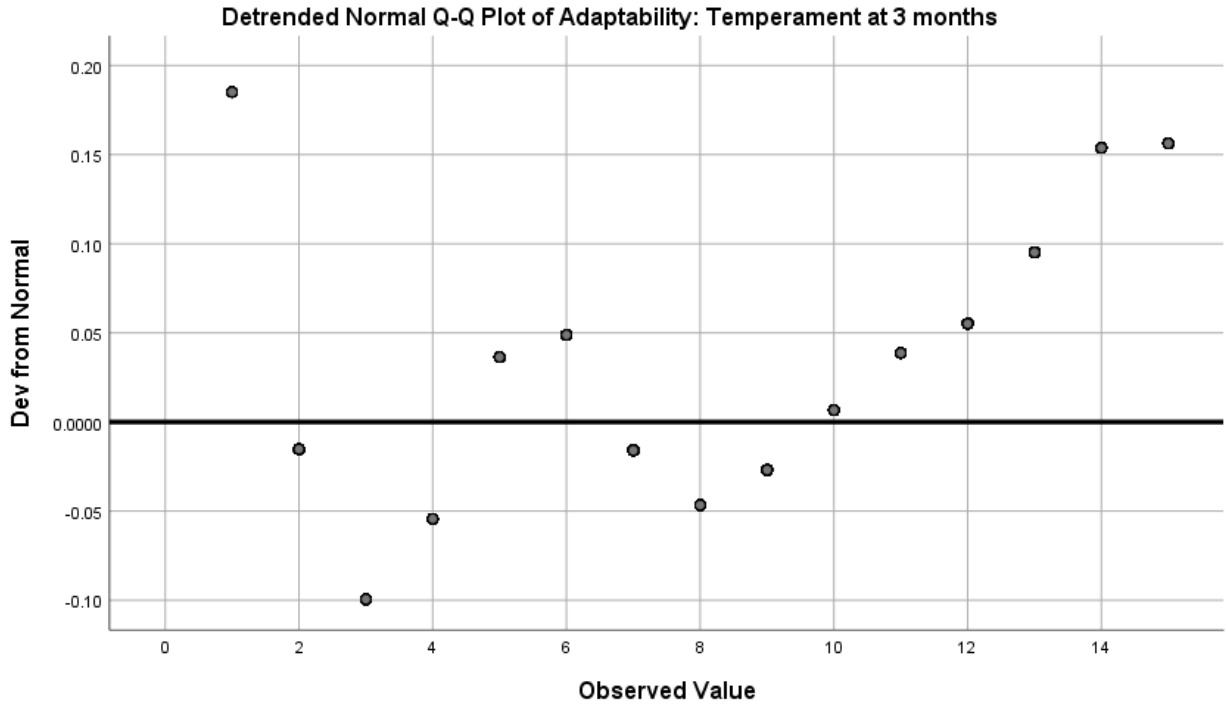
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

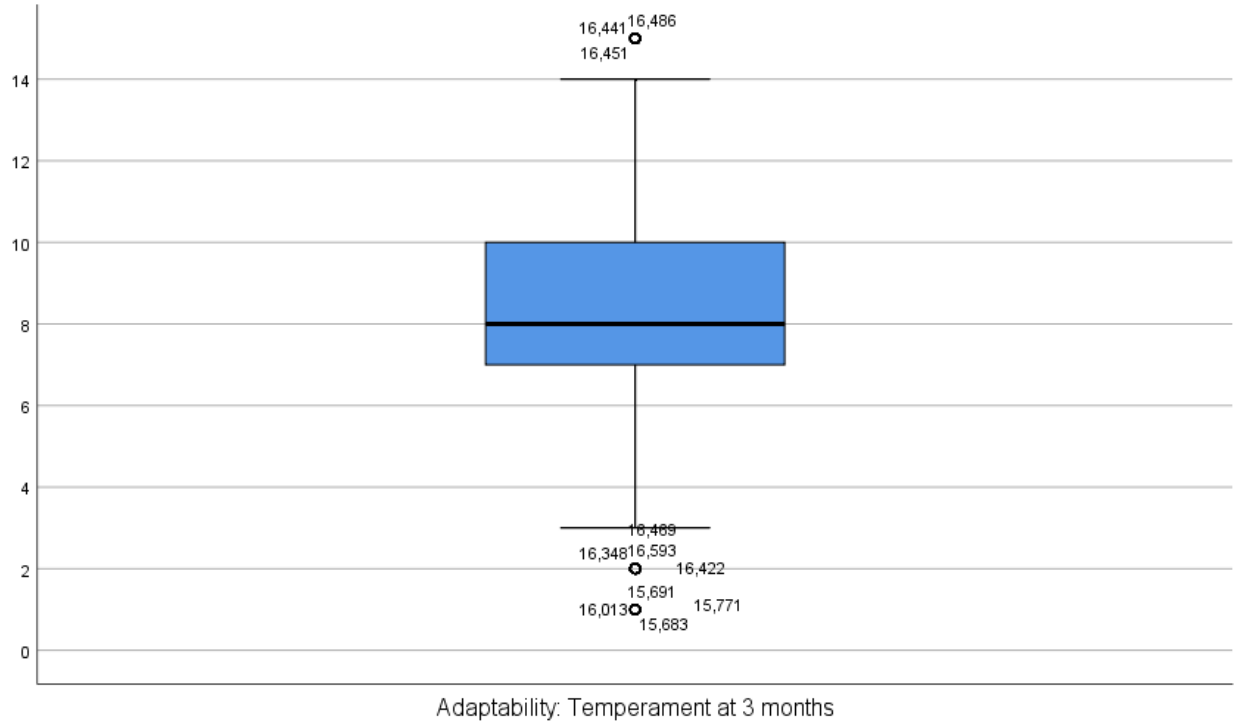
Histogram, Q-Q plots and box plots for the predictor variable adaptability prior to transformation.



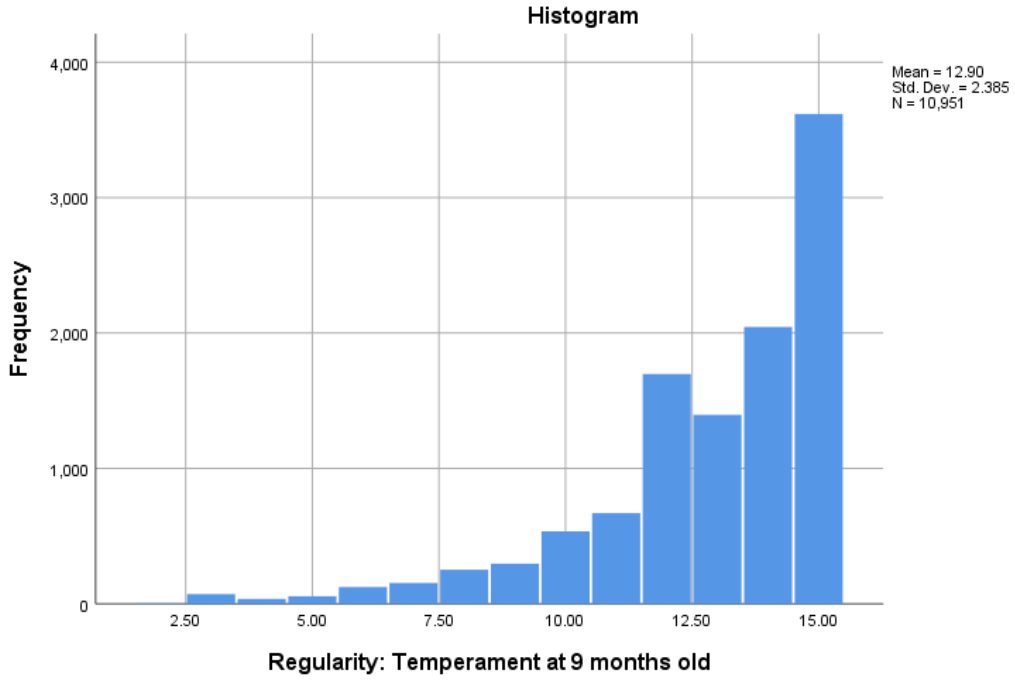


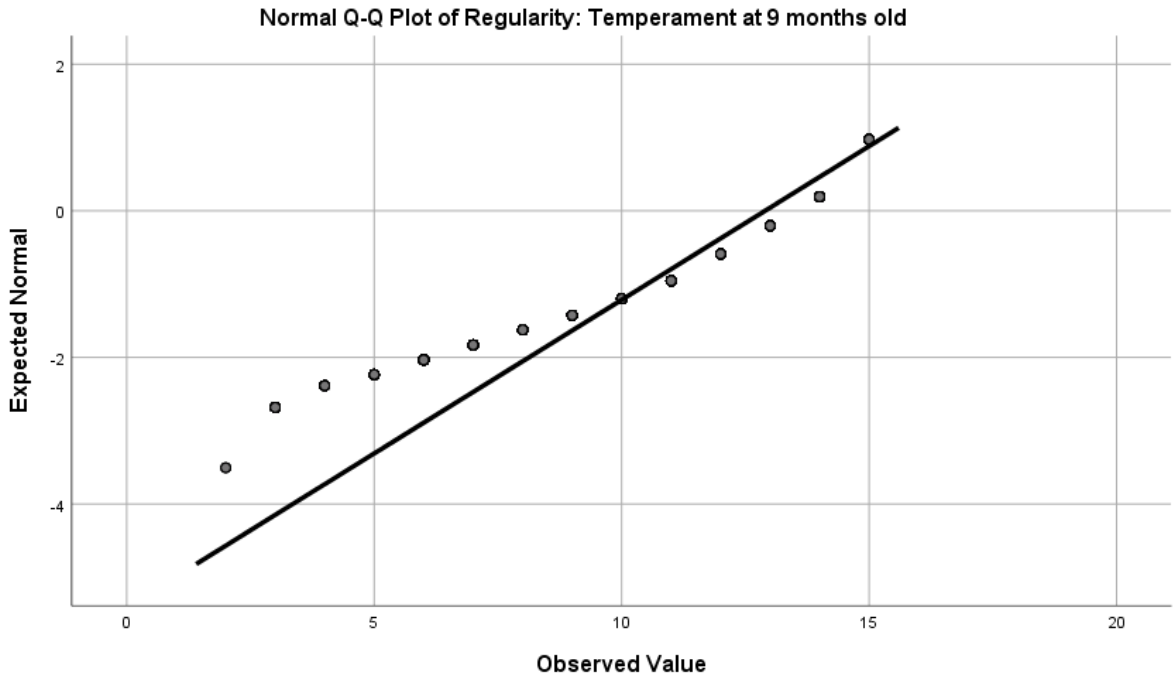
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

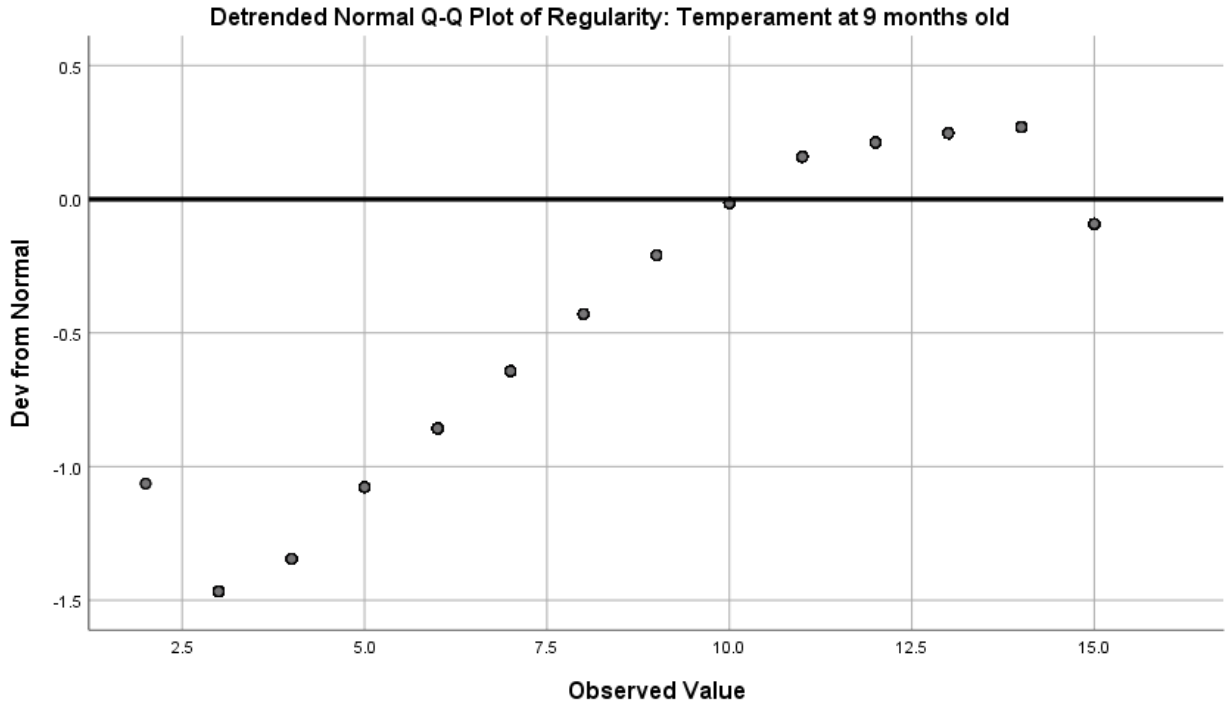


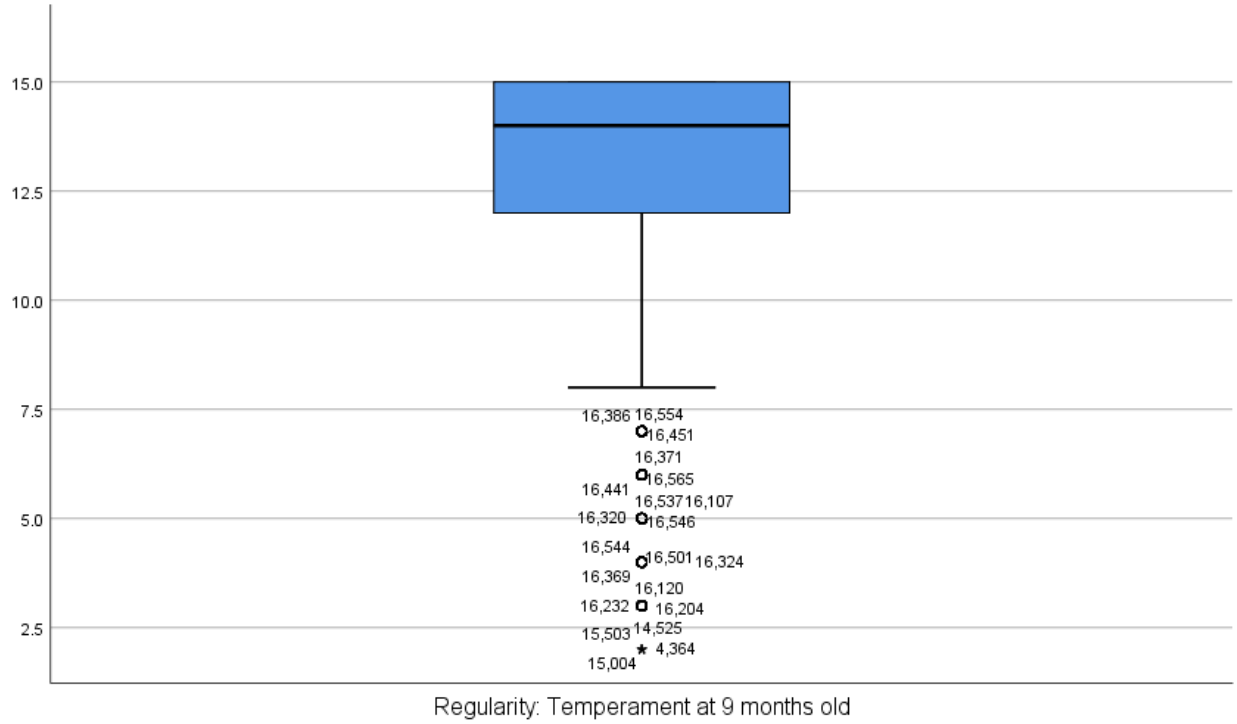


Histogram, Q-Q plots and box plots for the predictor variable regularity prior to transformation.



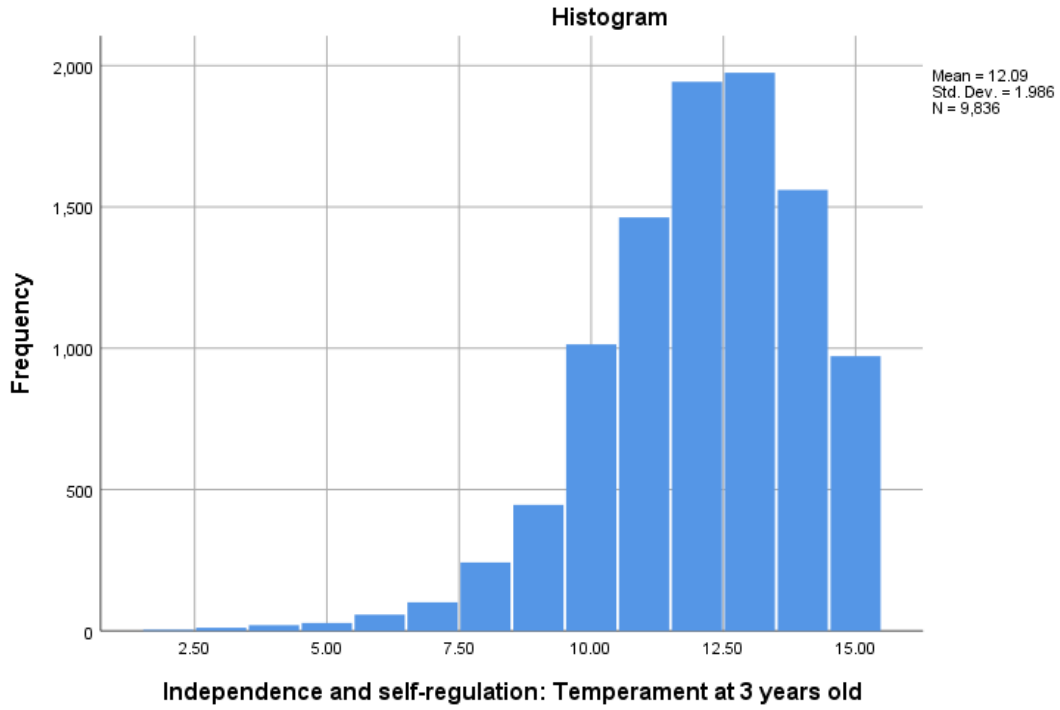



Detrended Normal Q-Q Plot of Regularity: Temperament at 9 months old
Dev from Normal
0.5
0.0
-0.5
-1.0
-1.5
2.5
5.0
7.5
10.0
12.5
15.0
Observed Value

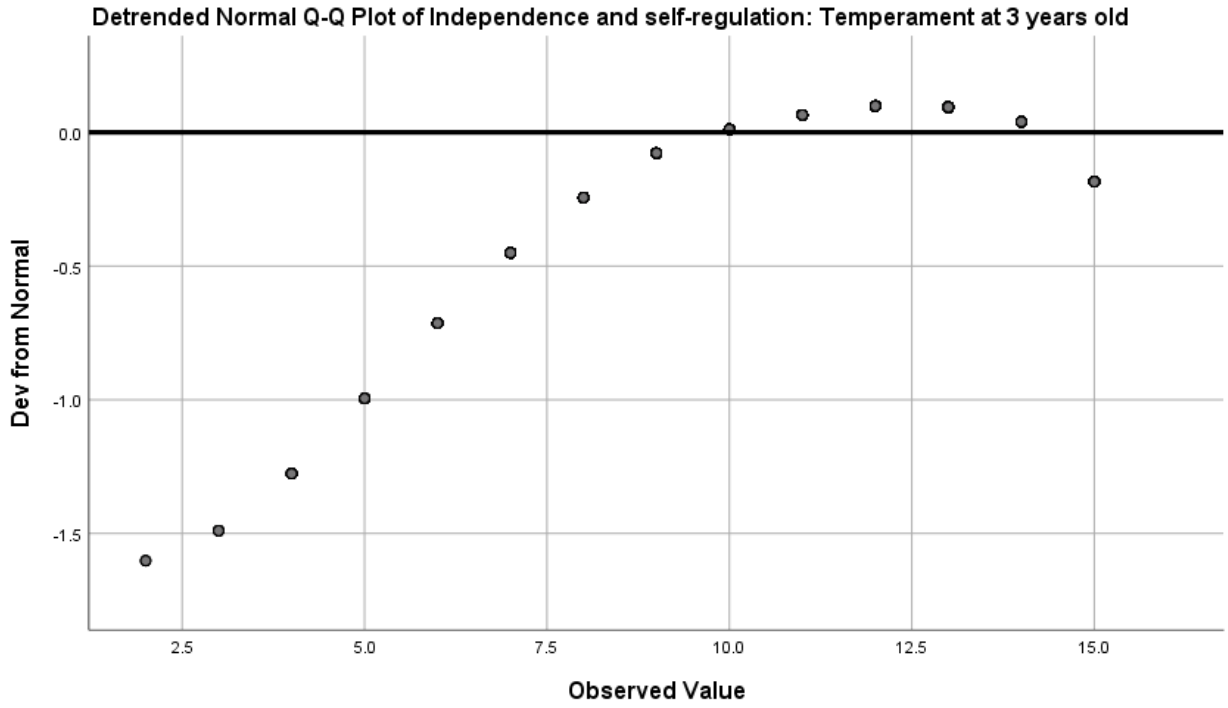

15.0
12.5
10.0
7.5
5.0
2.5
16,386
16,554
16,451
16,371
16,565
16,441
16,537
16,107
16,320
16,546
16,544
16,501
16,324
16,369
16,120
16,232
16,204
15,503
14,525
4,364
15,004
Regularity: Temperament at 9 months old

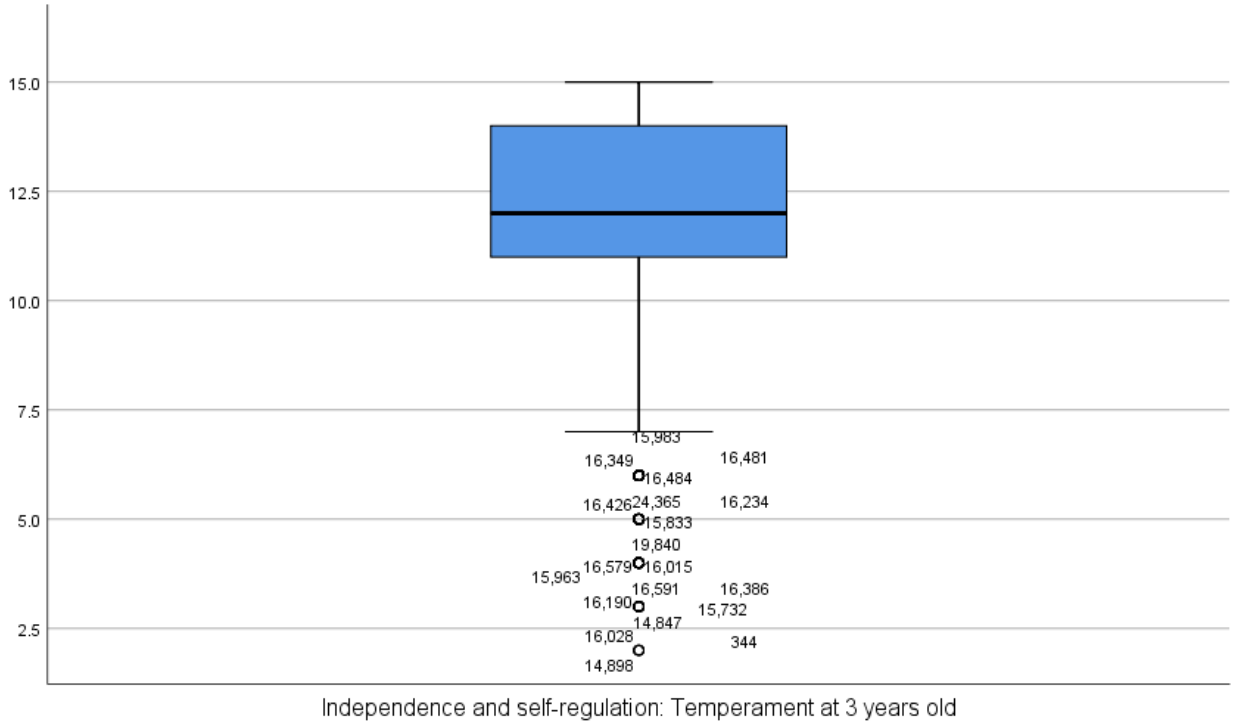
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Histogram, Q-Q plots, and box plots for the predictor variable independence/self-regulation prior to transformation.

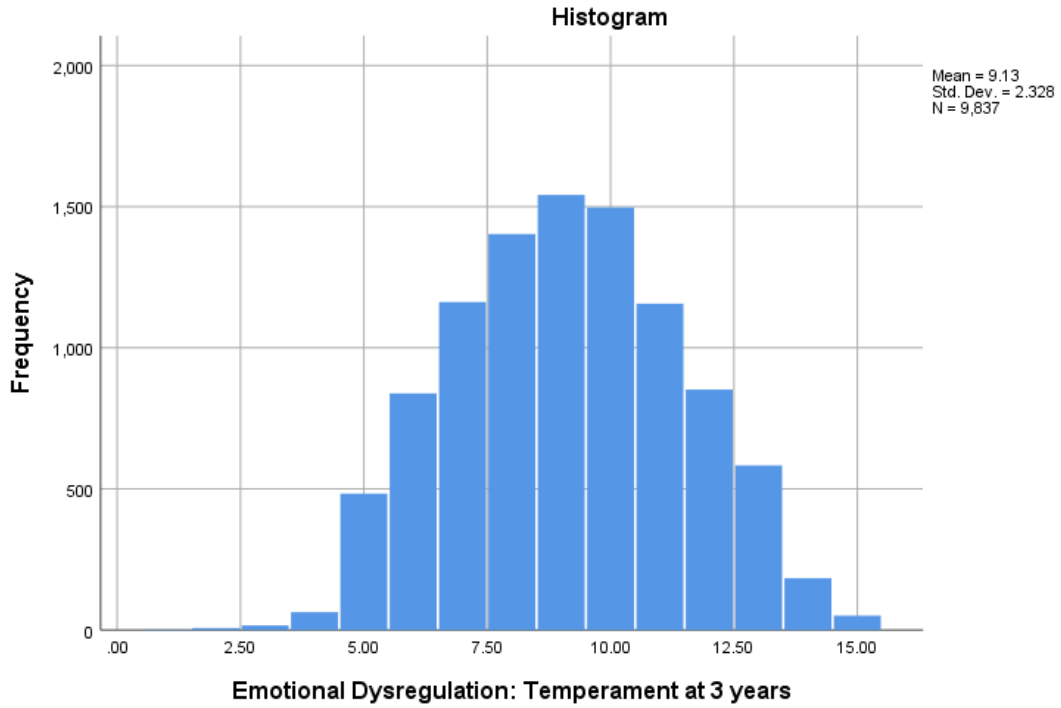


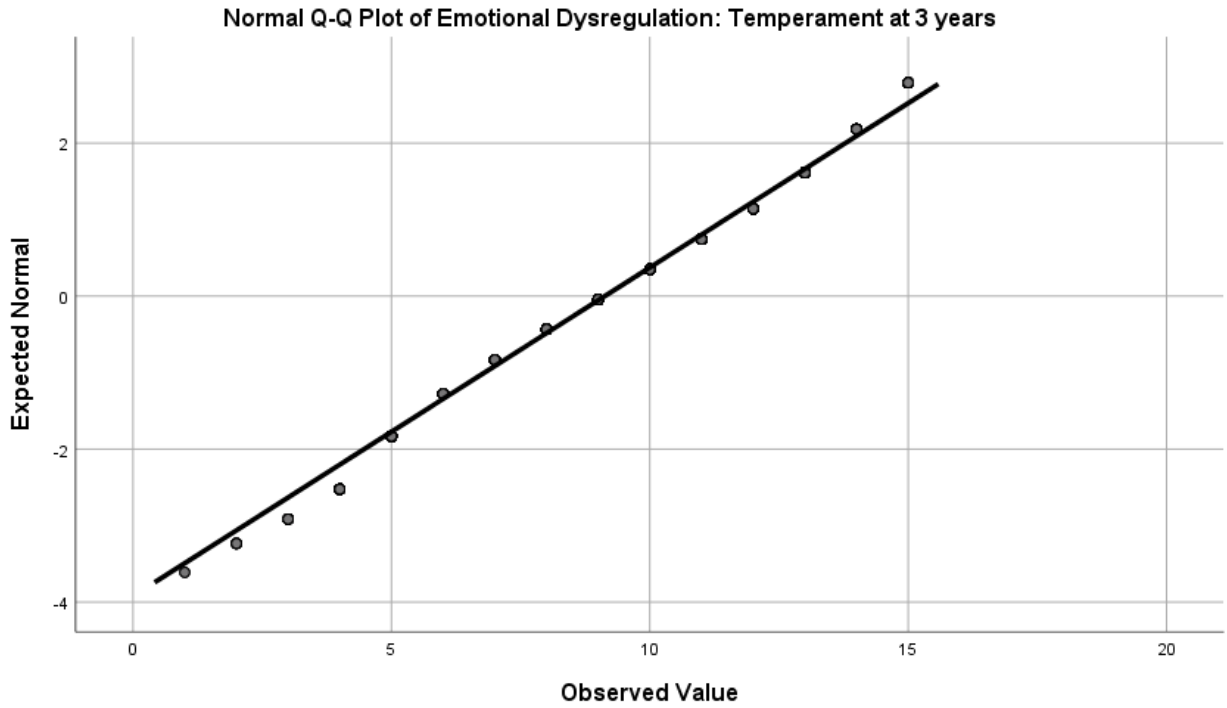
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



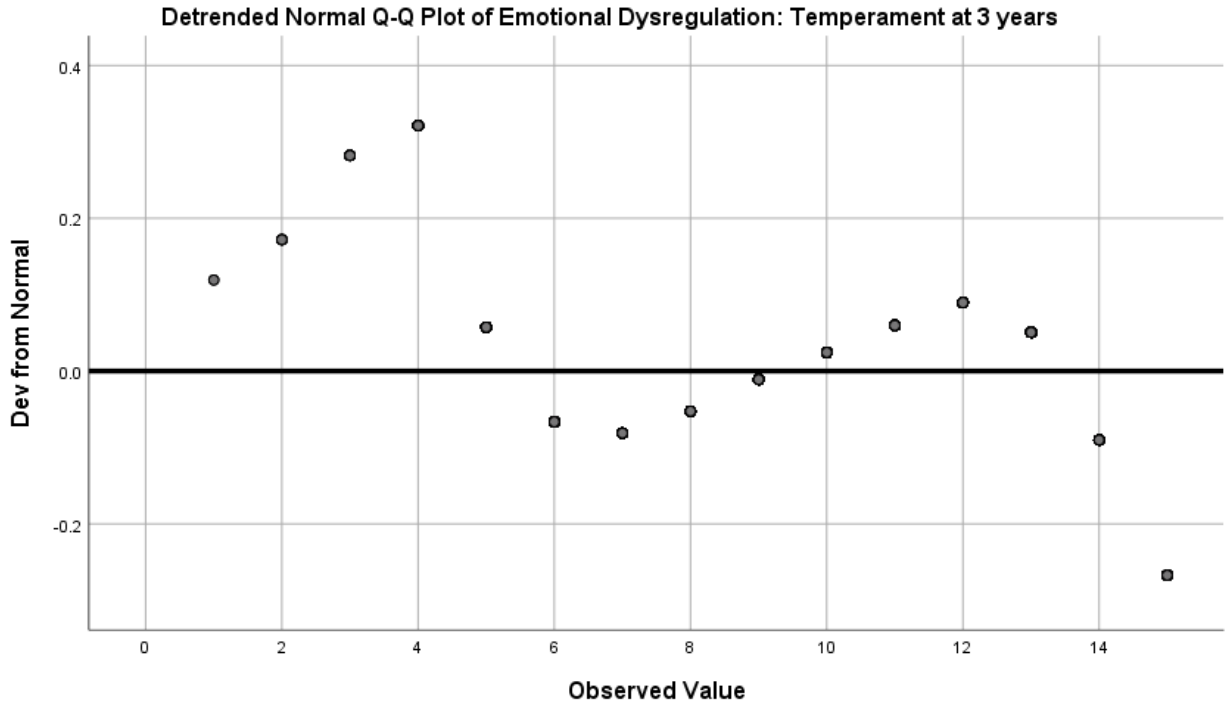


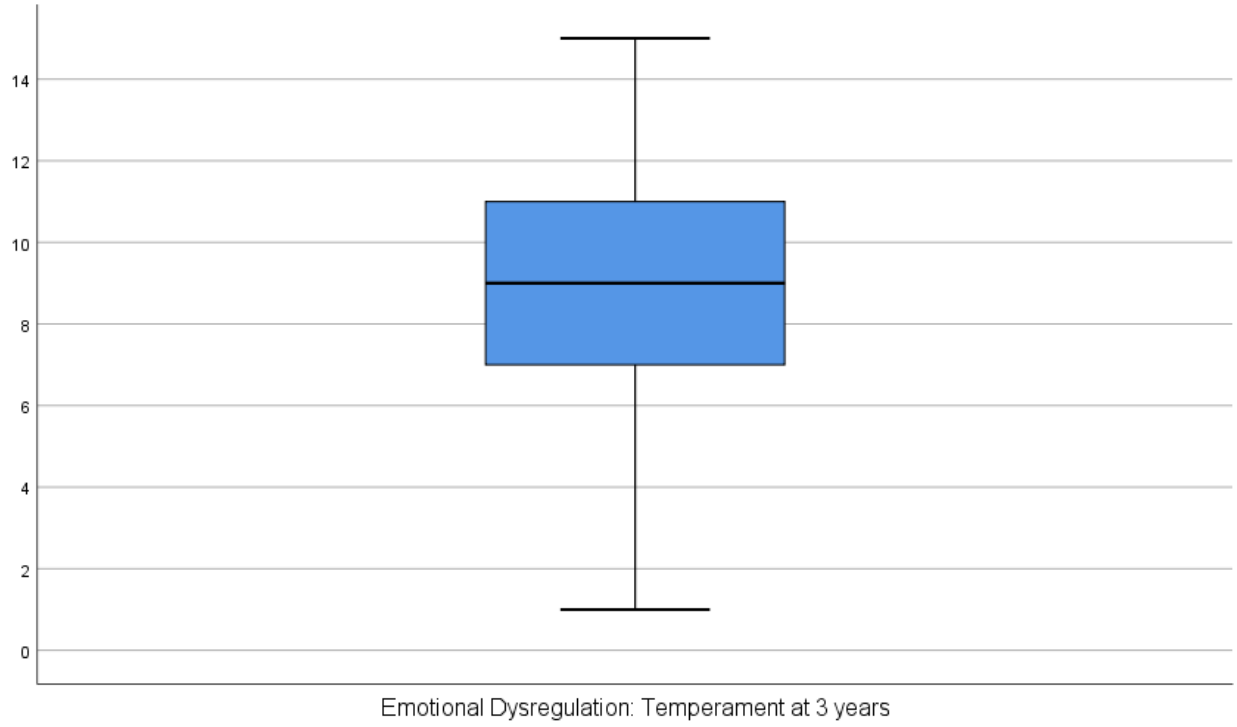
Histogram, Q-Q plots, and box plots for the predictor variable emotional dysregulation prior to transformation.





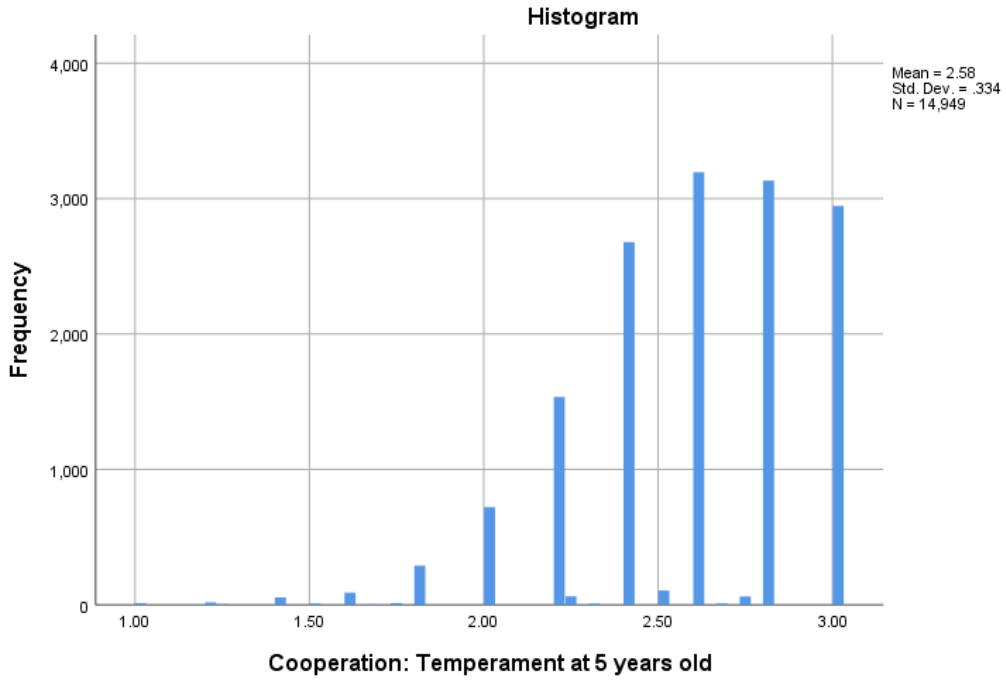
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

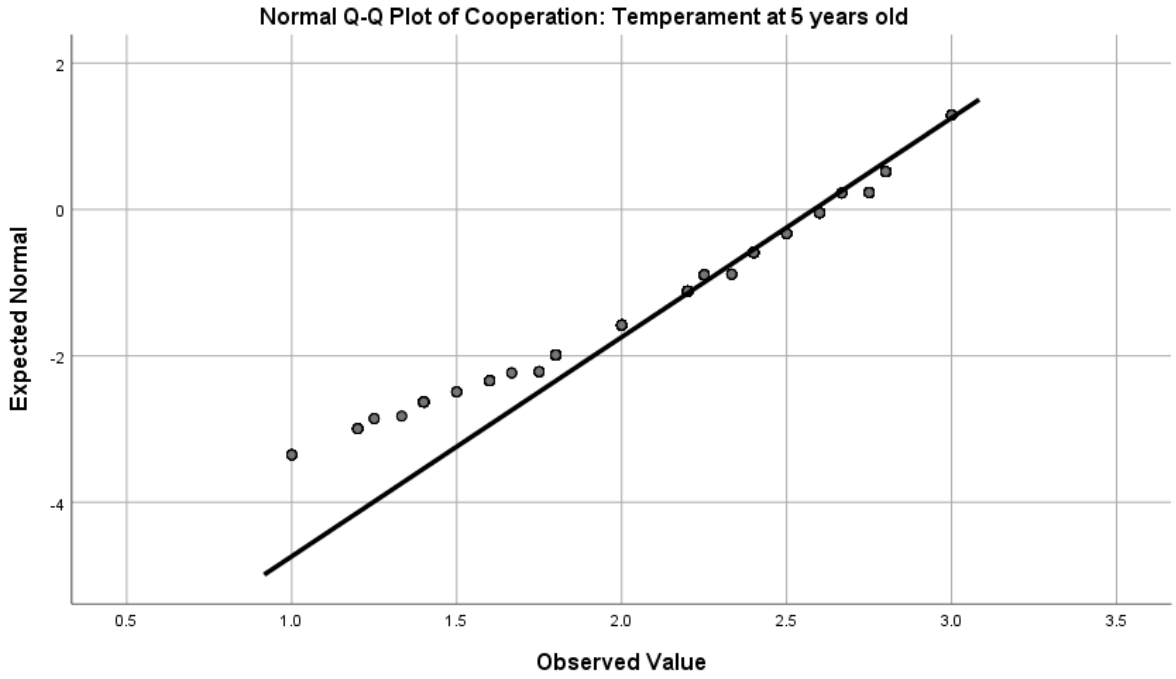


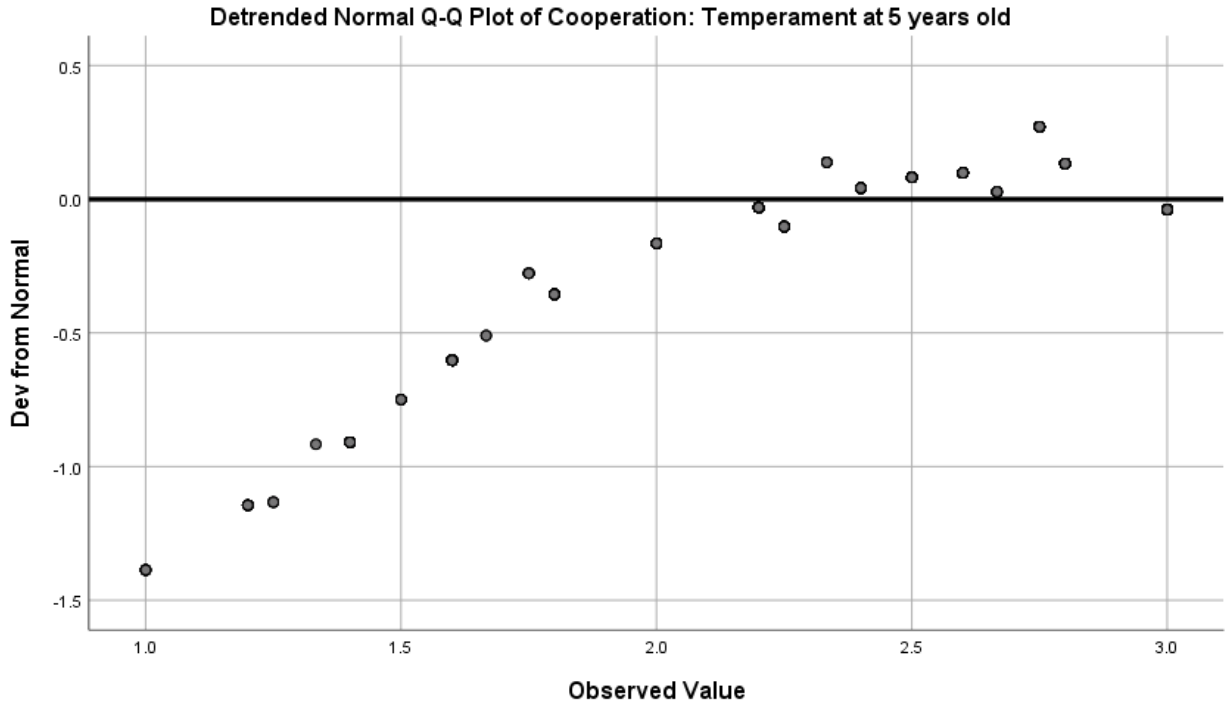


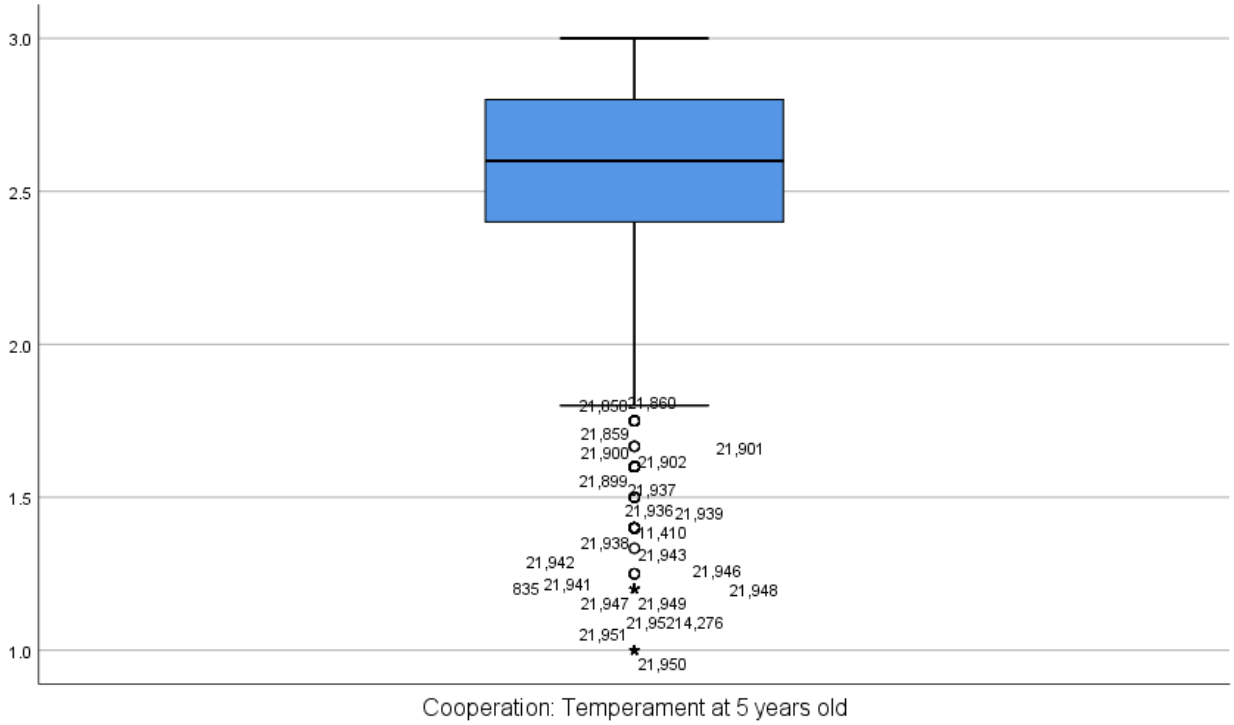
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Histogram, Q-Q plots and box plots for the predictor variable cooperation prior to transformation.



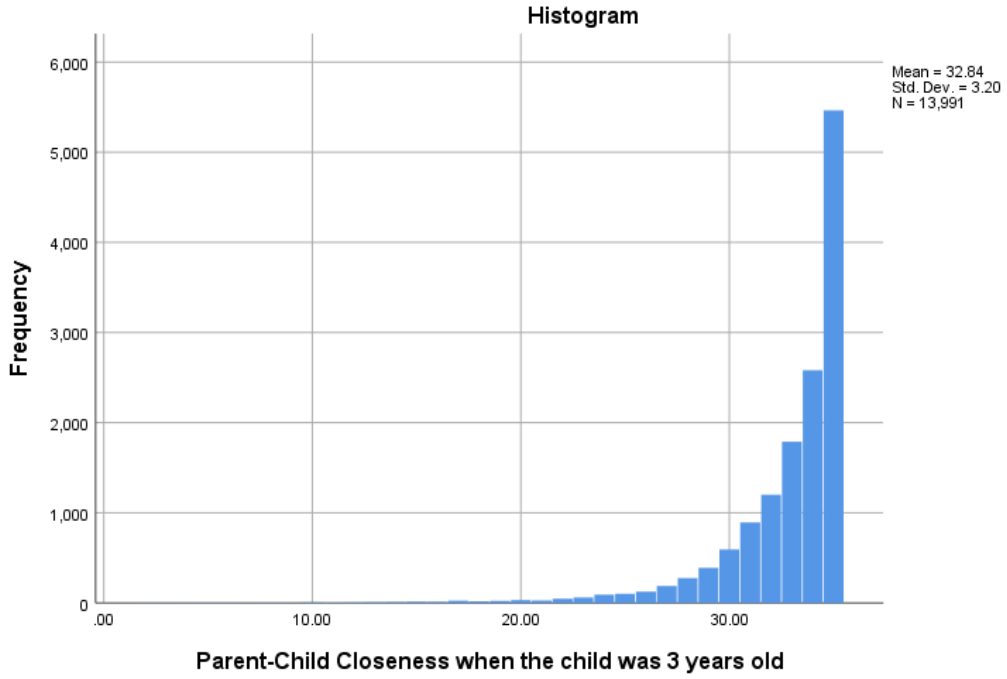


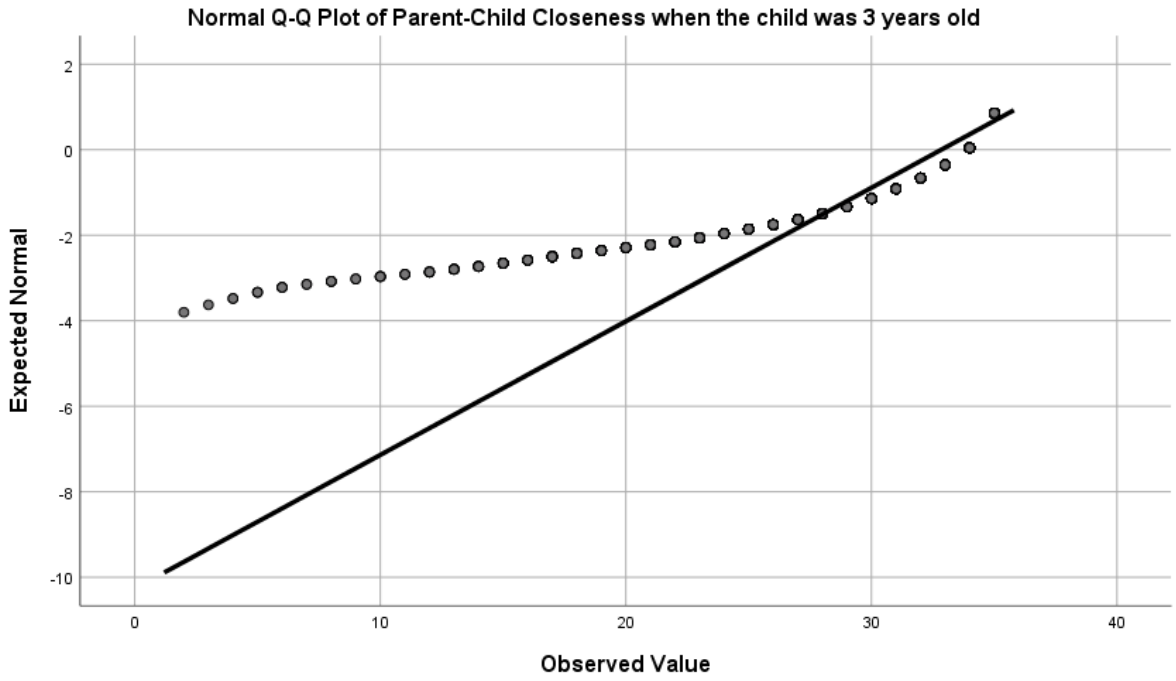

Detrended Normal Q-Q Plot of Cooperation: Temperament at 5 years old
Dev from Normal
0.5
0.0
-0.5
-1.0
-1.5
1.0
1.5
2.0
2.5
3.0
Observed Value

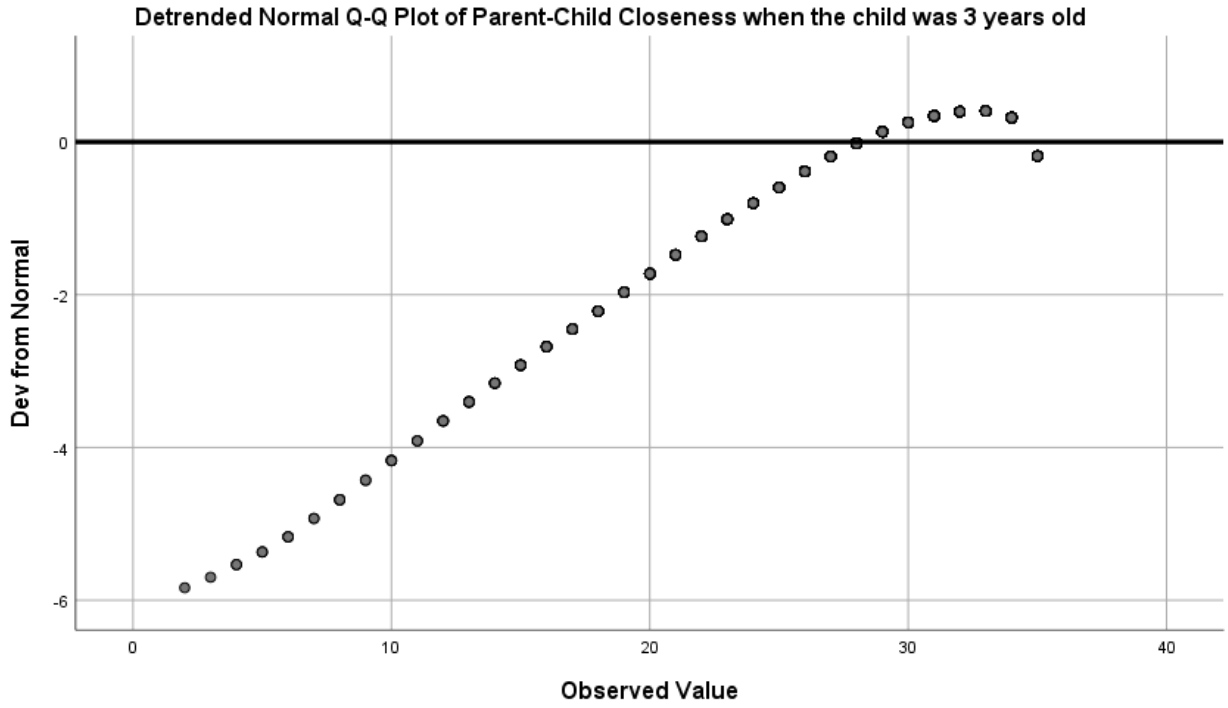

3.0
2.5
2.0
1.5
1.0
21,858
21,860
21,859
21,900
21,901
21,902
21,899
21,937
21,936
21,939
11,410
21,938
21,943
21,942
21,946
835
21,941
21,948
21,947
21,949
21,952
14,276
21,951
21,950
Cooperation: Temperament at 5 years old

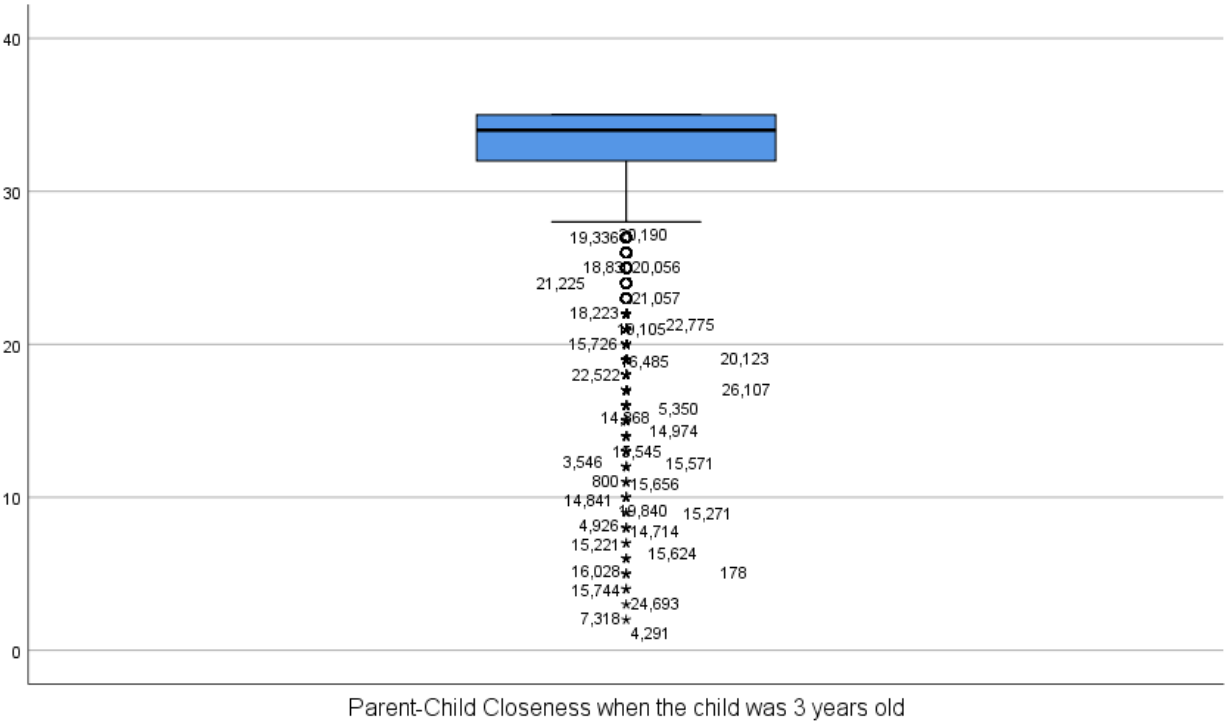
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Histogram, Q-Q plots and box plots for the predictor variable parent-child closeness prior to transformation.

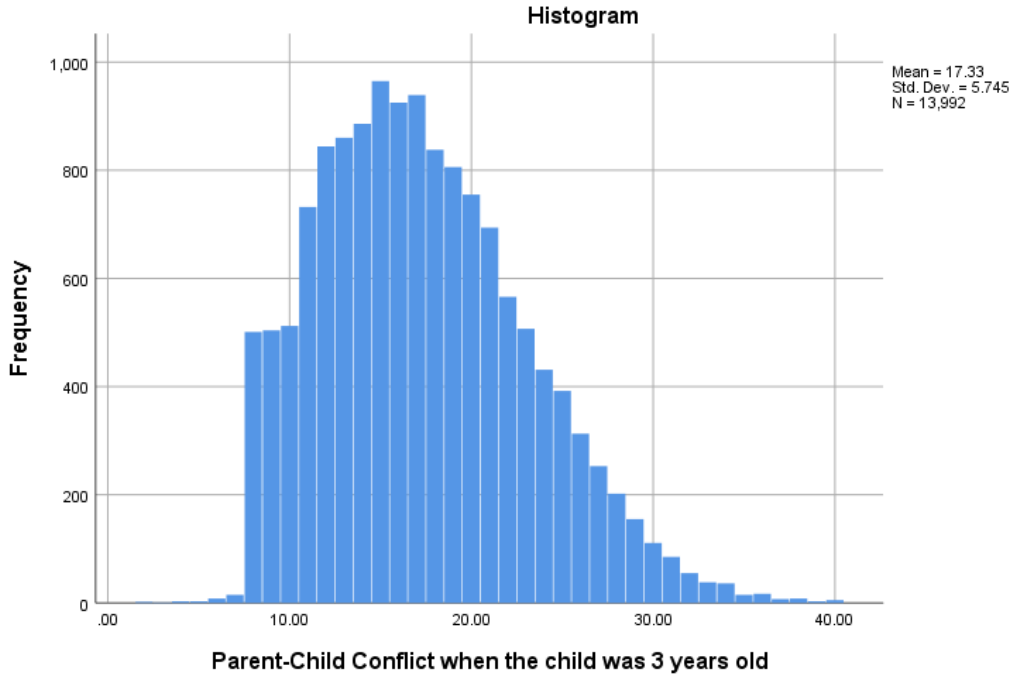




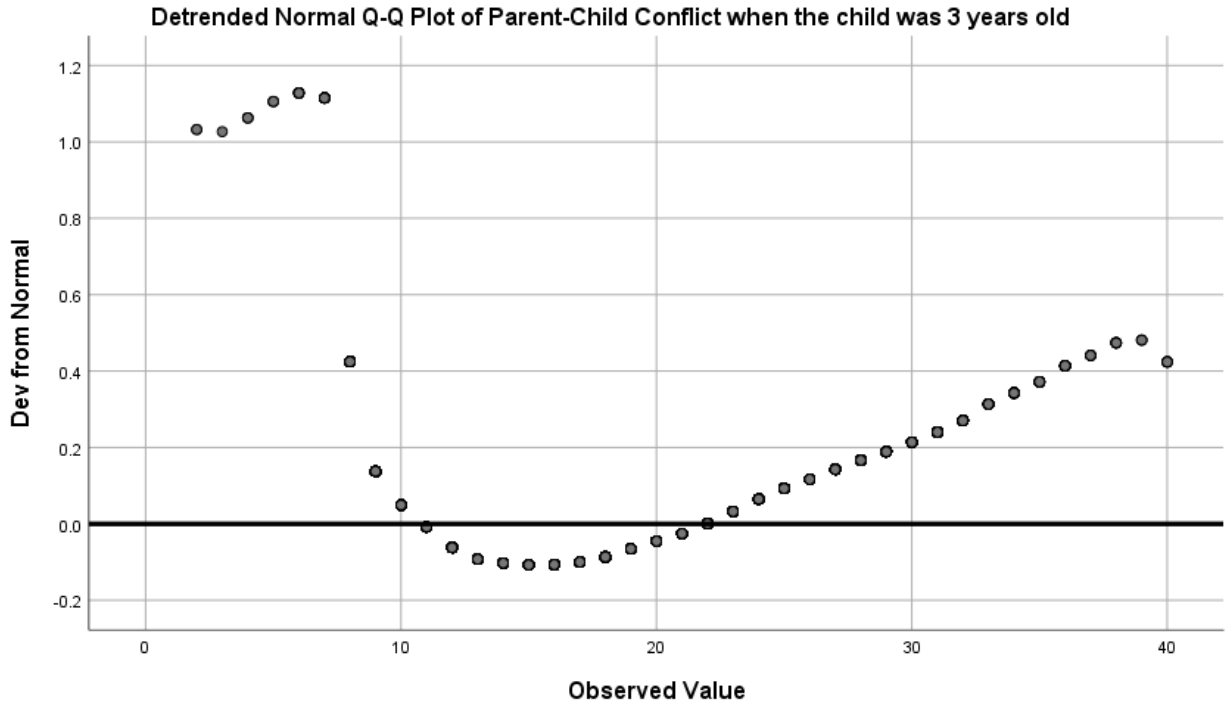

Detrended Normal Q-Q Plot of Parent-Child Closeness when the child was 3 years old
Dev from Normal
0
-2
-4
-6
0
10
20
30
40
Observed Value

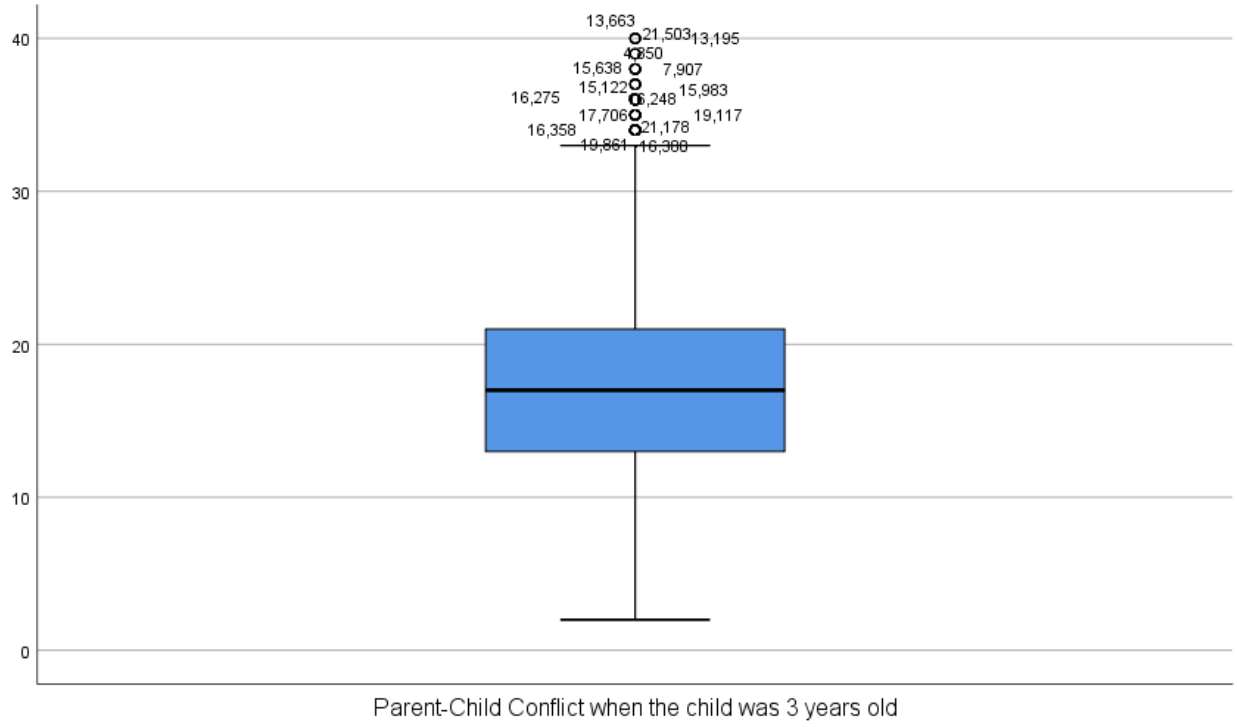

40
30
20
10
0
19,336
20,190
18,83
20,056
21,225
21,057
18,223
22,775
15,726
20,123
22,522
26,107
5,350
14,974
3,546
15,571
800
15,656
14,841
15,271
4,926
14,714
15,221
15,624
16,028
178
15,744
24,693
7,318
4,291
Parent-Child Closeness when the child was 3 years old

Histogram, Q-Q plots and box plots for the predictor variable parent-child conflict prior to transformation.

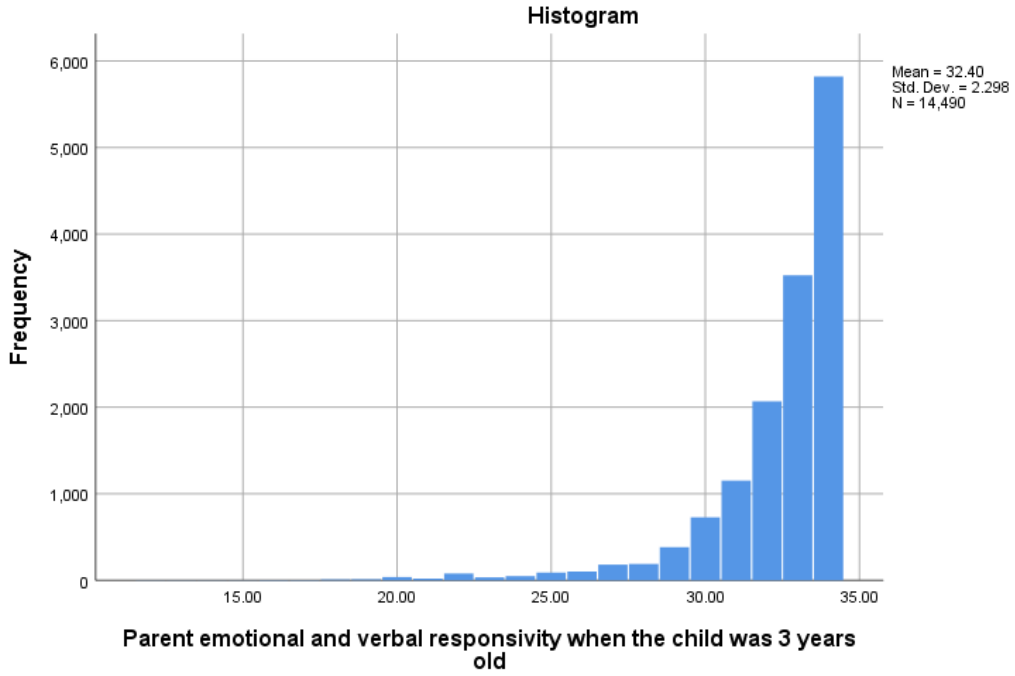


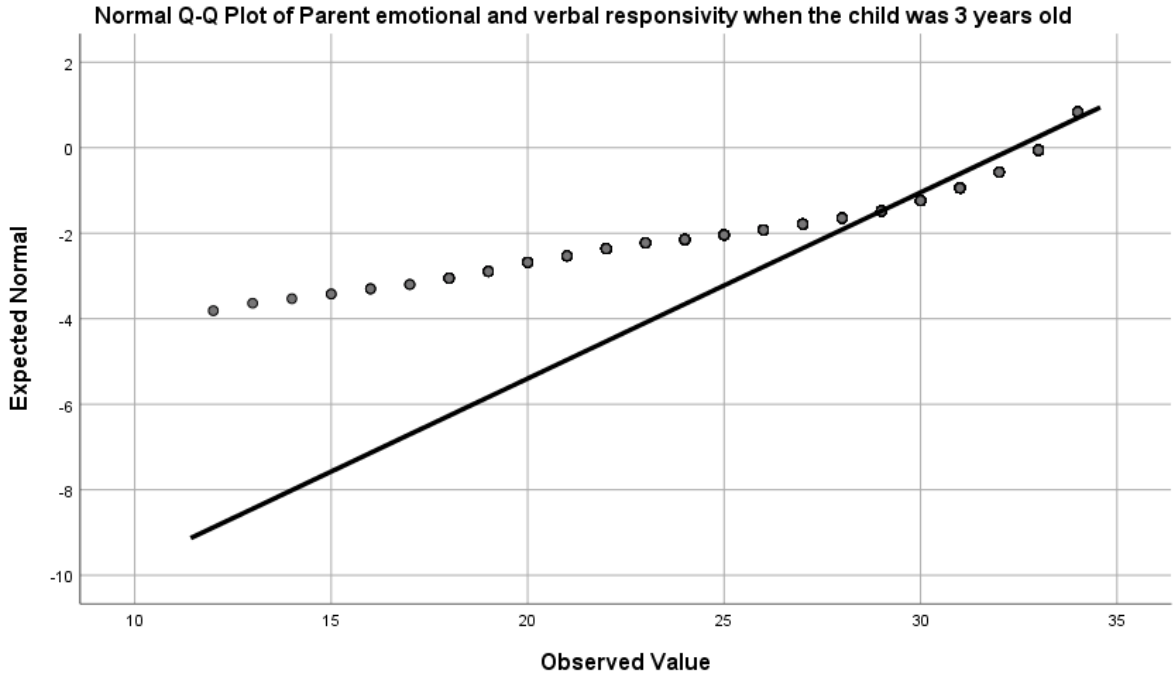
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

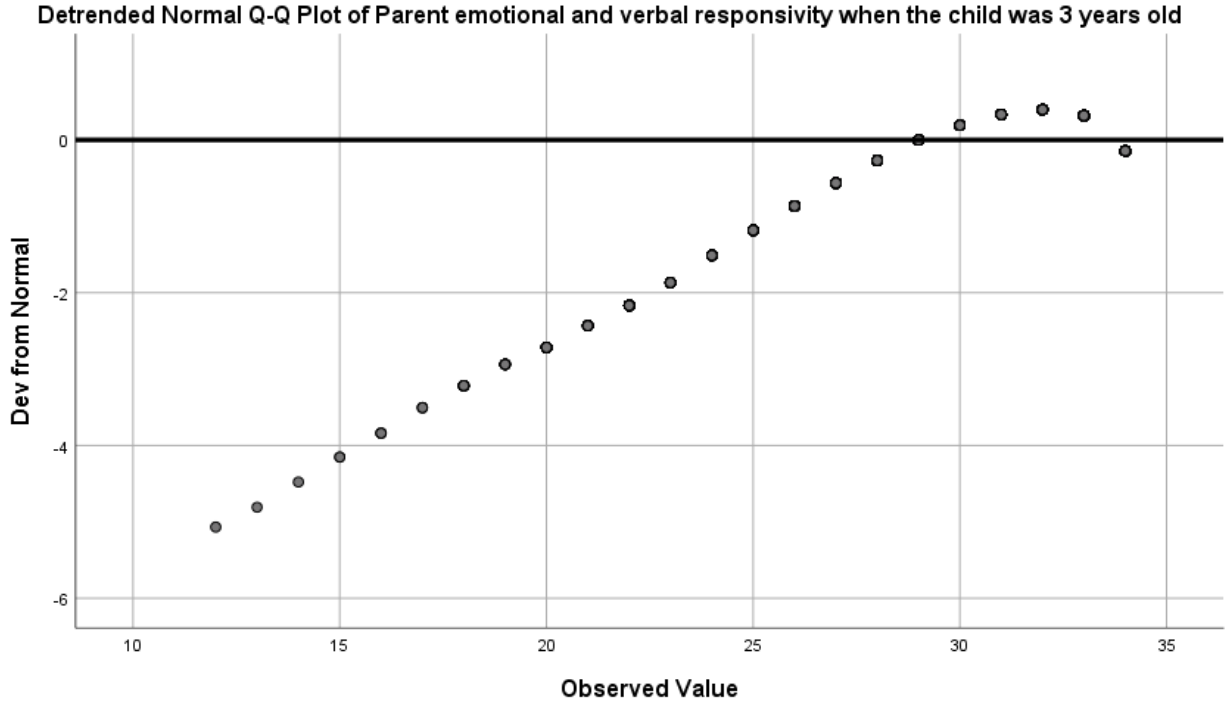


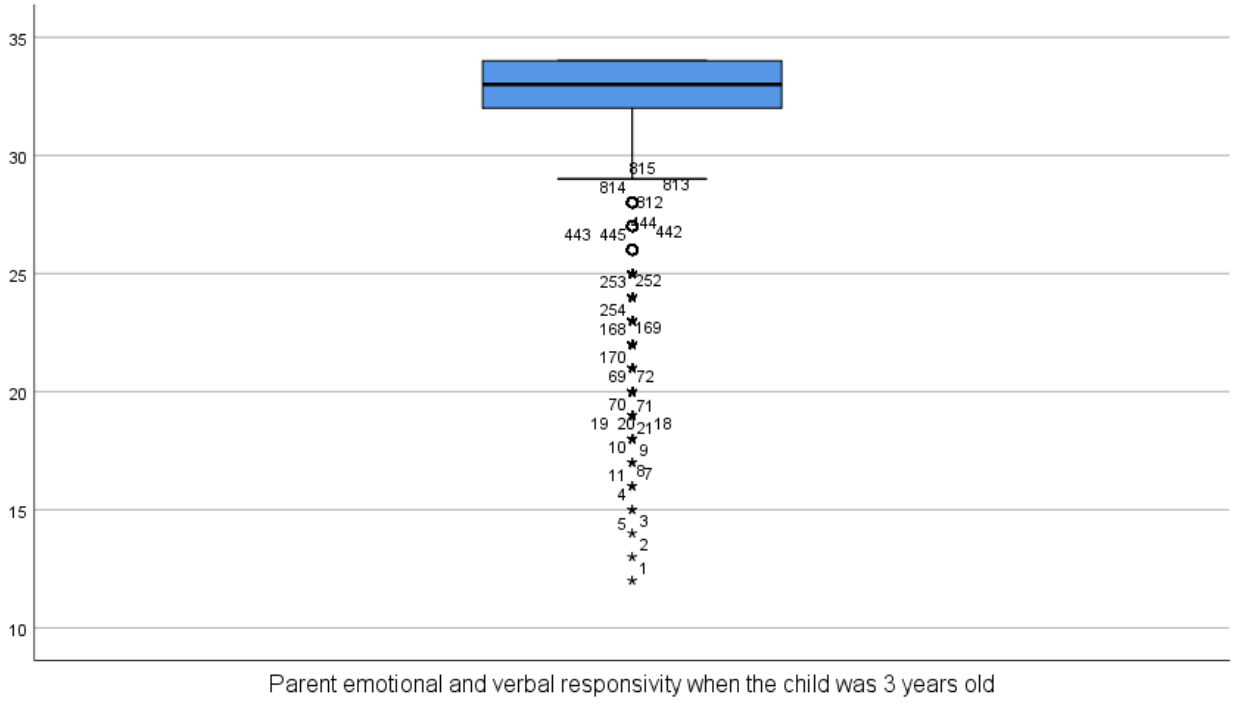


Histogram, Q-Q plots and box plots for the predictor variable parent emotional/verbal responsivity prior to transformation.



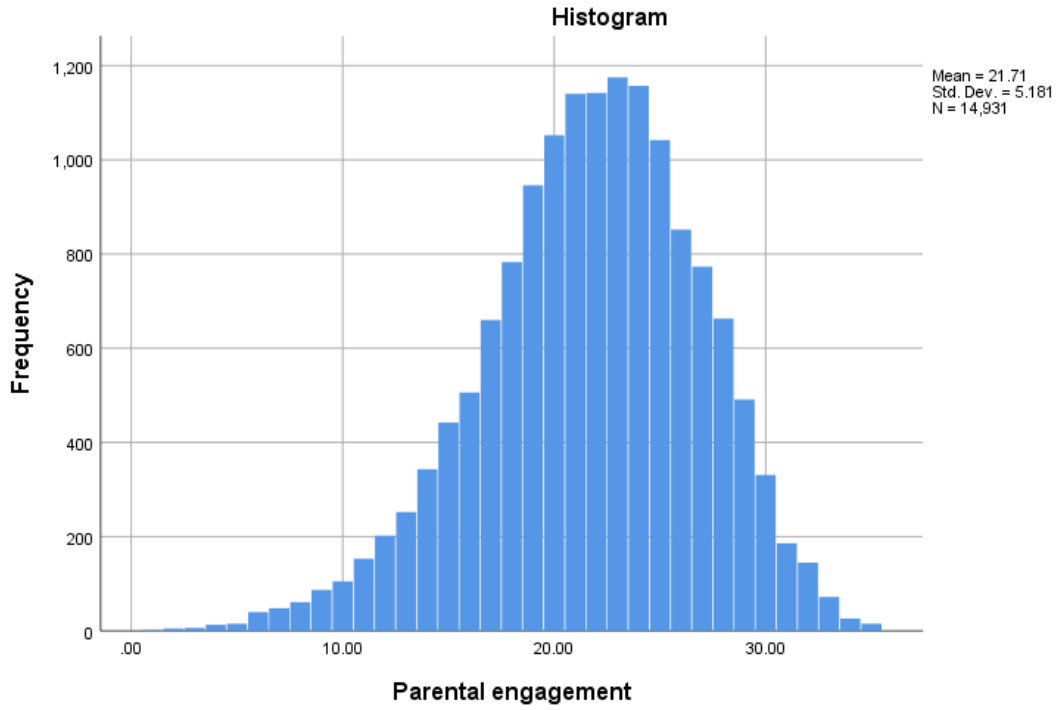


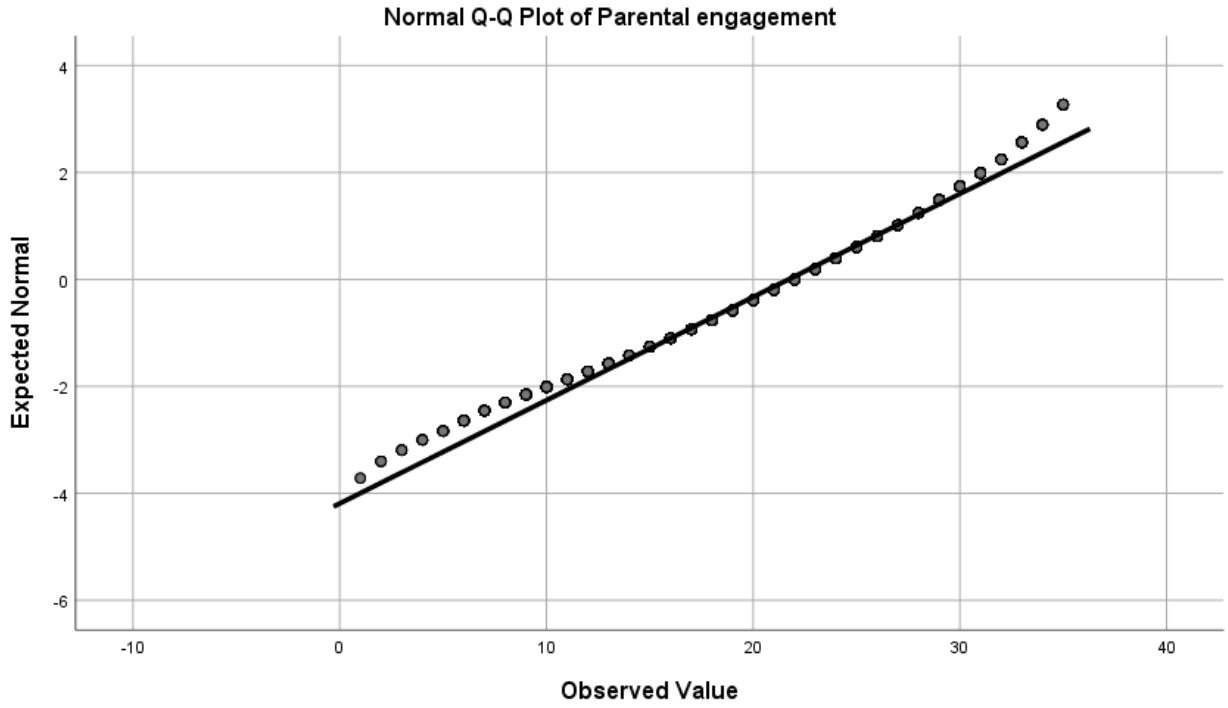

Detrended Normal Q-Q Plot of Parent emotional and verbal responsivity when the child was 3 years old
Dev from Normal
0
-2
-4
-6
10
15
20
25
30
35
Observed Value


35
30
25
20
15
10
815
814
813
812
444
443
445
442
253
252
254
168
169
170
69
72
70
71
19
20
21
18
10
9
11
8
7
4
5
3
2
1
Parent emotional and verbal responsivity when the child was 3 years old

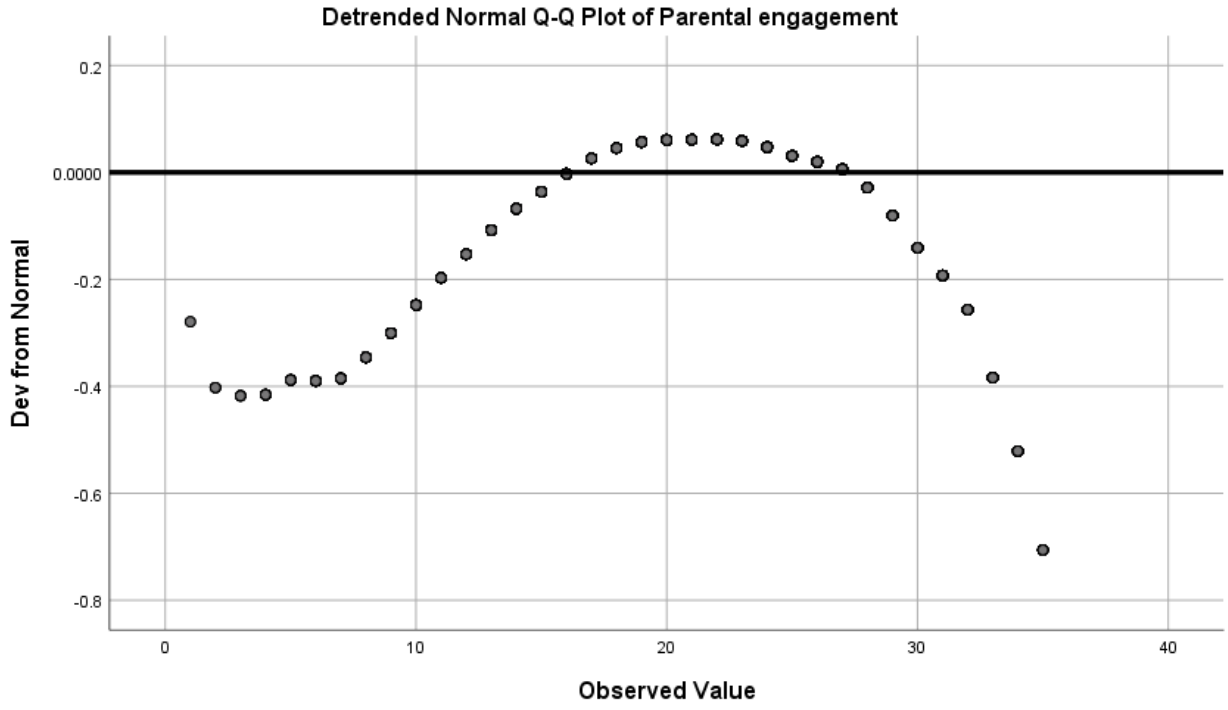
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

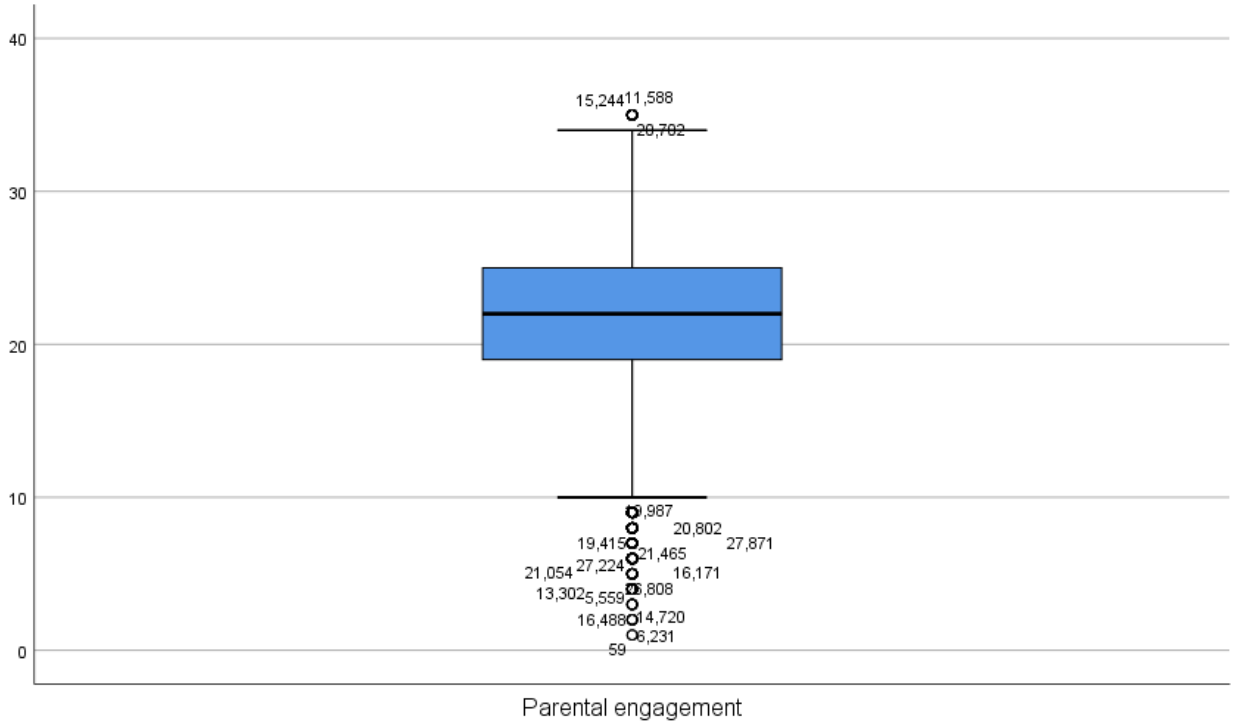
Histogram, Q-Q plots, and box plots for the predictor variable parental engagement prior to transformation.





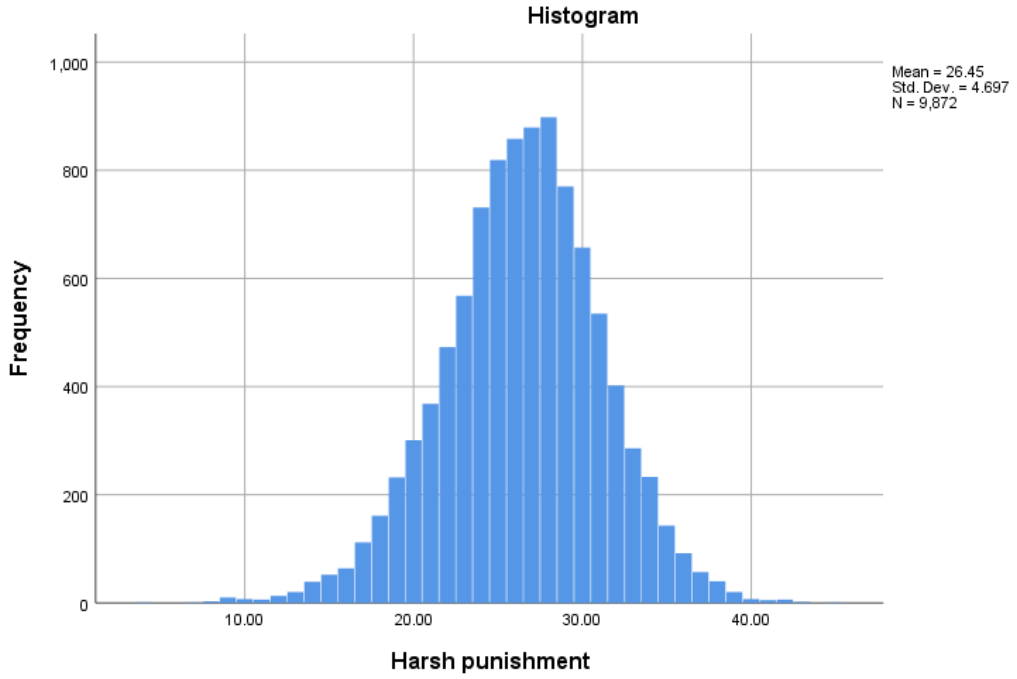
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

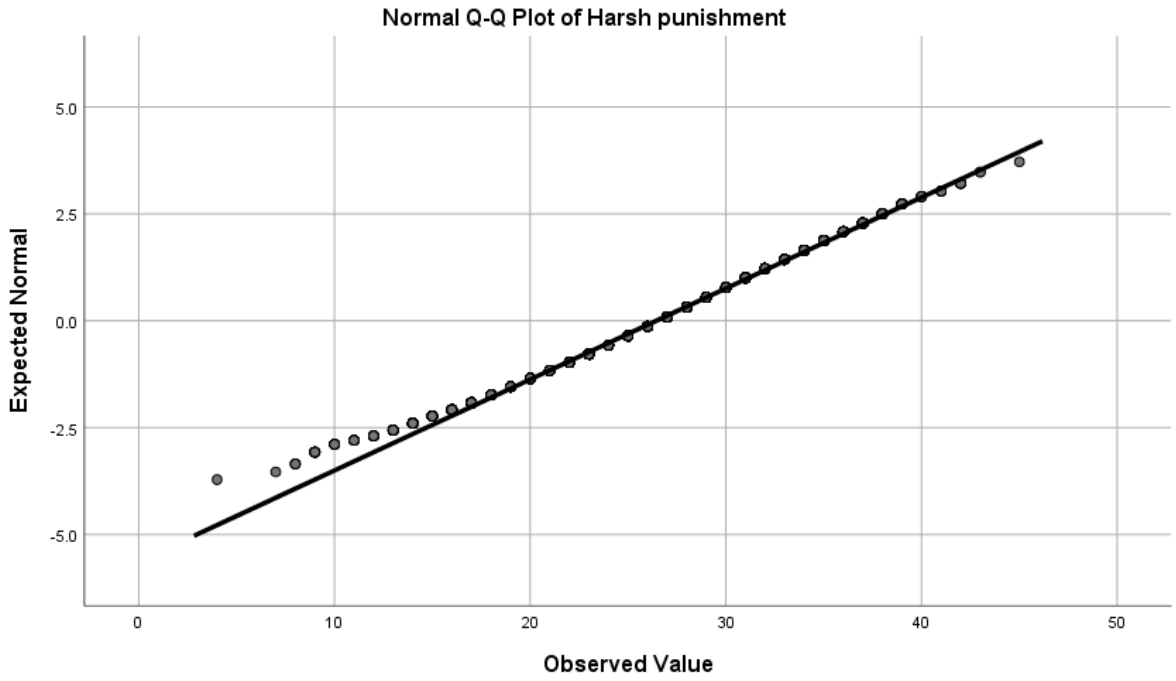


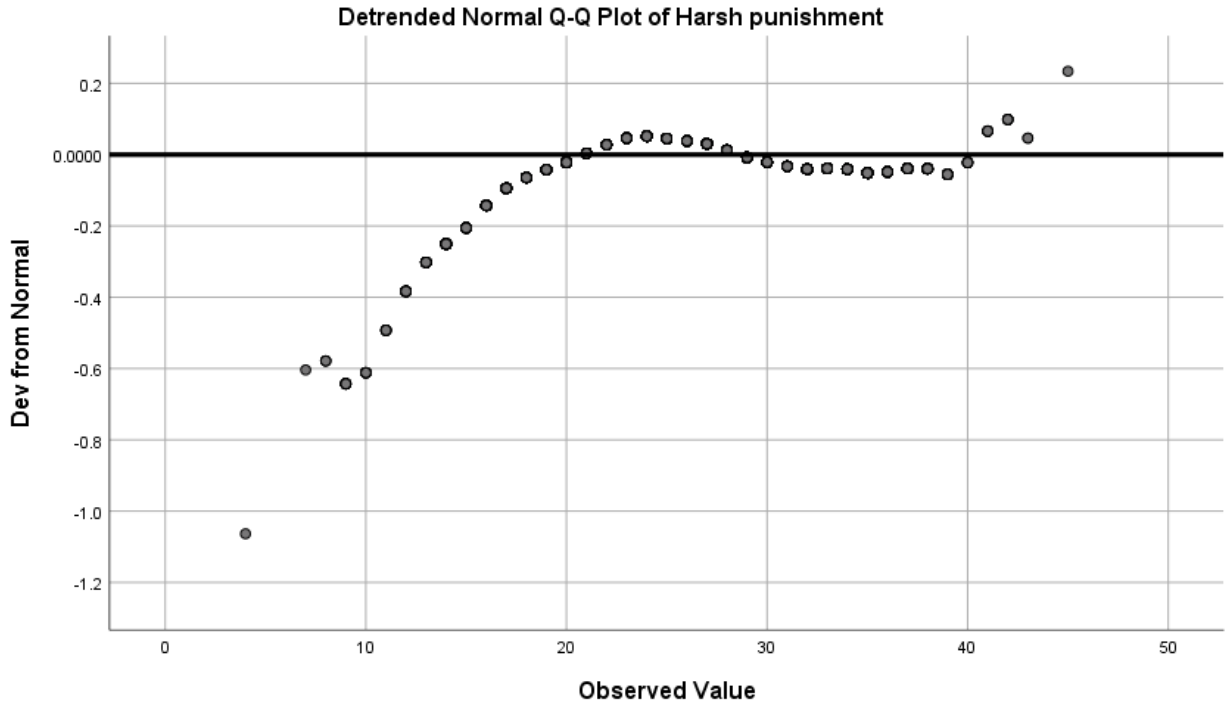


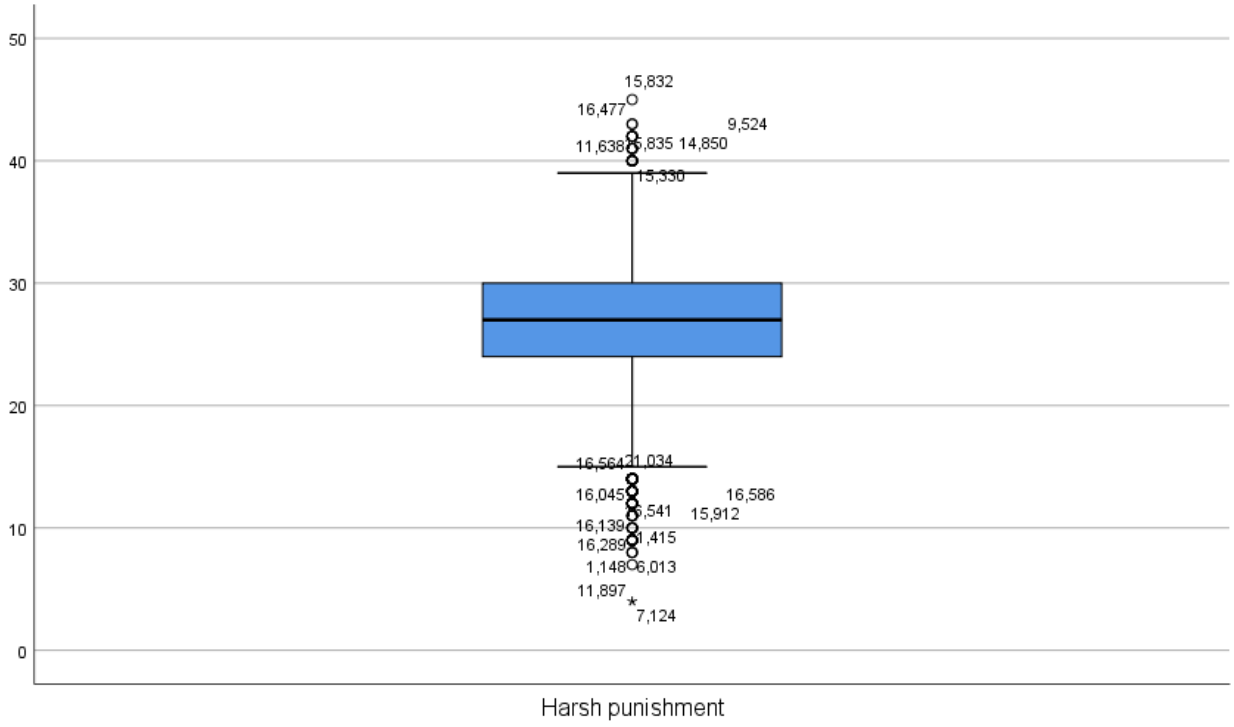
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Histogram, Q-Q plots and box plots for the predictor variable harsh punishment prior to transformation.



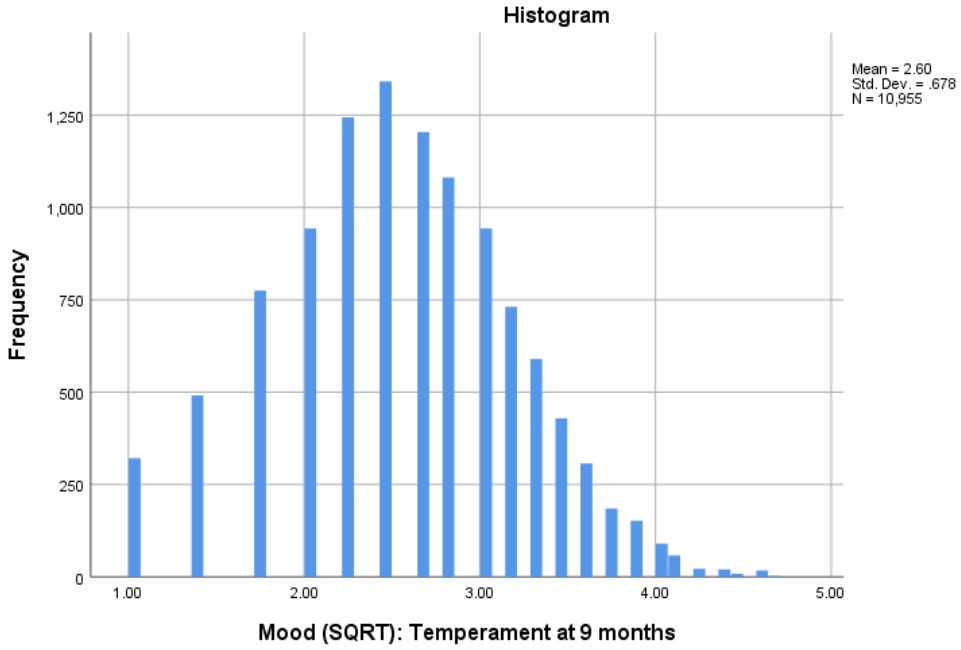


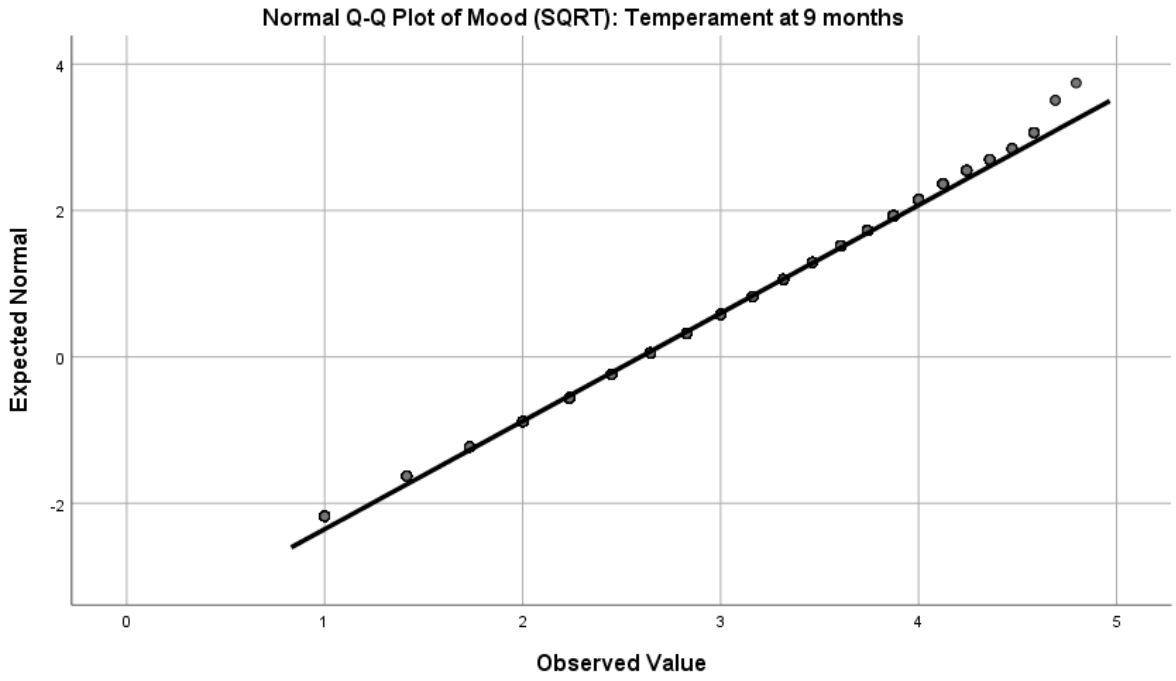

Detrended Normal Q-Q Plot of Harsh punishment
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
0
10
20
30
40
50
Observed Value

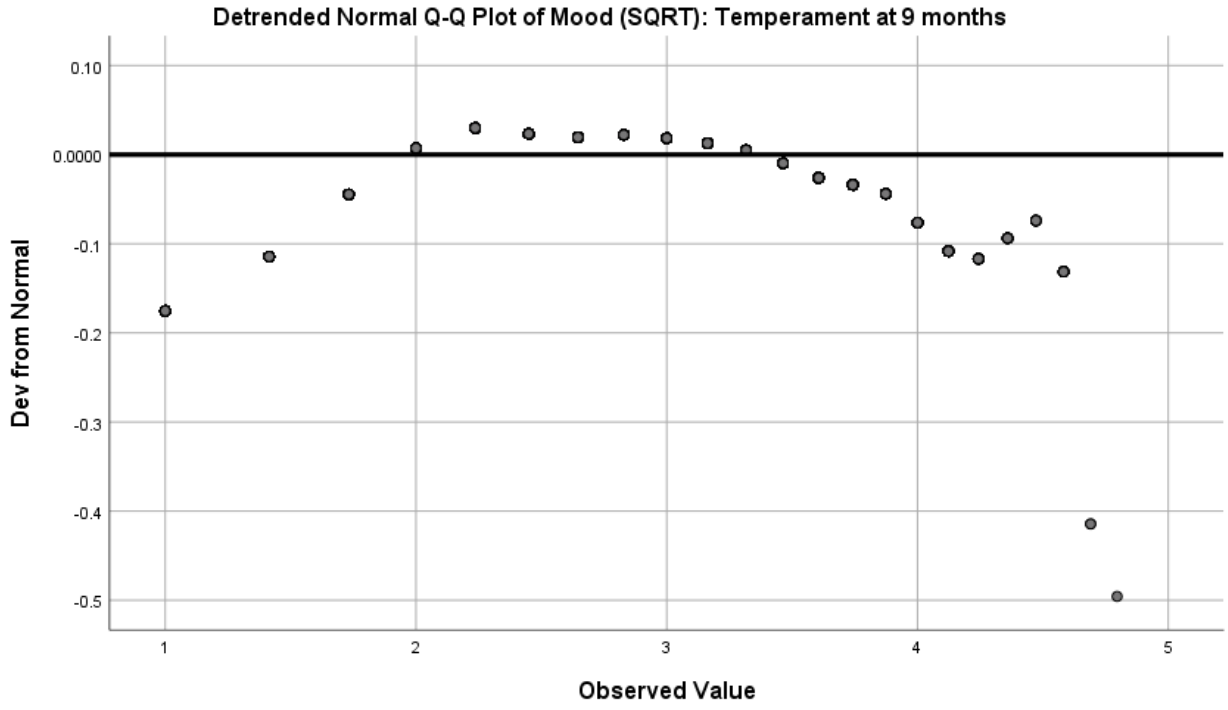

50
40
30
20
10
0
15,832
16,477
9,524
11,638
6,835
14,850
15,330
16,564
1,034
16,045
16,586
6,541
15,912
16,139
1,415
16,289
1,148
6,013
11,897
7,124
Harsh punishment

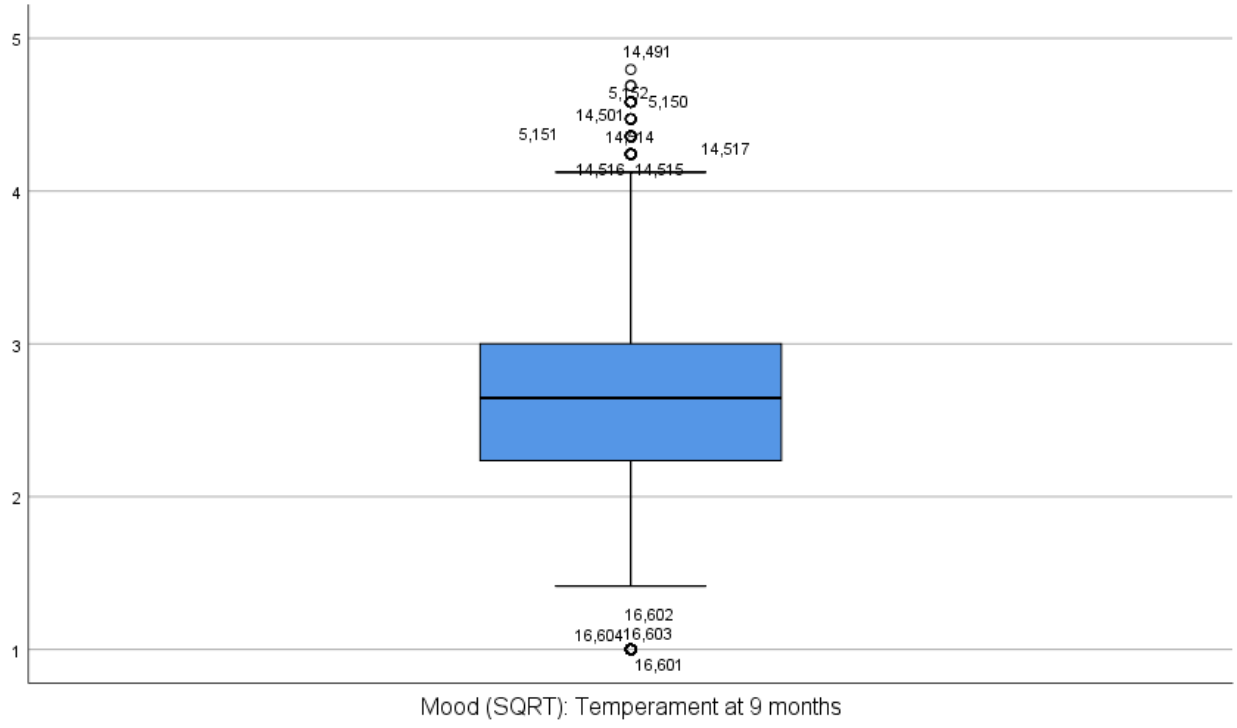
Appendix F. Histograms, Q-Q plots and box plots to test for the multinomial logistic regression predictor variables which had previously been skewed: after using log10 or square root to transform the variables.

Histogram, Q-Q plots and box plots for the predictor variable mood after transformation using SQRT.

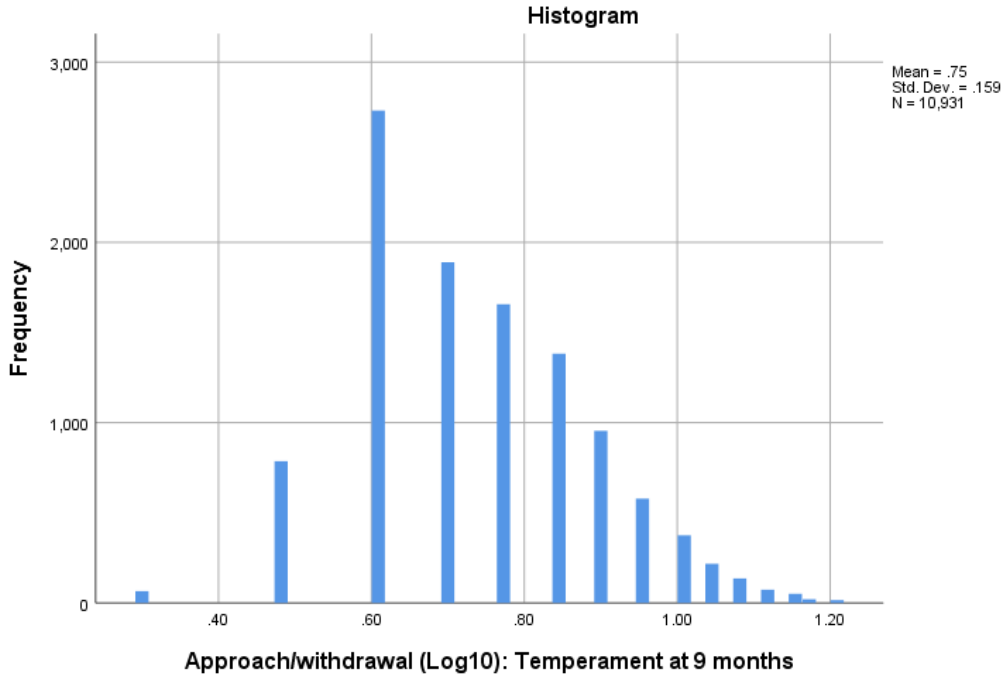


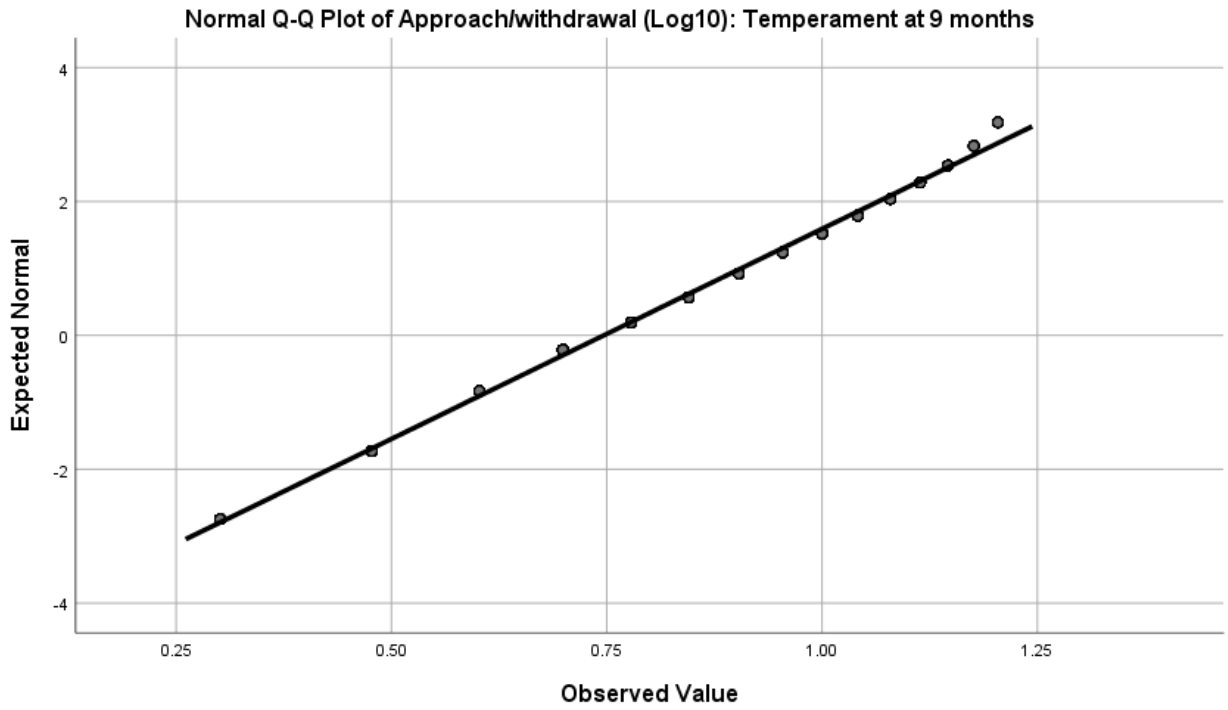



Detrended Normal Q-Q Plot of Mood (SQRT): Temperament at 9 months
Dev from Normal
0.10
0.0000
-0.1
-0.2
-0.3
-0.4
-0.5
1
2
3
4
5
Observed Value

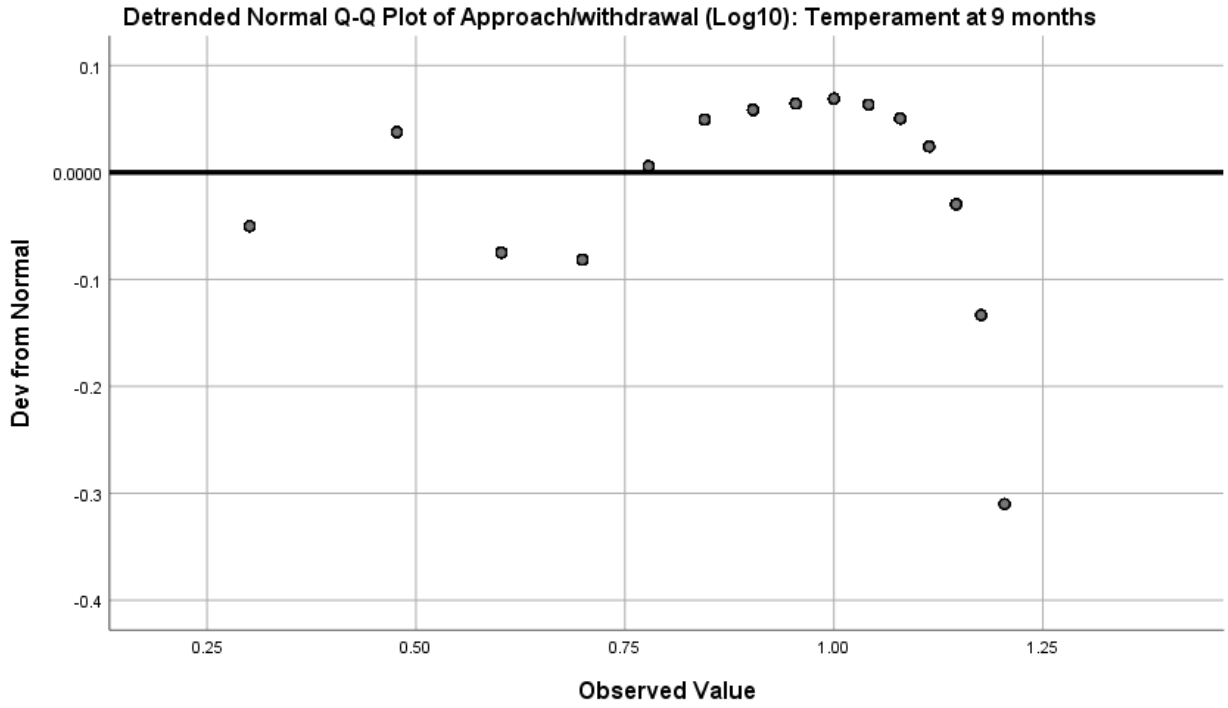

5
4
3
2
1
14,491
5,150
14,501
5,151
14,517
14,516
14,515
16,602
16,604
16,603
16,601
Mood (SQRT): Temperament at 9 months

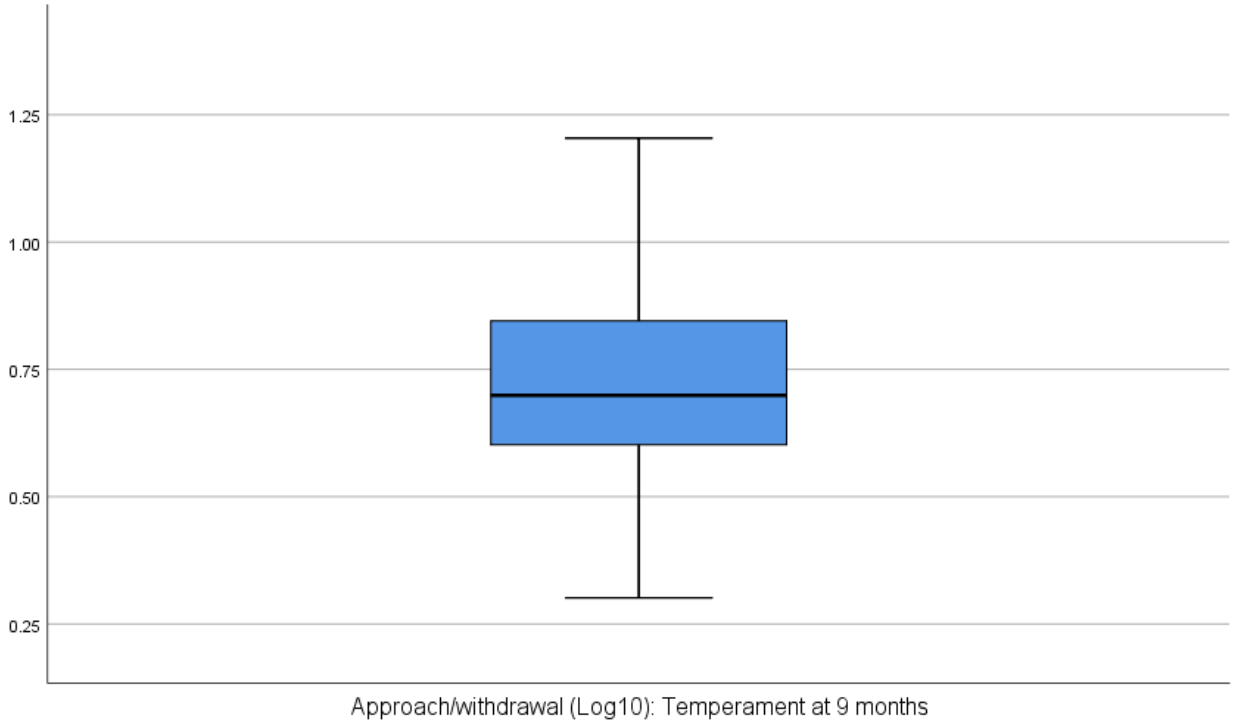
Histogram, Q-Q plots and box plots for the predictor variable approach/withdrawal after transformation using log10.



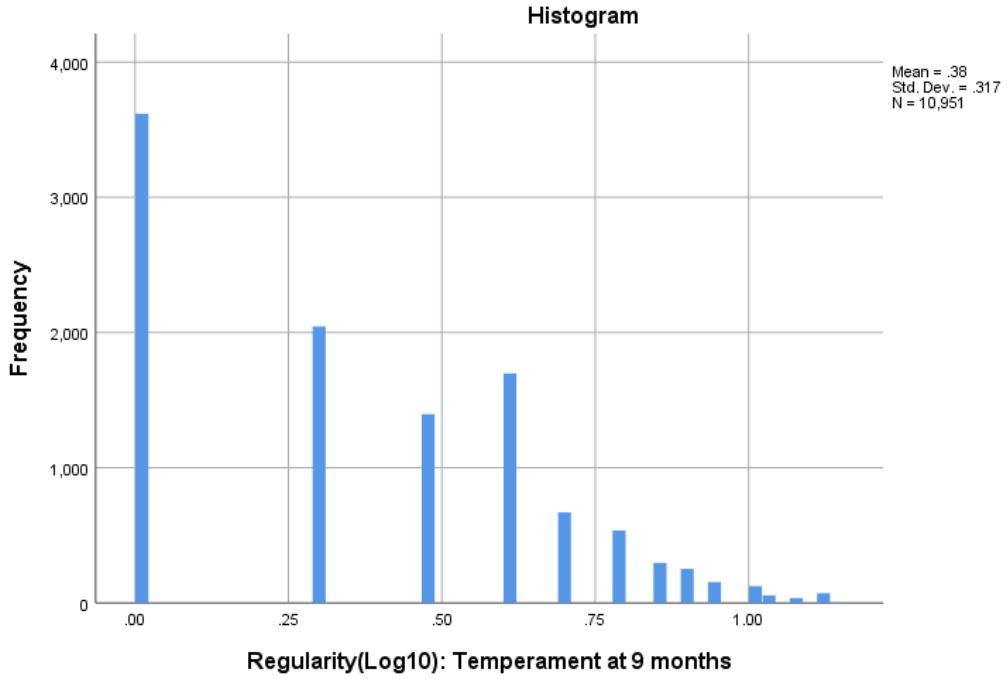


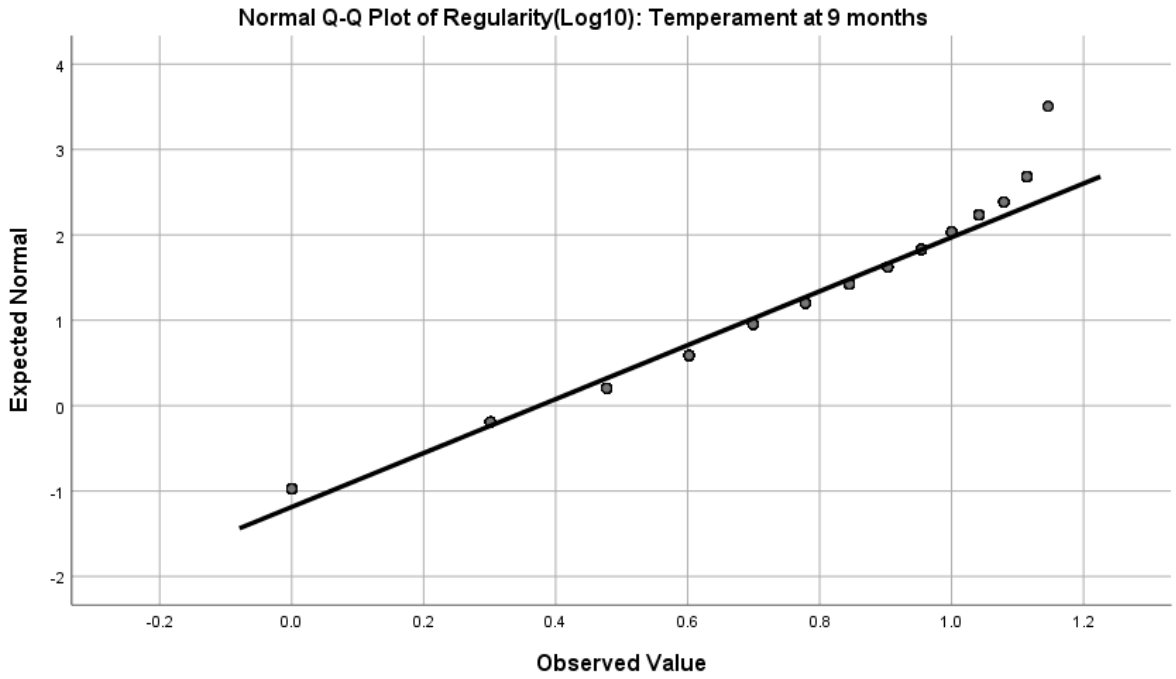
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

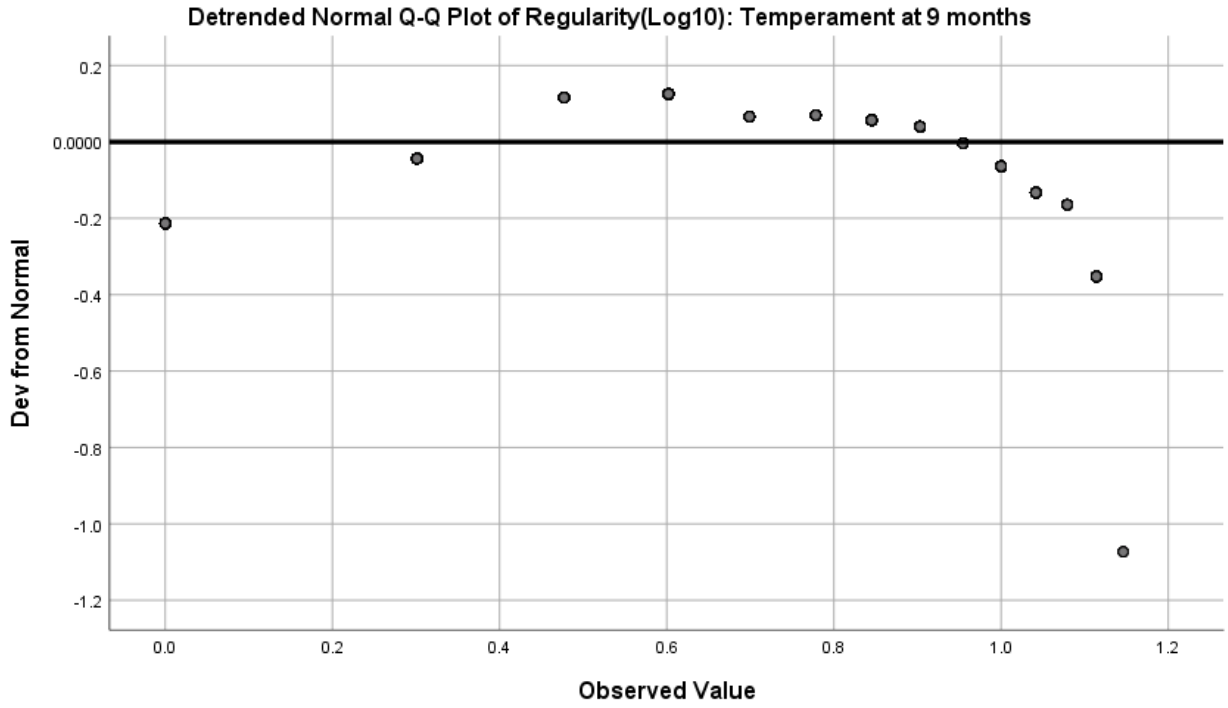


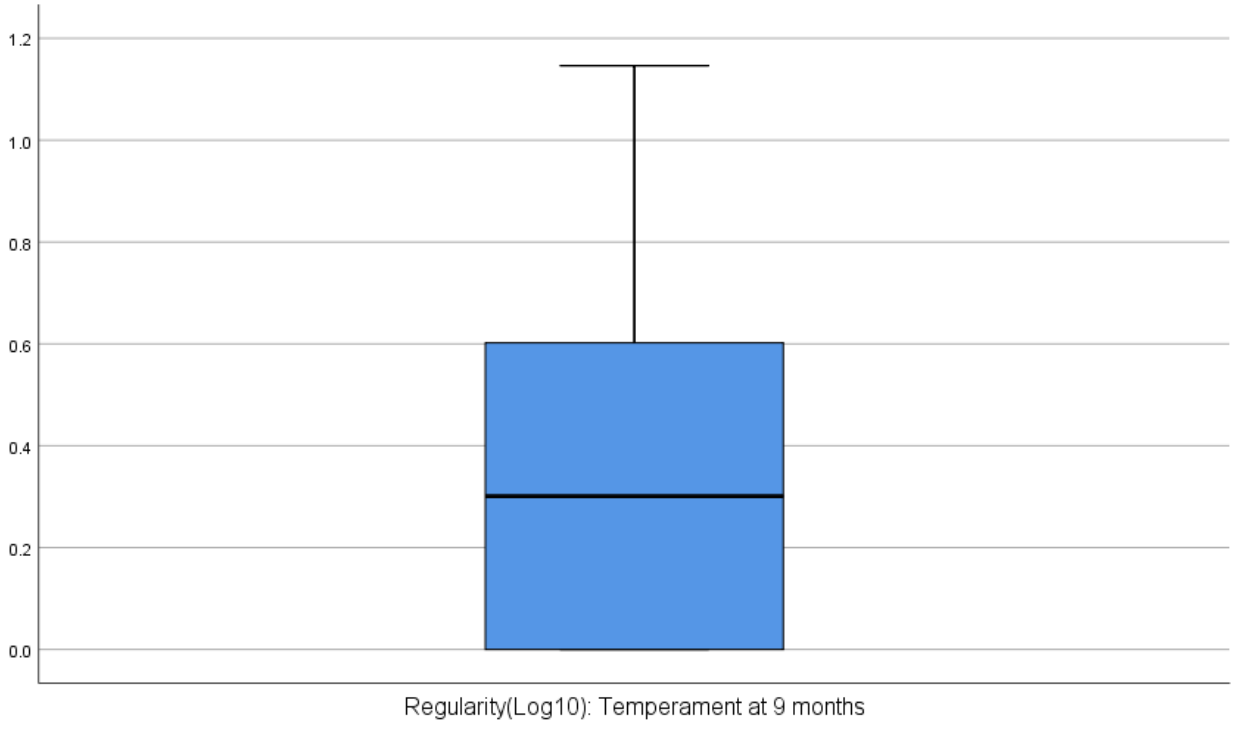


Histogram, Q-Q plots and box plots for the predictor variable regularity after transformation using log10.

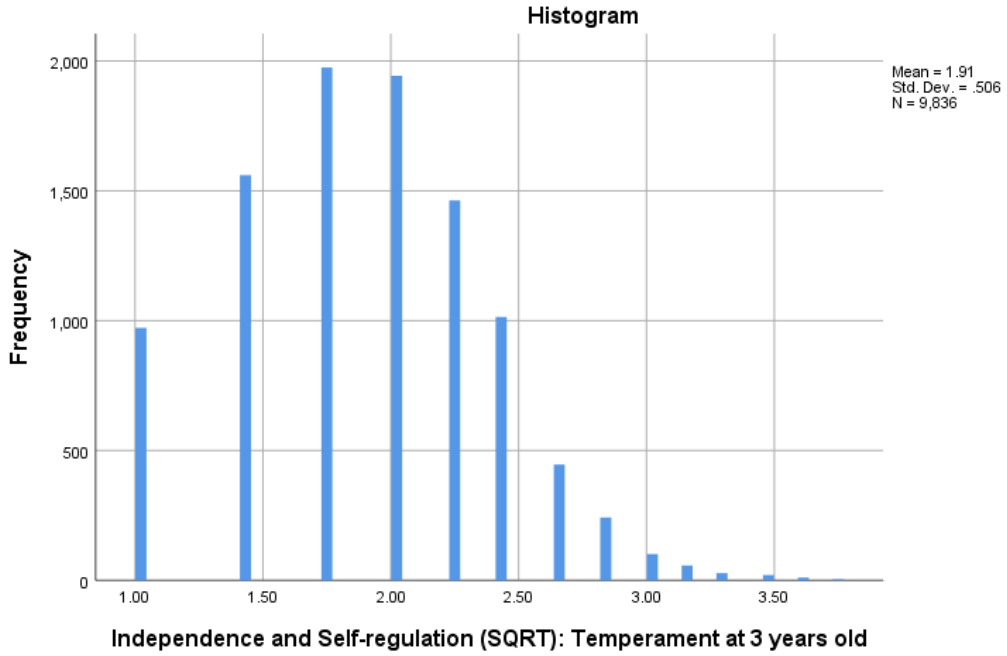




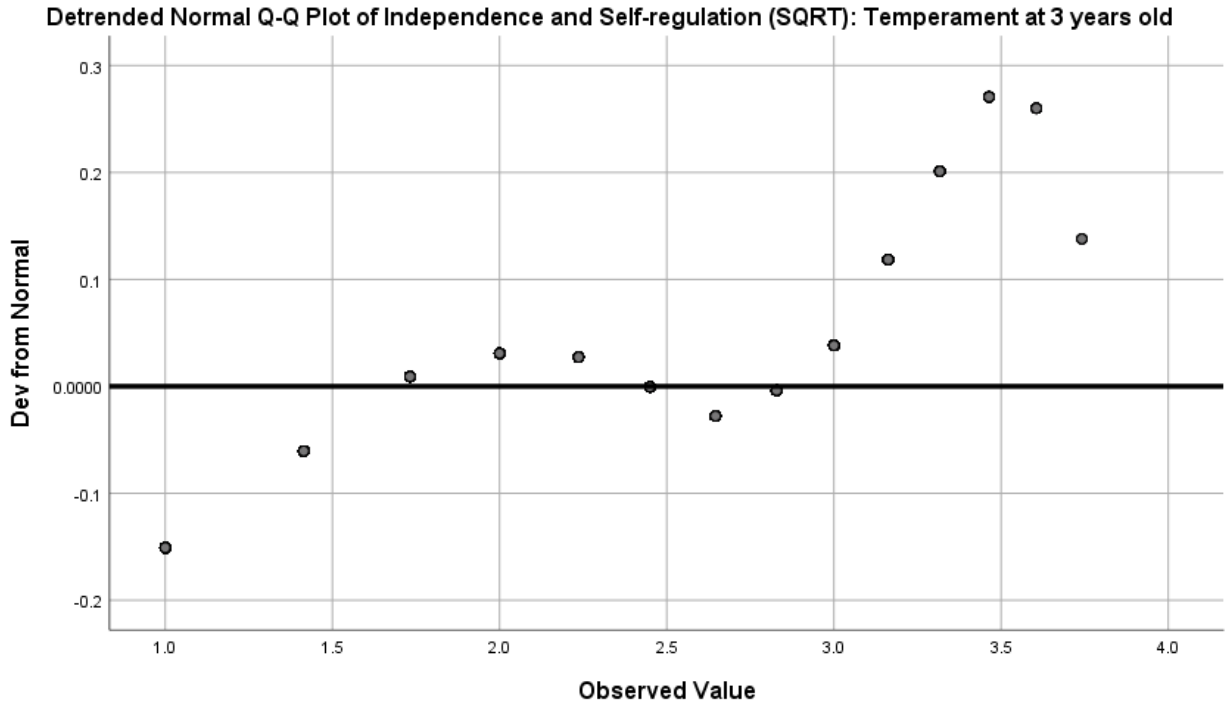

Detrended Normal Q-Q Plot of Regularity(Log10): Temperament at 9 months
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Observed Value

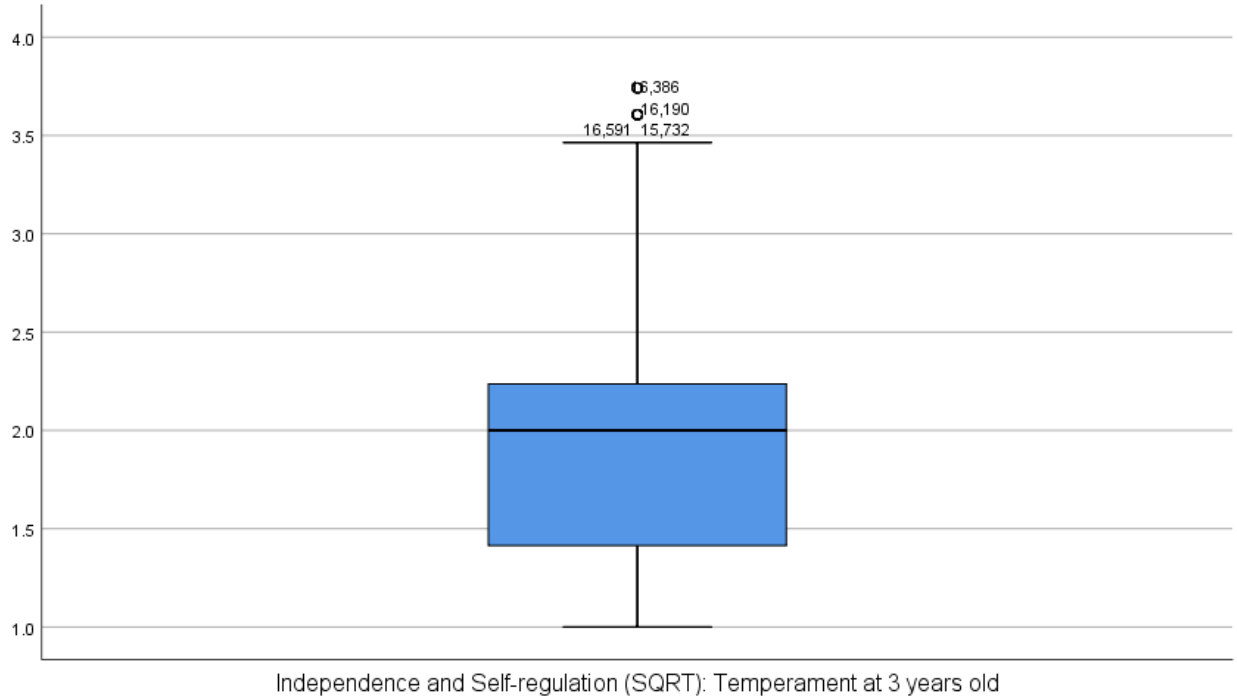

1.2
1.0
0.8
0.6
0.4
0.2
0.0
Regularity(Log10): Temperament at 9 months

Histogram, Q-Q plots and box plots for the predictor variable independence/self-regulation after transformation using SQRT.

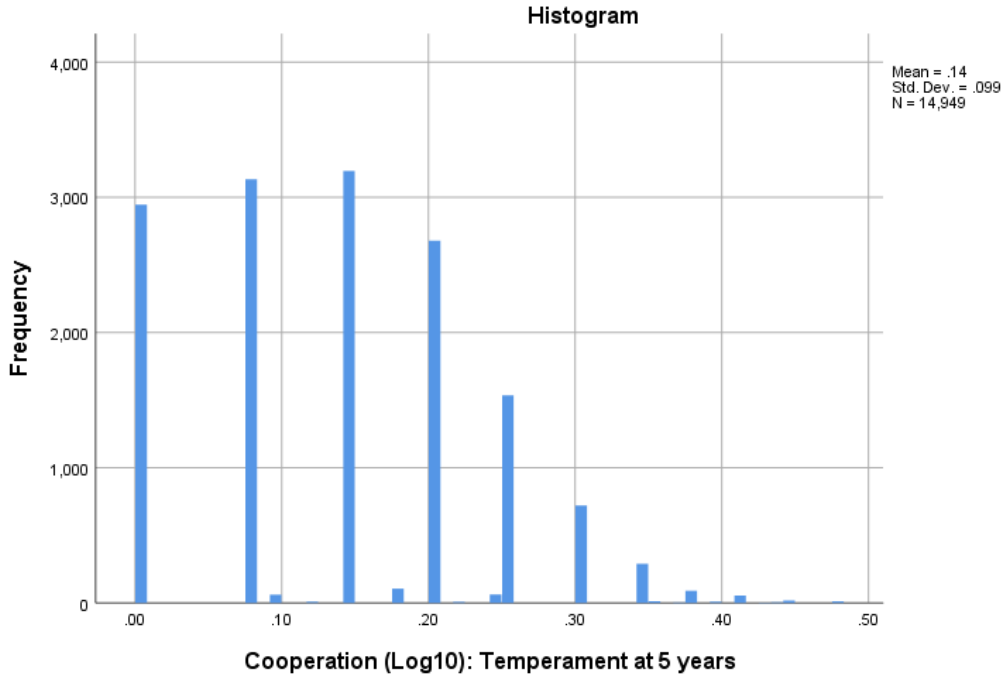


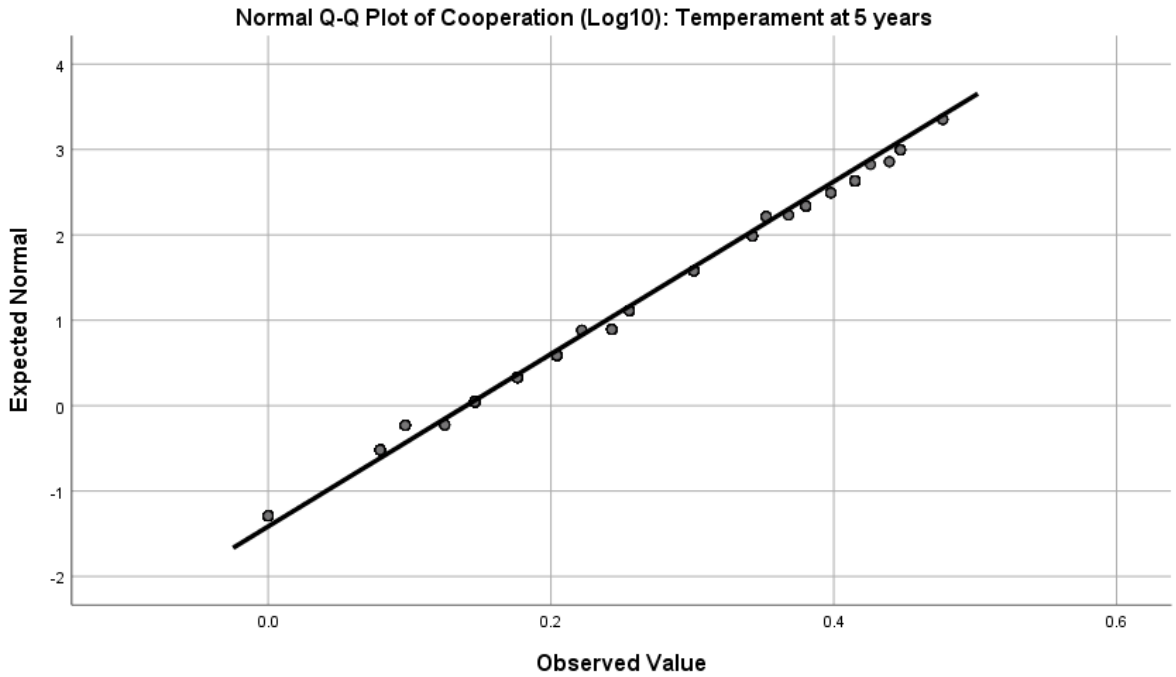
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



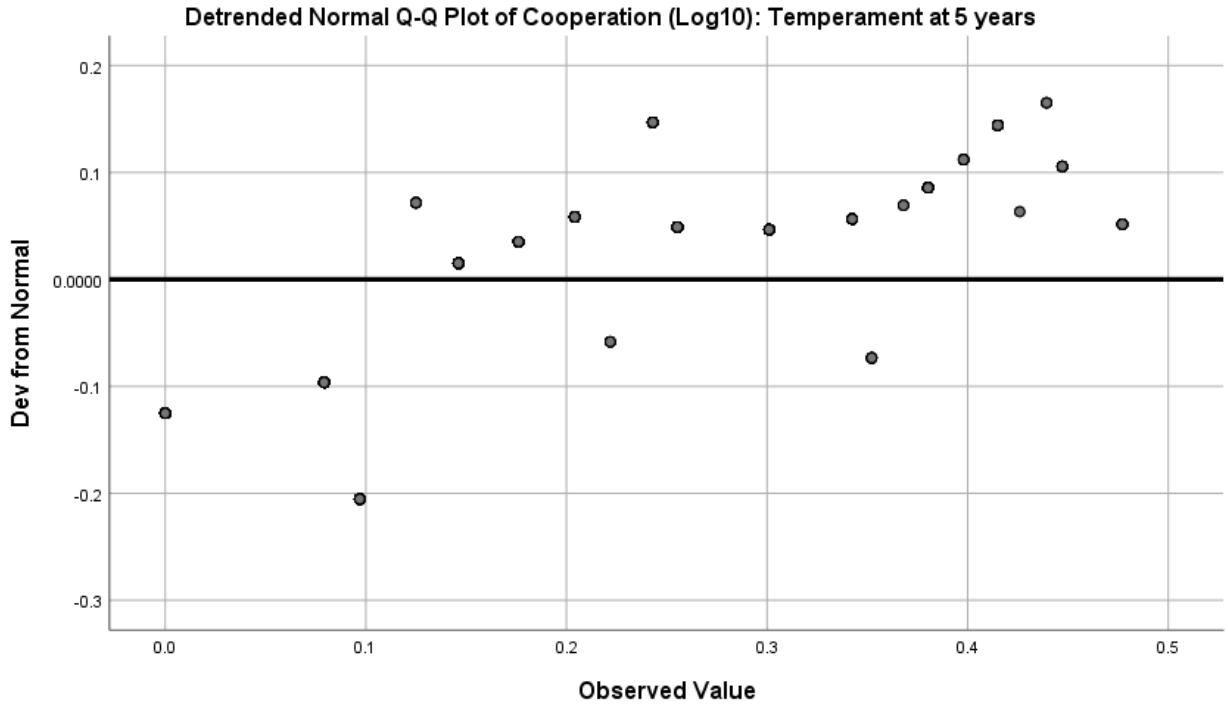


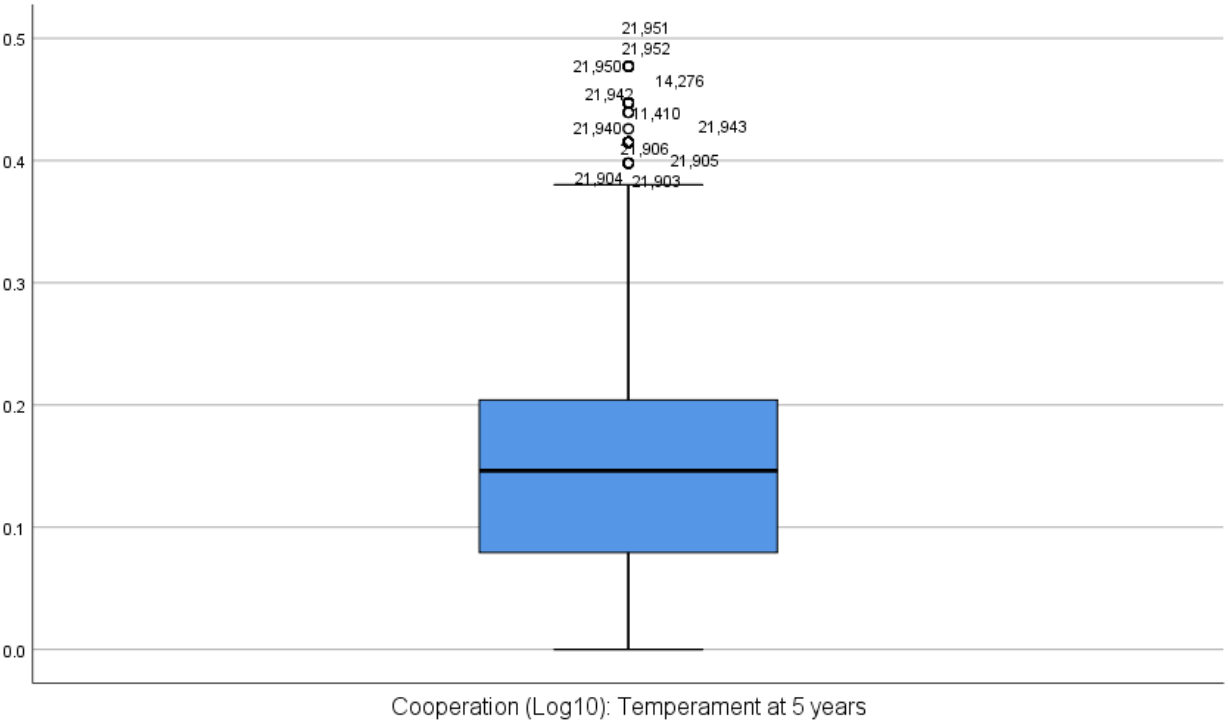
Histogram, Q-Q plots and box plots for the predictor variable cooperation after transformation using log10.



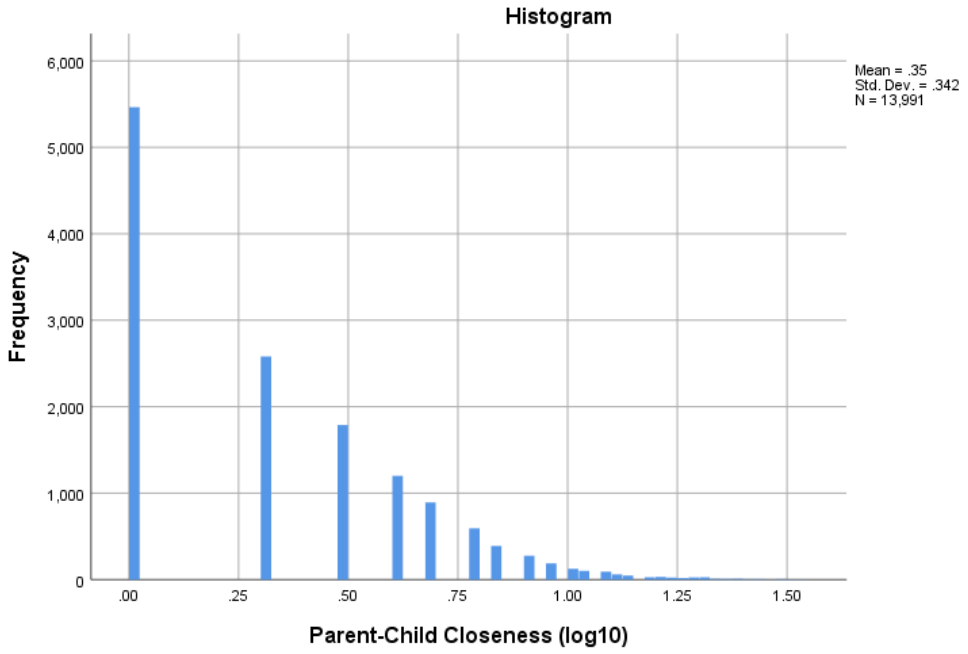


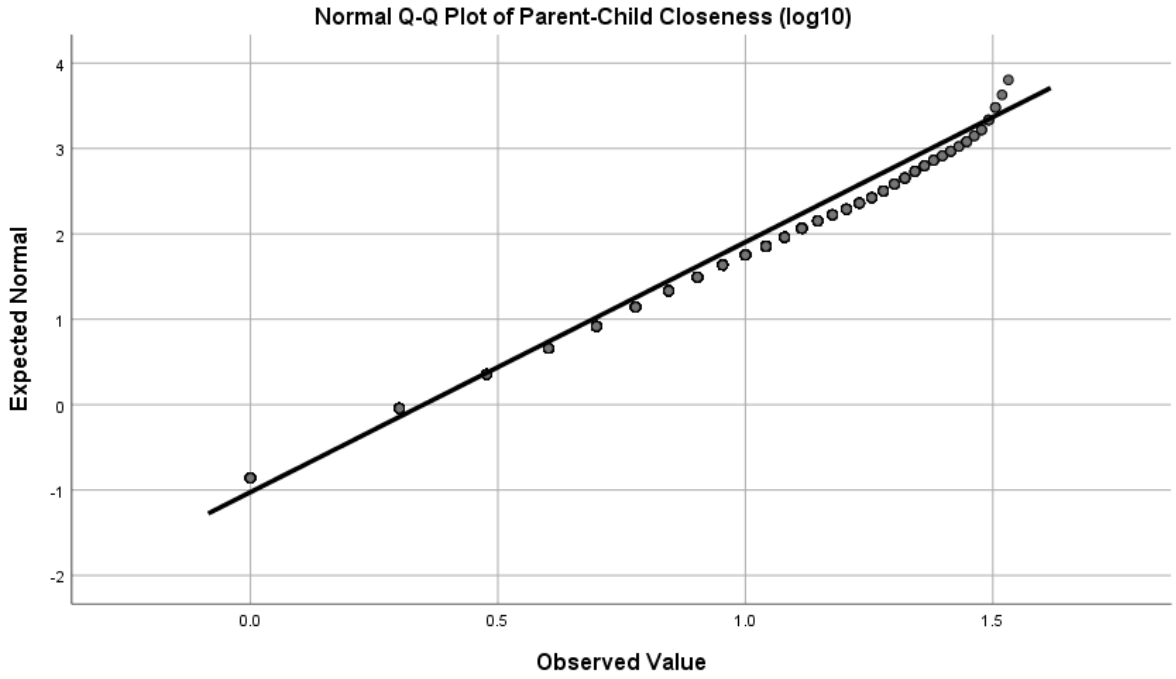
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



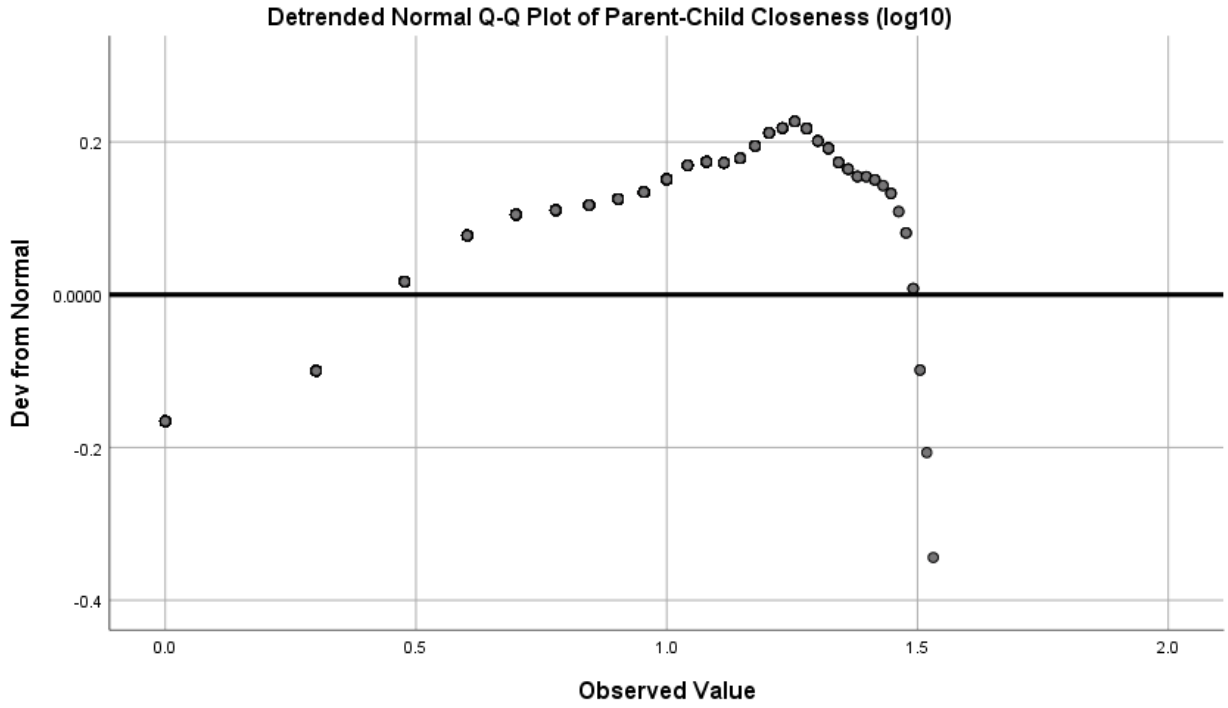


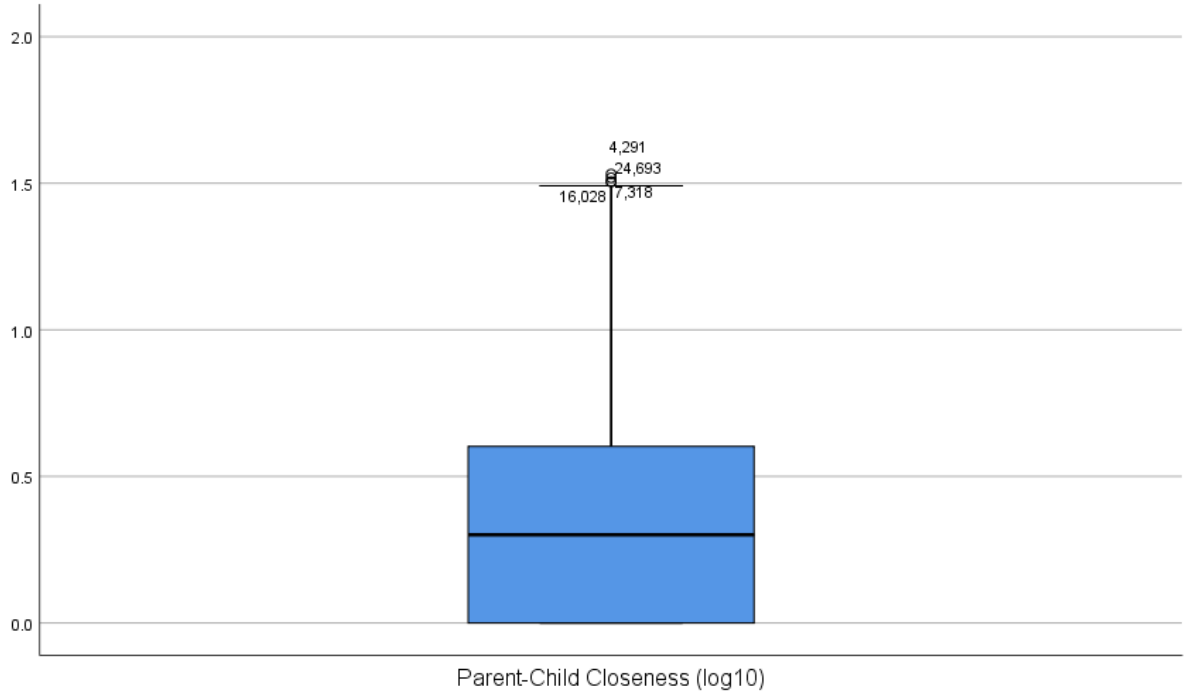
Histogram, Q-Q plots and box plots for the predictor variable parent-child closeness after transformation using log10.



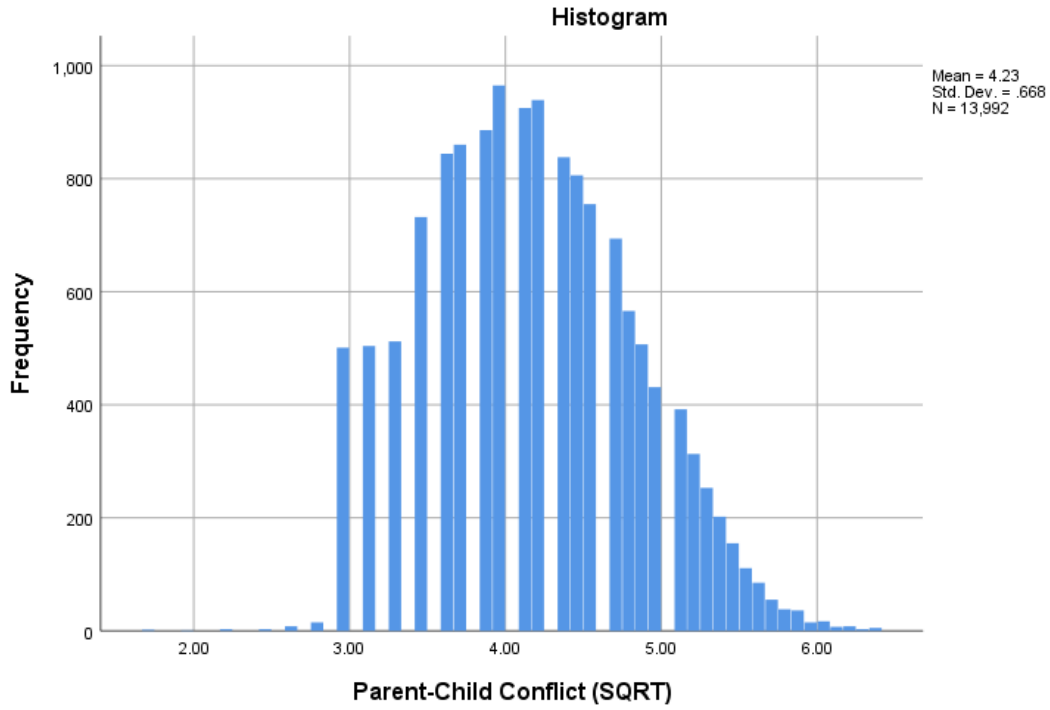


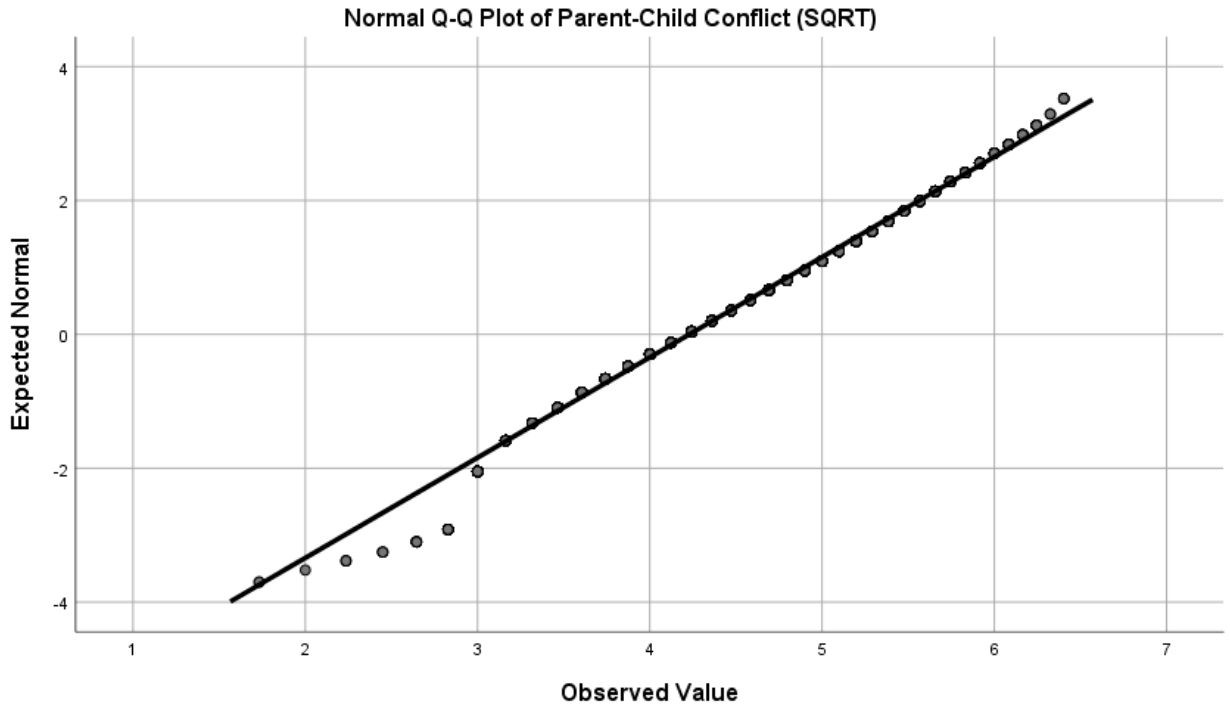
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



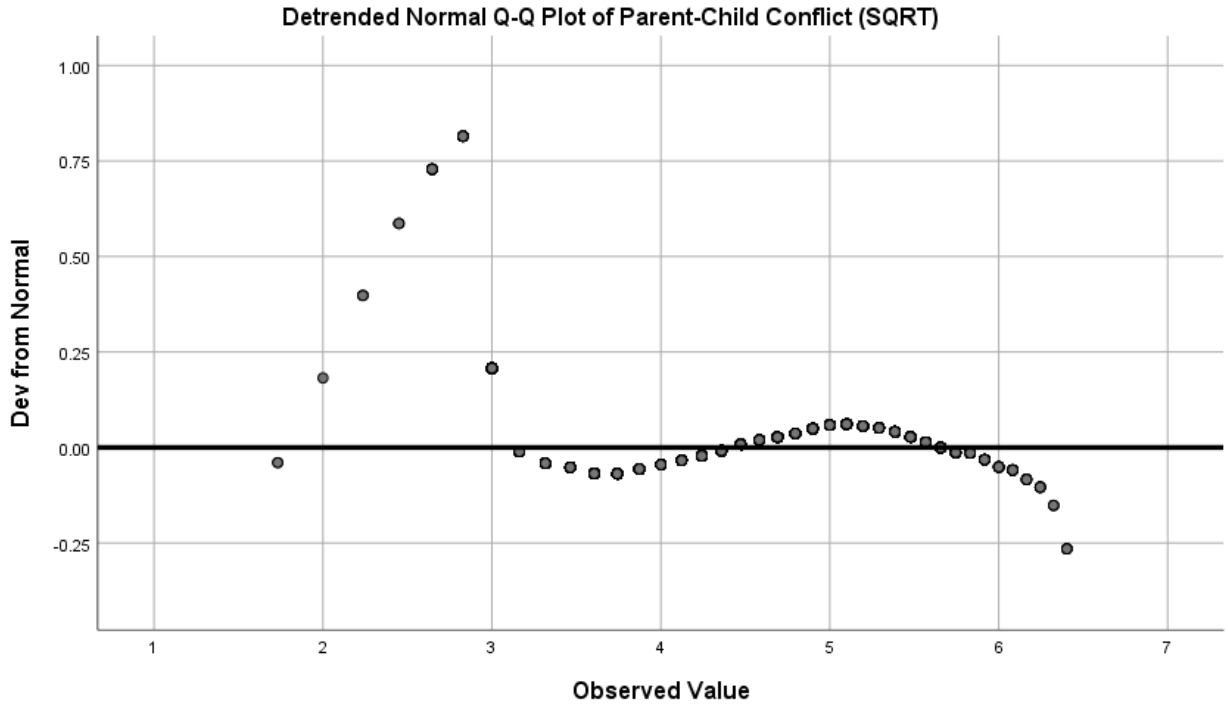


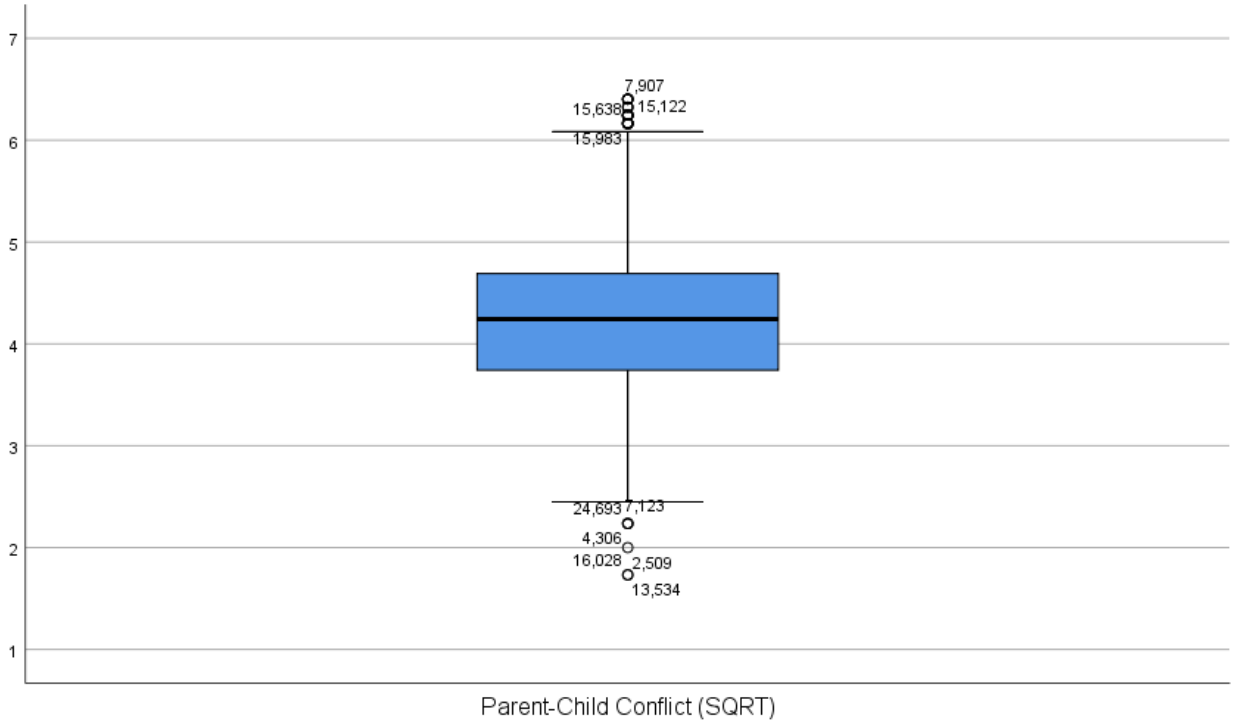
Histogram, Q-Q plots, and box plots for the predictor variable parent-child conflict after transformation using SQRT.



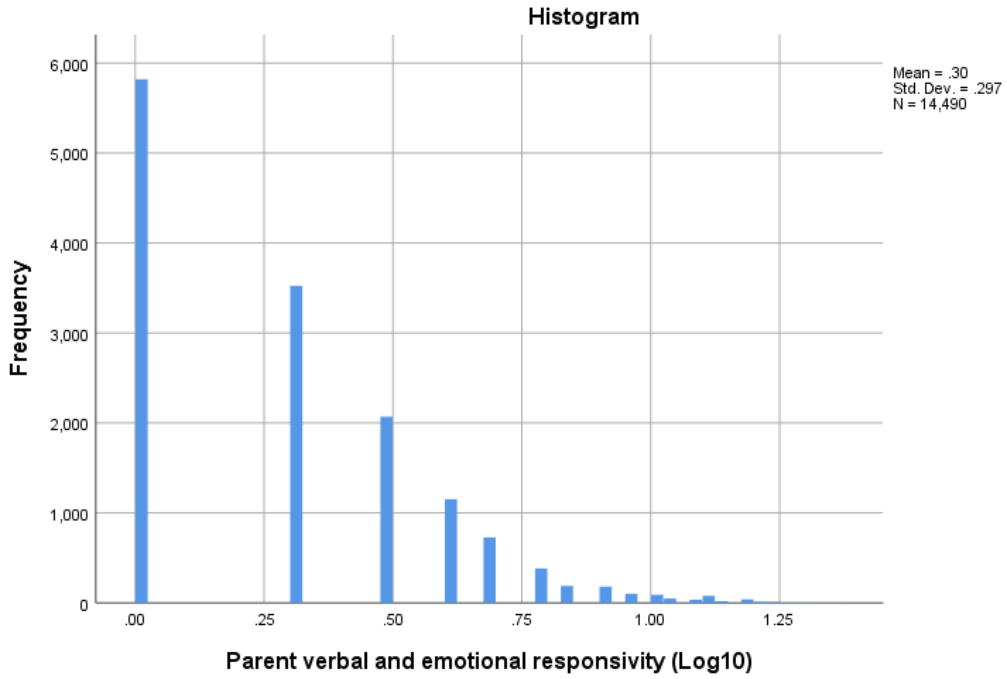


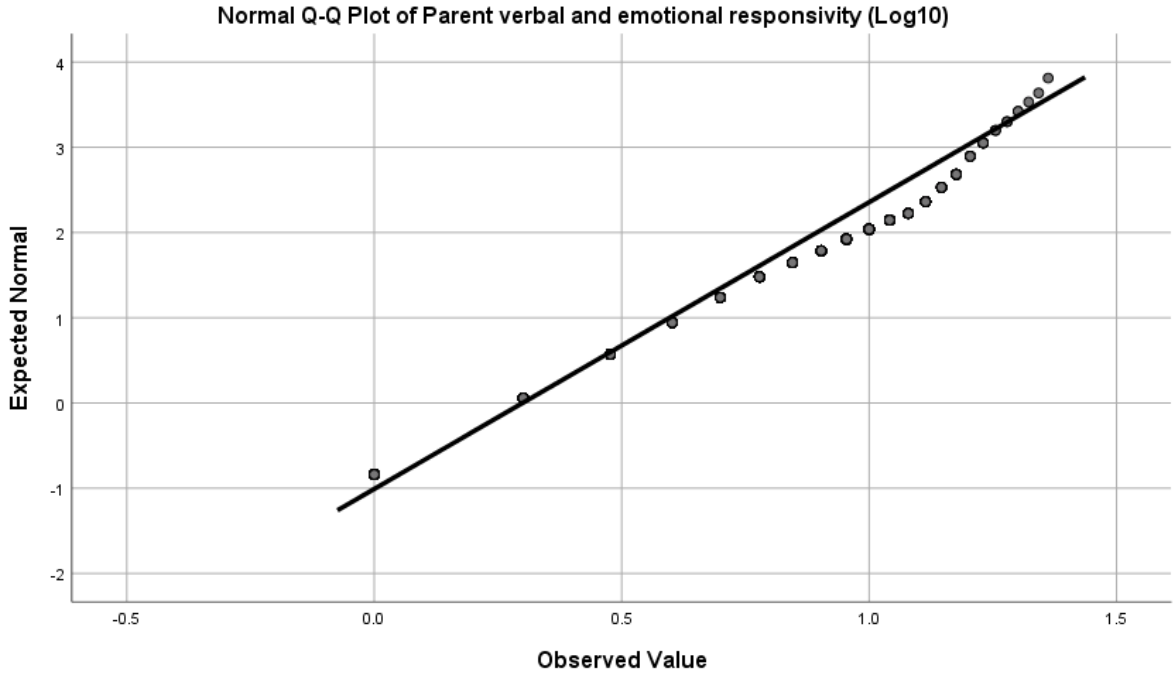
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

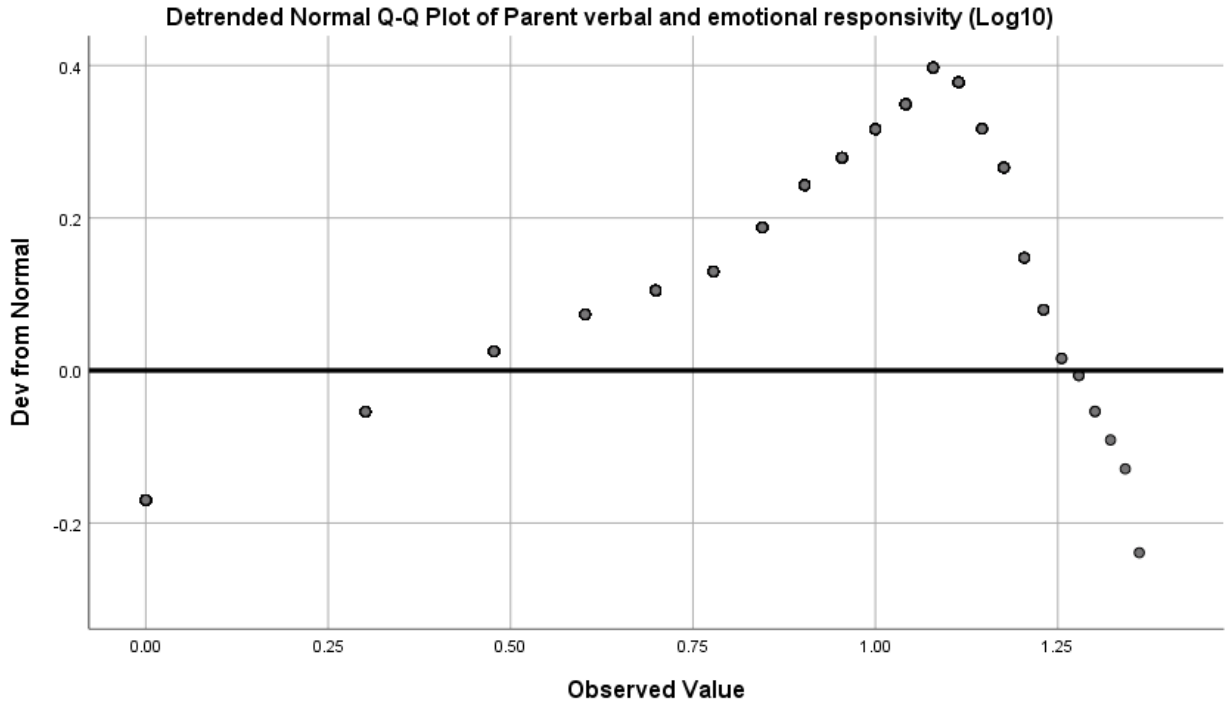


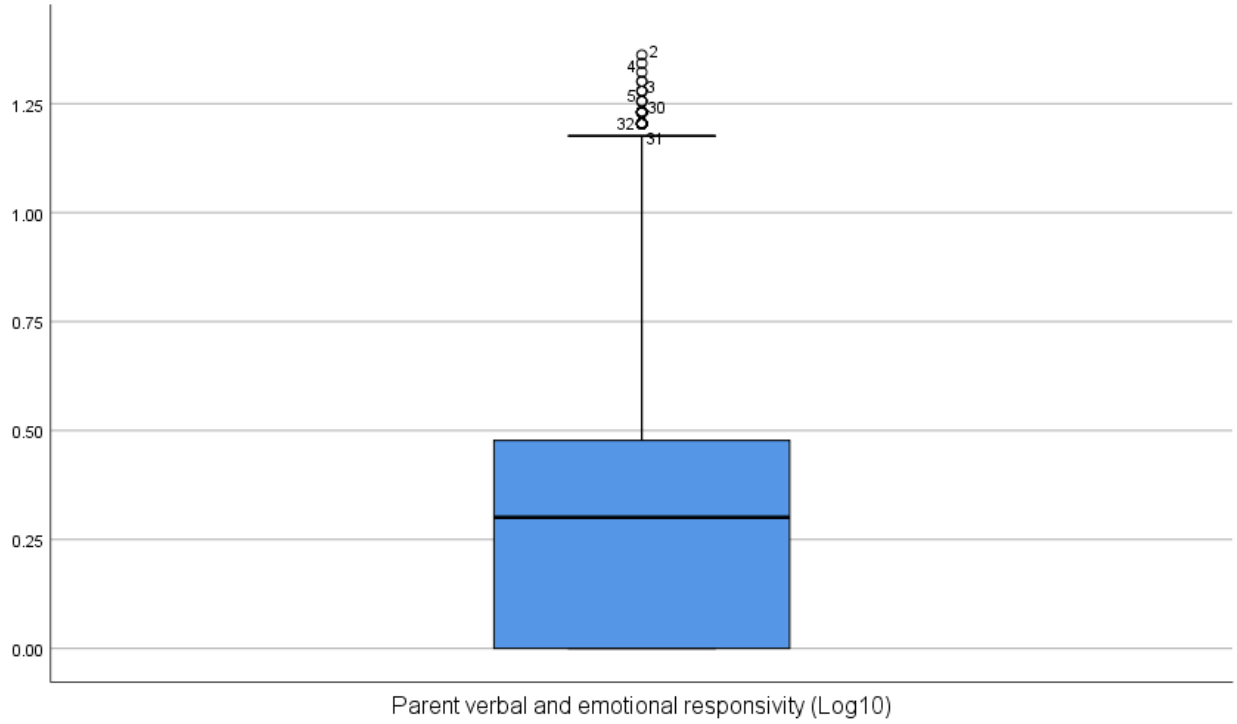


Histogram, Q-Q plots and box plots for the predictor variable parent verbal/emotional responsivity after transformation using log10.






Detrended Normal Q-Q Plot of Parent verbal and emotional responsivity (Log10)
Dev from Normal
0.4
0.2
0.0
-0.2
0.00
0.25
0.50
0.75
1.00
1.25
Observed Value


1.25
1.00
0.75
0.50
0.25
0.00
2
4
5
3
30
32
31
Parent verbal and emotional responsivity (Log10)

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix G. Multinominal regression analysis: significant variables with or without outliers.

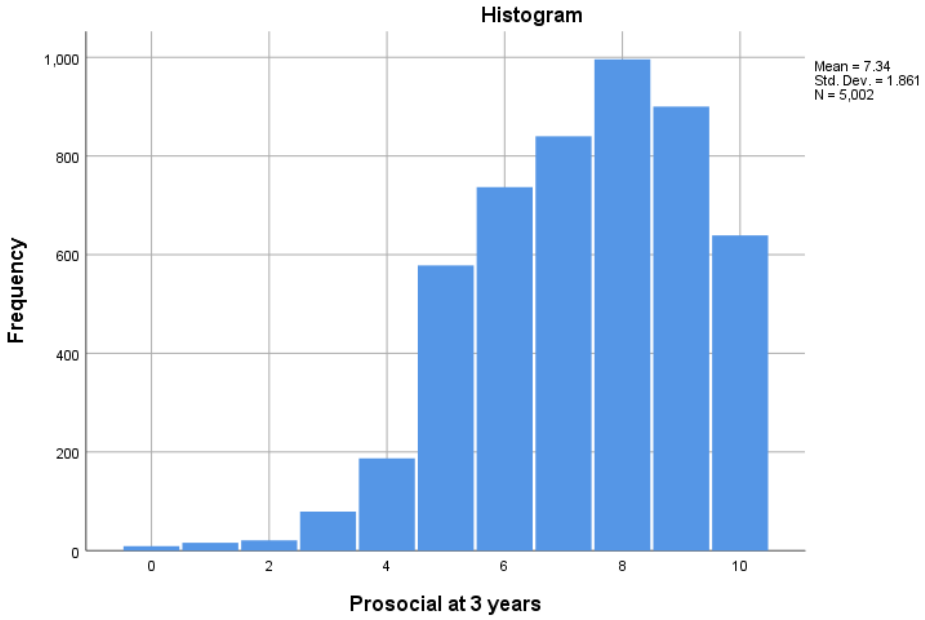
		With outliers		Without outliers	
Bullying subgroup contrasts	**Predictor**	**Estimate**	**P**	**Estimate**	**P**
Occasional bullies-Non-bullies	Intercept	-2.836	<0.001	-2.735	<0.001
	Mood	0.193	0.027	0.181	0.064[a]
	Emotional Dysregulation	-0.071	0.013	-0.068	0.024
	Parental Engagement	-0.024	0.033	-0.0202	0.108[a]
	Harsh Punishment	0.083	<0.001**	0.084	<0.001
Sibling bullies-Non-bullies	Intercept	-4.317	<0.001	-3.573	<0.001
	Difficulty Adapting	-0.076	0.016	-0.081	0.020
	Parent Emotional/Verbal Responsivity	0.514	0.033	0.370	0.143[a]
	Harsh Punishment	0.076	<0.001	0.076	<0.001
Generalist bullies-Non-bullies	Intercept	-2.831	<0.001	-2.623	<0.001
	Parent Emotional/Verbal Responsivity	0.247	0.093	0.191	0.214
	Parental Engagement	-0.018	0.039	-0.025	0.009
	Harsh Punishment	0.066	<0.001	0.069	<0.001
Occasional bullies-Generalist Bullies	Intercept	-0.005	0.994	-0.112	<0.880
	Mood	0.158	0.086	0.168	0.104
	Emotional Dysregulation	-0.067	0.027	-0.063	0.046
Sibling bullies-Generalist bullies	Intercept	-1.488	0.076	-1.039	0.299
	Difficulty Adapting	-0.086	0.008	-0.103	0.004
	Parental Engagement	0.026	0.077	0.028	0.087
Sibling bullies-Occasional bullies	Intercept	-1.483	0.116	0.838	0.414
	Approach/withdrawal	1.188	0.029	-1.085	0.056[a]
	Difficulty Adapting	-0.108	0.003	0.120	0.003
	Parent Emotional/Verbal Responsivity	0.490	0.084	-0.309	0.295
	Parental Engagement	0.033	0.048	-0.023	0.202[a]

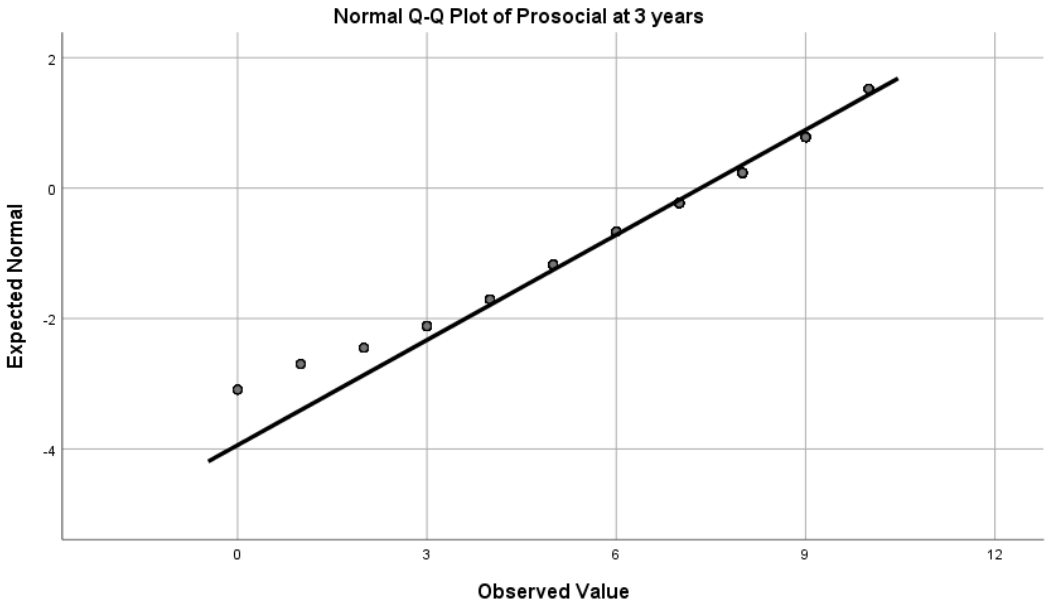
[a] Change from significant to non-significant

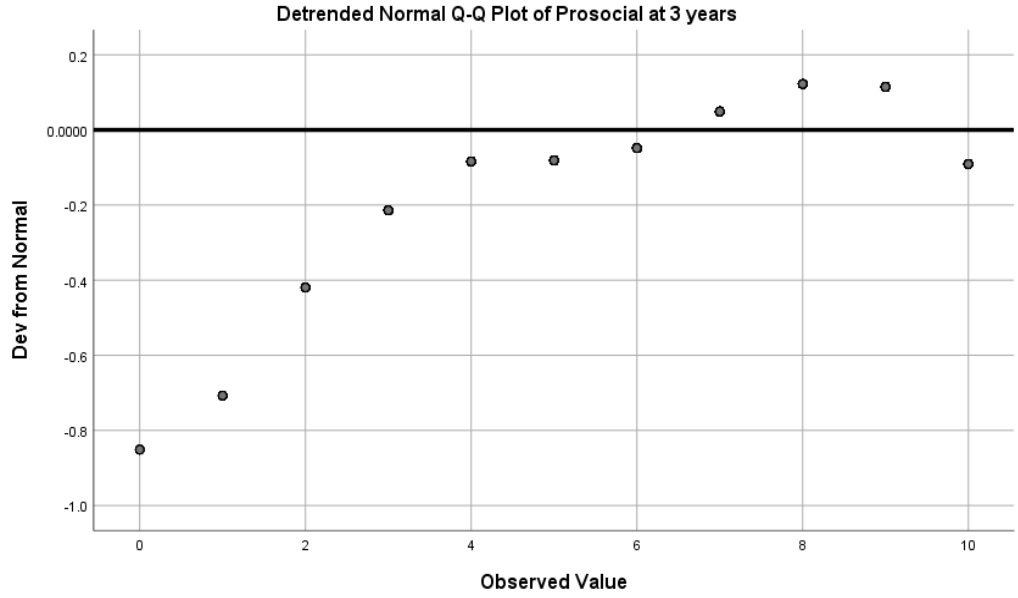
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

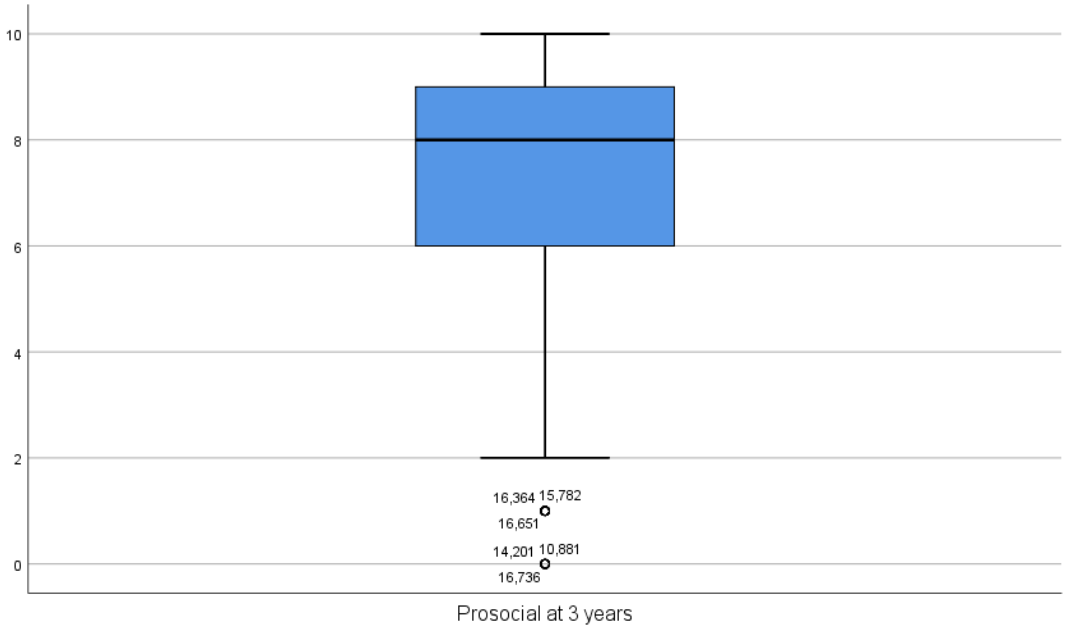
Appendix I. Strengthens and difficulties questionnaire (SDQ) measures used when the child was 3, 5, 7 and 14 years old: histogram, QQ plots and box plots for prosocial, externalising, internalising behaviours prior to transformation and after being transformed.

Strengthens and difficulties questionnaire (SDQ) scores when the child was 3 years old. histogram, QQ plots and box plots for prosocial behaviours measures prior to being transformed.

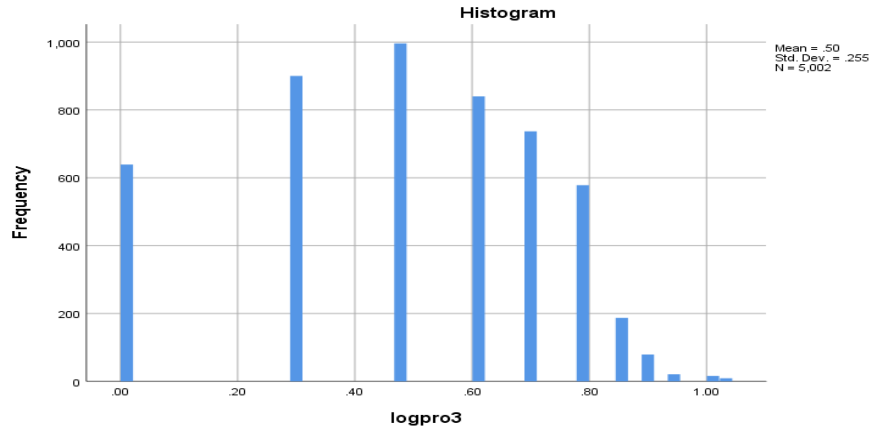




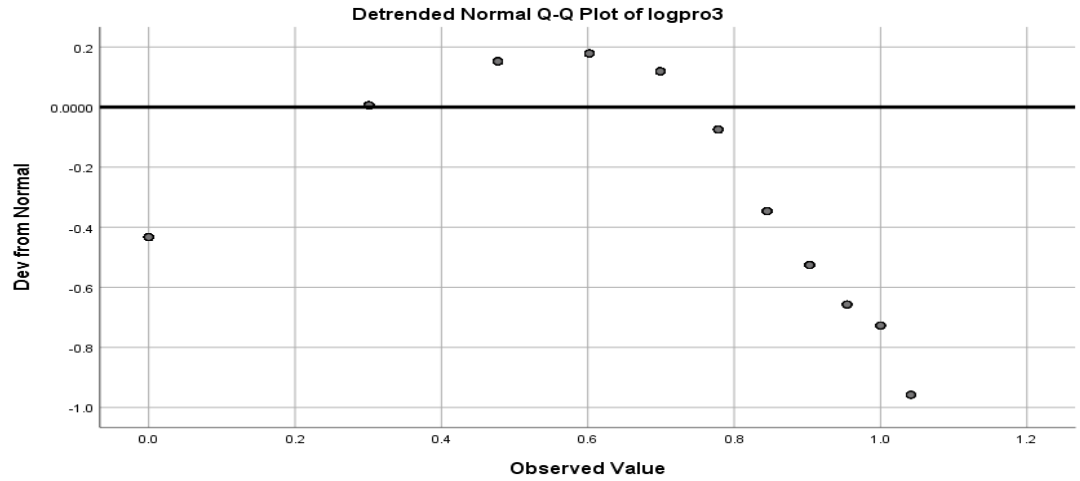


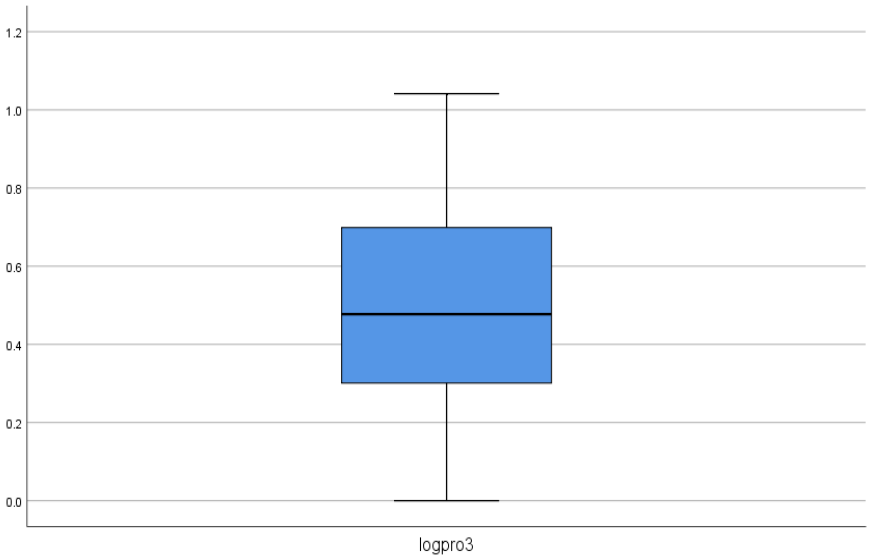


Strengthens and difficulties questionnaire (SDQ) scores when the child was 3 years old. histogram, QQ plots and box plots for prosocial behaviours measures after being transformed using log10.

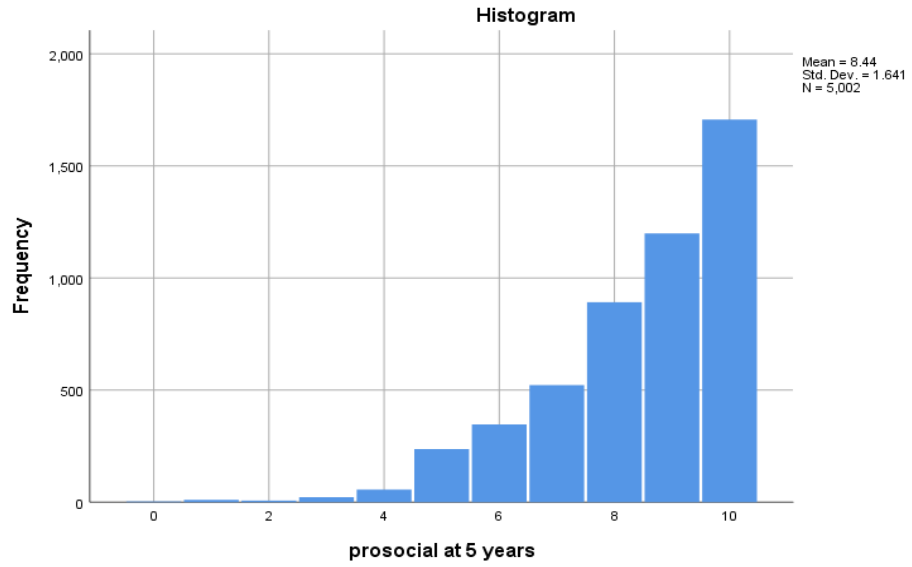


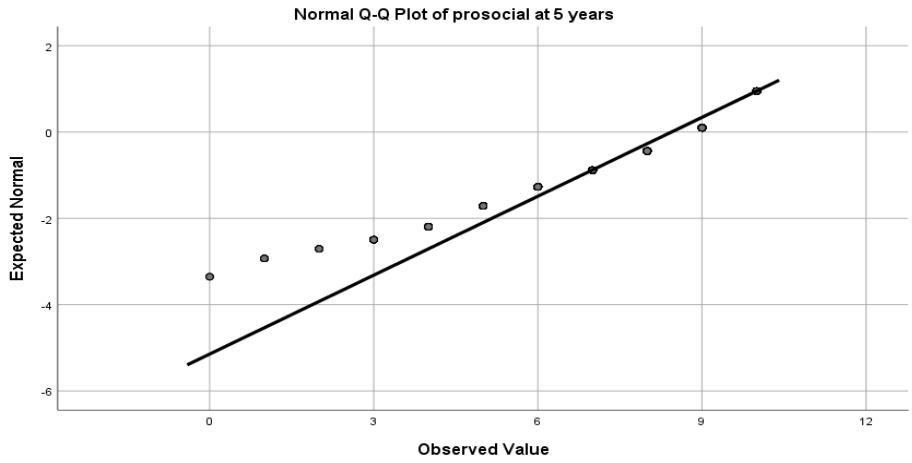

Normal Q-Q Plot of logpro3
Expected Normal
Observed Value
4
2
0
-2
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2

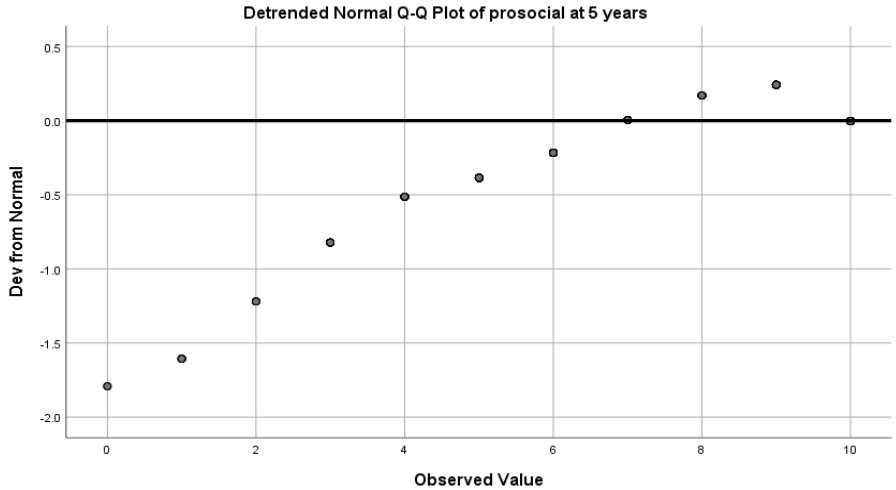

Detrended Normal Q-Q Plot of logpro3
Dev from Normal
Observed Value
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2

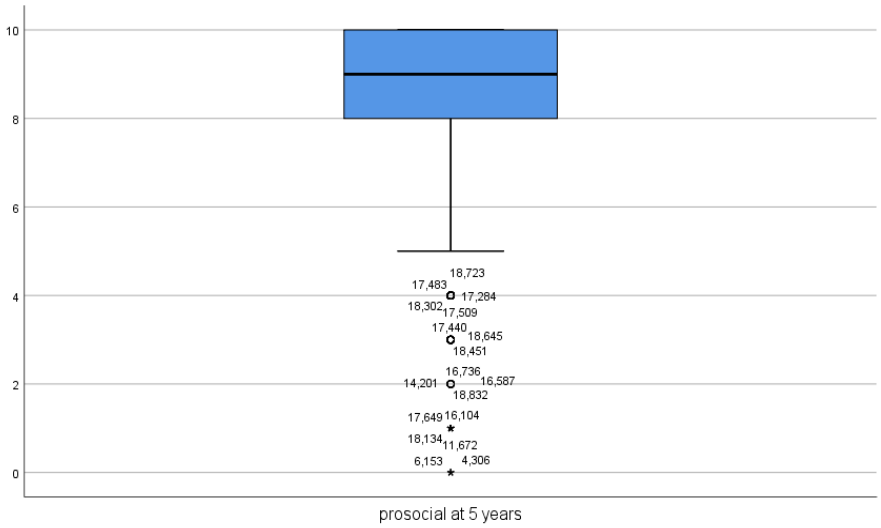

1.2
1.0
0.8
0.6
0.4
0.2
0.0
logpro3

Strengthens and difficulties questionnaire (SDQ) scores when the child was 5 years old. histogram, QQ plots and box plots for prosocial behaviours measures prior to being transformed.

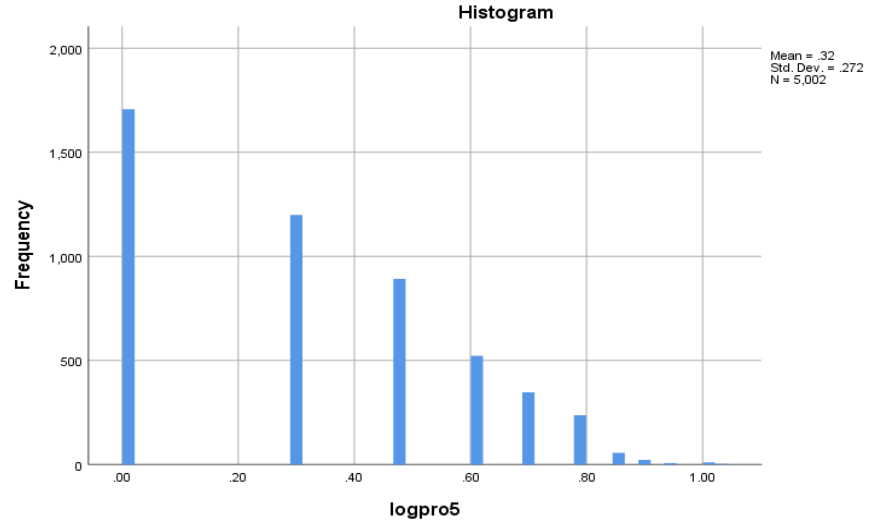


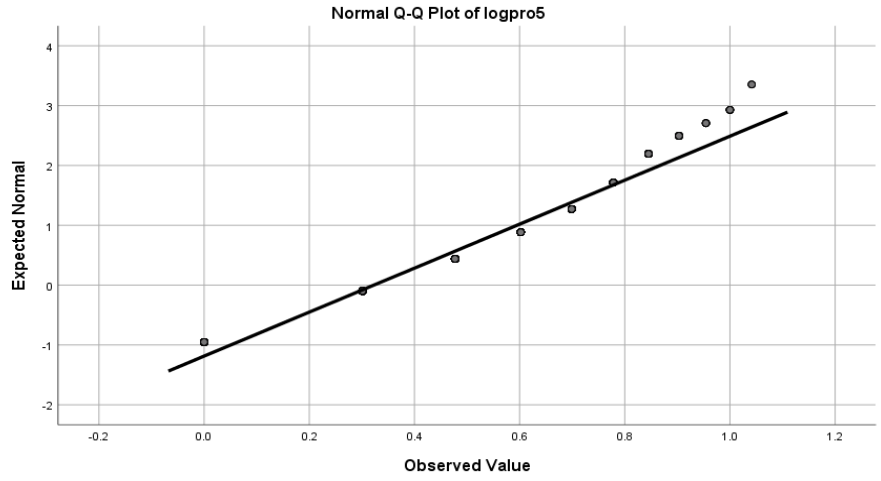




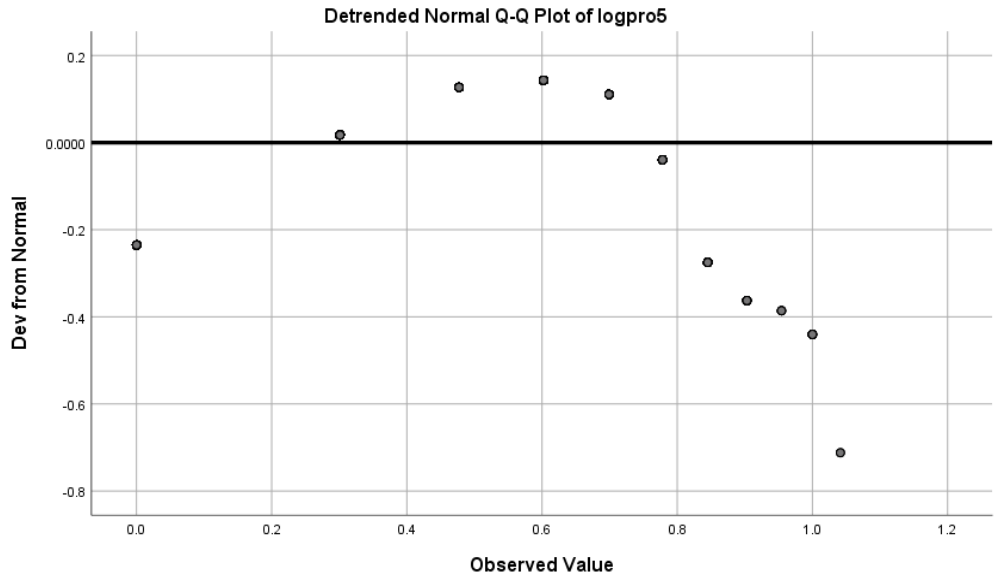


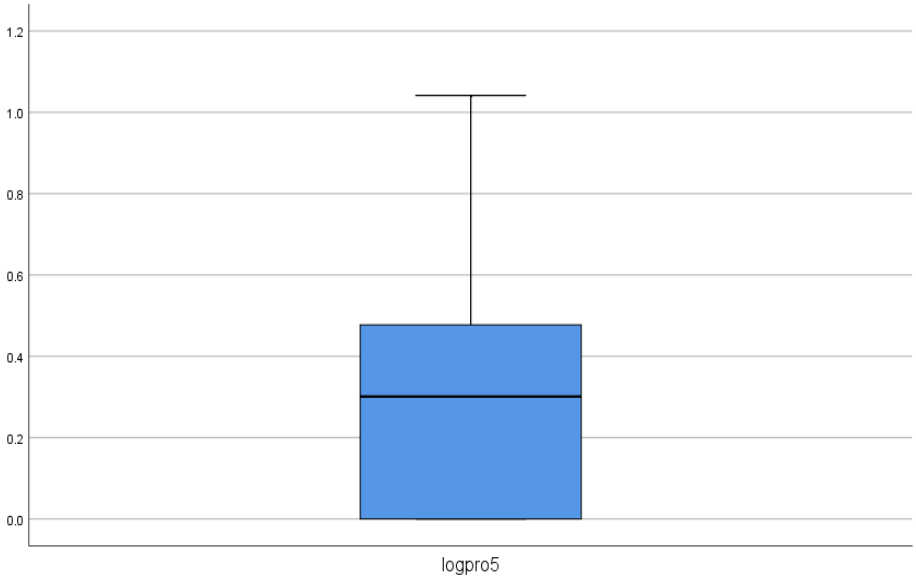
Strengthens and difficulties questionnaire (SDQ) scores when the child was 5 years old. histogram, QQ plots and box plots for prosocial behaviours measures after being transformed using log10.





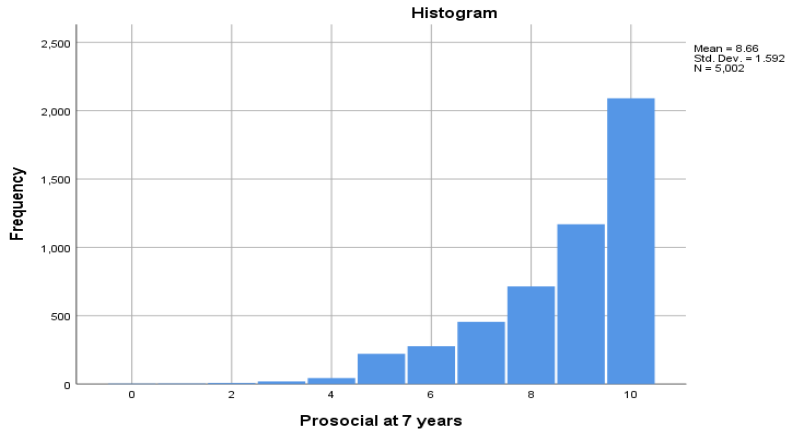
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

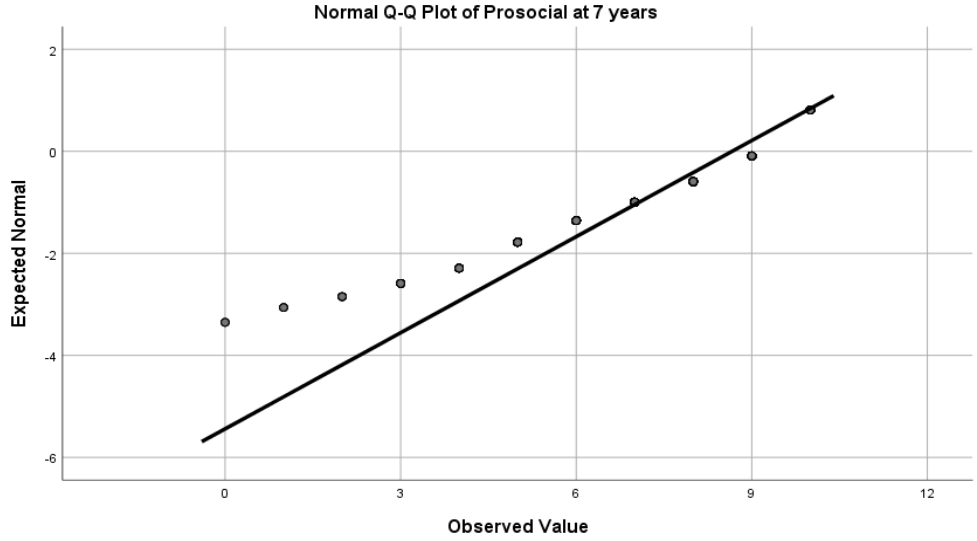


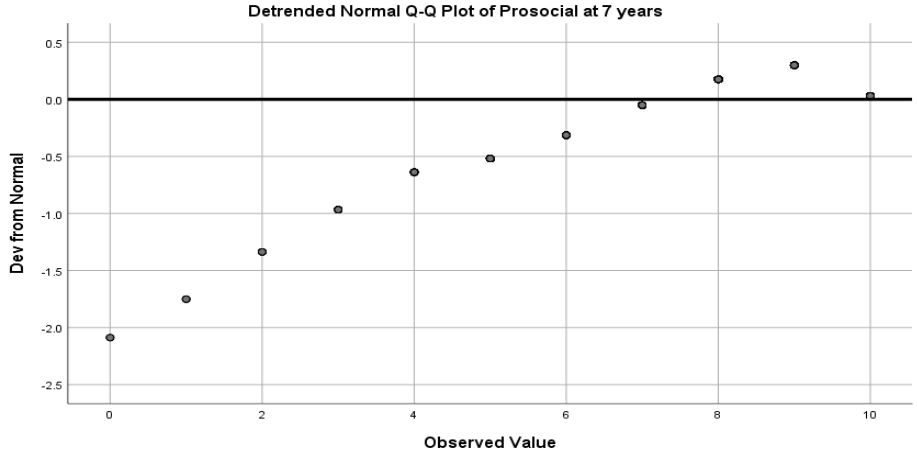


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

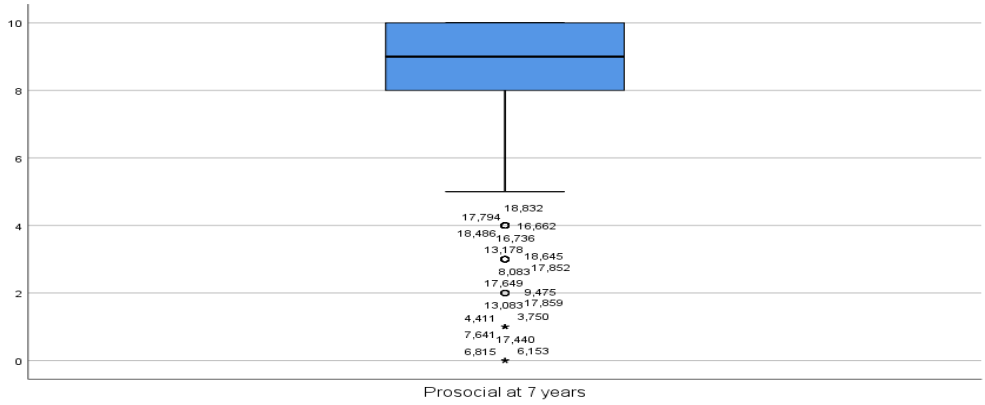
Strengthens and difficulties questionnaire (SDQ) scores when the child was 7 years old. histogram, QQ plots and box plots for prosocial behaviours measures prior to being transformed.



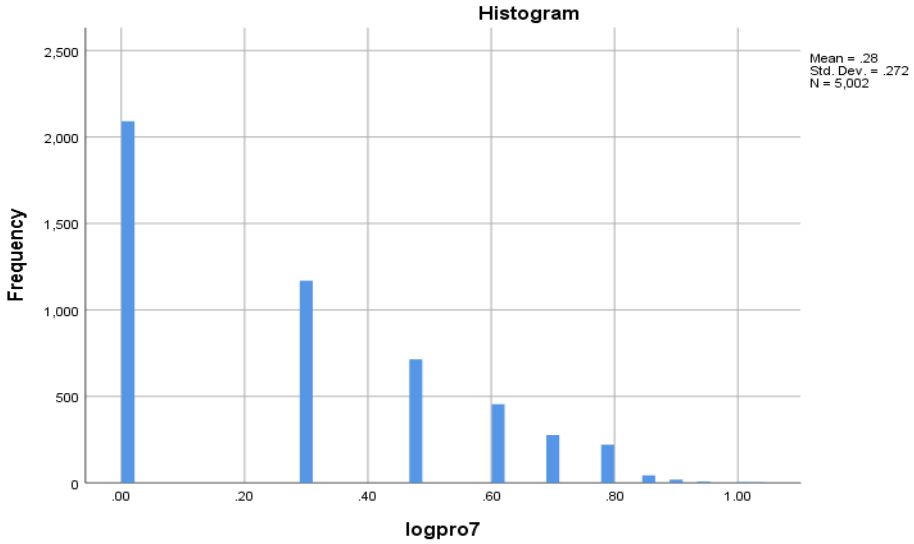


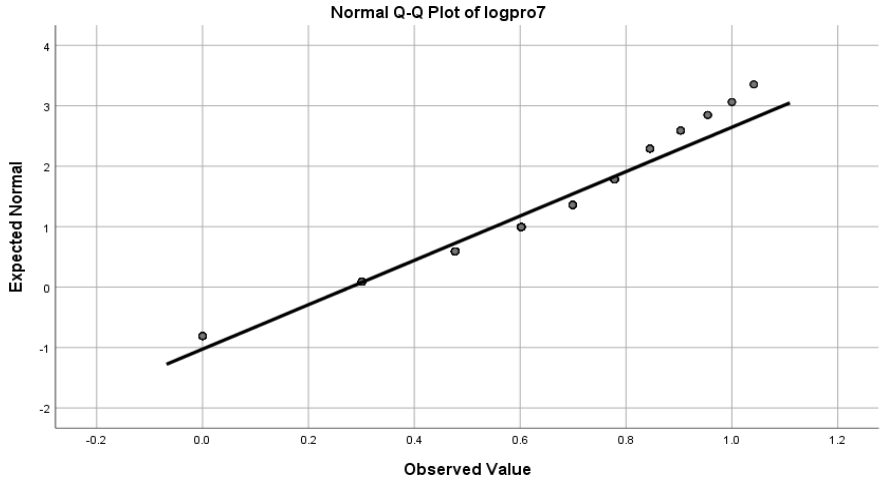


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

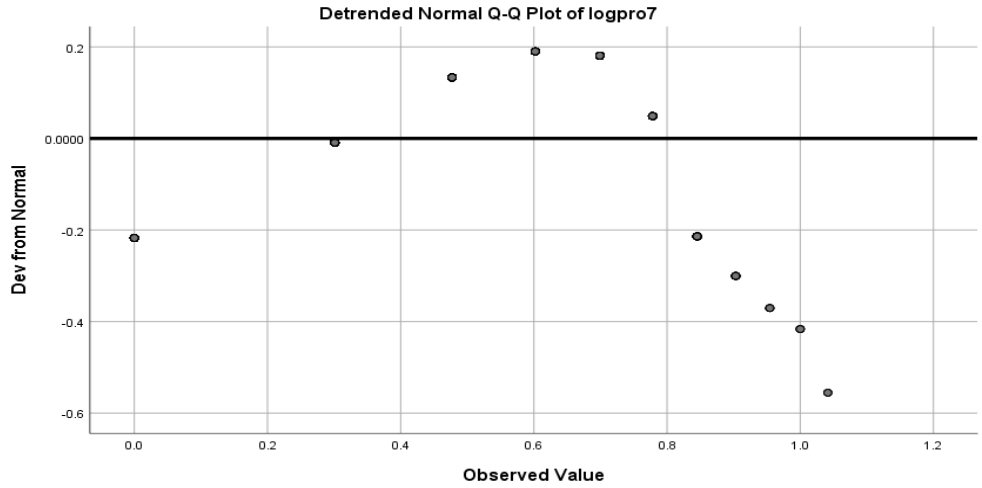


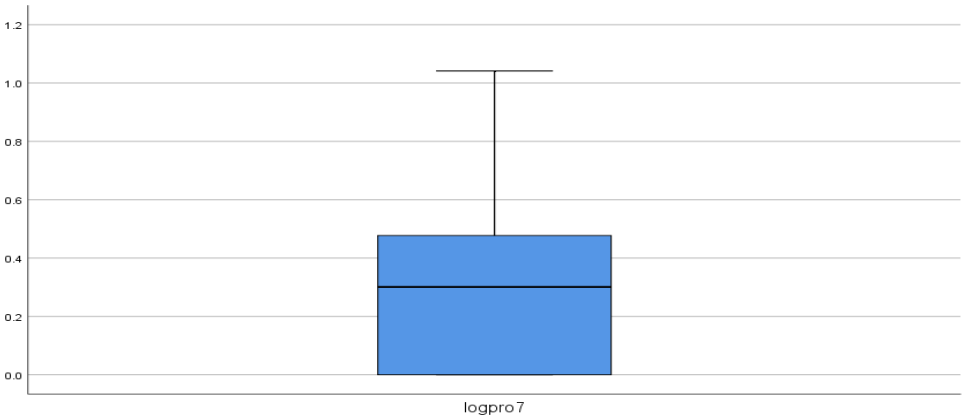
Strengthens and difficulties questionnaire (SDQ) scores when the child was 7 years old. histogram, QQ plots and box plots for prosocial behaviours measures after being transformed using log10.



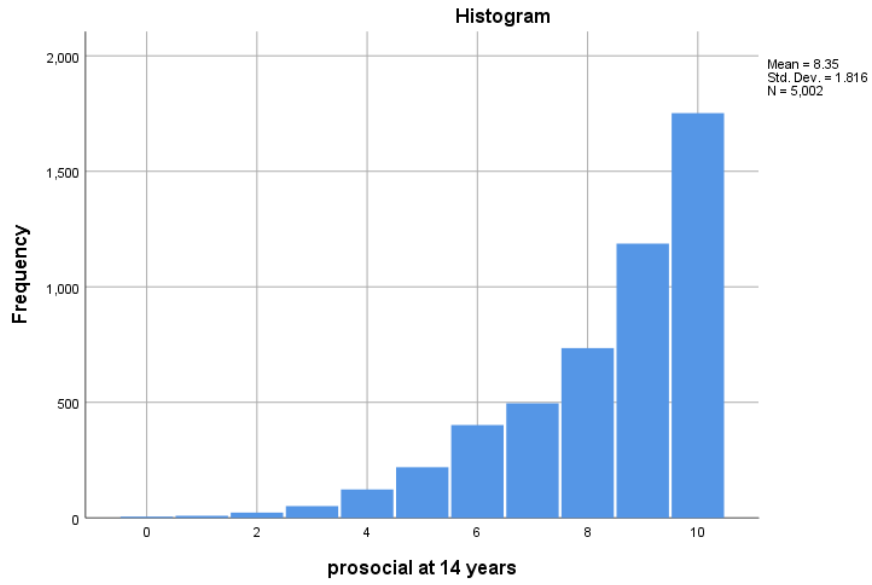


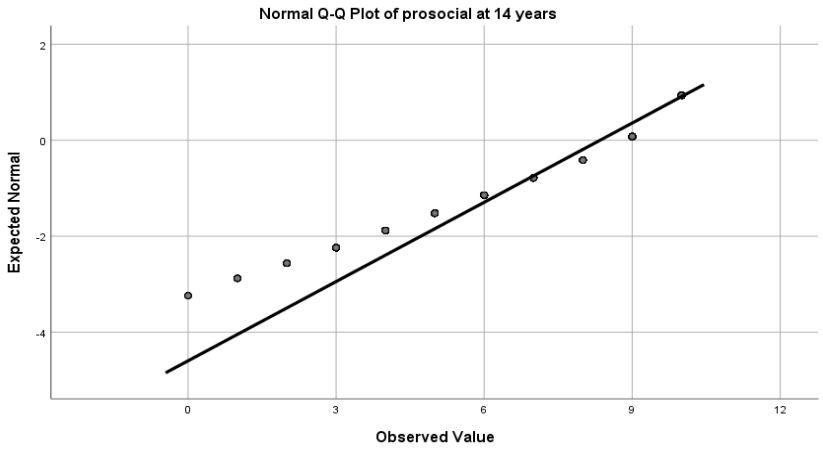
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

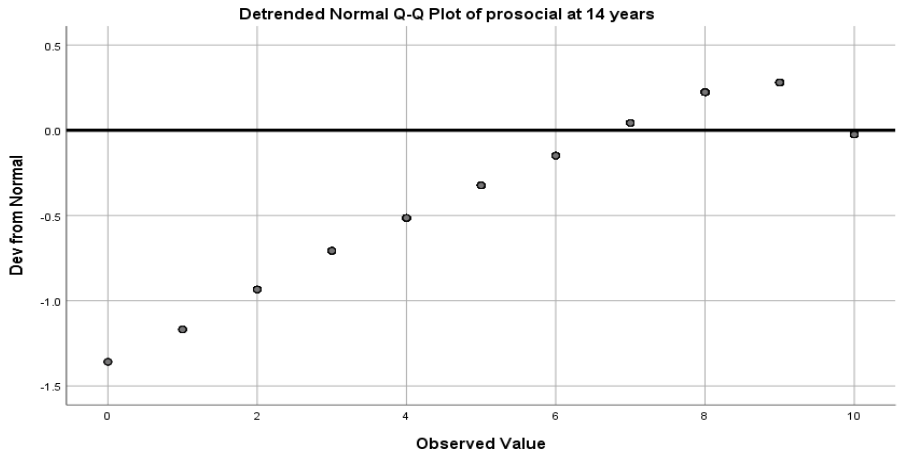


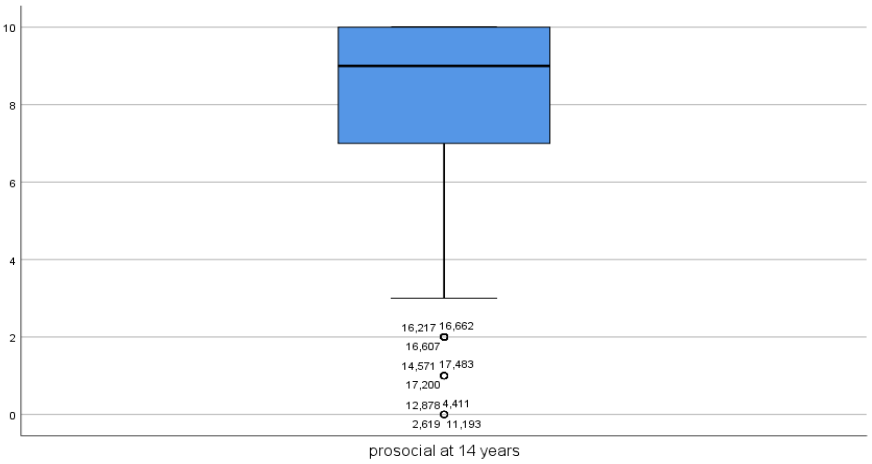


Strengthens and difficulties questionnaire (SDQ) scores when the child was 14 years old. histogram, QQ plots and box plots for prosocial behaviours measures prior to being transformed.

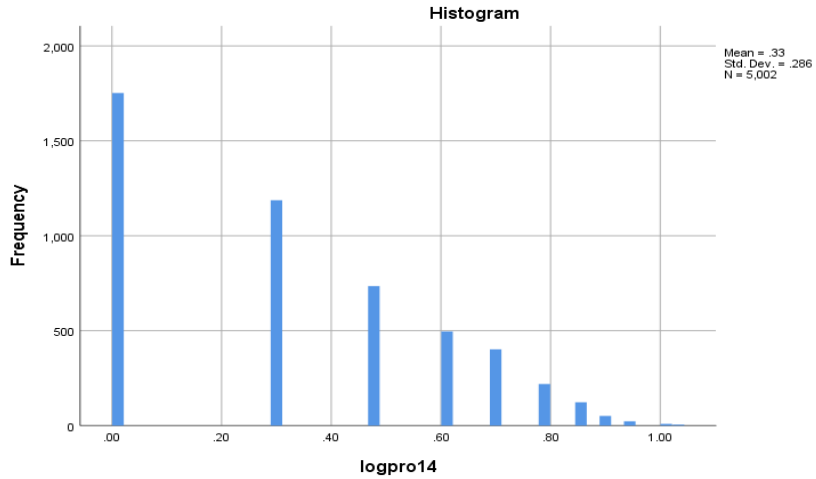


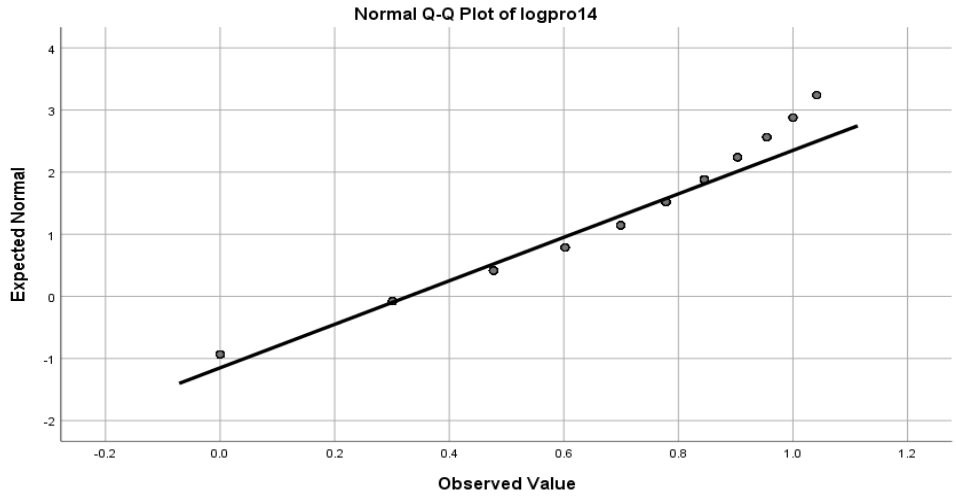

Normal Q-Q Plot of prosocial at 14 years
Expected Normal
Observed Value
2
0
-2
-4
0
3
6
9
12

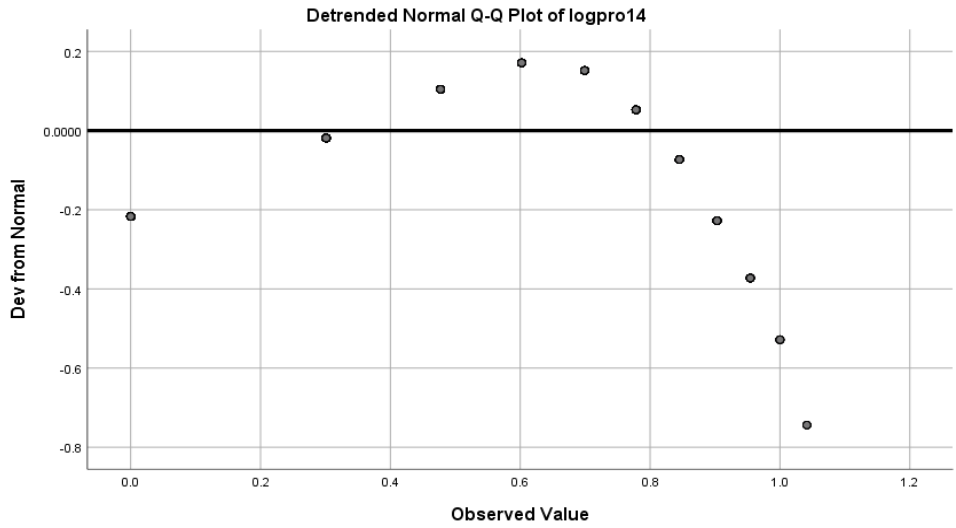

Detrended Normal Q-Q Plot of prosocial at 14 years
Dev from Normal
Observed Value
0.5
0.0
-0.5
-1.0
-1.5
0
2
4
6
8
10


10
8
6
4
2
0
16,217
16,662
16,607
14,571
17,483
17,200
12,878
4,411
2,619
11,193
prosocial at 14 years

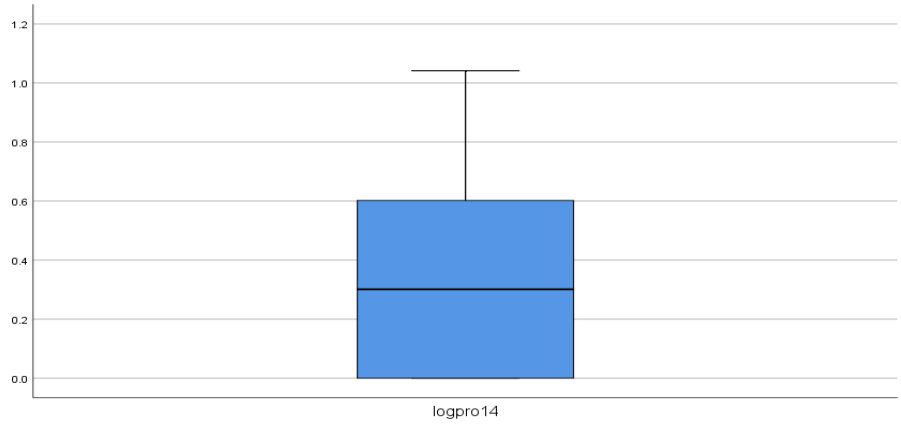
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



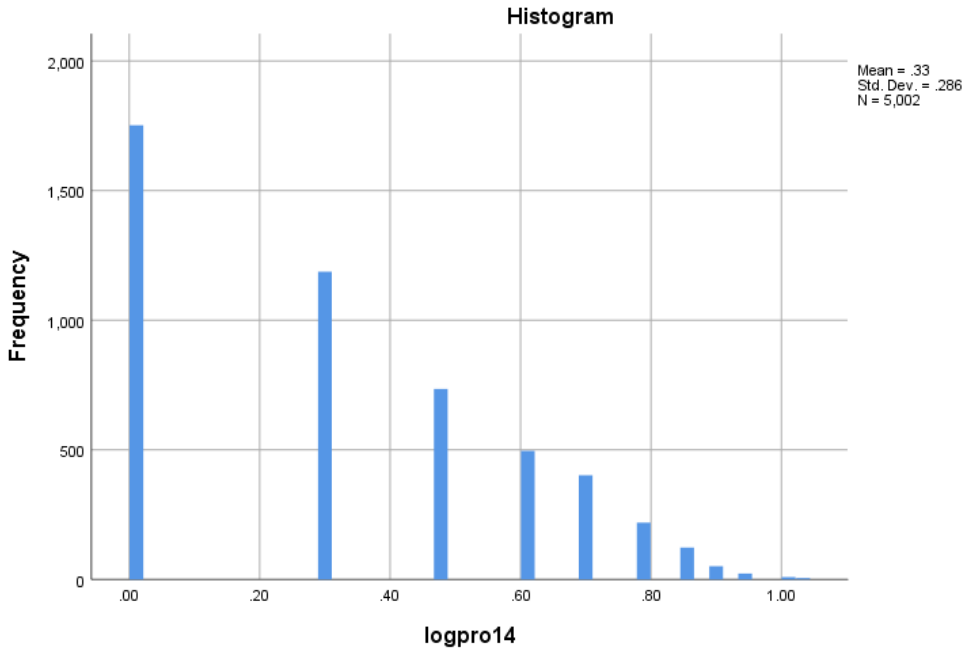




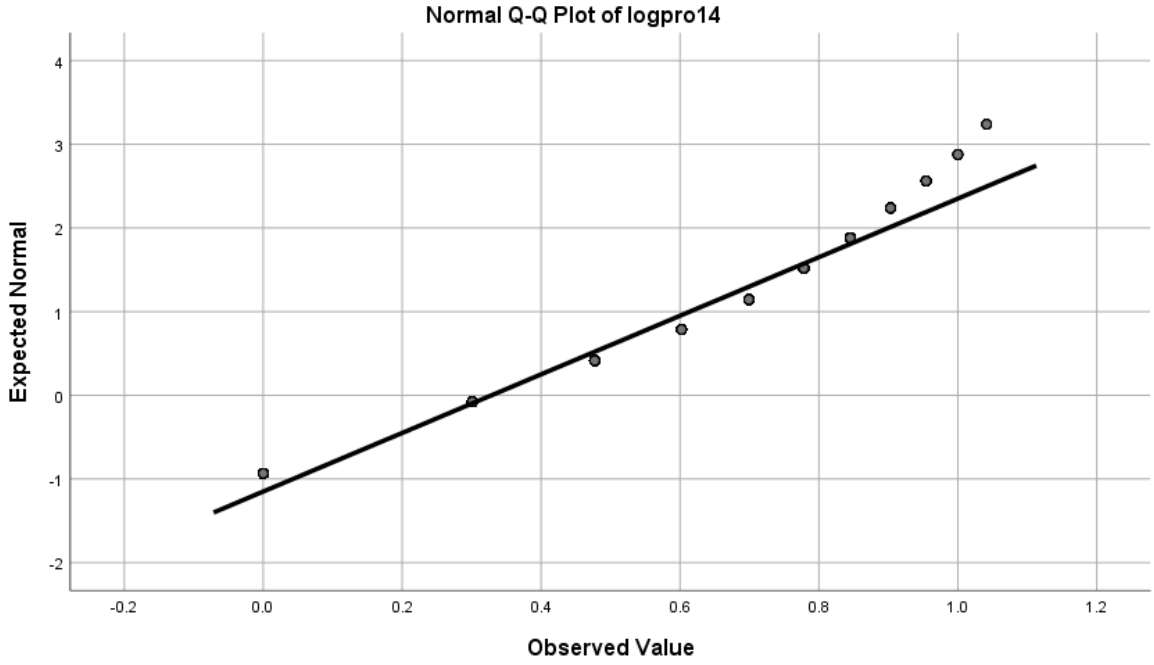
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

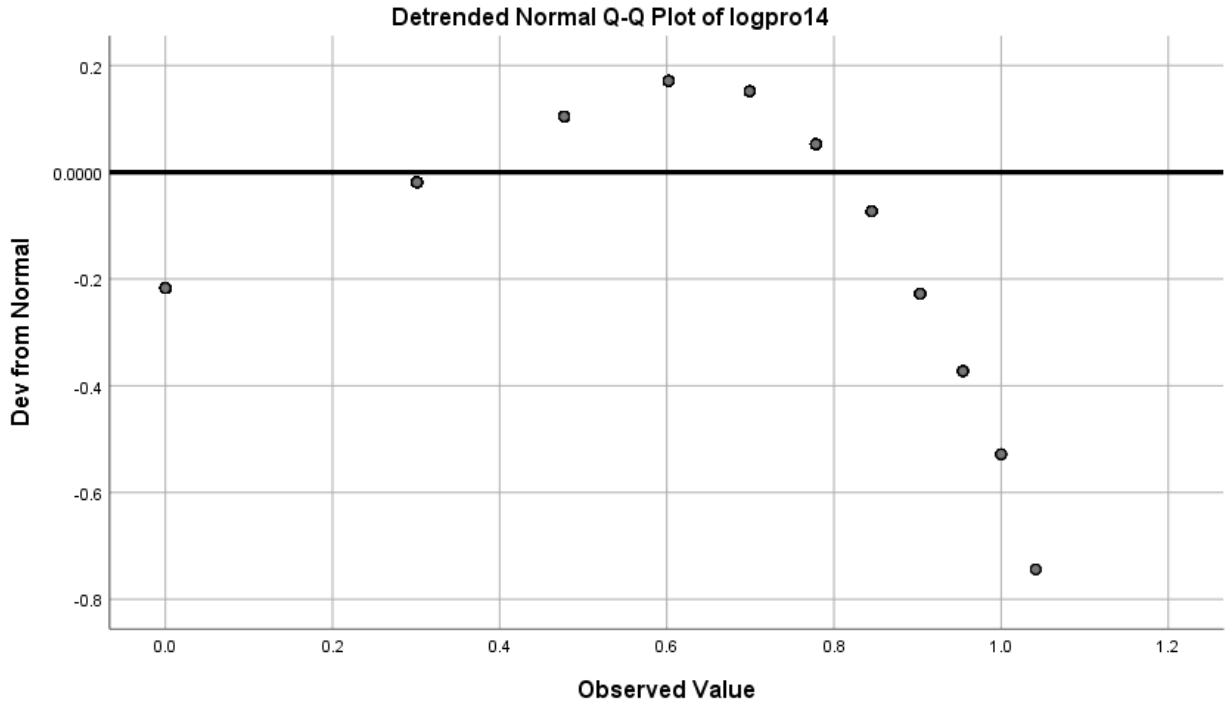


Strengthens and difficulties questionnaire (SDQ) scores when the child was 14 years old. histogram, QQ plots and box plots for prosocial behaviours measures after being transformed using log10.

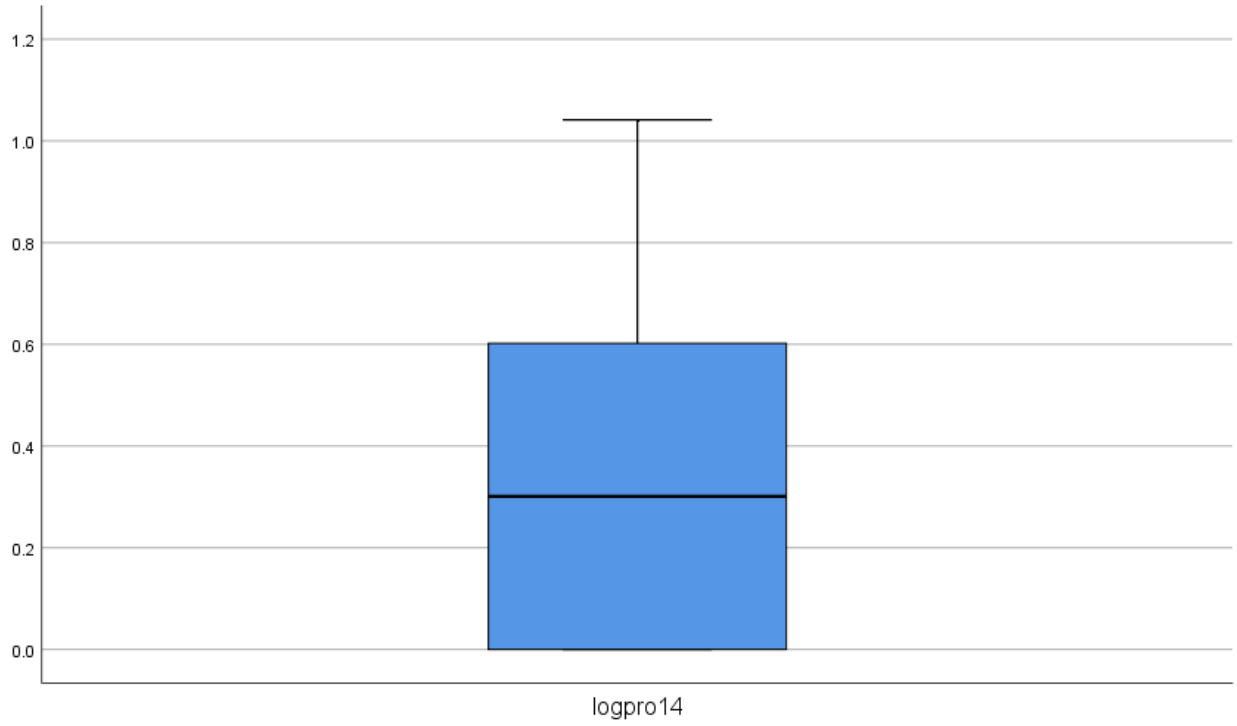


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

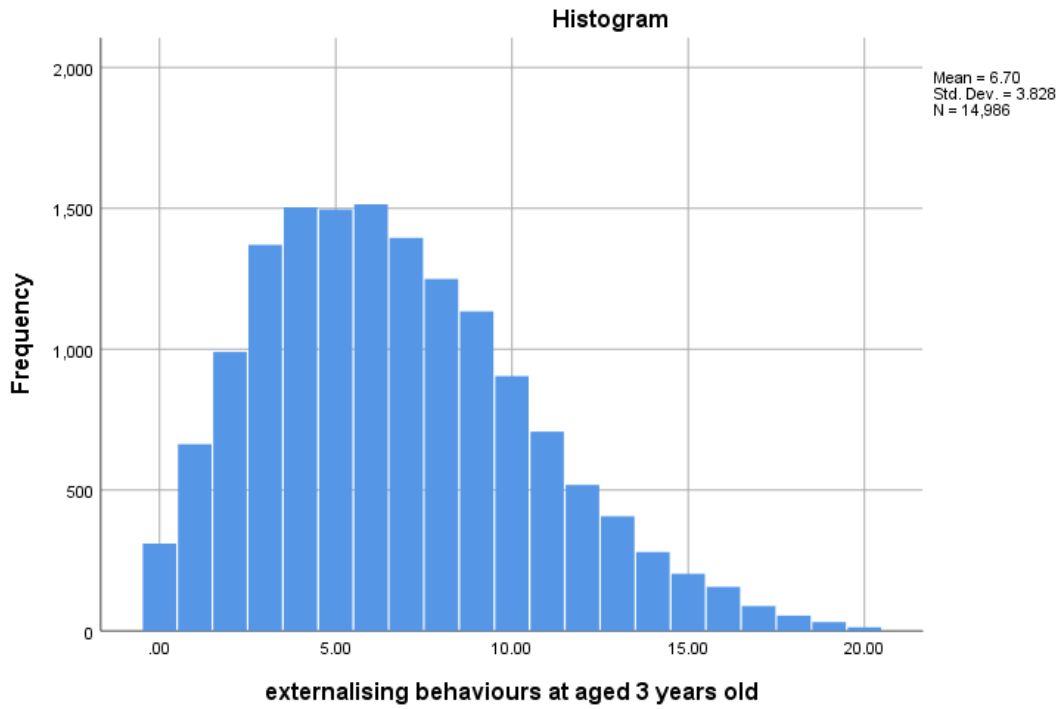


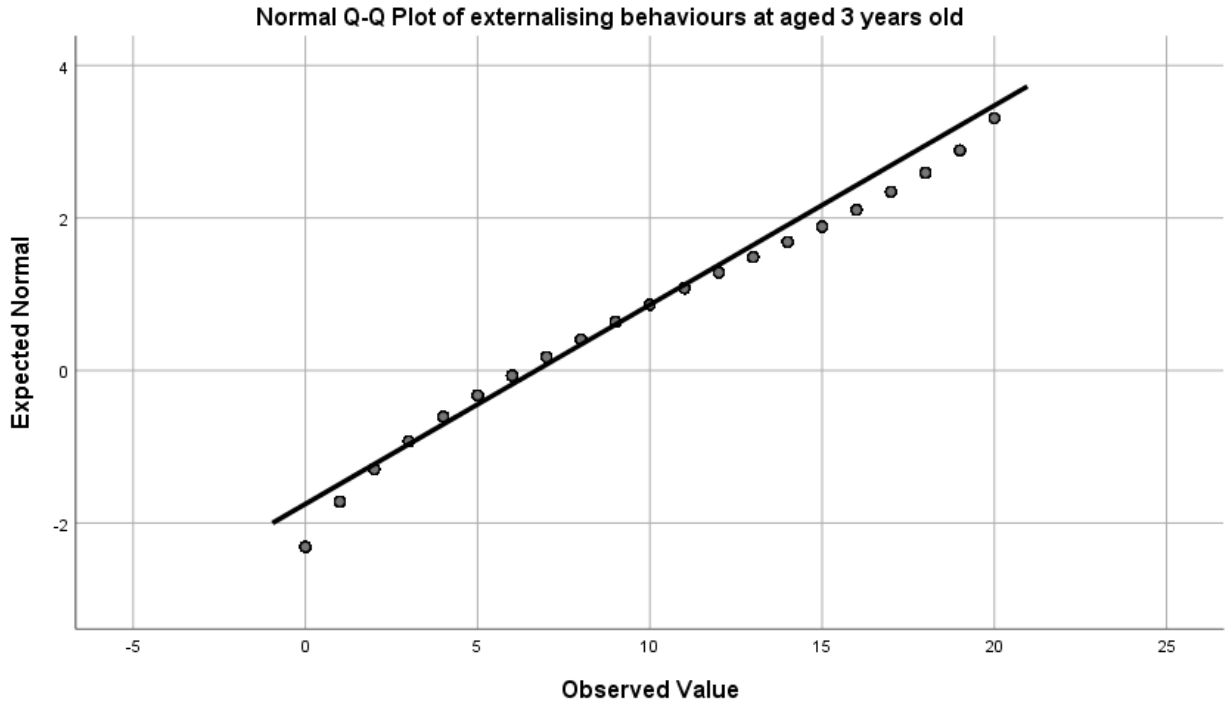


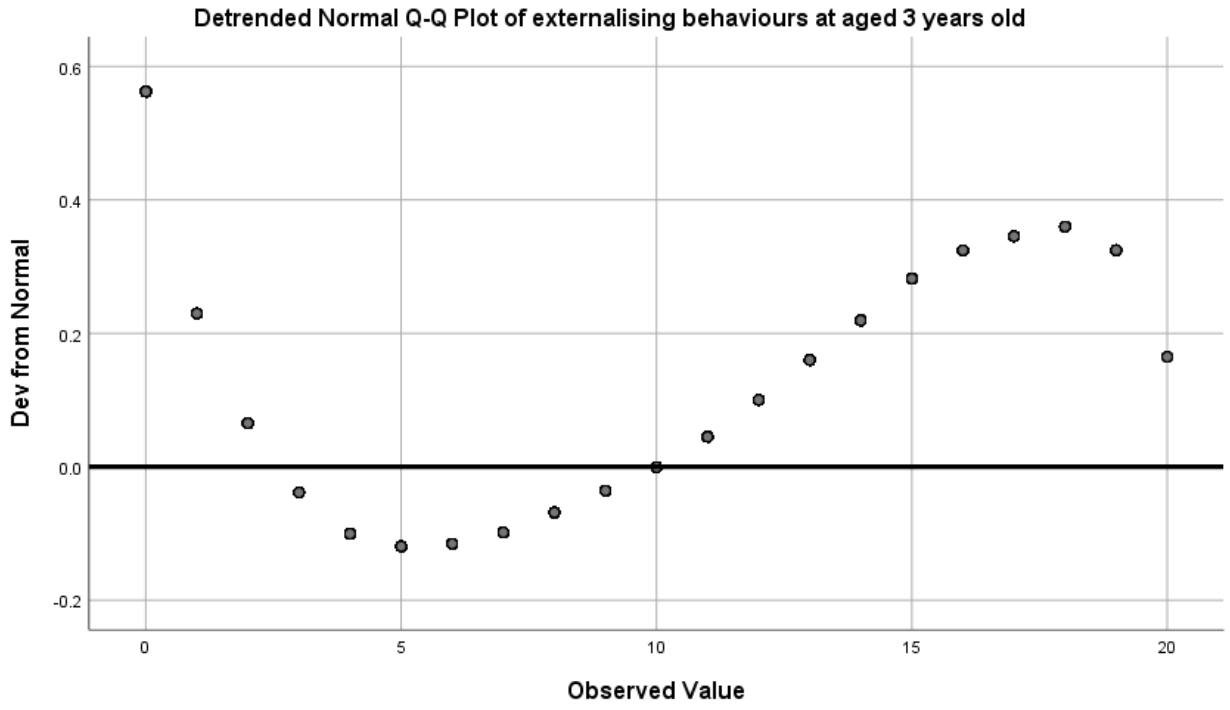
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



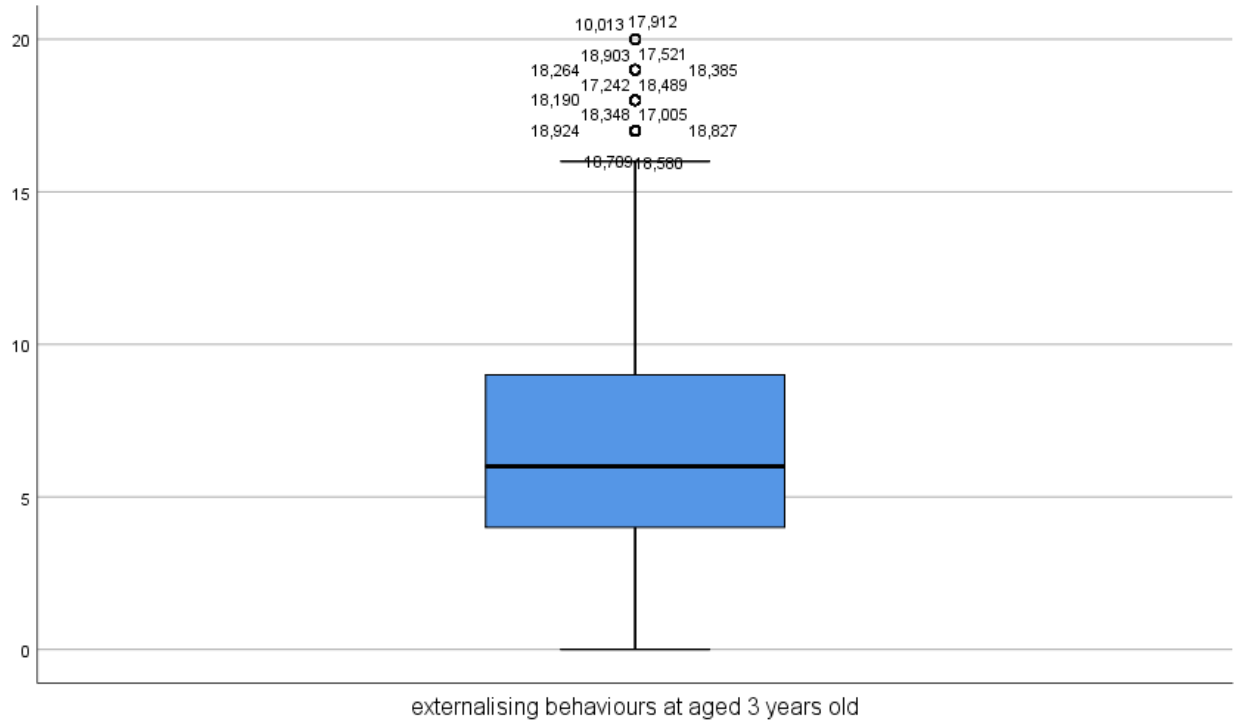
Strengthens and difficulties questionnaire (SDQ) scores when the child was 3 years old. histogram, QQ plots and box plots for externalising behaviours measures prior to being transformed.




Normal Q-Q Plot of externalising behaviours at aged 3 years old
Expected Normal
Observed Value
4
2
0
-2
-5
0
5
10
15
20
25

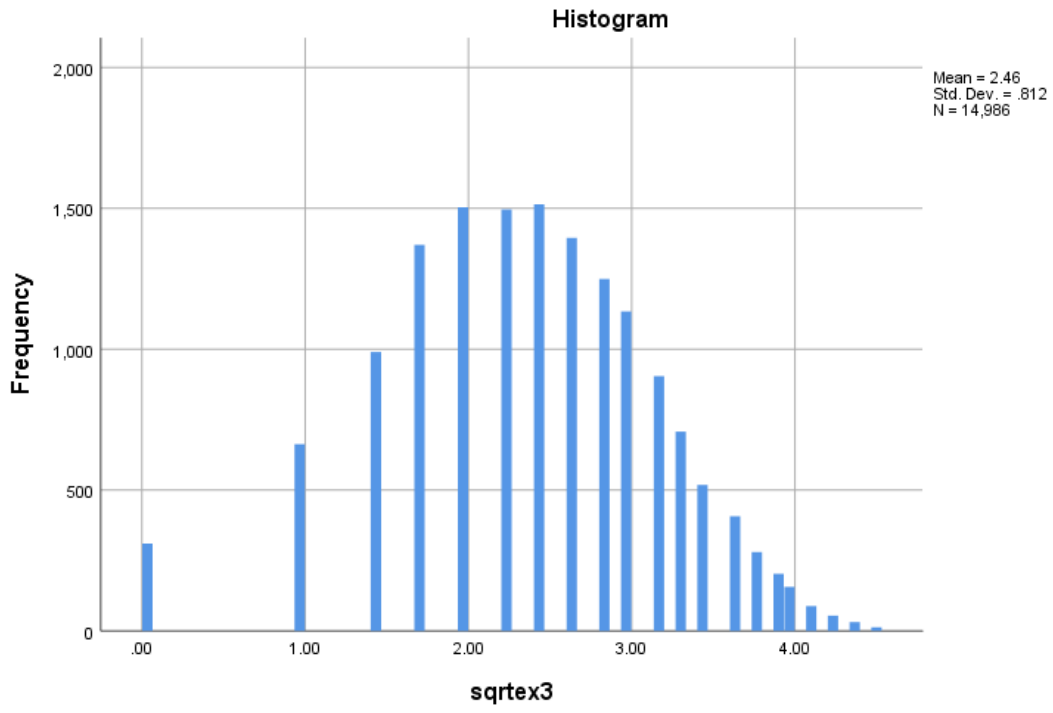

Detrended Normal Q-Q Plot of externalising behaviours at aged 3 years old
Dev from Normal
Observed Value
0.6
0.4
0.2
0.0
-0.2
0
5
10
15
20

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

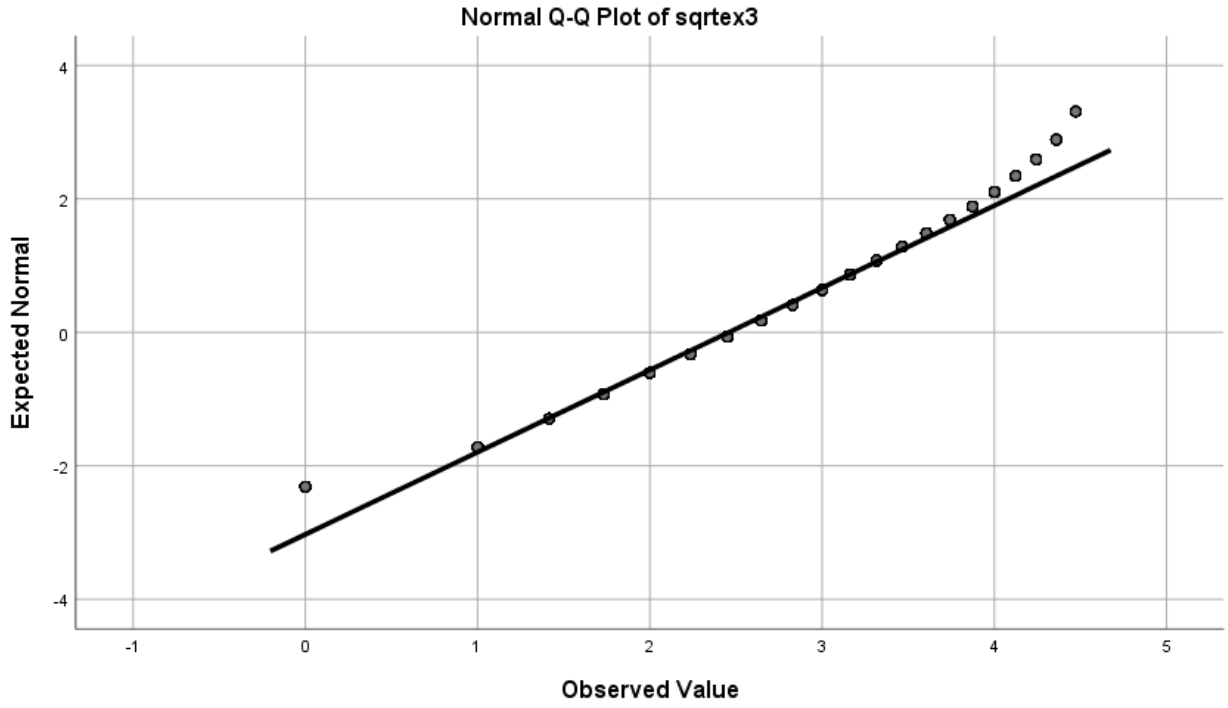


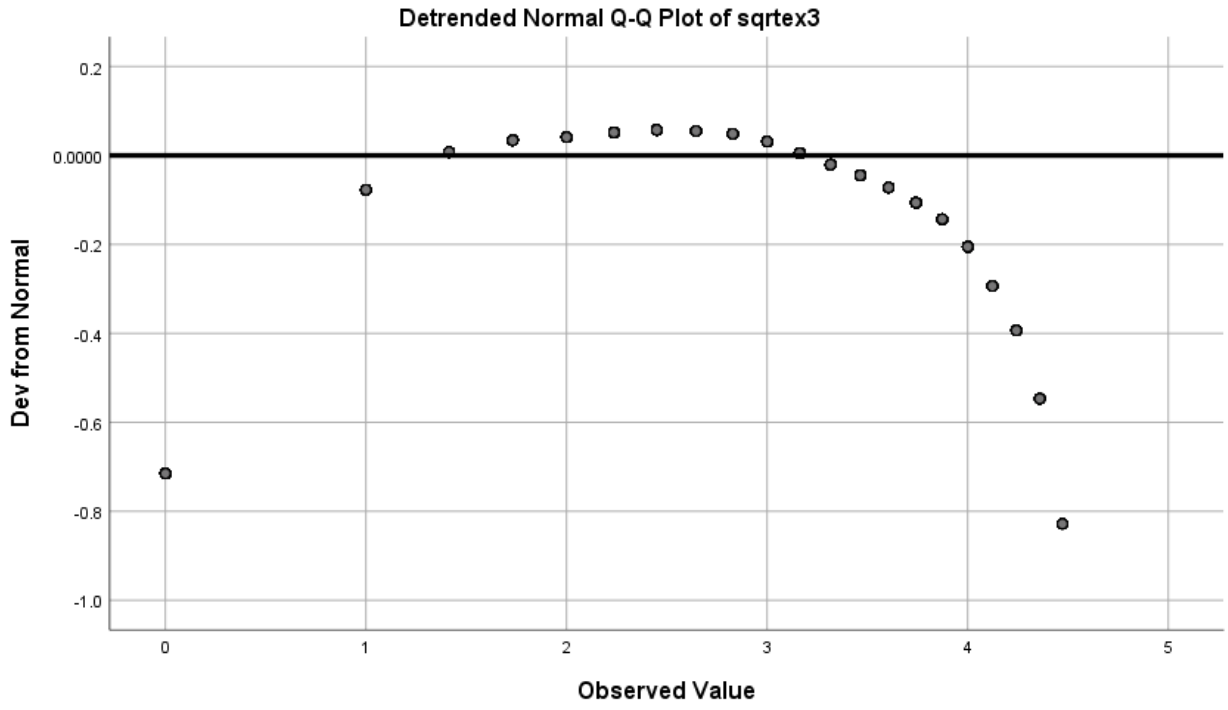
Strengthens and difficulties questionnaire (SDQ) scores when the child was 3 years old. histogram,

QQ plots and box plots for externalising behaviours measures after being transformed using square root (SQRT).

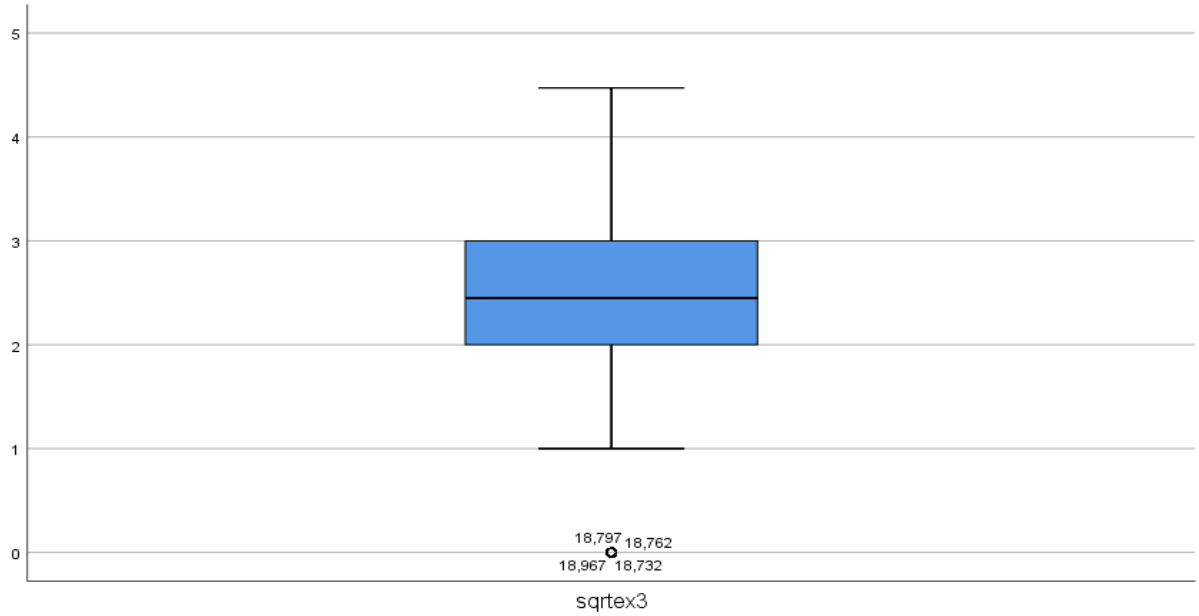


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

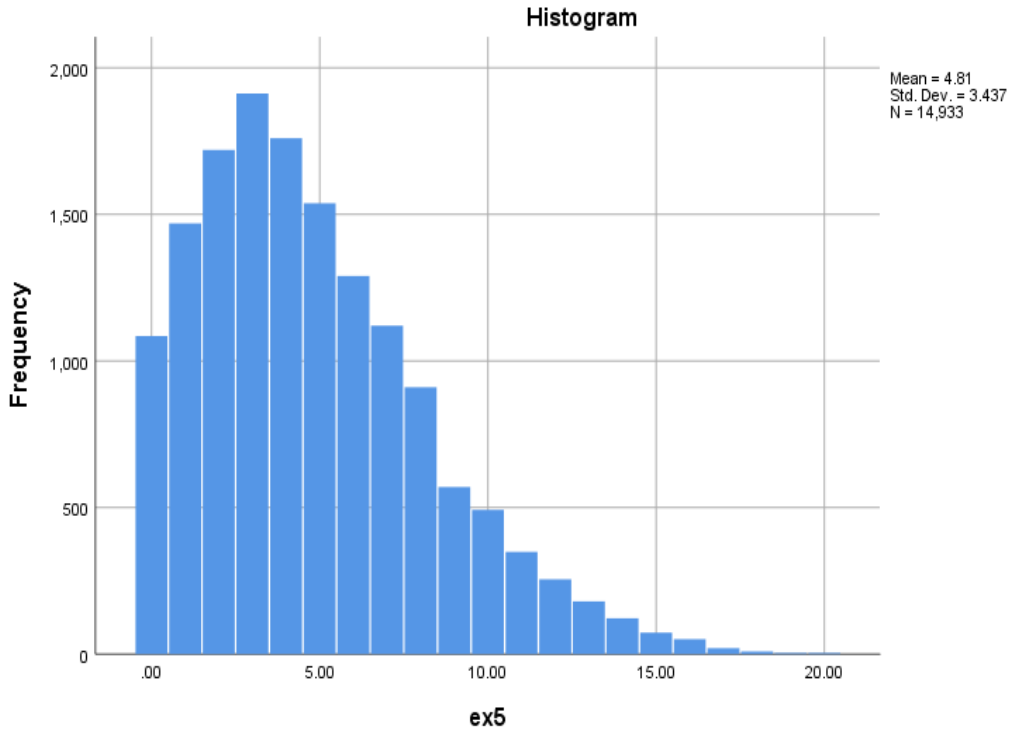




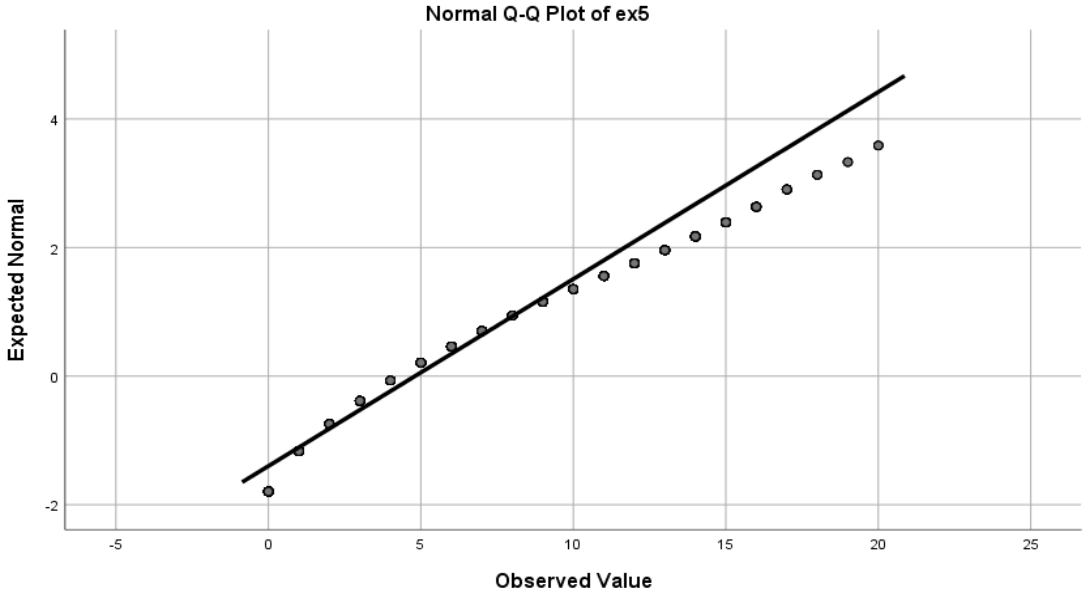
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

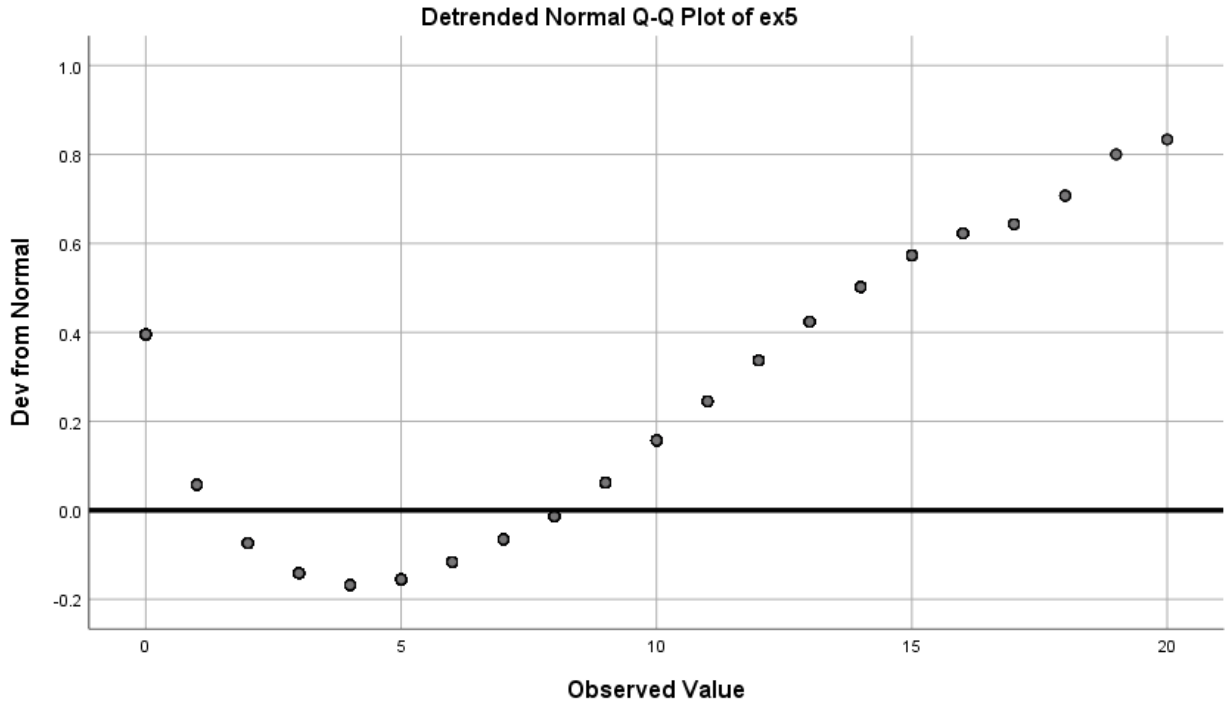


Strengthens and difficulties questionnaire (SDQ) scores when the child was 5 years old. histogram, QQ plots and box plots for externalising behaviours measures prior to being transformed.

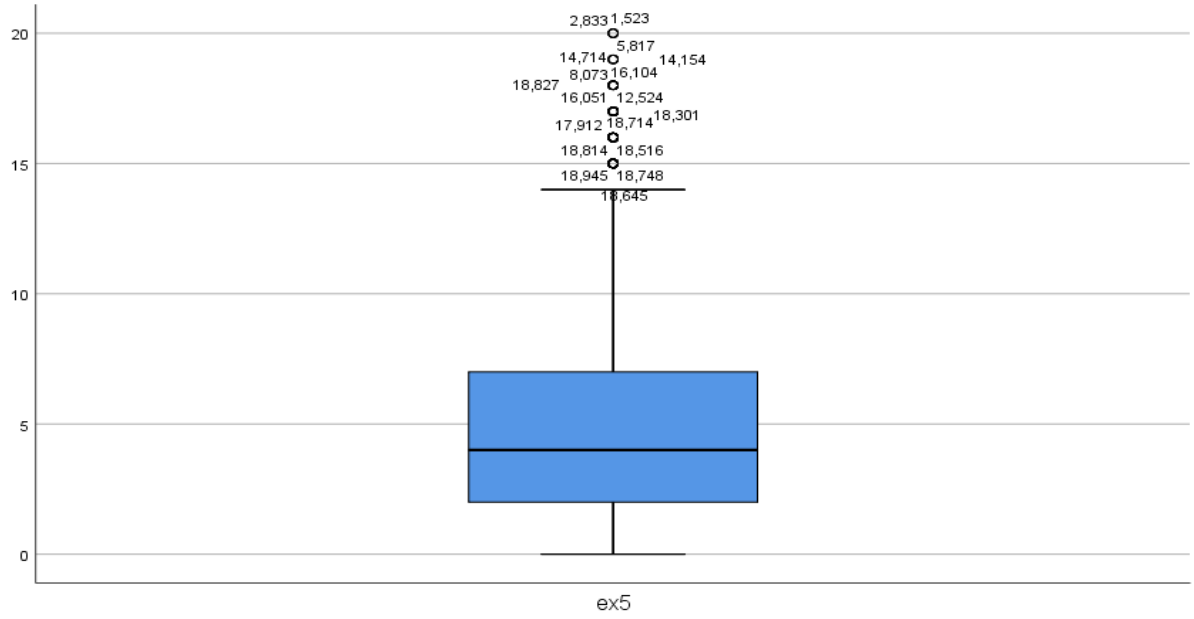


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

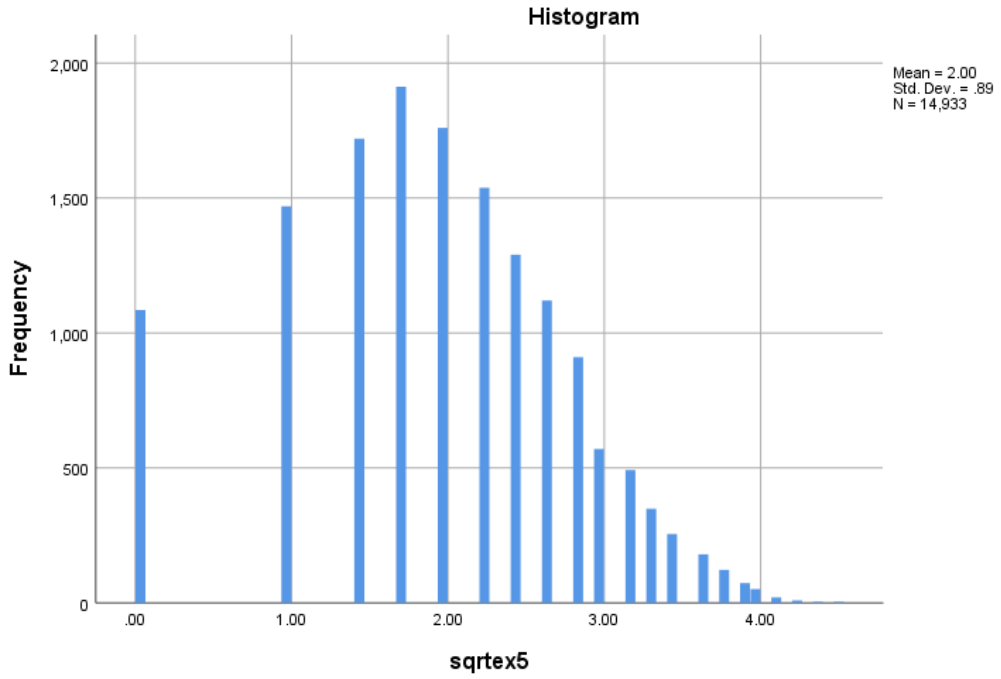


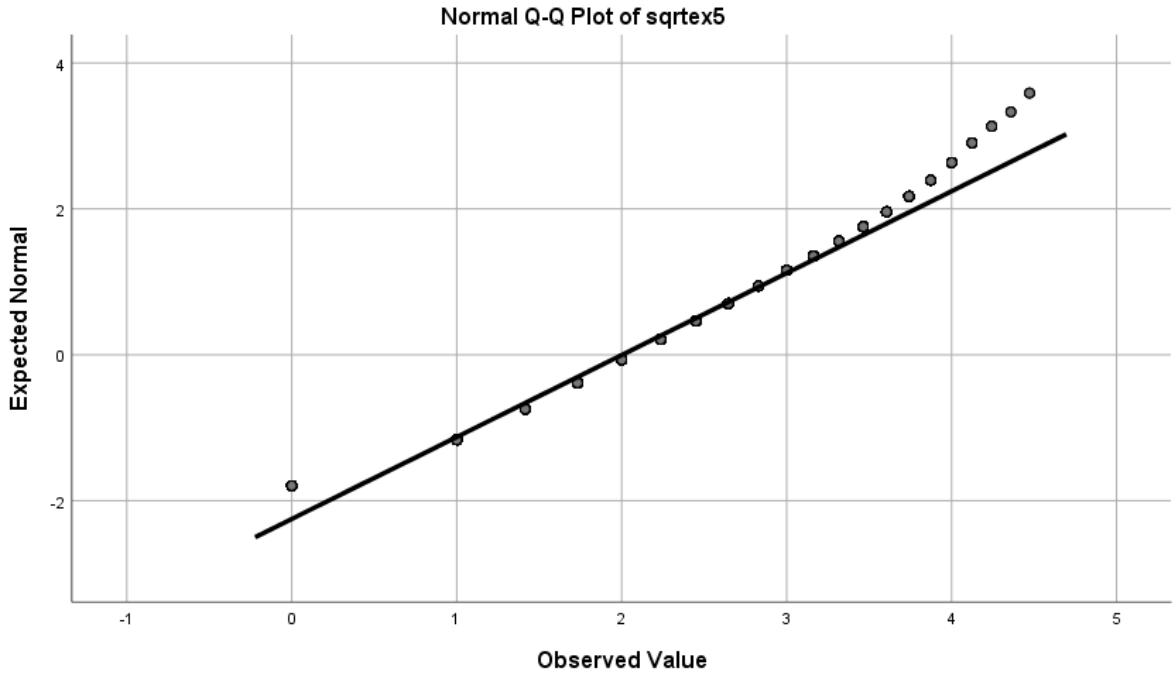


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

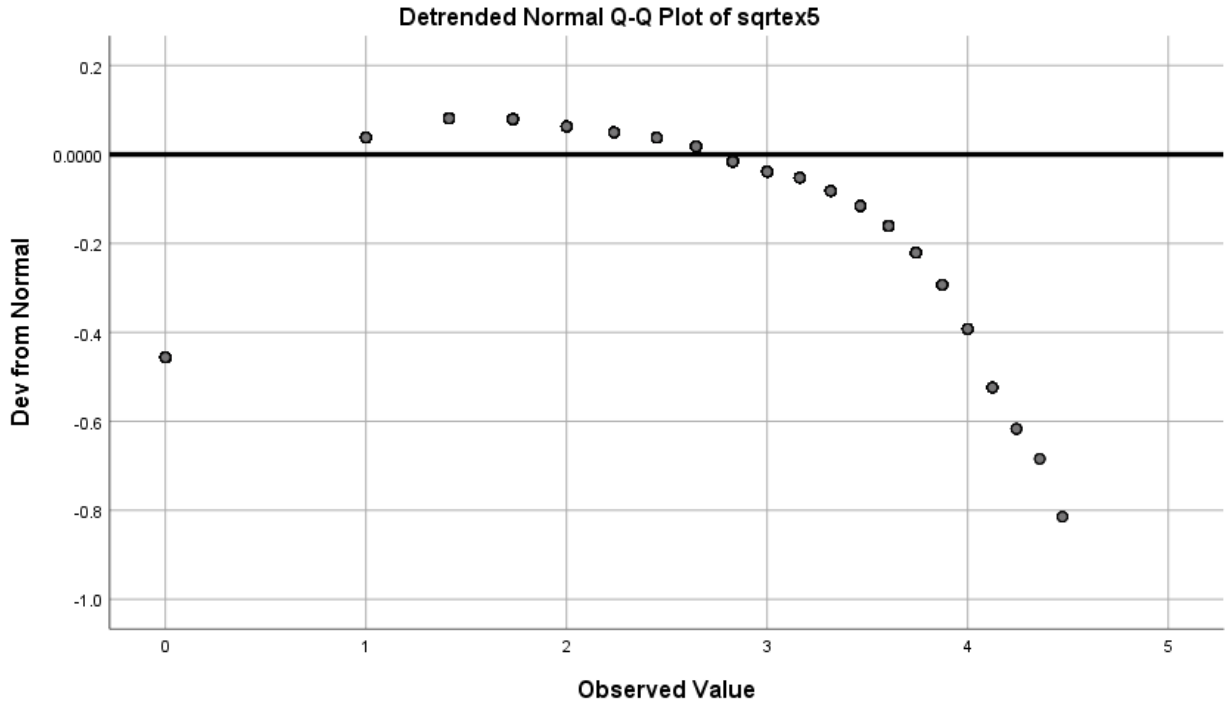


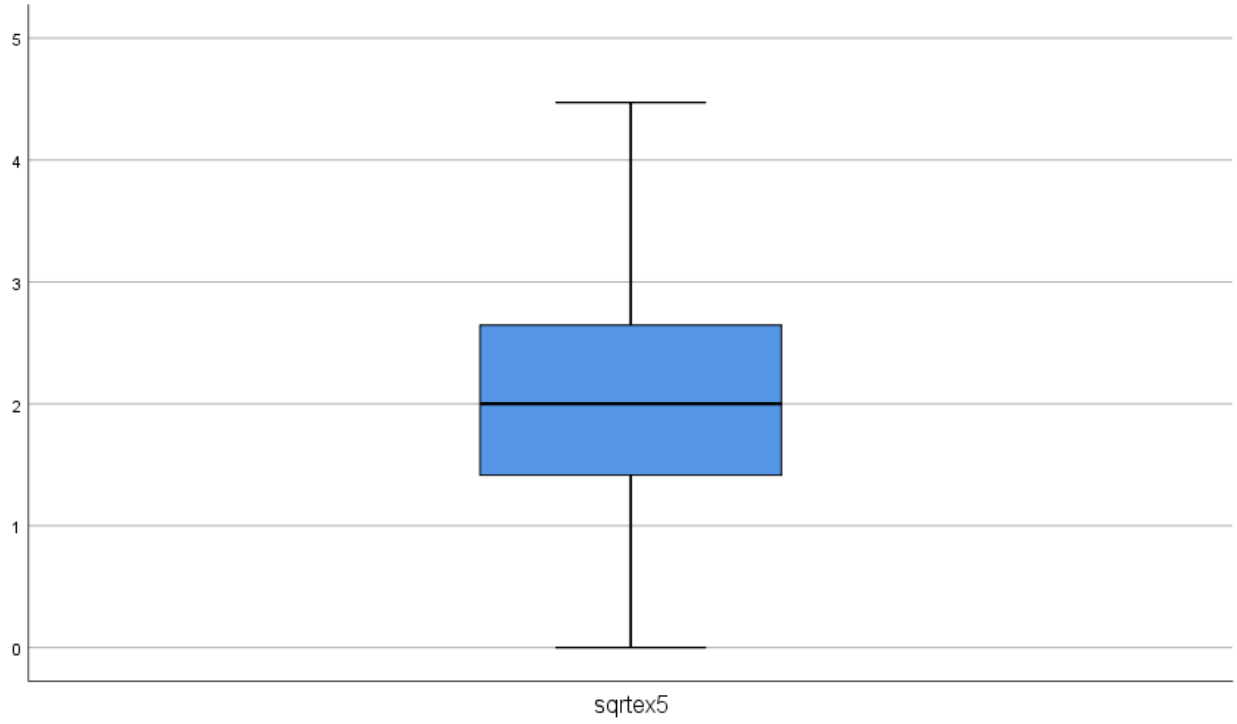
Strengthens and difficulties questionnaire (SDQ) scores when the child was 5 years old. histogram, QQ plots and box plots for externalising behaviours measures after being transformed using square root (SQRT).



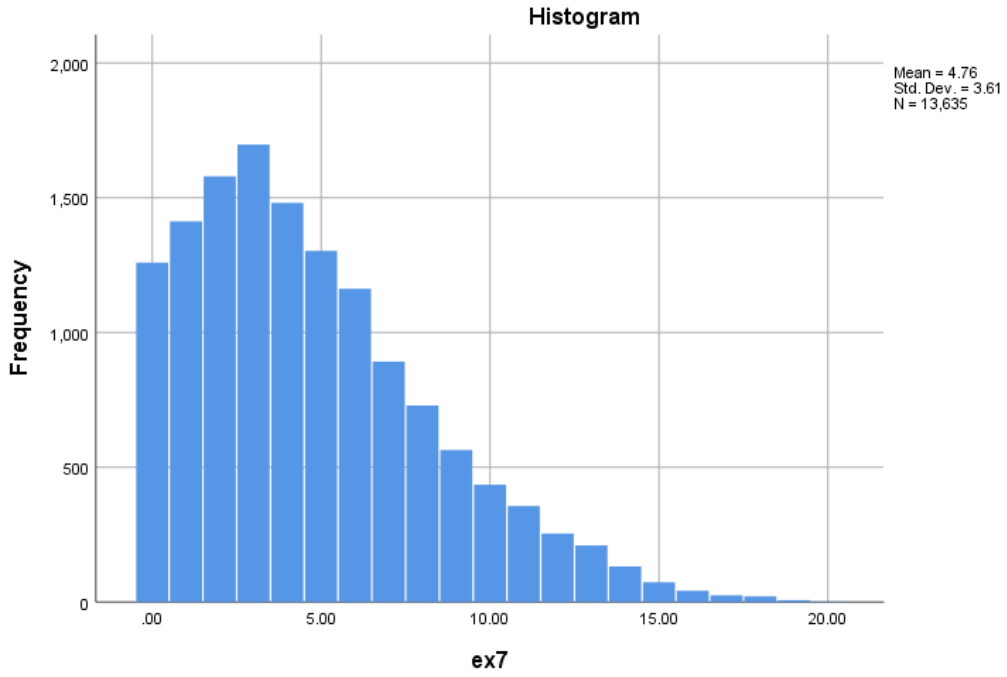


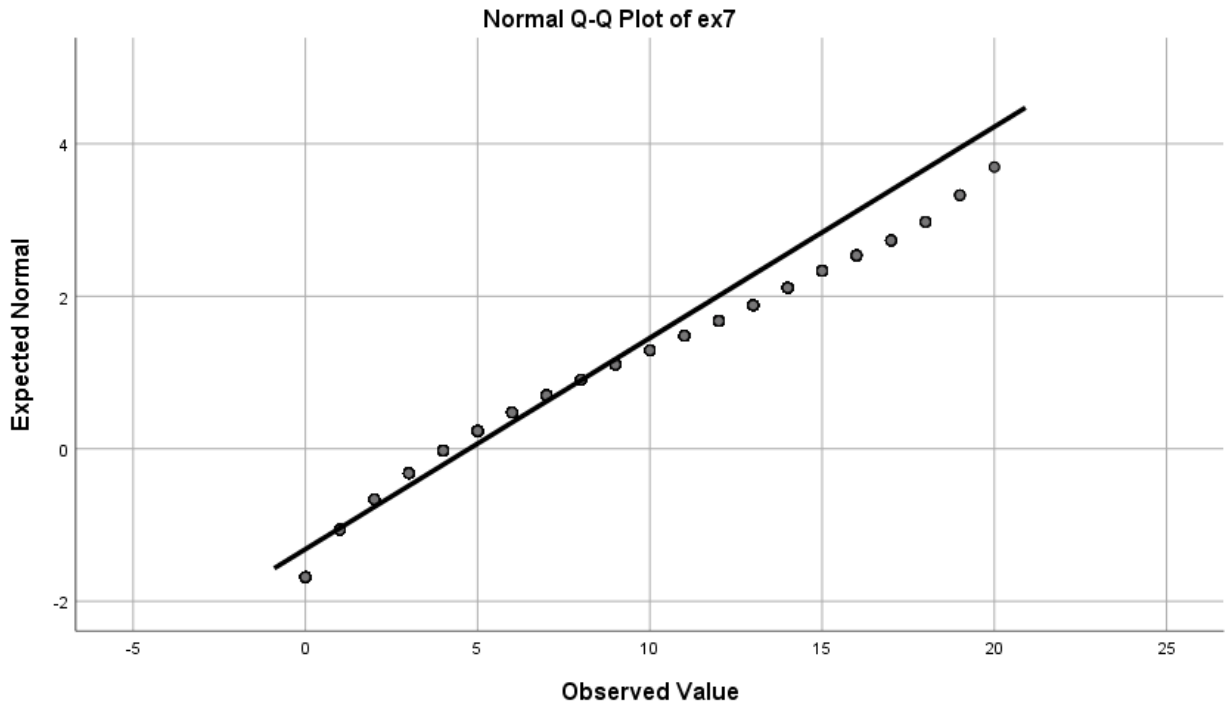
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



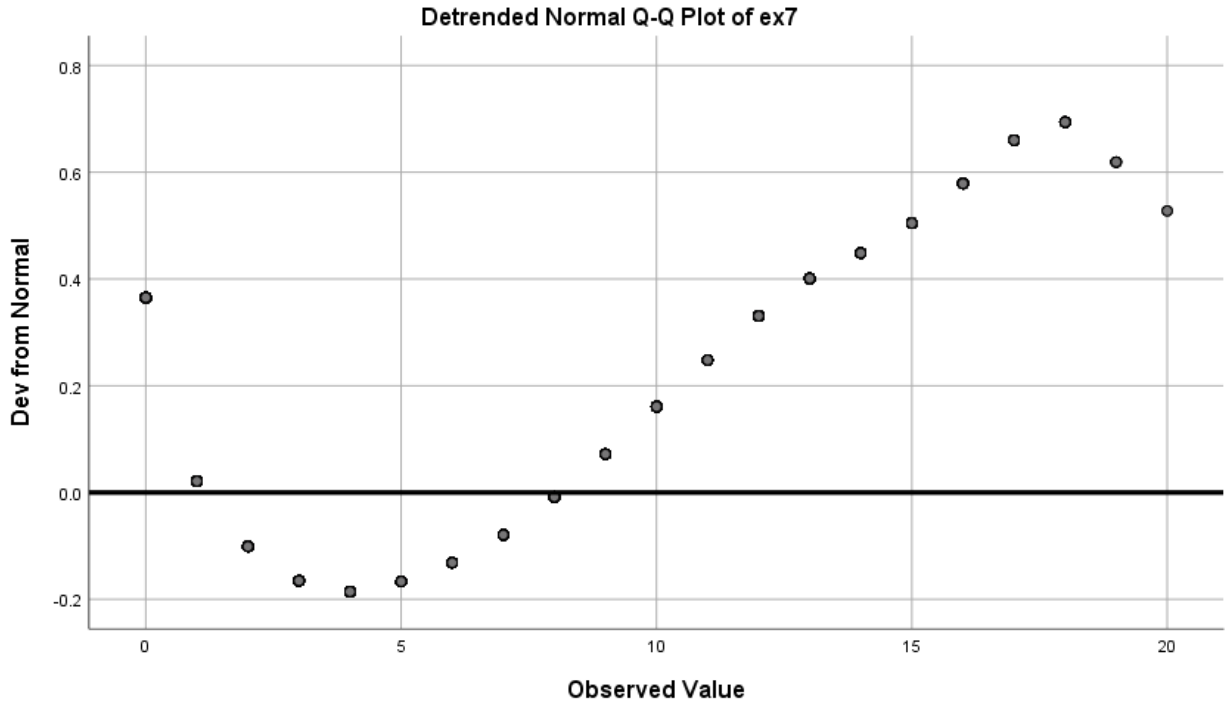


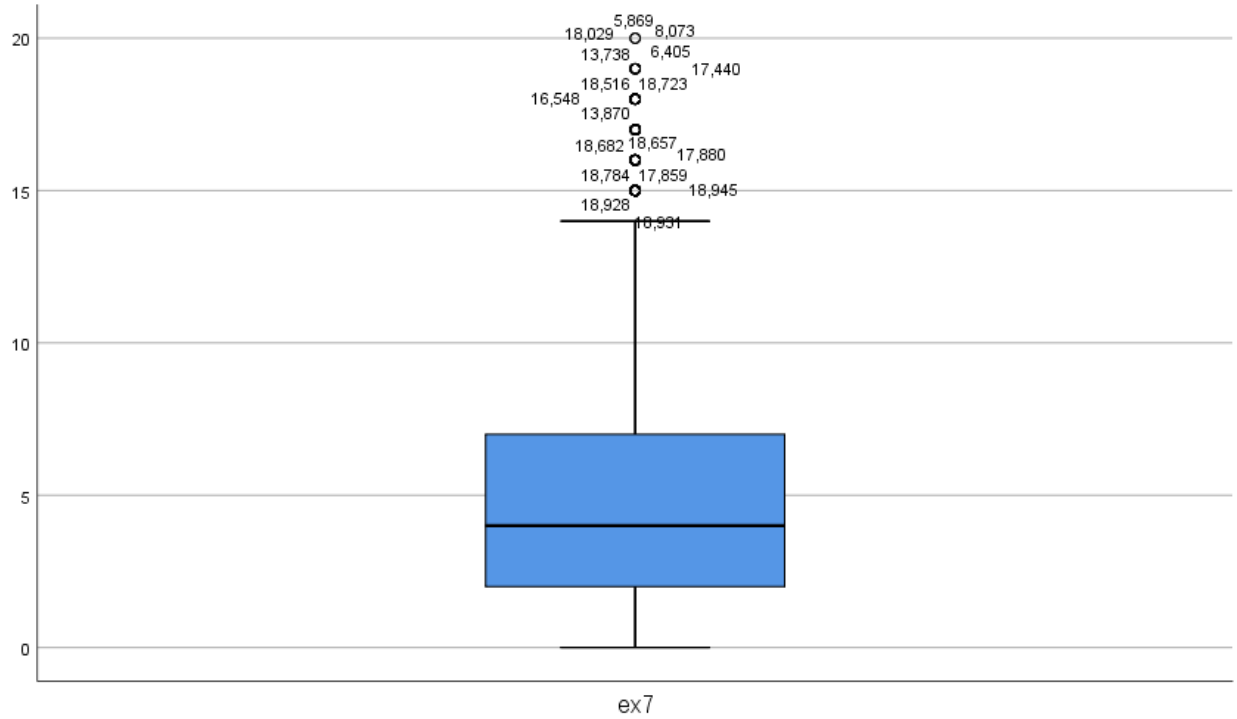
Strengthens and difficulties questionnaire (SDQ) scores when the child was 7 years old. histogram, QQ plots and box plots for externalising behaviours measures prior to being transformed.



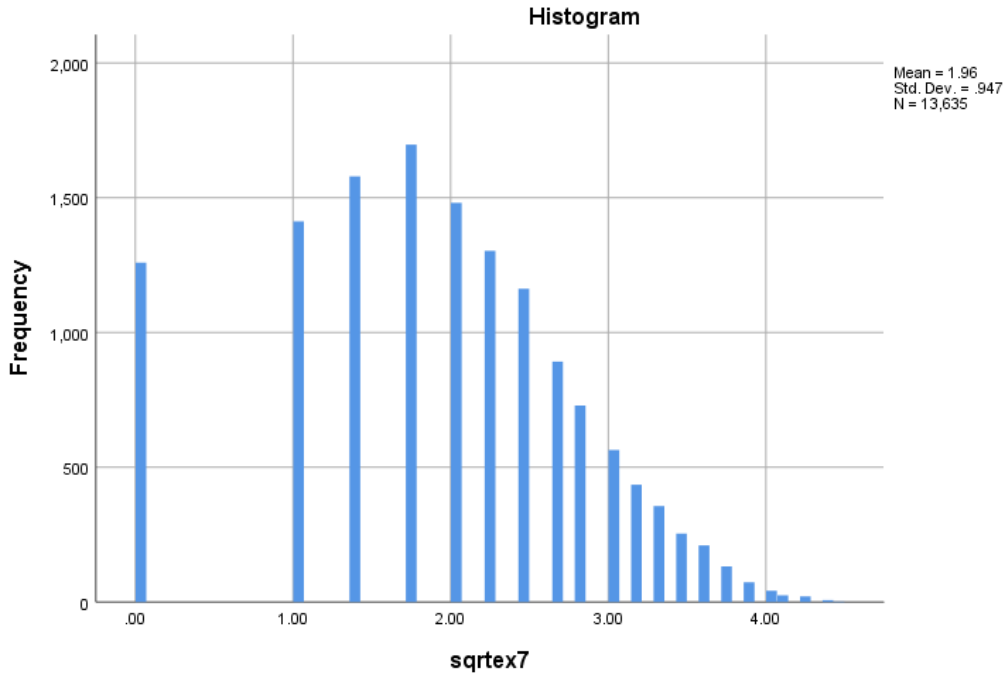


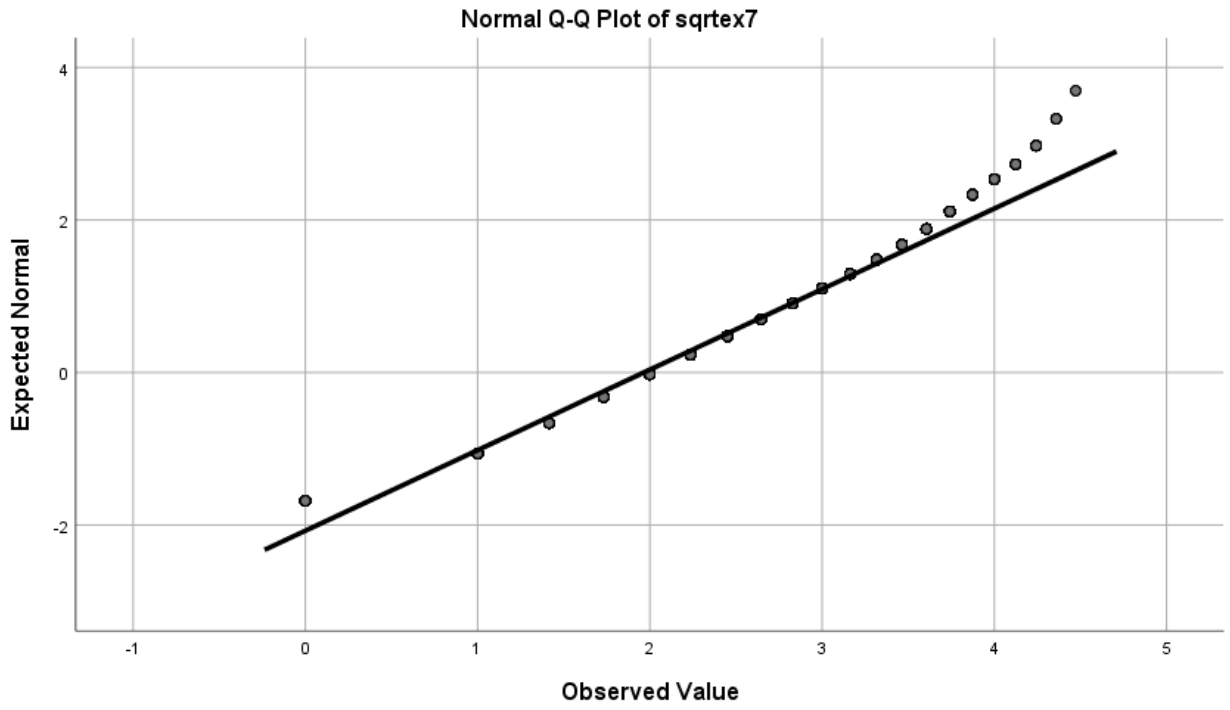
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

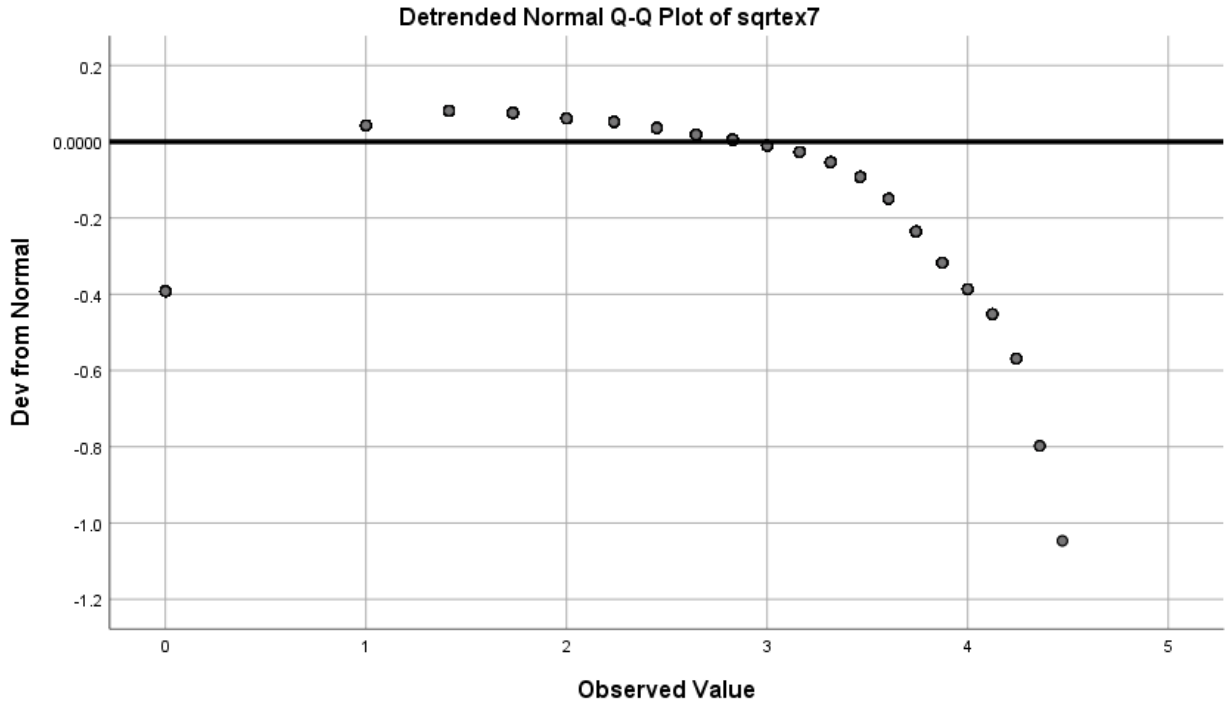


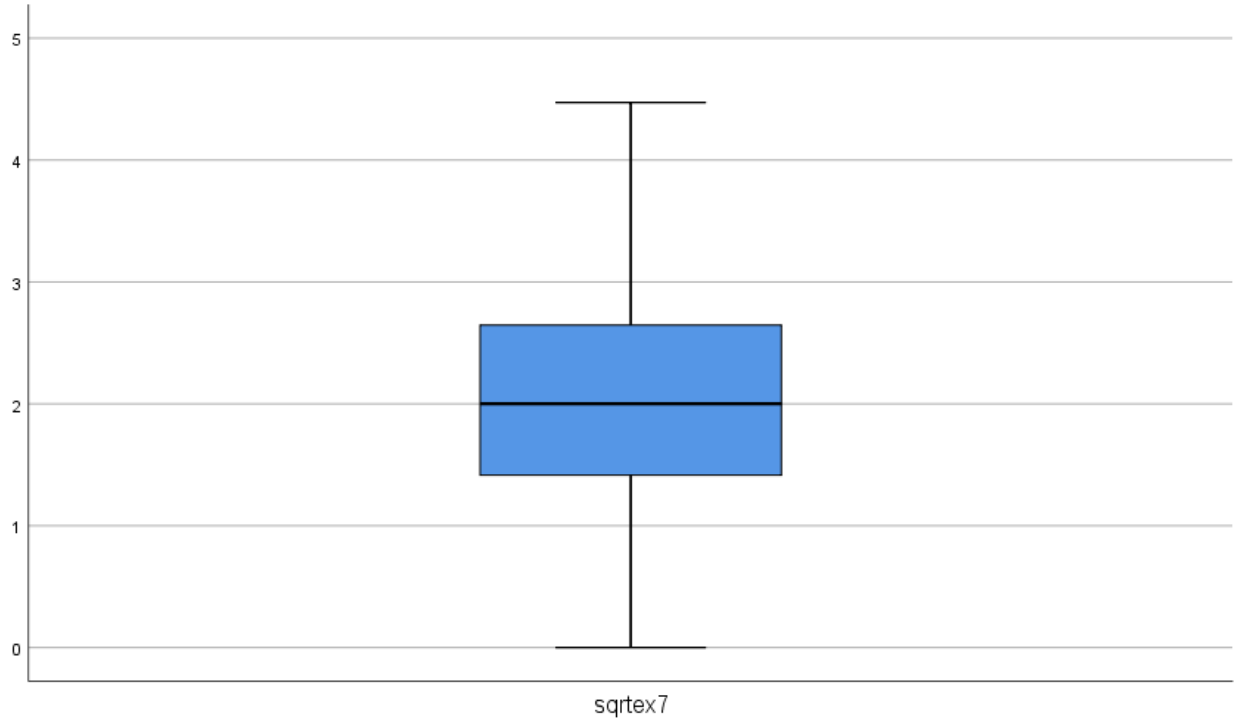


Strengthens and difficulties questionnaire (SDQ) scores when the child was 7 years old. histogram, QQ plots and box plots for externalising behaviours measures after being transformed using square root (SQRT).



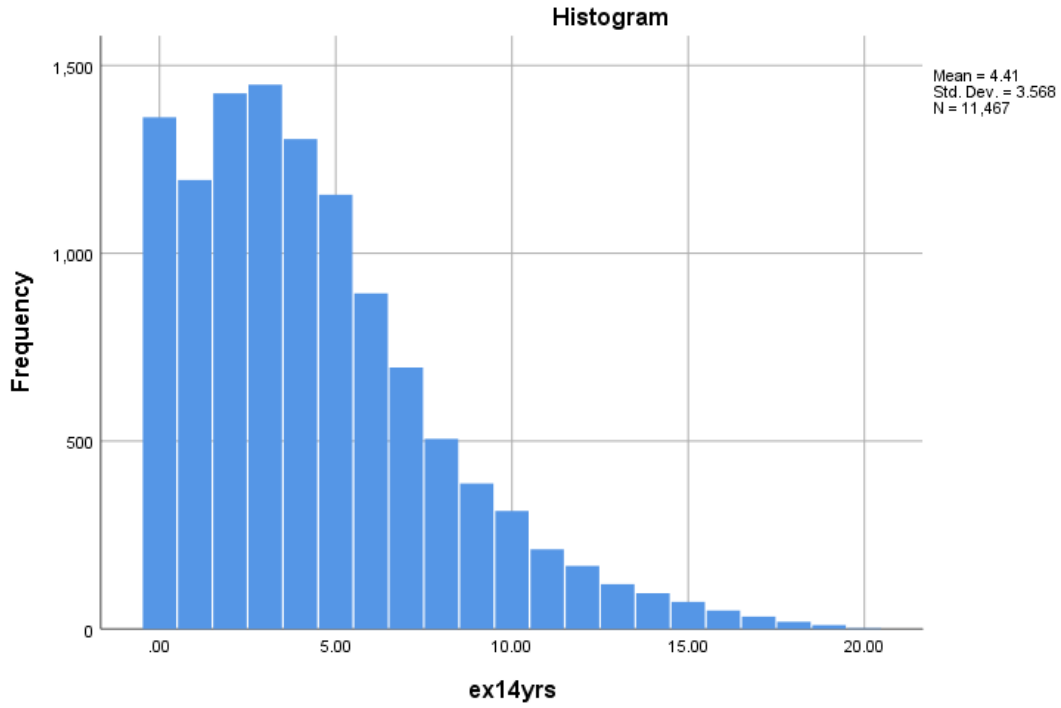


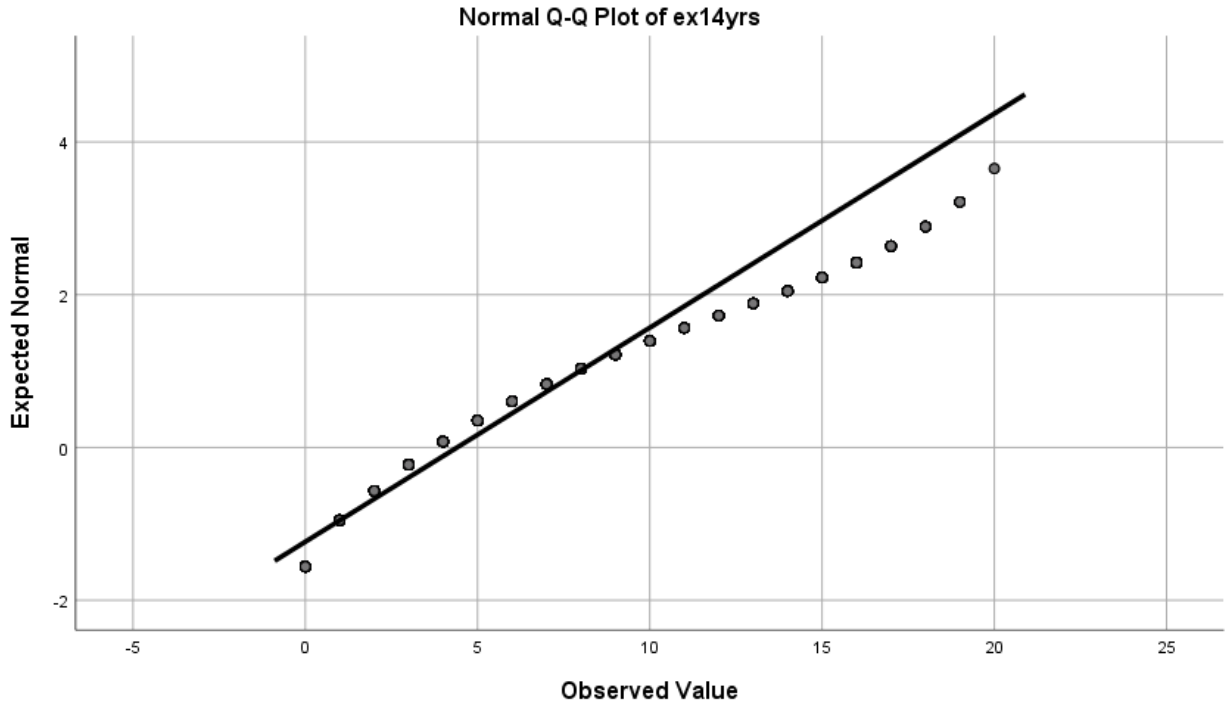

Detrended Normal Q-Q Plot of sqrtex7
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
0
1
2
3
4
5
Observed Value

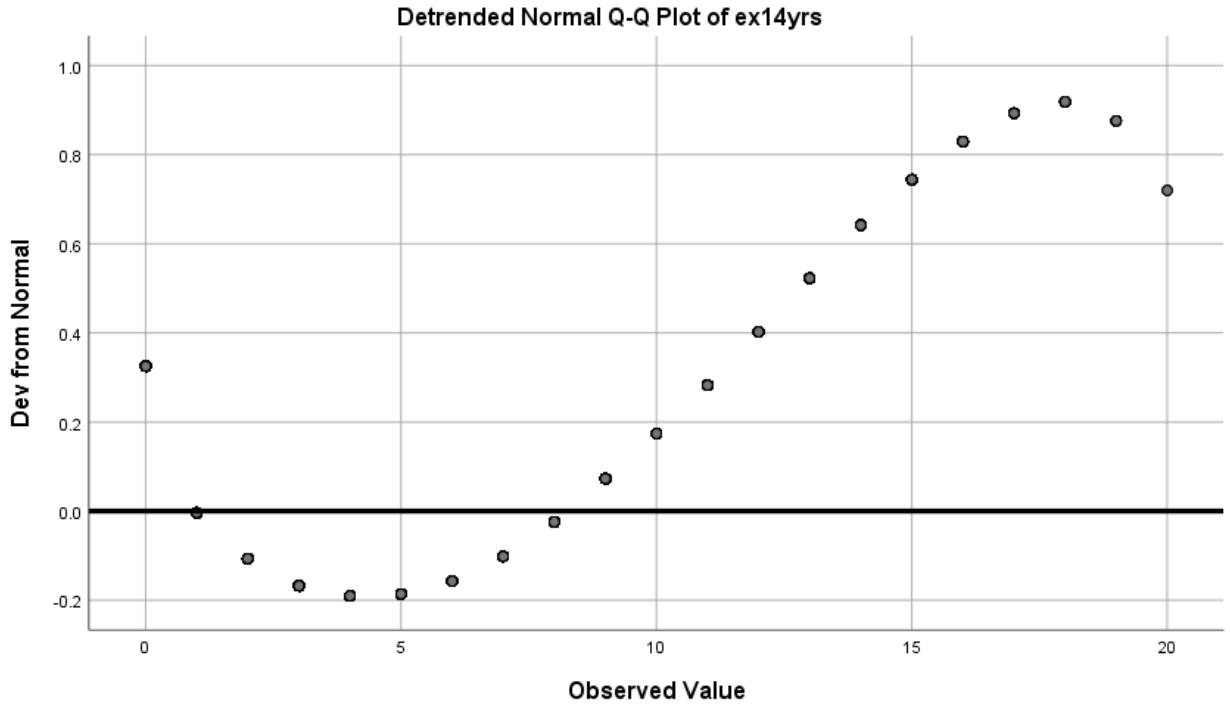

5
4
3
2
1
0
sqrtex7

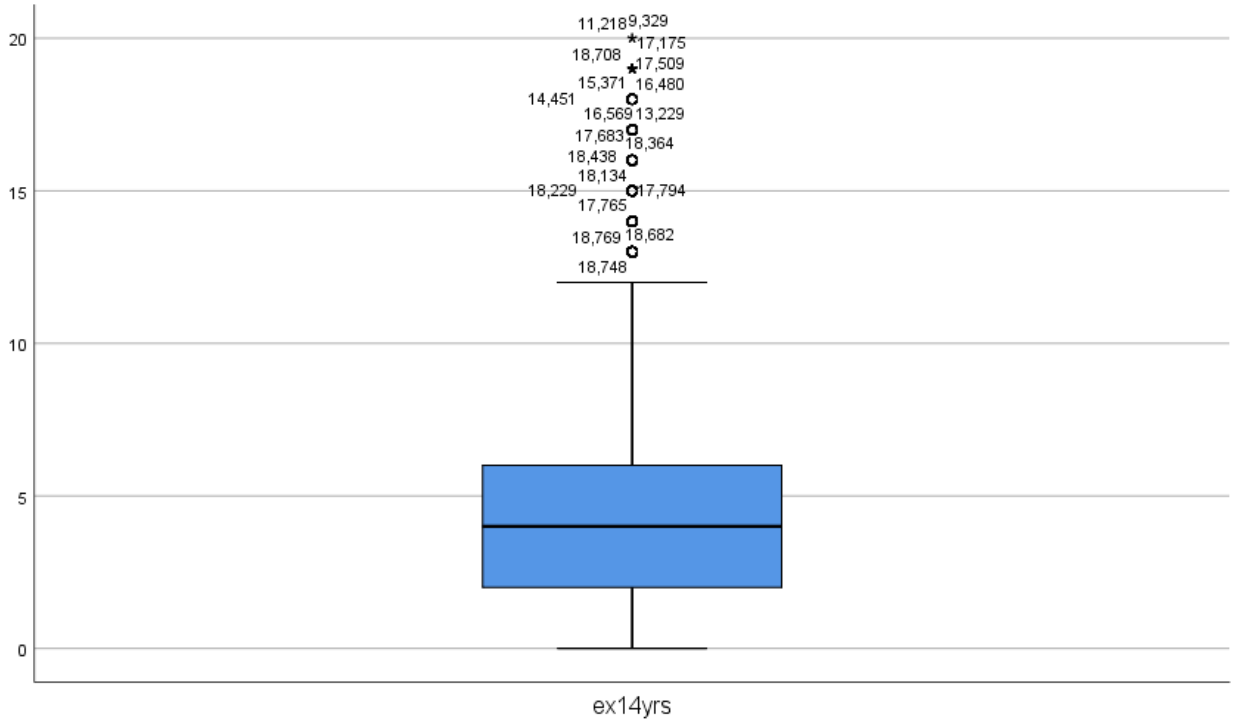
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Strengthens and difficulties questionnaire (SDQ) scores when the child was 14 years old. histogram, QQ plots and box plots for externalising behaviours measures prior to being transformed.

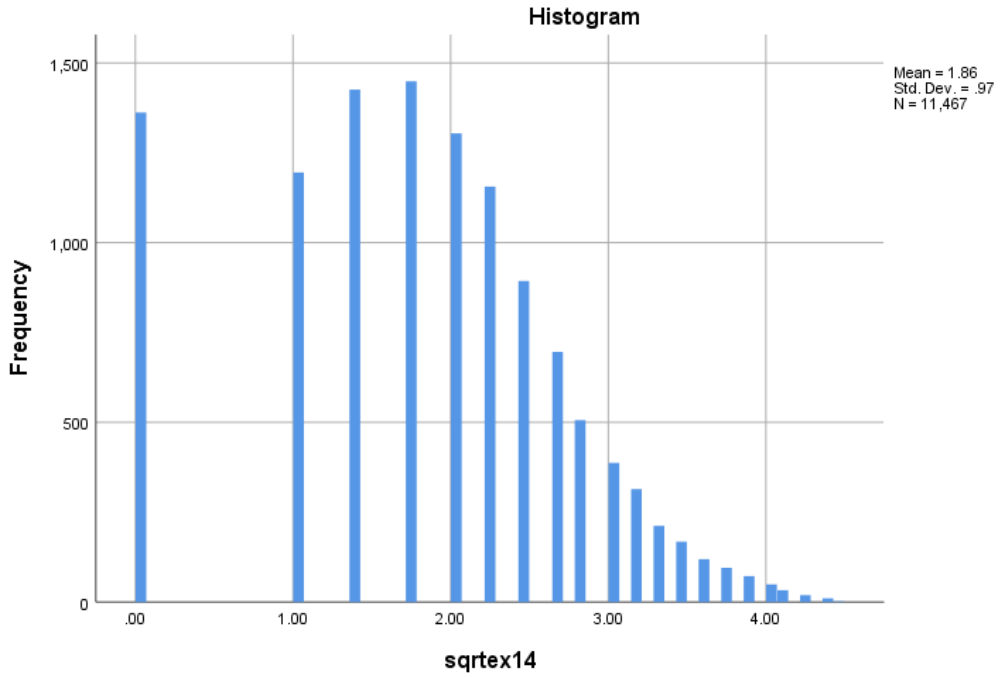


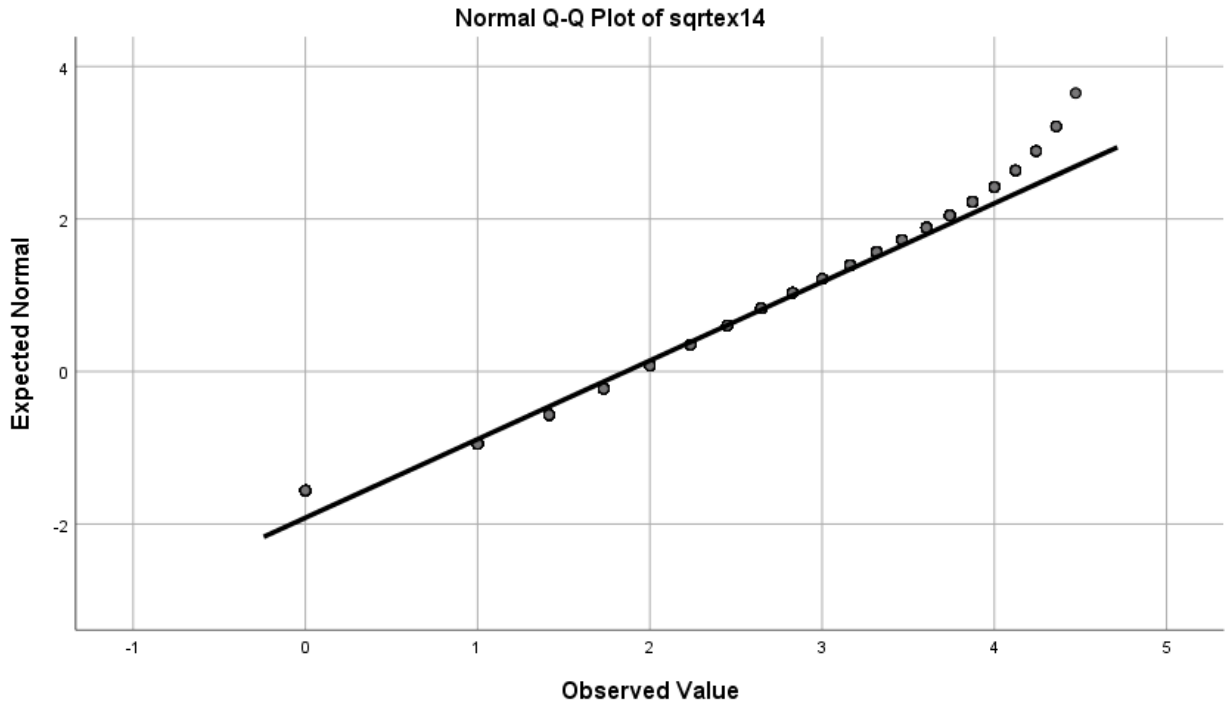



Detrended Normal Q-Q Plot of ex14yrs
Dev from Normal
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
0
5
10
15
20
Observed Value

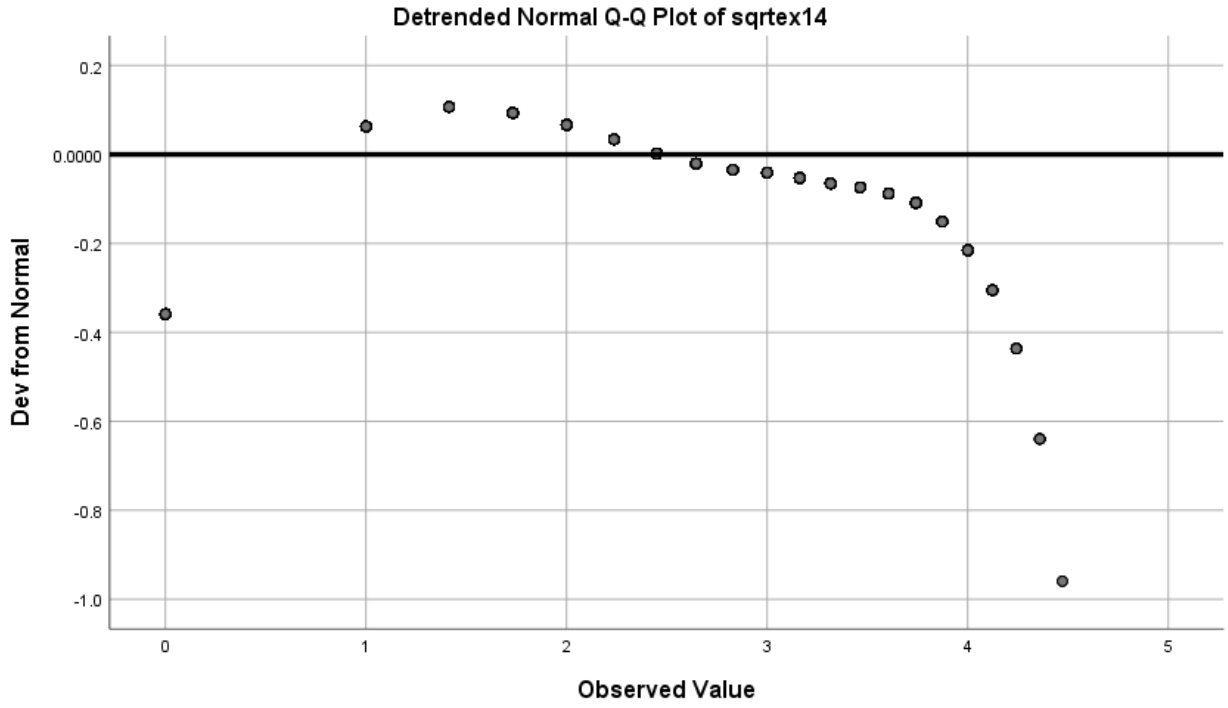

20
15
10
5
0
11,218
9,329
17,175
18,708
17,509
15,371
16,480
14,451
16,569
13,229
17,683
18,364
18,438
18,134
18,229
17,794
17,765
18,769
18,682
18,748
ex14yrs

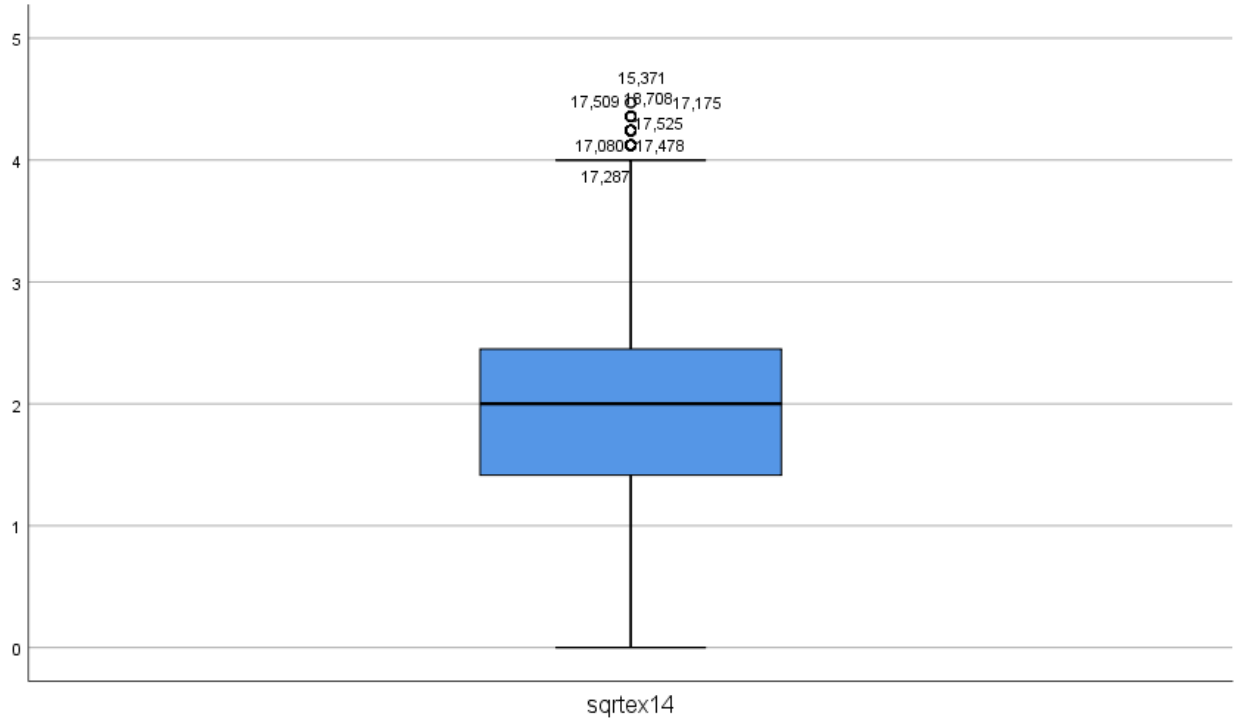
Strengthens and difficulties questionnaire (SDQ) scores when the child was 14 years old. histogram, QQ plots and box plots for externalising behaviours measures after being transformed using square root (SQRT).



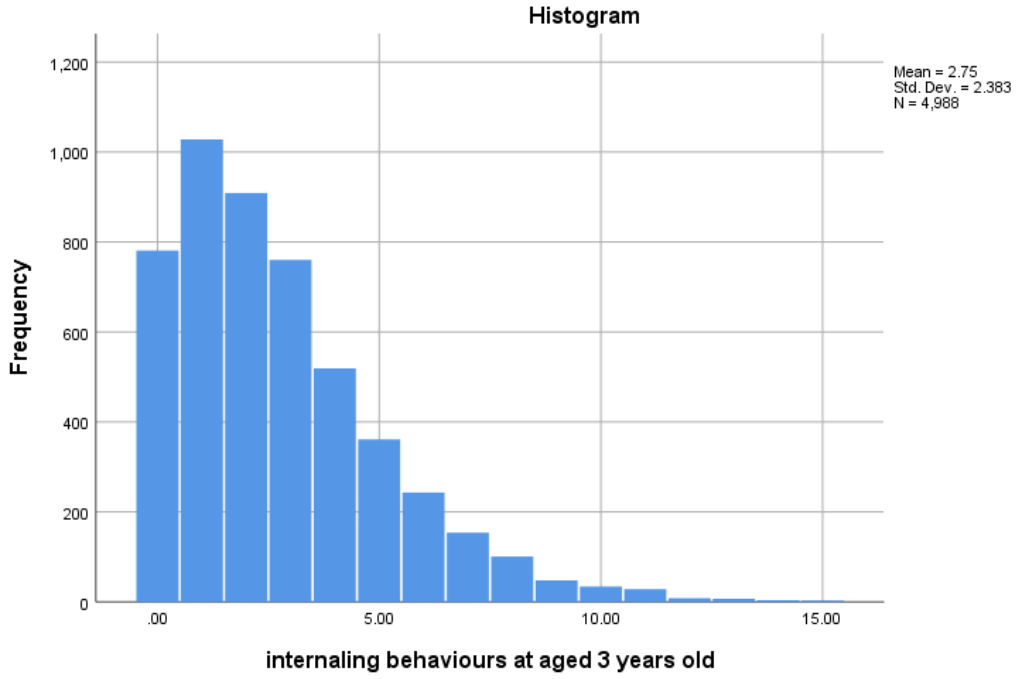


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

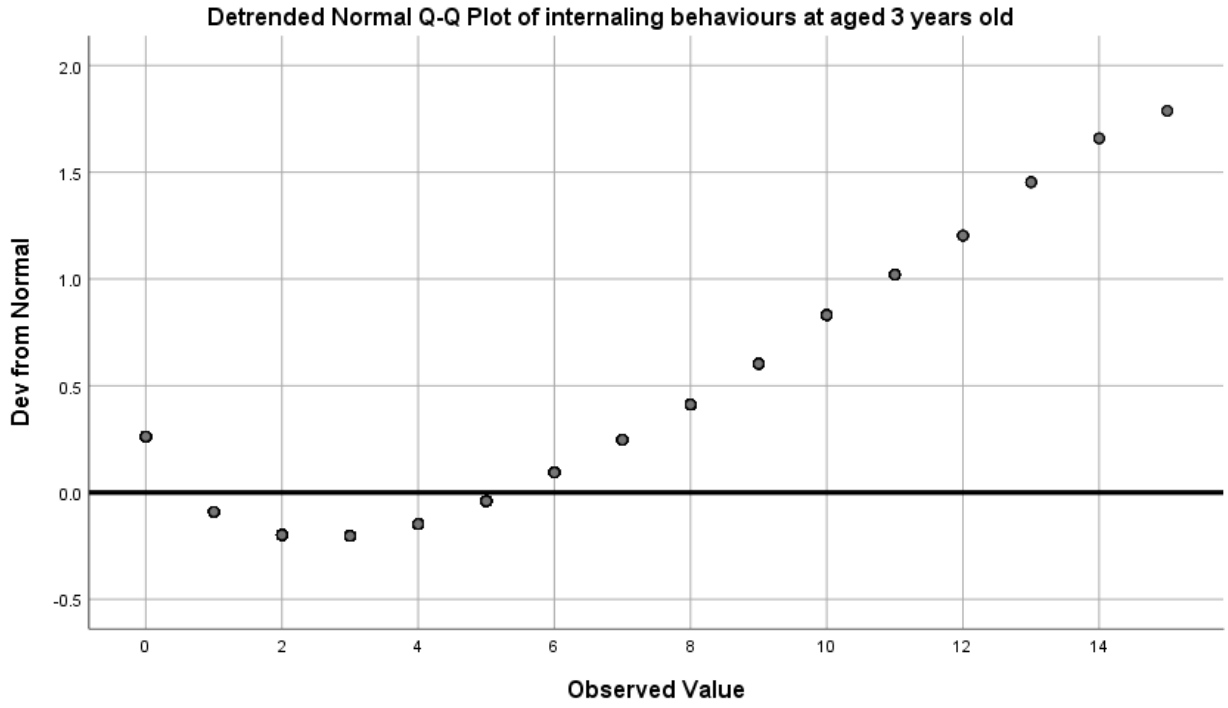


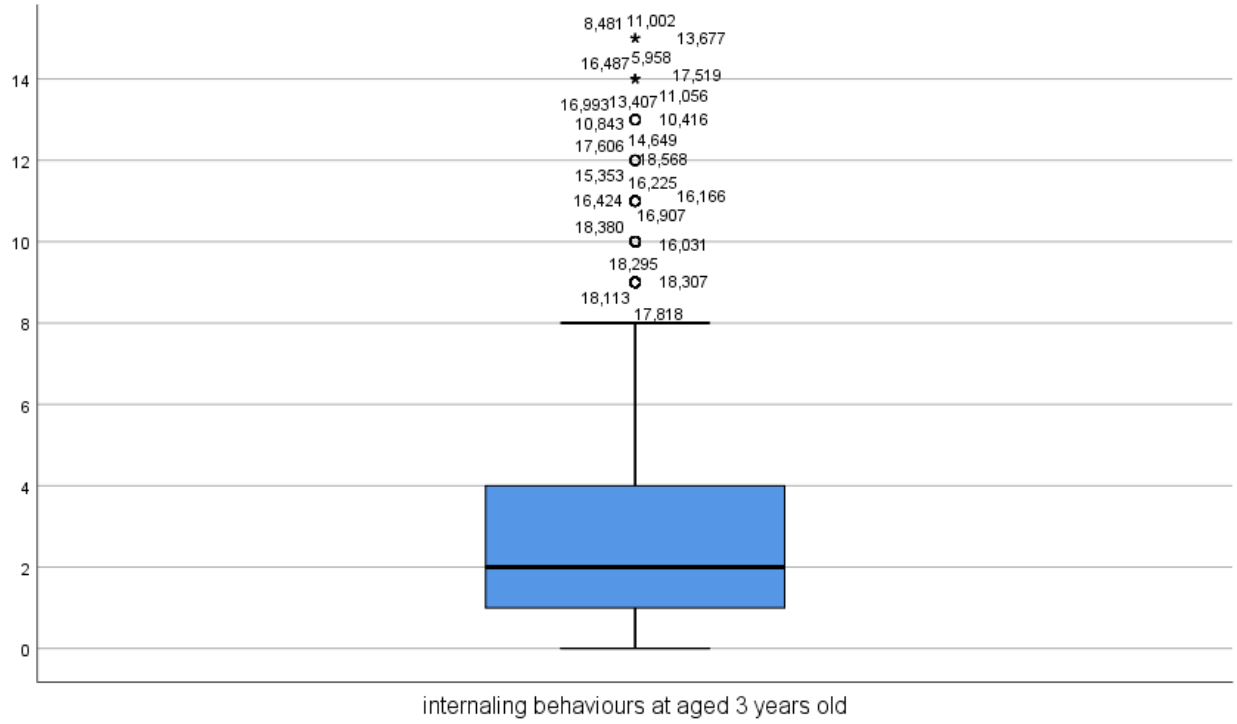


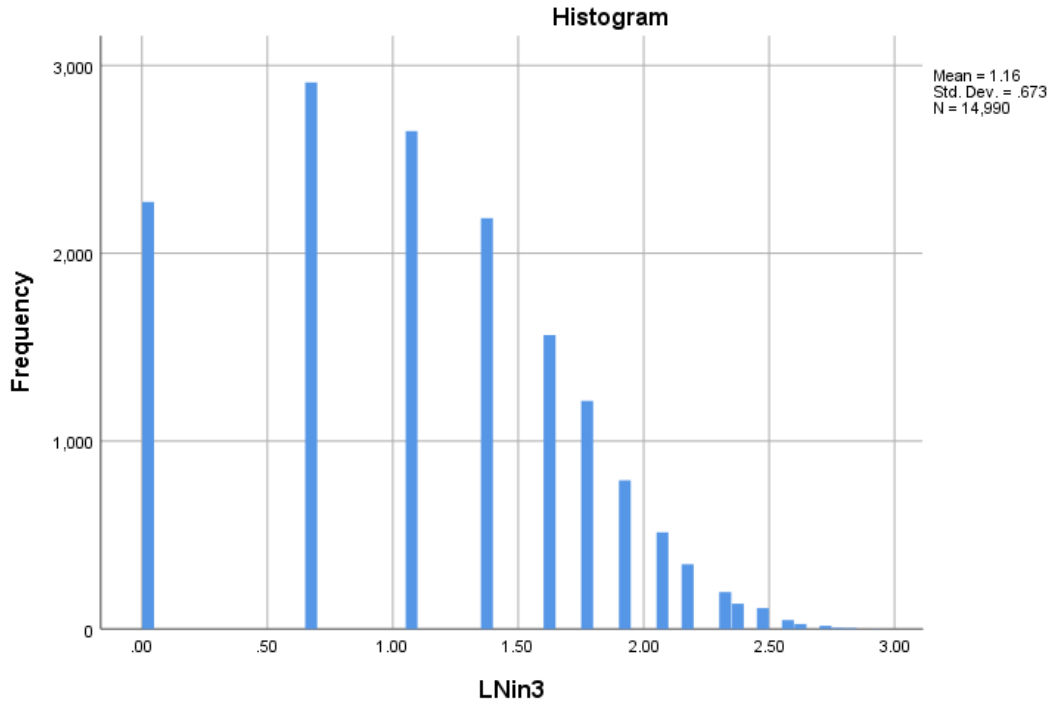
Strengthens and difficulties questionnaire (SDQ) scores when the child was 3 years old. Histogram, QQ plots and box plots for internalised behaviours measures prior to being transformed.

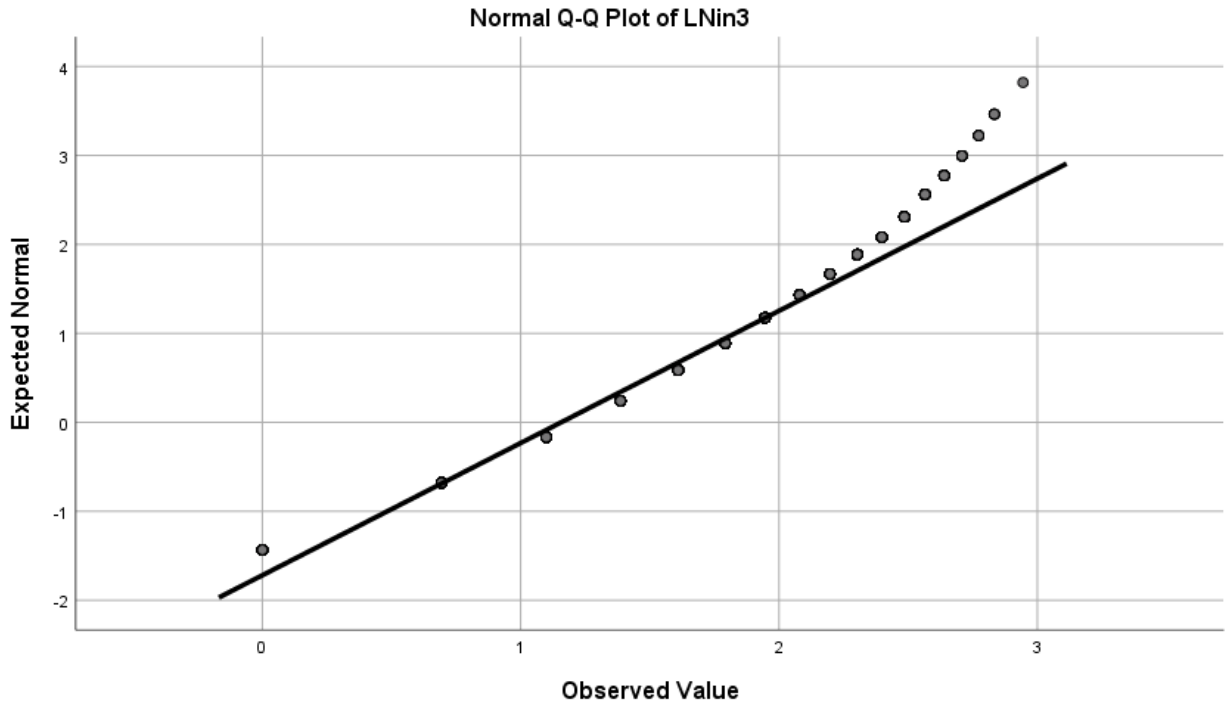


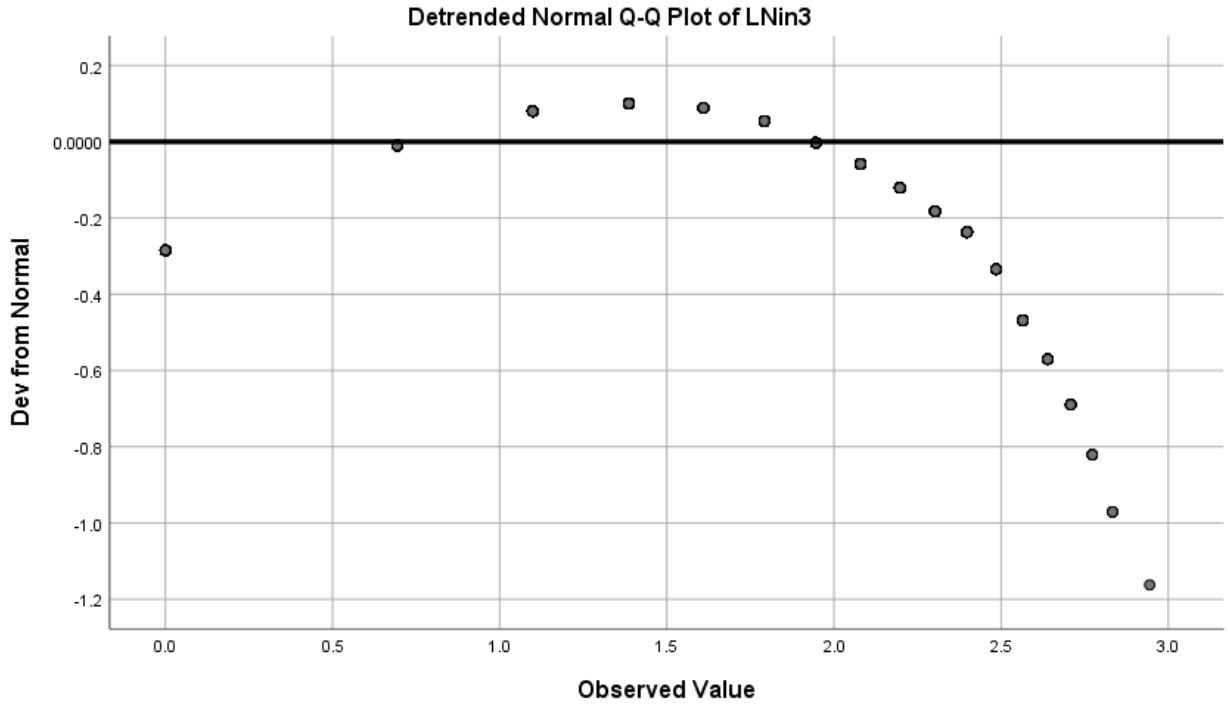
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

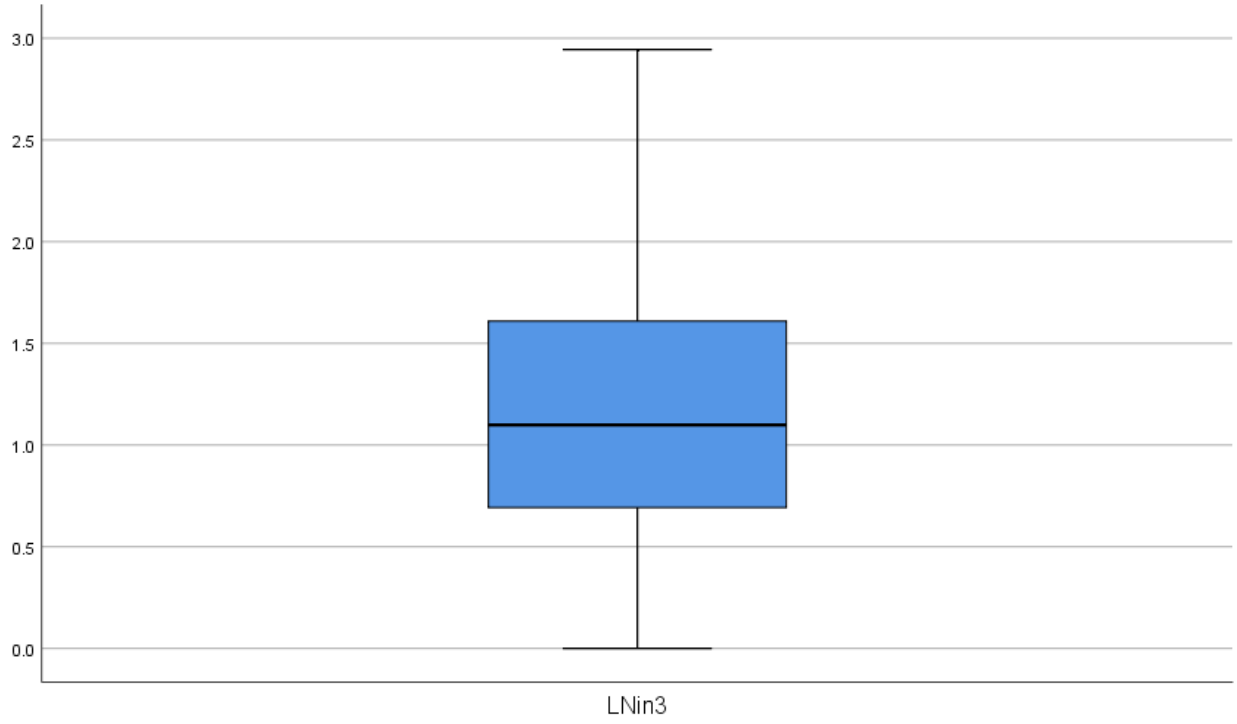




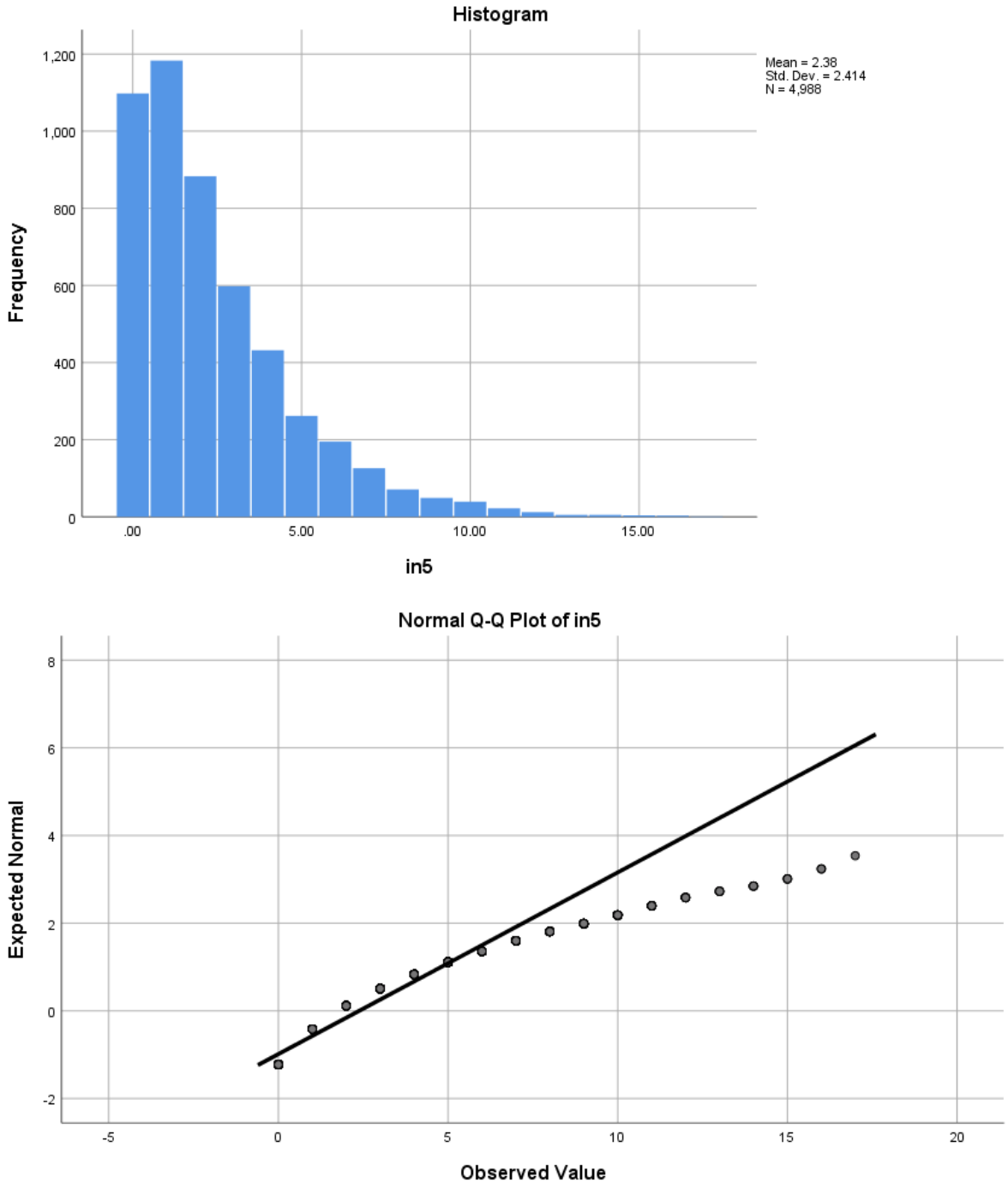

Histogram
Mean = 1.16
Std. Dev. = .673
N = 14,990
Frequency
3,000
2,000
1,000
0
.00
.50
1.00
1.50
2.00
2.50
3.00
LNin3


Normal Q-Q Plot of LNin3
Expected Normal
4
3
2
1
0
-1
-2
0
1
2
3
Observed Value

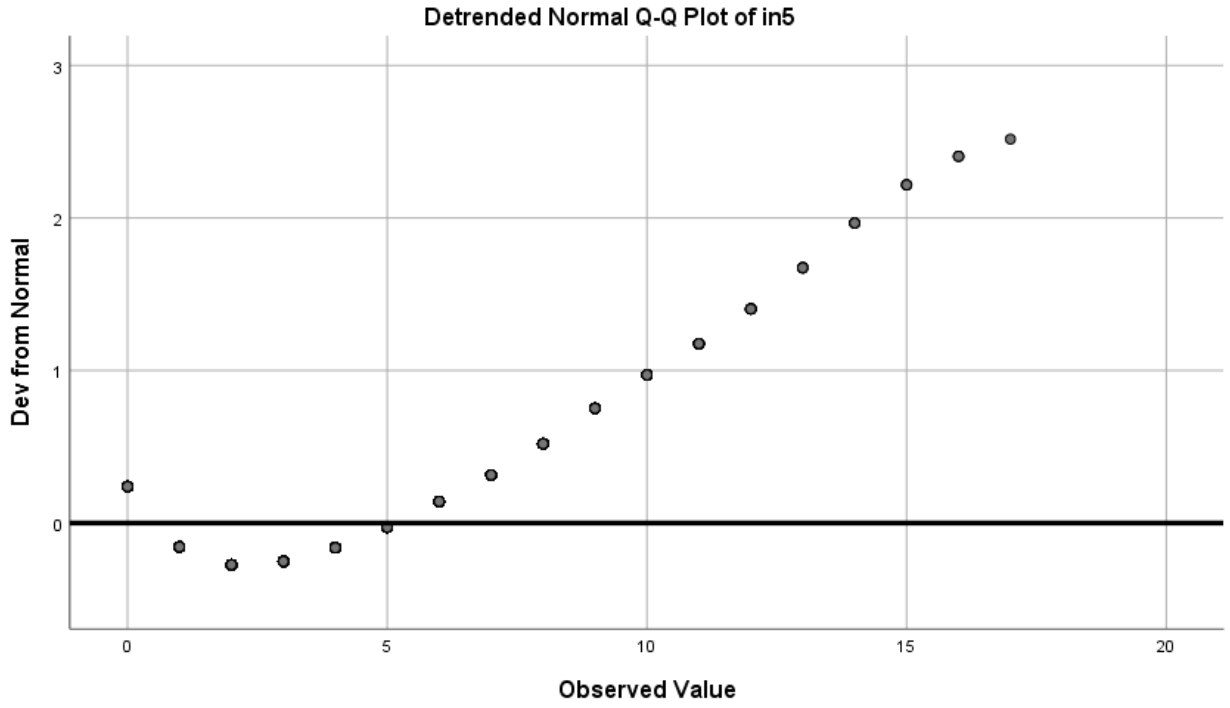

Detrended Normal Q-Q Plot of LNin3
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Observed Value

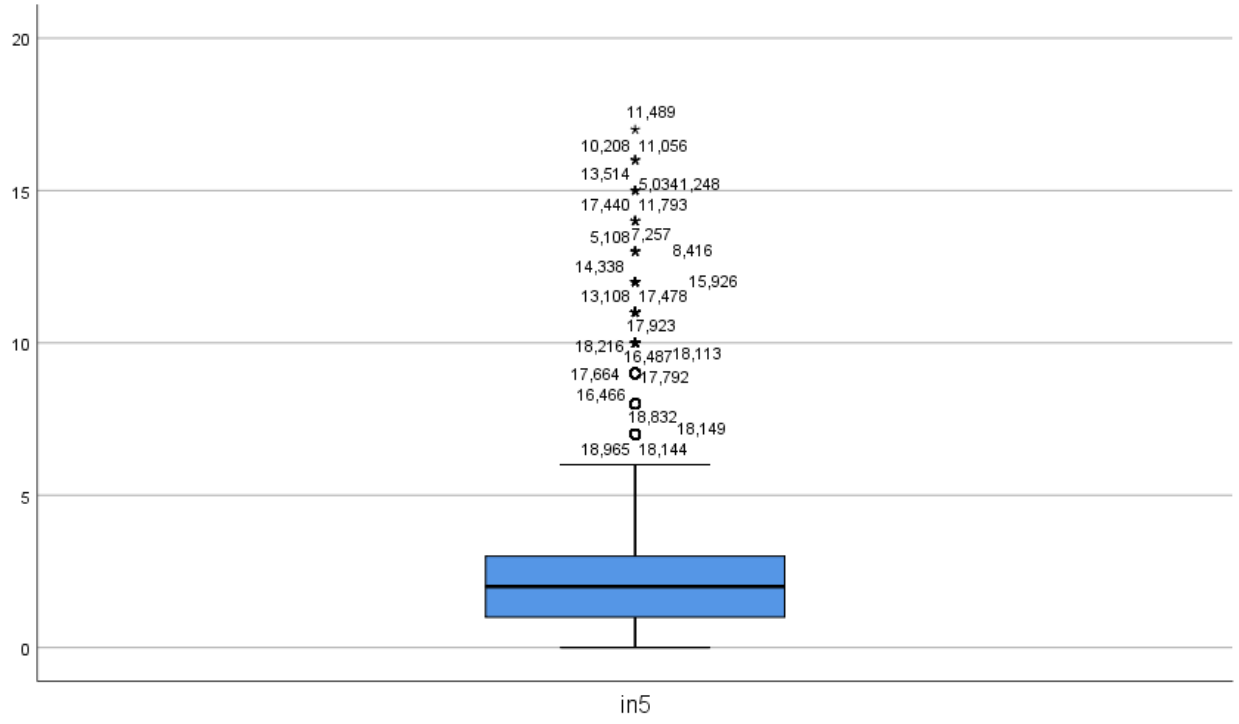

3.0
2.5
2.0
1.5
1.0
0.5
0.0
LNin3

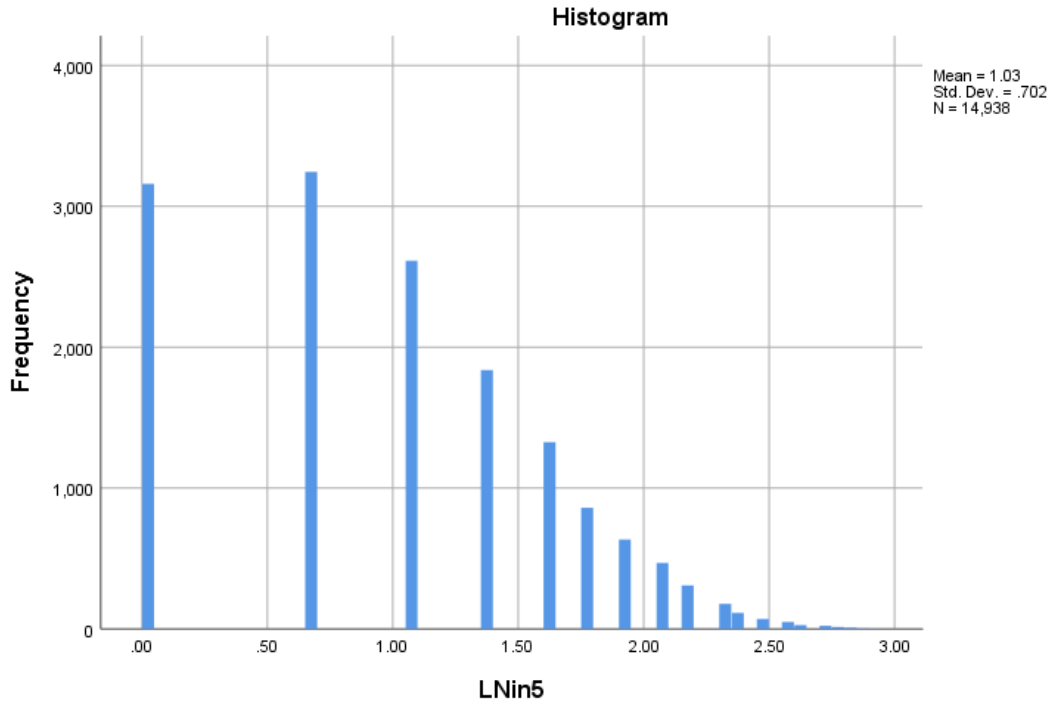
Strengthens and difficulties questionnaire (SDQ) scores when the child was 5 years old. Histogram, QQ plots and box plots for internalised behaviours measures prior to being transformed.

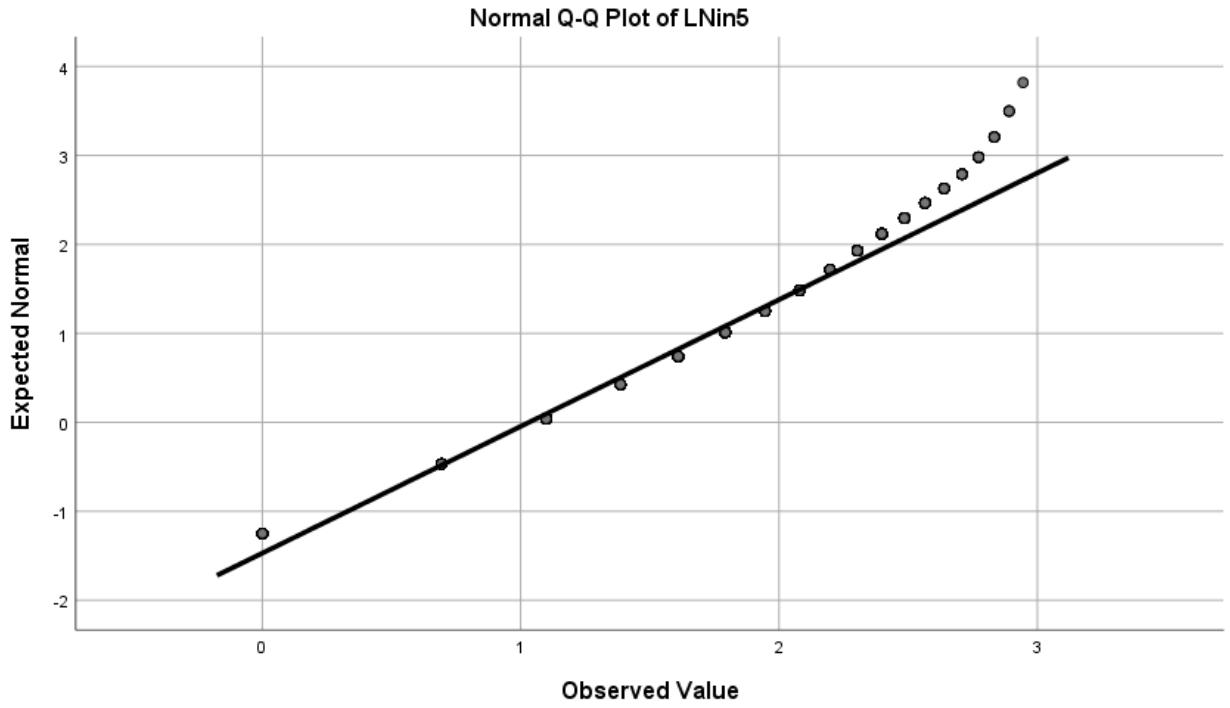


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

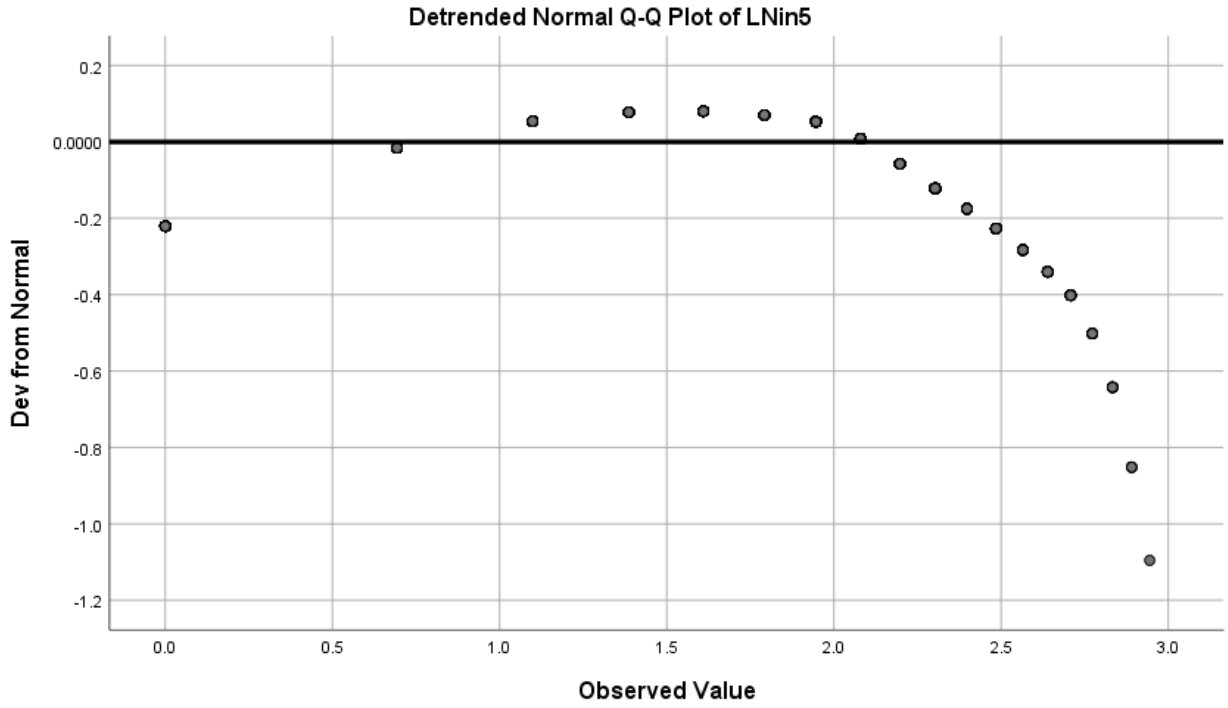


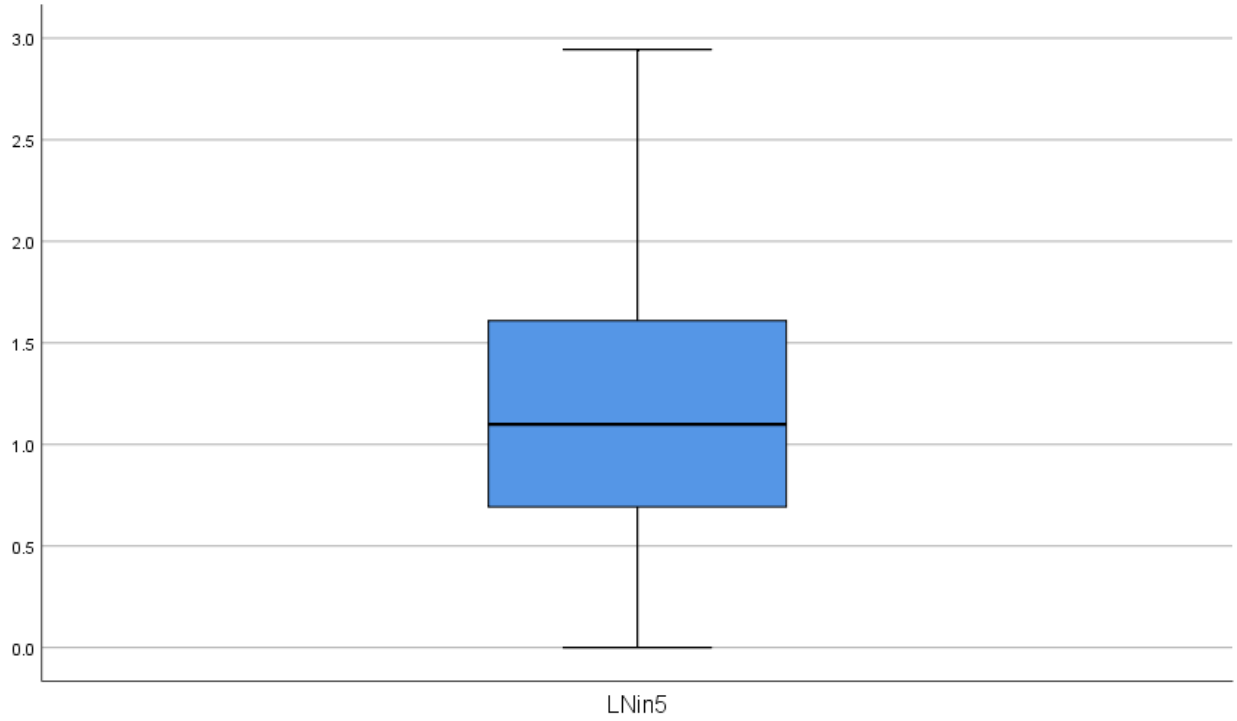



Histogram
Mean = 1.03
Std. Dev. = .702
N = 14,938
Frequency
4,000
3,000
2,000
1,000
0
.00
.50
1.00
1.50
2.00
2.50
3.00
LNin5

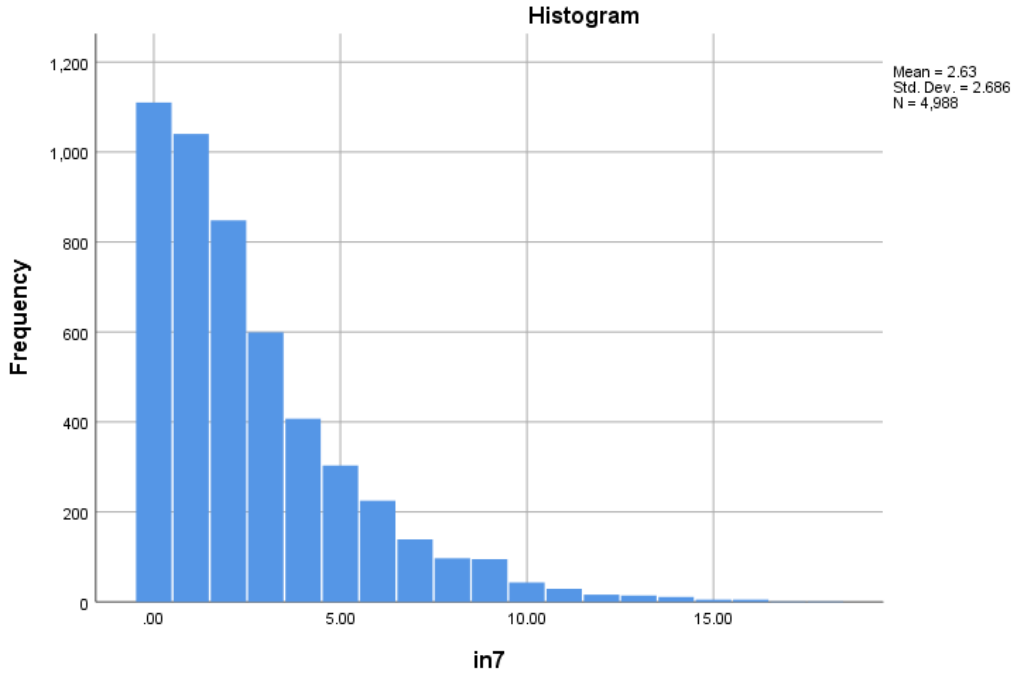

Normal Q-Q Plot of LNin5
Expected Normal
4
3
2
1
0
-1
-2
0
1
2
3
Observed Value

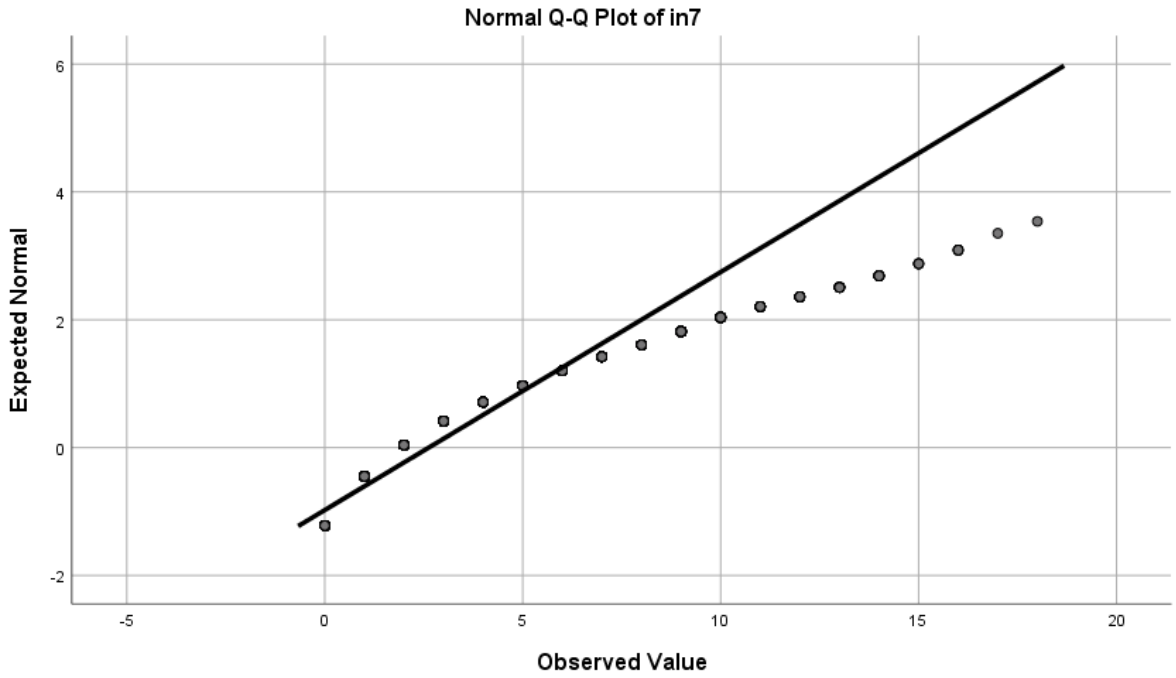
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.



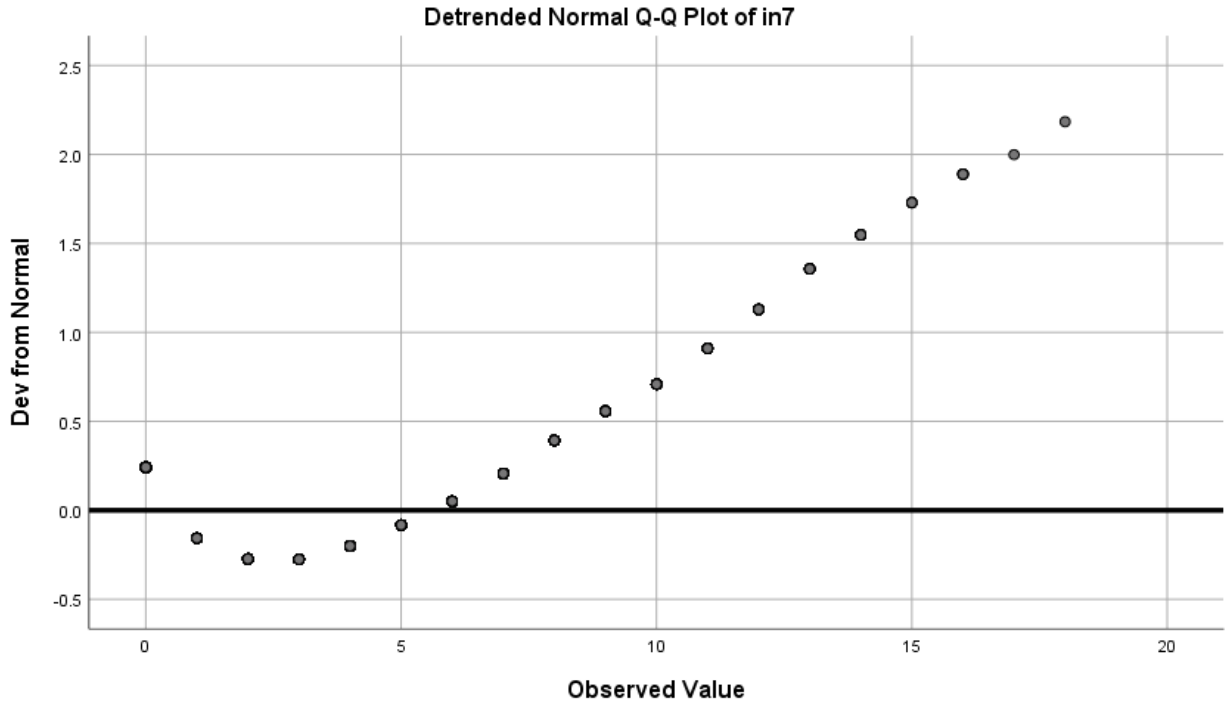


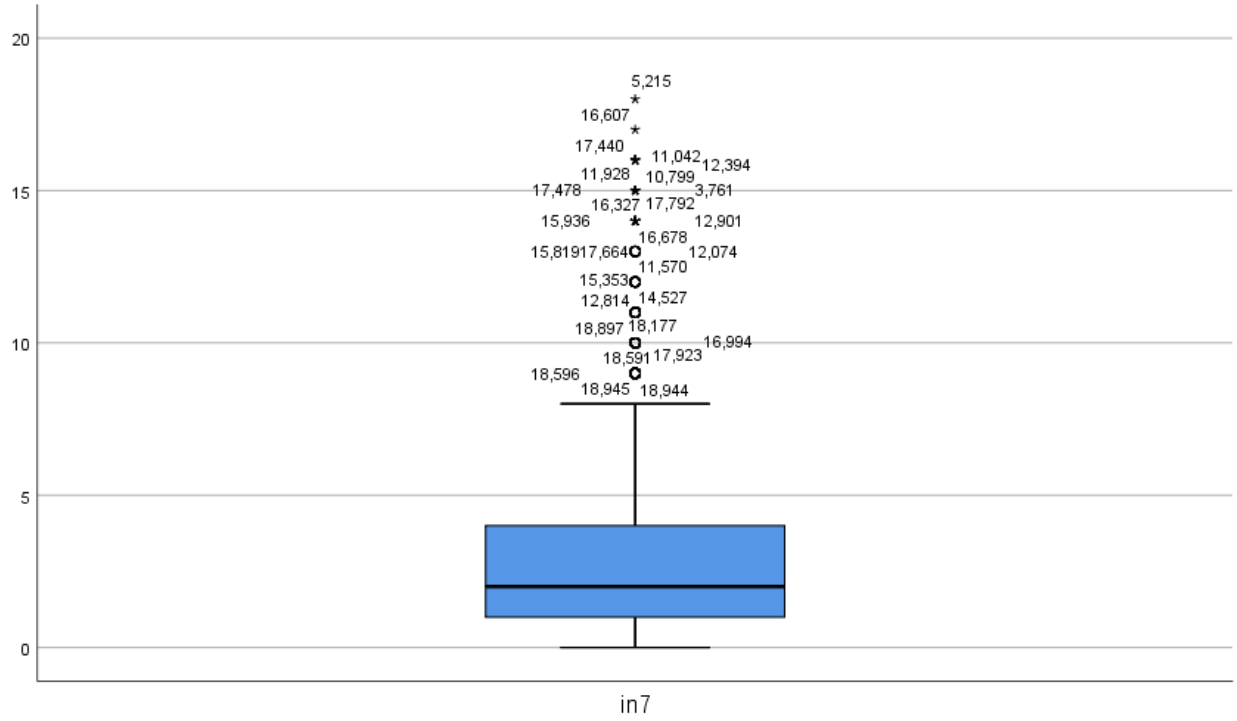
Strengthens and difficulties questionnaire (SDQ) scores when the child was 7 years old. histogram, QQ plots and box plots for internalised behaviours measures prior to being transformed.

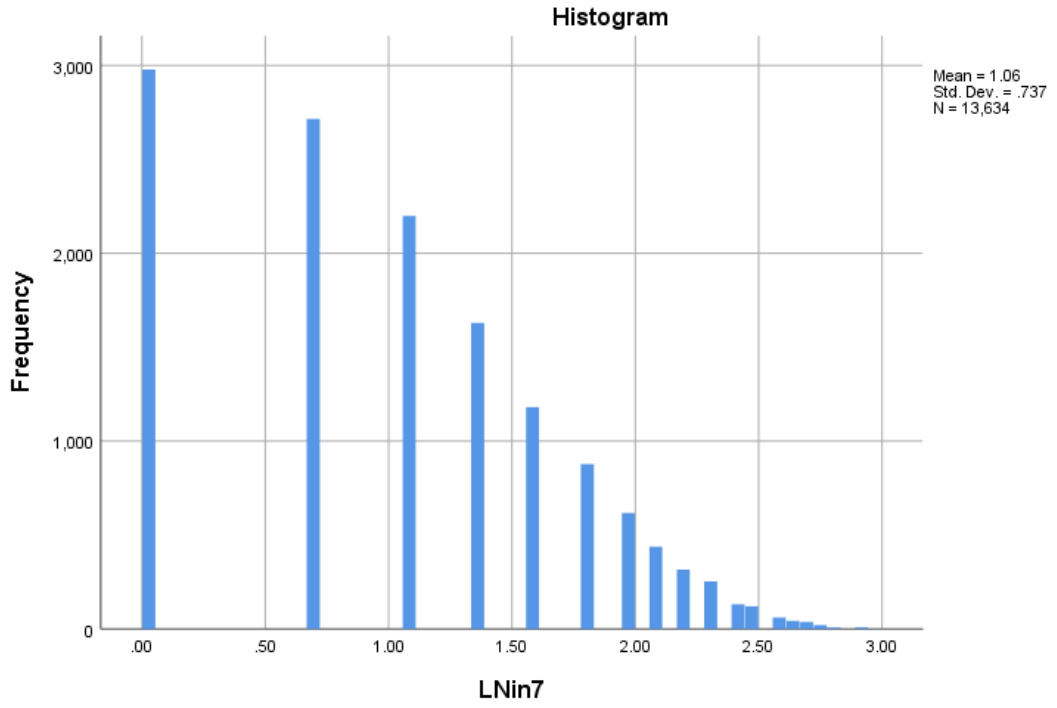


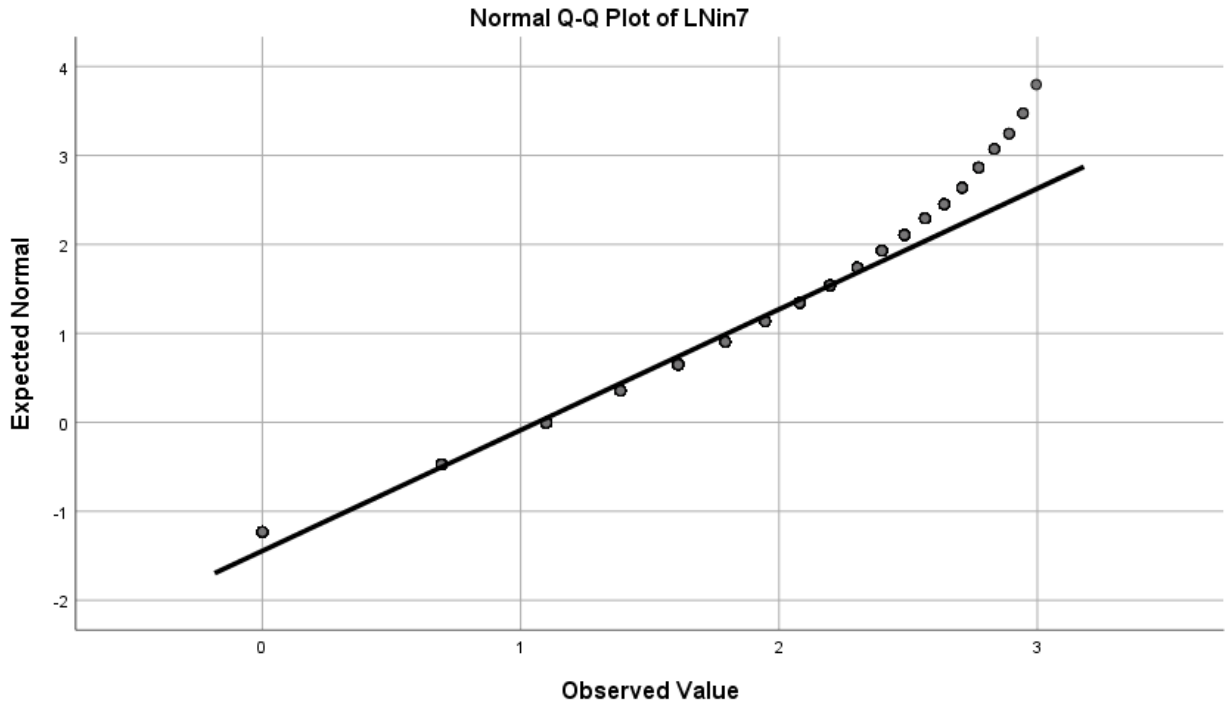


Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

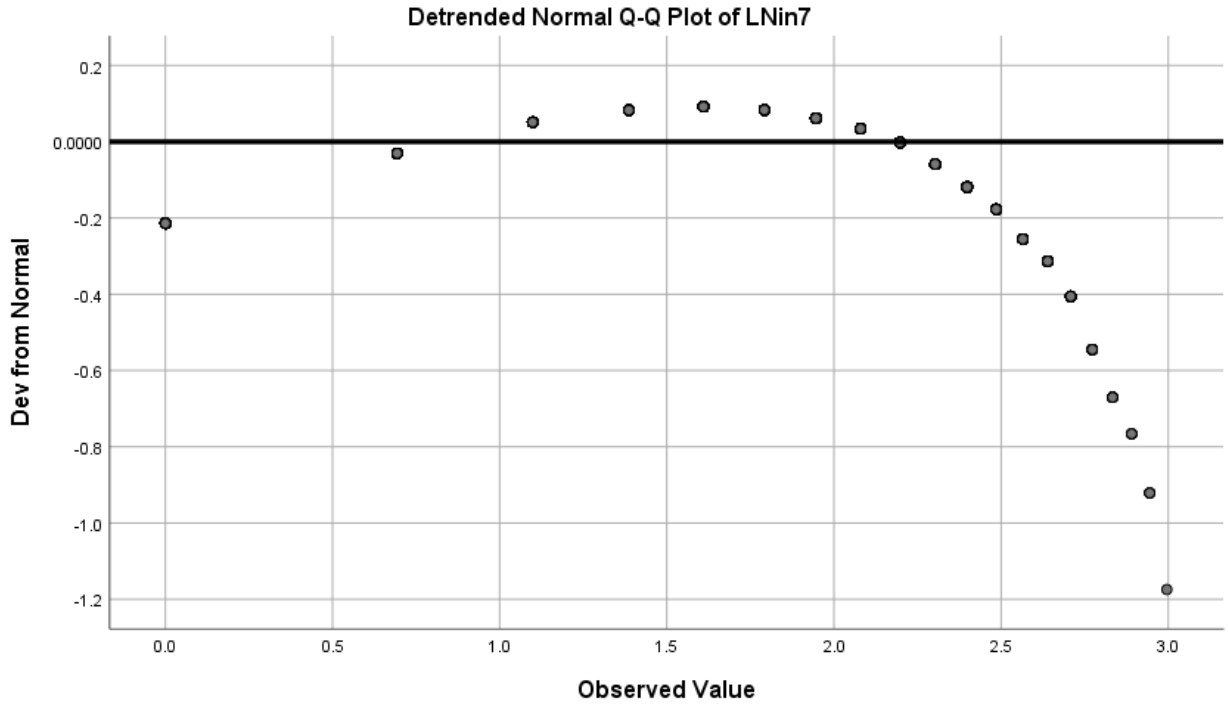


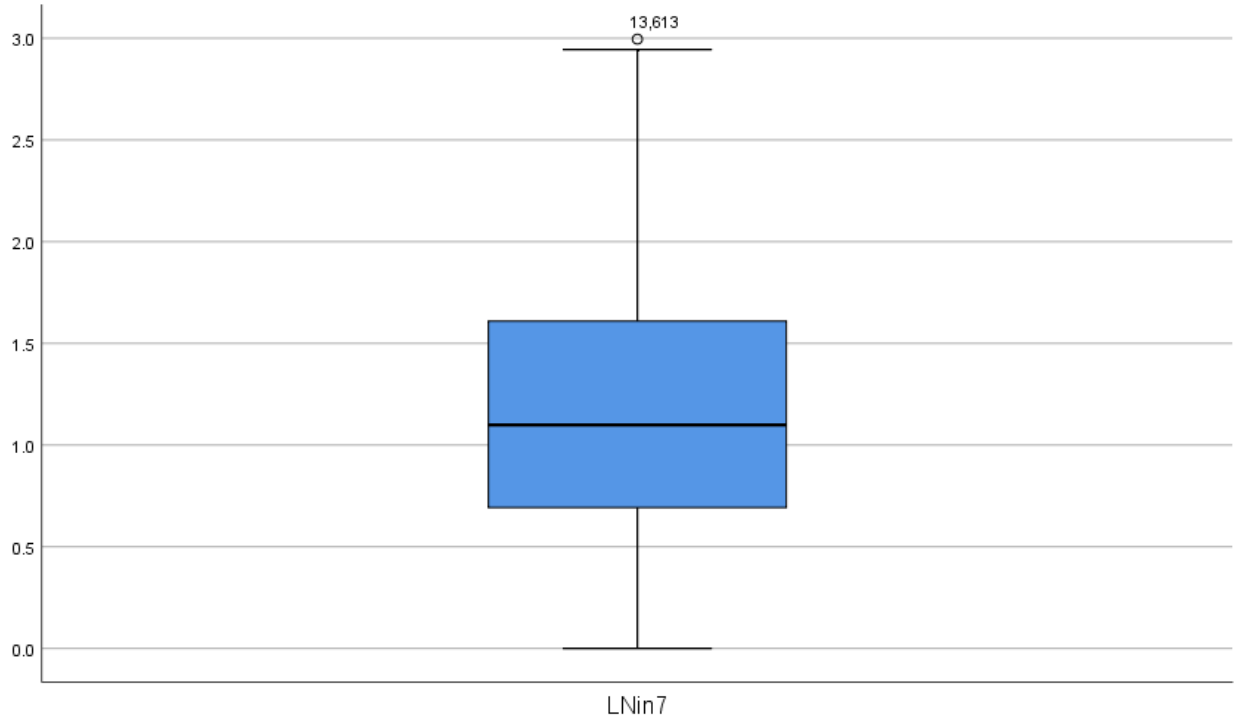



Histogram
Mean = 1.06
Std. Dev. = .737
N = 13,634
Frequency
3,000
2,000
1,000
0
.00
.50
1.00
1.50
2.00
2.50
3.00
LNin7

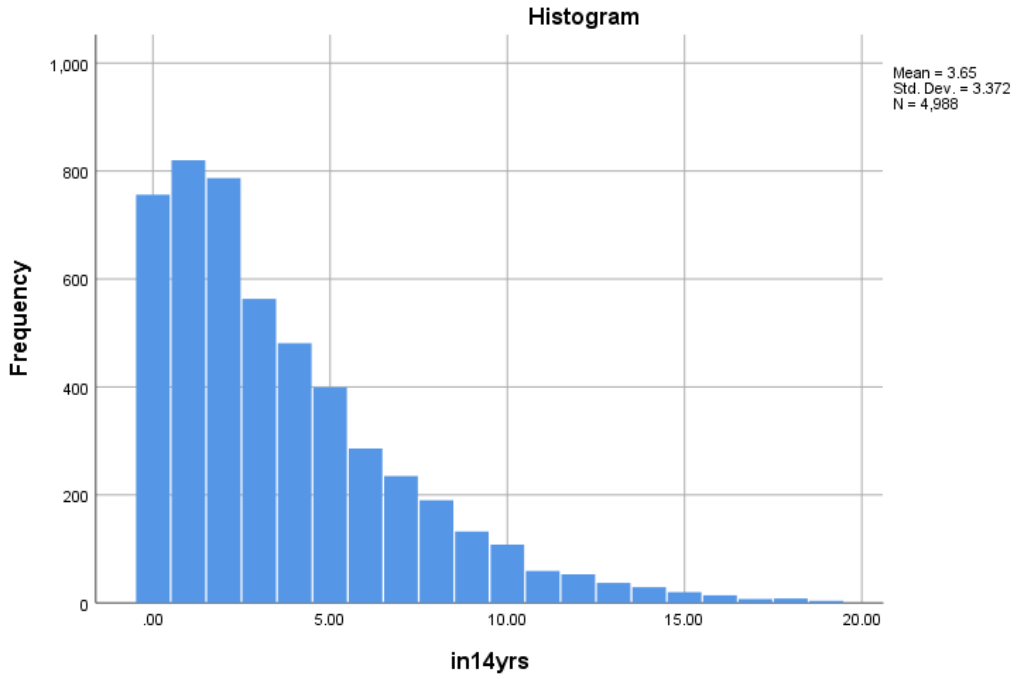

Normal Q-Q Plot of LNin7
Expected Normal
4
3
2
1
0
-1
-2
0
1
2
3
Observed Value

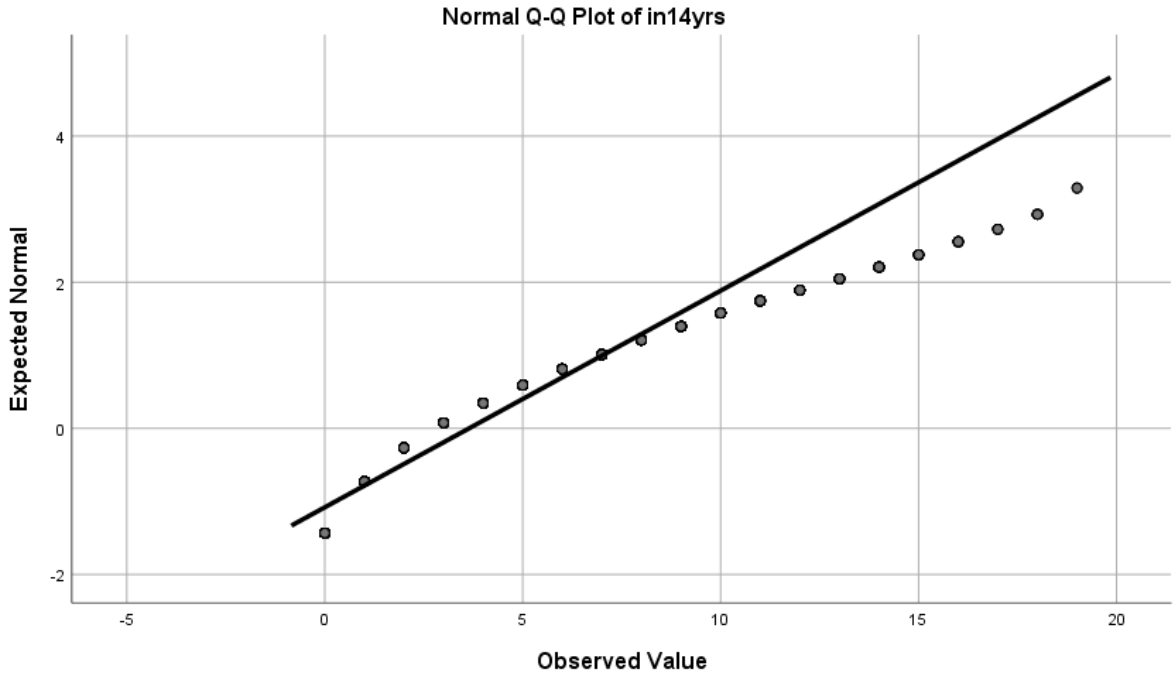
Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

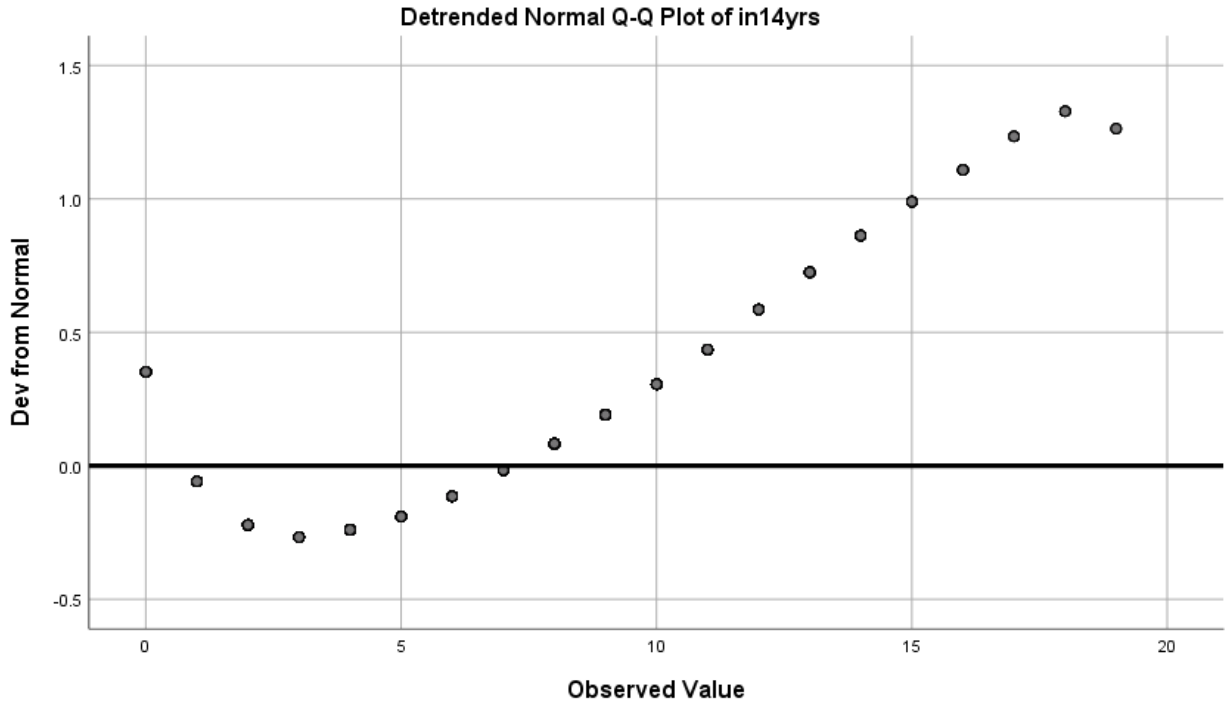


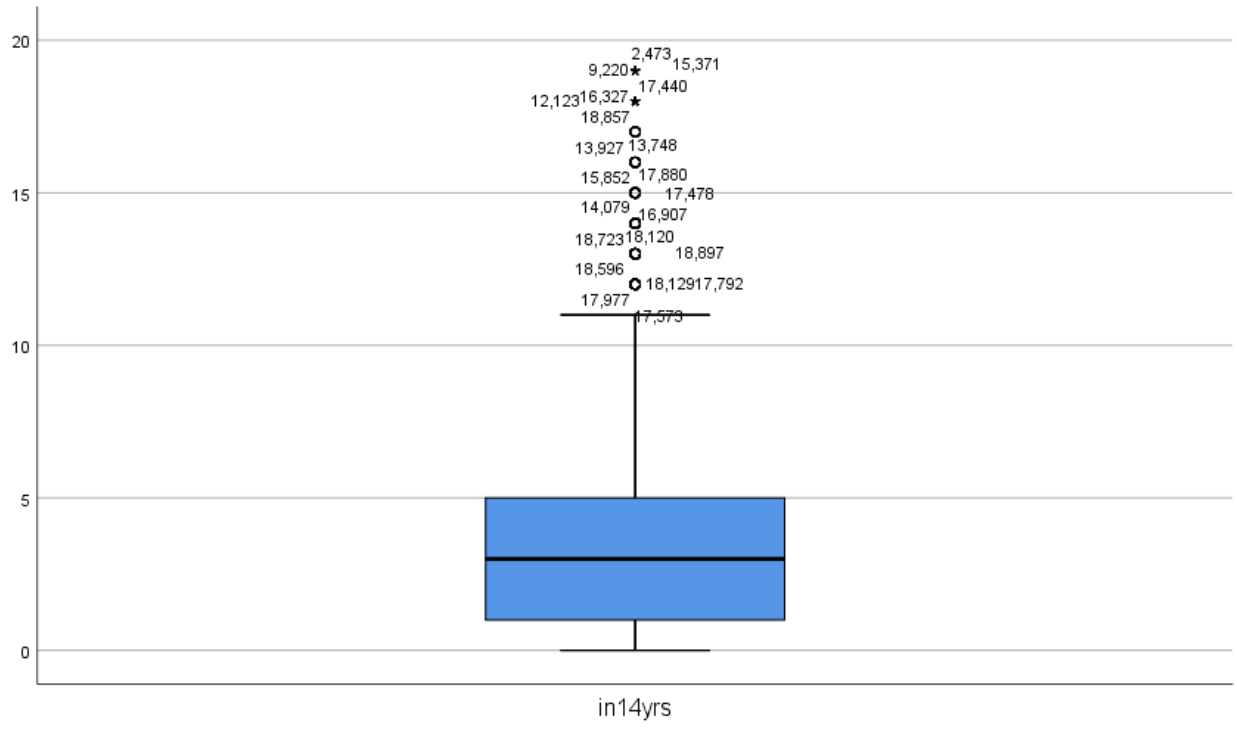


Strengthens and difficulties questionnaire (SDQ) scores when the child was 14 years old. histogram, QQ plots and box plots for internalising behaviours measures prior to being transformed.

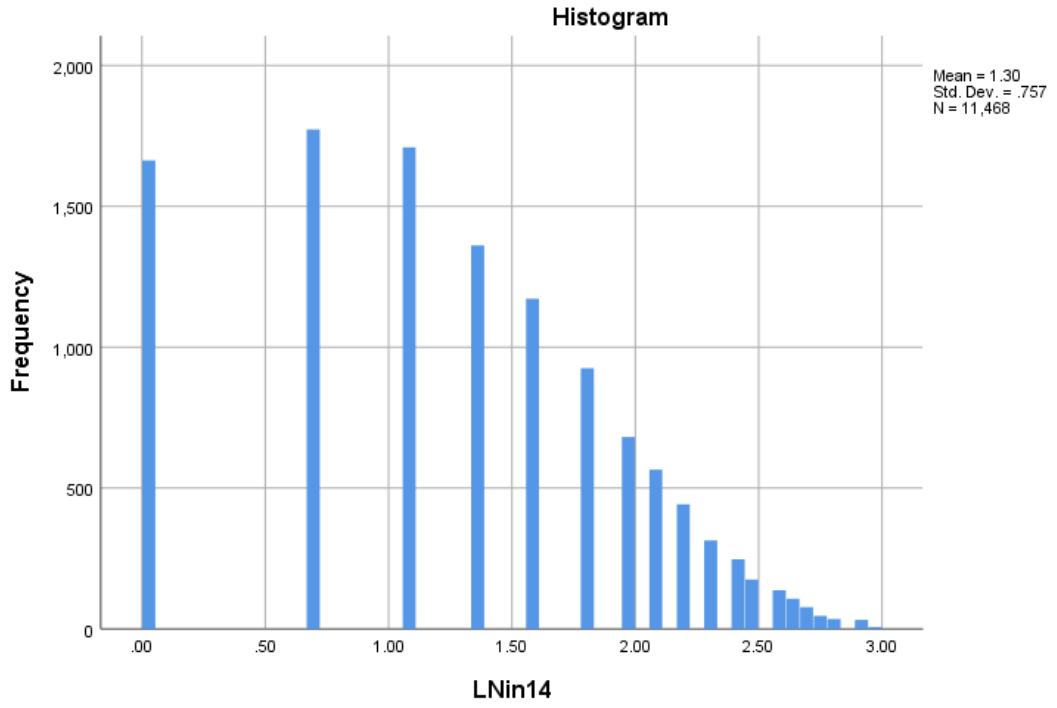


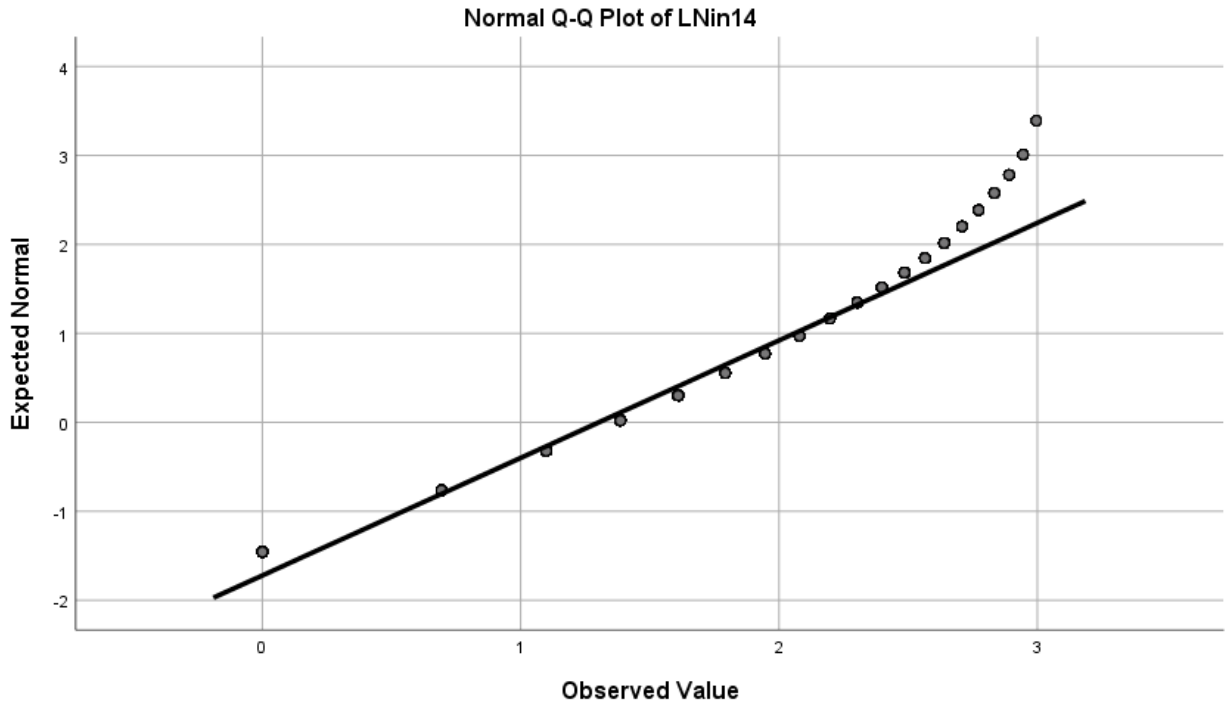


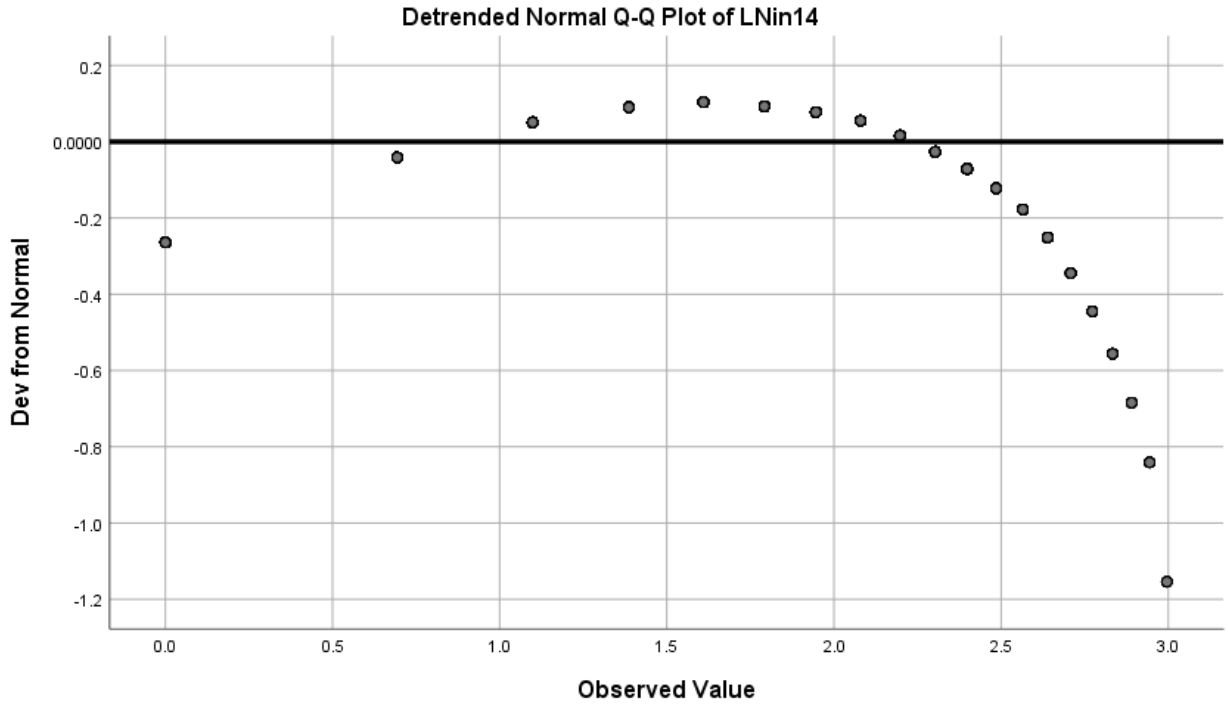

Detrended Normal Q-Q Plot of in14yrs
Dev from Normal
1.5
1.0
0.5
0.0
-0.5
0
5
10
15
20
Observed Value

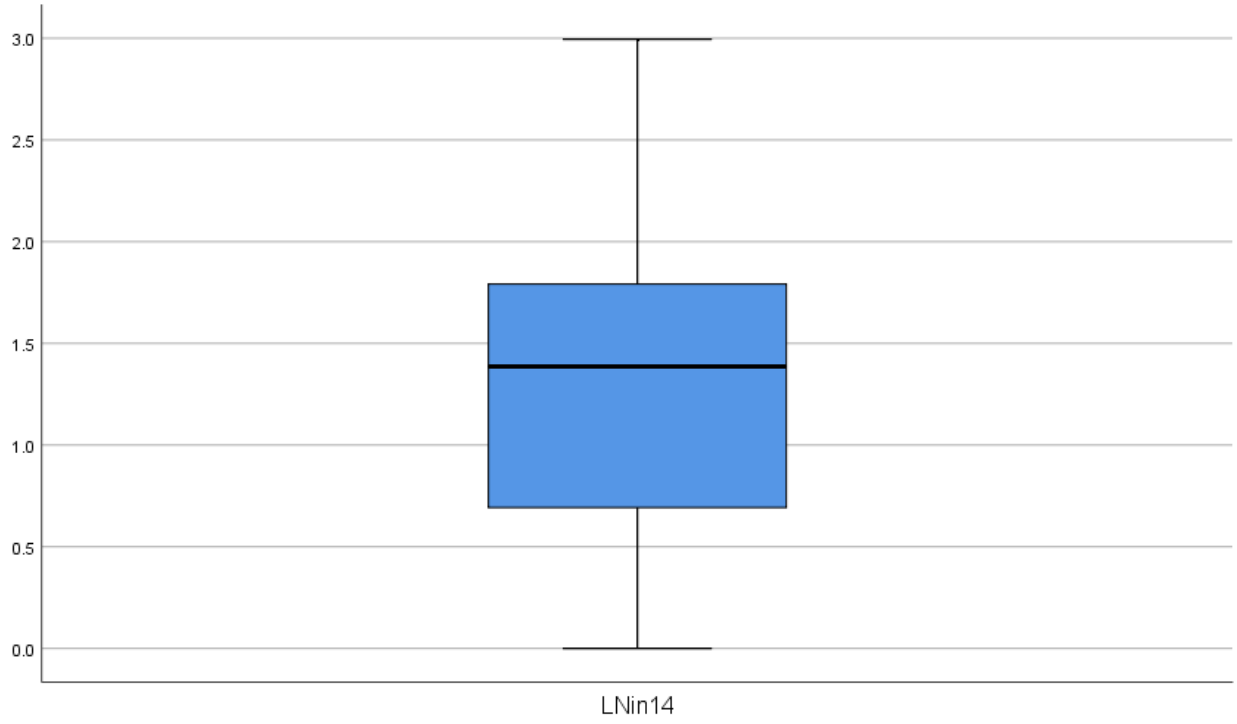

20
15
10
5
0
2,473
9,220
15,371
17,440
12,123
16,327
18,857
13,927
13,748
15,852
17,880
17,478
14,079
16,907
18,723
18,120
18,897
18,596
18,129
17,792
17,977
17,573
in14yrs

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.






Detrended Normal Q-Q Plot of LNin14
Dev from Normal
0.2
0.0000
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Observed Value


3.0
2.5
2.0
1.5
1.0
0.5
0.0
LNin14

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix J. Line graphs for each of the profile models: comparing subgroups on CU behaviours, peer bullying and sibling bullying.

Figure H. *Two profile model: comparing each subgroup on CU behaviours, peer bullying and sibling bullying.*

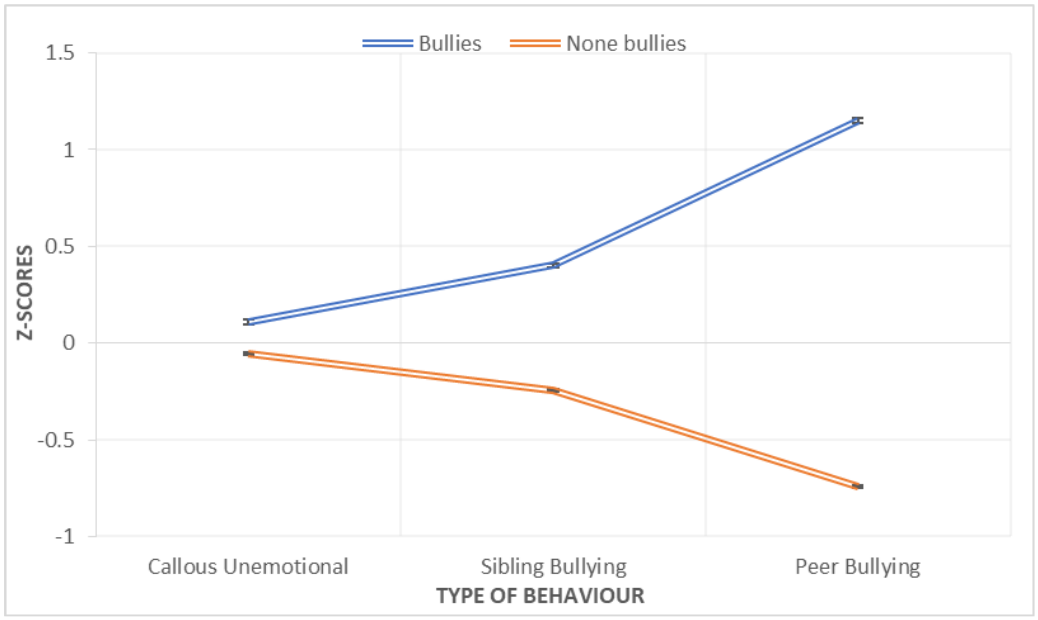
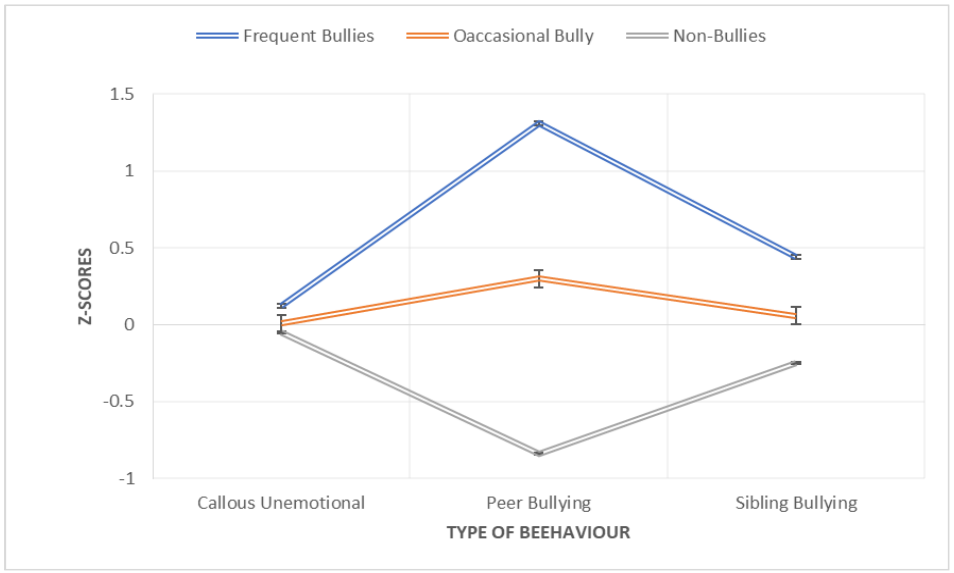


Figure I. *Three profile model: comparing each subgroup on CU behaviours, peer bullying and sibling bullying.*



Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

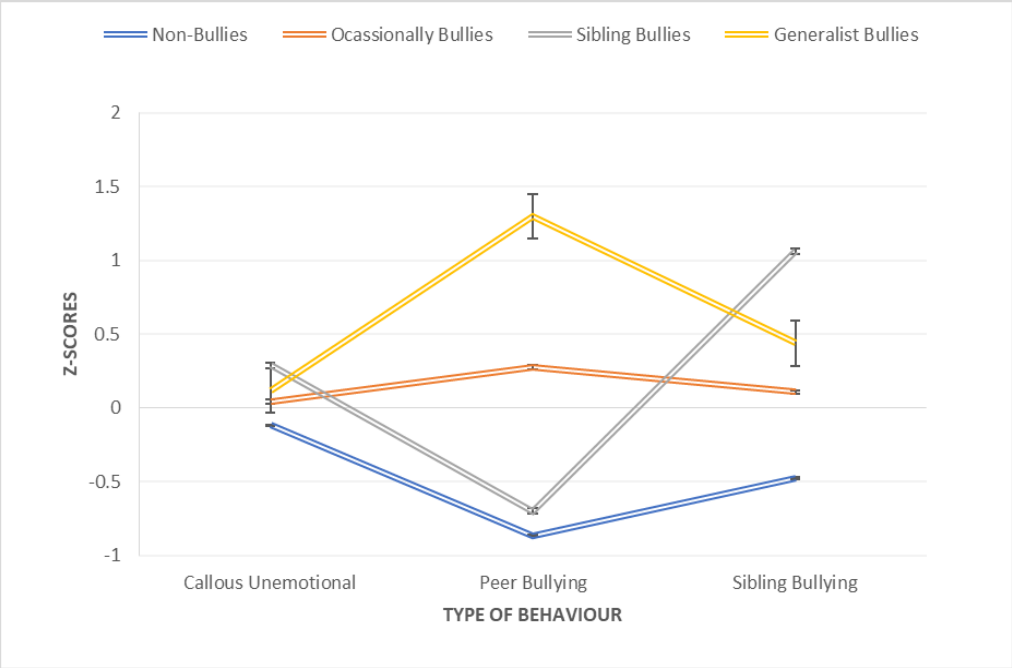


Figure J. *Four profile model: Comparing CU behaviours, peer bullying and sibling bulling for each bullying subgroup.*

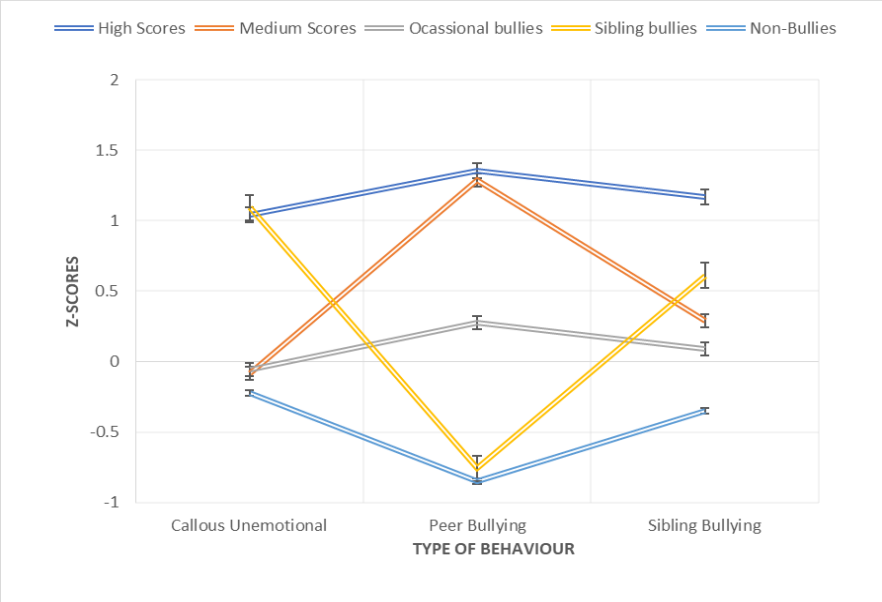


Figure K. *Five profile model: comparing each subgroup on CU behaviours, peer bullying and sibling bullying.*

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

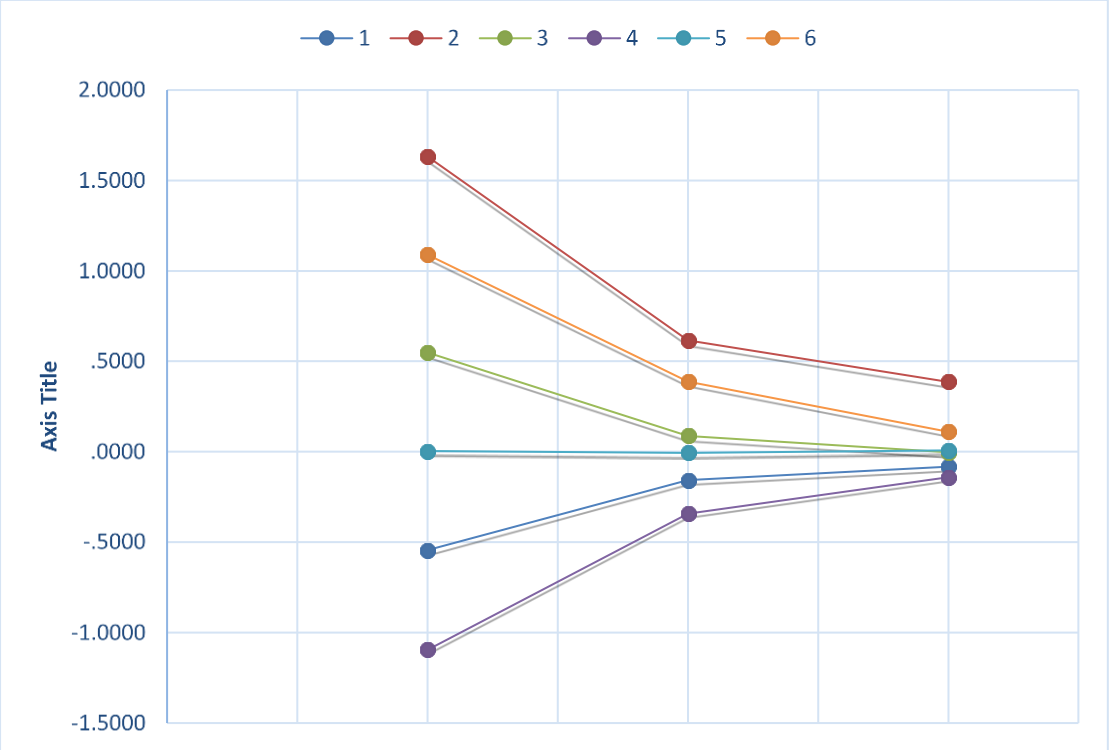
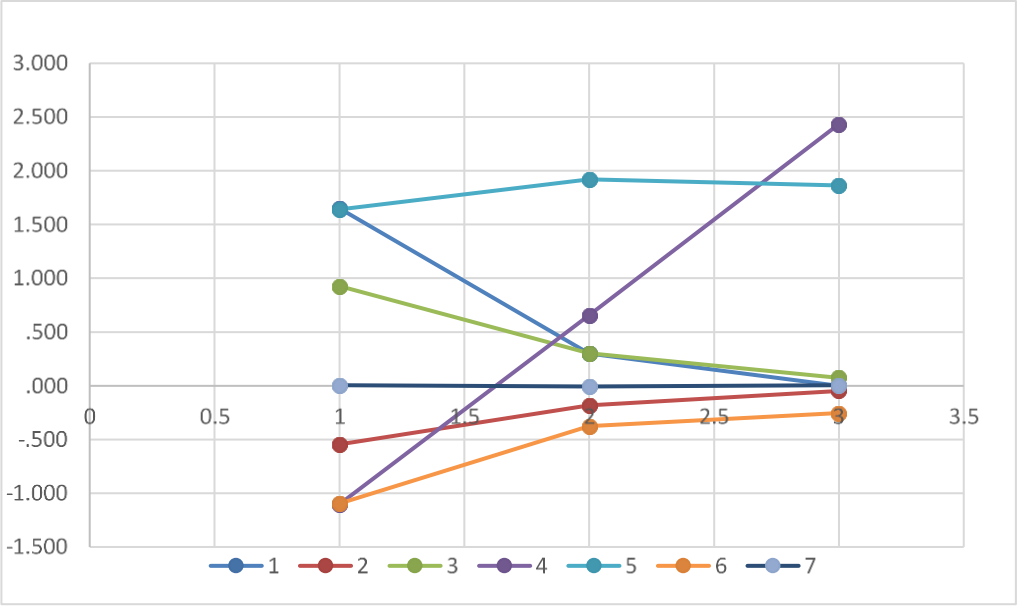


Figure L. *Six profile model: comparing each subgroup on CU behaviours, peer bullying and sibling bullying.*



.

Figure M. *Seven profile model: comparing each subgroup on CU behaviours, peer bullying and sibling Bullying*

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix K: Simple line graphs for prosocial, externalising and internalising behaviours at various time points (age 3, 5, 7 and 14 years old).

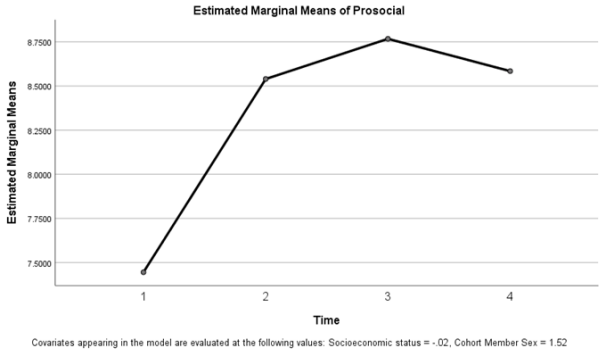


Figure N: *Simple line graphs for prosocial behaviours at various time points (age 3, 5, 7 and 14 years old).*

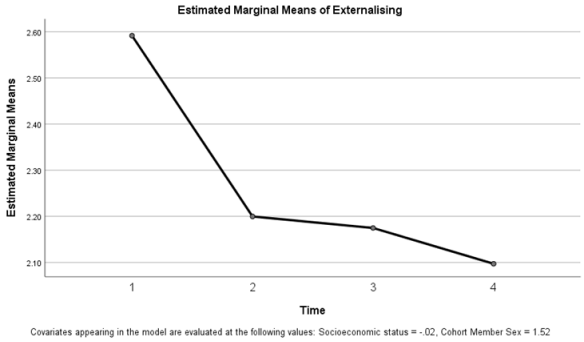


Figure O: *Simple line graphs for externalising behaviours at various time points (age 3, 5, 7 and 14 years old).*

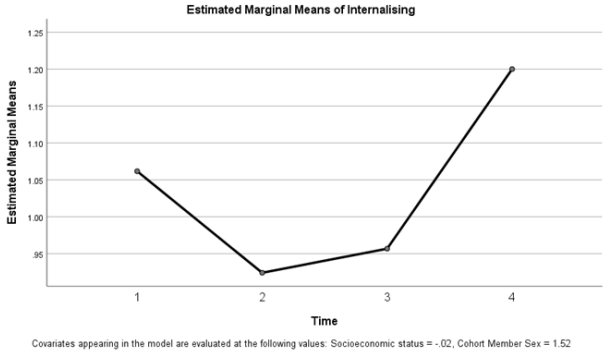


Figure P: *Simple line graphs for internalising behaviours at various time points (age 3, 5, 7 and 14 years old).*

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix L: Simple line graphs comparing the bullying class subgroups on prosocial, externalising and internalising behaviours.

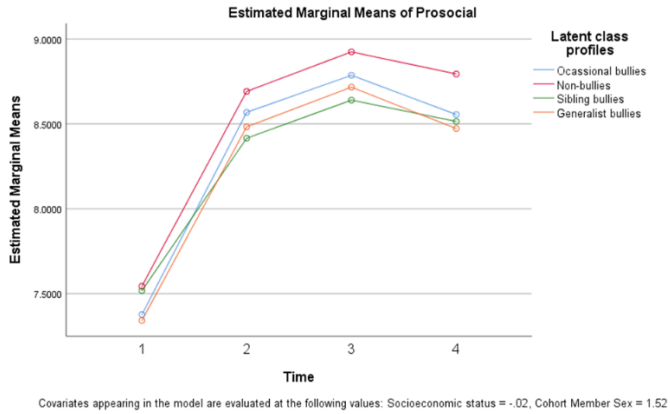


Figure Q: Simple line graph comparing the bullying class subgroups on prosocial behaviours.

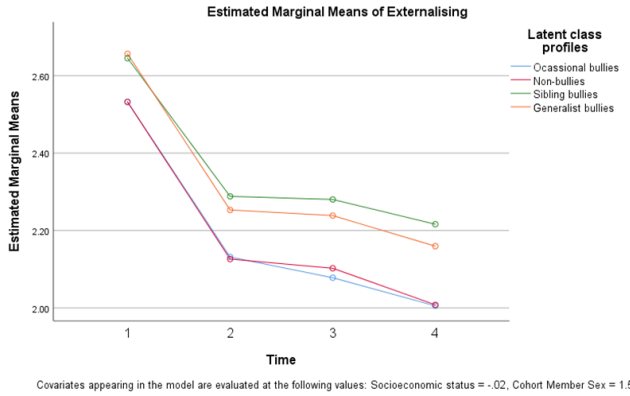


Figure R: Simple line graph comparing the bullying class subgroups on externalising behaviours.

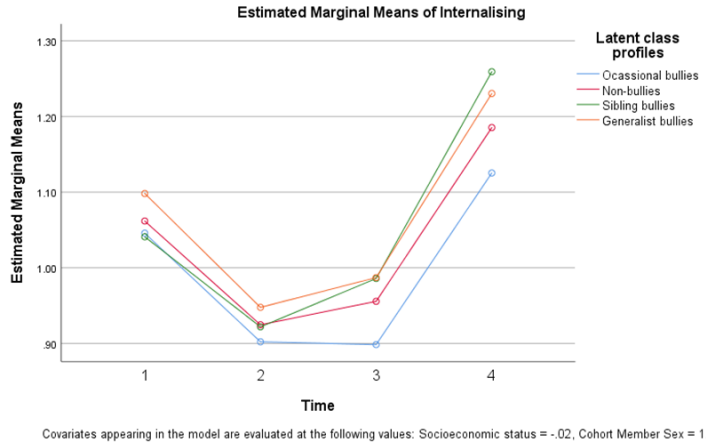


Figure S: Simple line graph comparing the bullying class subgroups on internalising behaviours.

Early identification and treatment of subgroups of sibling bullies whose aggression persisted over contexts and with a degree of callousness.

Appendix M. Data extraction information for systematic review: demographics, quality assessment and intervention type and effectiveness.

Table 25. *Demographical information for each of the studies in the systematic literature review.*

Authors (date)	Location and period	Childs Gender	Age of children in years (mean)	Age of parents	Ethnicity	SES
Dadds et al. (2019)	Australia Started 2012	Female =24% Male= 76%	3 to 8 (5.87) EE=5.72; CCP=6	EE Mother= 38.95 Father=42.25 CCP Mother= 37.78 Father=38.24 Overall: Mother= 38.33 Father=40.25	Information not available.	Socio-economic index for areas (Australian bureau of statistics). EE= 8.55; CCP= 8.74 overall: 8.65 Maternal education EE= 4.84; CCP=4.26 overall: 4.55. 1=primary, 2=year 10, 3=year 12, 4=college, 5=university.
Donohue et al. (2021)	Washington, USA. 2014 to 2018	Female= 40.6% Male= 59.4%	3 to 5 (4.56)	No information available	White=90.6% Black= 3.1% Biracial/ multiracial =6.3% Hispanic/ Latino=9.4%	Information not available.
Somech & Elizur (2012) Elizur et al. (2017) Elizur & Somech (2018)	Jerusalem 2007 to 2012	Female= 23.6% Male= 76.4%	3 to 5 (4.04)	Mother=33.28 Father= 36.12	Israel=79.3 Europe=7.5 North America=5.4 South America= 2.9 Africa= 4.3	Mother: High school =47.9; College=27.9; Higher Degree=19.3. Father: High school=53.6; College=17.1; Higher degree= 19.3 Income: <4,000= 8% 4,001-6,000 = 6% 6,001-8,000 =17% 8,001-10,000 = 18 10,001-15,000=25% 15,001-20,000=19% >20,000 =7%.

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Kjøbli et al. (2018)	Norway 2008 to 2010	Female= 31.9% Male= 68.1%	3 to 12(7.28) BPT: 7.28; PMTO: 8.56; ISST: 7.64	Parents= 34.31	Norwegian = 93.5% Western European= 1.9% Other ethnicity= 4.6%	Average income= $88,815 Upper-middle income level. College or higher university degree = 39.4% High school= 52.8% Junior high school or elementary school= 7.9%
Kolko et al. (2009)	Pittsburgh USA (no date available).	Community: Female=14.5% Male= 85.5% Clinic: Female=15.7% Male = 84.3% Control: Female=17.4% Male= 82.6% Overall: Female: 15.87% Male= 84.13%	6 to 11 (8.8) Community= 8.7 Clinic= 8.9 Control = 9.2	Information not available	Community: minority ethnicity= 47.8% Clinic: minority ethnicity= 57.1% Control: minority ethnicity= 42% Overall: minority ethnicity= 48.97%	Community: SES score 37% Unmarried= 59.4% Caregiver attended college= 69.6% Clinic: SES=35.5% Unmarried= 62.9% Attended college= 64.3% Control: SES= 38% Unmarried= 43.5 Caregiver attended college= 76.8%
Lockman et al. (2018)	Alabama, USA. (no date available)	Female=37% Male= 63%	10 to 11 (10.7)	Information not available.	African American =68% Caucasian =31% Other race/ethnicity =1%.	SES= lower class (Hollingshead index score=28).

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Muratori et al. (2015 and 2019)	Pisa, Italy. 2007 to 2010	Female: CP=14% BtC=11% TAU= 16% Overall: 13.67% Male: CP=86% BtC=89% TAU=84 % Overall= 86.33%	8 to 12 (10.35) CP=9.9 5; BtC=10. 55; TAU=1 0.56	Informati on not available.	Information not available.	SES: Class I-II CP=23%, BtC=31%, TAU=19% Class III CP= 57%, BtC=48%, TAU= 36% Class IV-V CP=20%, BtC=21%, TAU= 45%.
McGrath et al., (2013). Sourander et al., (2016, 2018)	Southwe st Finland 2011 to 2013	Interventi on: Male=61. 2% Female=3 8.8% Control: Male=62. 5% female=3 7.5% Overall: Male= 61.85% Female= 38.15%	All children were 4	Interventi on Mother= 30.5 Father= 33.2 Control Mother= 29.8 Father= 31.4 Overall Mother=3 0.15 Father=32 .3	Interventio n Finnish=94 .89% Swedish=4. 31% Other=0.8 Control Finnish=94 .82% Swedish= 3.02% Other= 2.16% Overall: Finish: 94.855 Swedish= 3.67 Other=1.48	Intervention: Mothers education Elementary or less=5.7%, Secondary= 37%. College or above=57.4% Fathers education Elementary or less=7.4%, Secondary= 45.8%. College or above=46.8% Control: Mothers education Elementary or less=6.9%, Secondary= 35.1%. College or above=58% Fathers education Elementary or less=7.5%, Secondary= 47.1%. College or above=44.9%

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Hawes & Dadds (2005, 2007)	Brisbane & Sydney, Australia 2002 to 2003	Male= 100%	4 to 8 (6.29)	Information not available.	Information not available.	Income: $20, 000= 7% $20,000-30,000=12% $30,000-50,000 =26% Over $50,000= 55% Education: Junior certificate= 16% High School= 40% University=31%
Agazzi et al. (2020)	Florida USA (no date)	Male	4 ½	Information not available.	Information not available.	"Luca's parents described family life as stable, with full time employment (both parents) and adequate finances and social supports. Luca was enrolled in a private preschool"
Kimonis & Armstrong (2012); Datyner et al. (2016)	Florida USA (no date)	Male	5years 10months 5.83	Information not available.	Biracial and adopted.	Information not available.
Fleming et al. (2017)	New south wales Australia (no date)	Male	5 years 1 month 5.08	Information not available.	Caucasian	Information not available.
Mills et al. (2018)	Hershey, USA (no date)	Female	11 years old.	Information not available.	Caucasian	Parents employment= military Amy attended a rural public school.

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Table 26. *CU measure, study design and quality assessment scores.*

Authors (date)	CU measure	Study Design	Quality assessment score
Dadds et al. (2019)	UNSW system: Antisocial Process Screening Device (APSD; Frick & Hare, 2001) & Strengths & Difficulties Questionnaire (SDQ; Goodman, 1997). Pre-post and 3 months follow up.	RCT	12 out of 13 (92.2%) No confidence intervals
Donohue et al. (2021)	Five items from the CBCL/$1^1/_2$-5 which have been found to differentiate CU behaviours from other externalising problems. Pre-post and 18 weeks follow up. Internal consistency was adequate (a = .69)	RCT	11 out of 13(84.62%) No confidence intervals. Both groups not measured at follow-up
Somech & Elizur (2012) Elizur et al. (2017) Elizur & Somech (2018)	11 commonly used items in CU behaviours' assessment of preschoolers (Cronbach's alpha = 0.82). Eight items from Frick's (2004) Inventory of Callous Unemotional traits (ICU), Parent Report (Preschool Version). Three APSD for prekindergarten items from Dadds et al.' (2005) community study. Pre-post and 1 year follow up.	RCT	12 out of 13 (92.2%) Control group was very minimal.
Kjøbli et al. (2018)	15 items from Merrell's behaviour scales (Merrell at al., 2001). Alpha reliability for the three subscales were .77/.77/.81, .79/.83/.79, and .78/.83/.83 at pre/post/follow-up, respectively. Pre-post and 6 months follow-up.	RCT	10 out of 13(76.92%) Experimenters & participants are not blind to grouping.
Kolko et al. (2009)	The teacher-reported on six items of callous/unemotional traits on the Antisocial Processes Screening Device (APSD; Frick 1994). Pre-Post and Follow-ups at 6, 12, 24 36 months.	RCT	6 out of 13 (46.15%). Too many interventions, impossible to see what is affective.
Lockman et al. (2013)	The teacher-reported on six items of callous/unemotional traits on the Antisocial Processes Screening Device (APSD; Frick 1994). Alpha levels ranged from 0.70 to 0.79. Pre-post and 3-year follow-up. callous–unemotional traits (6 items).	RCT	9 out of 13 (69.23%) Not blind and no confidence intervals.
Murator et al. (2015 and 2019)	Parent-reported on six items of callous/unemotional traits on the Antisocial Processes Screening Device (APSD; Frick & Hare 2001). Cronbach a across the time points was .73 for the APSD-CU. The total 24-score inventory of callous unemotional traits (CUI; Frick, 2004). The study found a mean cronbach of 0.72 across the time points. Pre-post and 1-year follow up; and 6-year outcome study.	Non-equivalent control group design.	9 out of 13 (69.23%) Not blind and no confidence intervals.

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McGrath et al., (2013). Sourander et al., (2016, 2018)	24-score inventory of callous unemotional traits (CUI; Frick, 2004). Pre-post, 12 & 24 month follow up.	RCT	11 out of 13 (84.62%) Results were maintained after a year, but not at 24 months.
Hawes & Dadds (2005, 2007)	Items from the APSD and Strengthens & Difficulties Questionnaire (SDQ) were pooled to create a measure of CU behaviours. Dadds et al. (2005) factor analyzed the pooled items from the APSD and SDQ, producing distinct CU and Antisocial factors. The validity of this joint ASPD–SDQ measurement structure has also been supported in twin research showing substantial genetic risk for CU behaviours in 7-year-old children (Viding et al., 2004). Alphas for the CU behaviours was .79. Pre-post and 6-month follow-up.	Case Control	7 out of 8. (87.5%) Same size (n=56) is smaller than recommended for the type of analysis.
Agazzi et al. (2020)	24-item Inventory of Callous Unemotional Traits (ICU-Parent Preschool version; Frick, 2004) Pre-treatment and weekly and 4-month follow-up.	Single case study. Client: Luca	Score of 7 out of 11. (54.55%)
Kimonis & Armstrong (2012); Datyner et al. (2016)	24-item Inventory of Callous-Unemotional Traits (ICU; Frick, 2004). PCIT: Pre-treatment and weekly, plus follow-up at 1, 5 weeks and 5-months. CARES: Pre-treatment and weekly, plus follow up at 24-months.	Single case study. Client: Luke	Score of 7 out of 11. (54.55%)
Fleming et al. (2017)	24-item Inventory of Callous-Unemotional Traits (ICU; Frick, 2004). Pre-treatment, weekly, post and 3-month follow-up.	Single case study. Client: Matthew	Score of 7 out of 11. (54.55%)
Mills et al. (2018)	24-item Inventory of Callous-Unemotional Traits (ICU; Frick, 2004). Pre-mid and post treatment.	Single case study. Client: Amy	6 out of 11. (54.55%)

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Table 27: *Review papers extracted information regarding the intervention type and results*

Authors (date)	**Intervention description.**	**CU behaviours reduction**	**Effect size**	**Assessment time points**	**Maintained at follow-up**
Dadds et al. (2019)	PMT & Emotional Engagement (EE) or the control condition PMT & Child Centred Play (CCP). 15 hours total	There were significant time effects for both mother (n2=.572) and fathers (n2=.334) ratings of CU behaviours as both fell. Teachers' ratings did not. Levels remained clinically high throughout.	Large effects	Intervention: Mothers rating of CU Pre (10.63), post (8.42) and 3 months follow up (8.37). Fathers rating of CU Pre (10.27), post (8.09) and 3 months follow up (7.45). Control: Mothers rating of CU Pre (9.13), post (6.50) and 3 months follow up (6.50). Fathers rating of CU Pre (9.80), post (8.30) and 3 months follow up (7.20).	Yes
Donohue et al. (2021)	Parent−Child Interaction Therapy—Emotion Development (PCIT-ED) or a waitlist control condition (treated after 18 weeks). 20 sessions (20 hours)	Compared with the waiting list control, children who received PCIT-ED treatment displayed a significantly (P<0.001) greater reduction in CU behaviours.	Large effect= 0.74	Intervention Pre (2.77), post (1.14) and 18 weeks follow up (1.23). Control: Pre (3.31), post (3.08).	Yes- but no control

Somech & Elizur (2012) Elizur et al. (2017) Elizur & Somech (2018)	Hitkashrut 4 (2-hour) weekly coparent training sessions with 5–7 couples or control in which parents received two consultation sessions & made use of Hitkashrut's key components/handouts. 10 hours (6 sessions) Effectiveness study (Somech & Elizur, 2012) Mediation by ineffective parenting (Elizur et al. 2017) EC and CU mediation of treatment effect on 1-year follow-up (Elizur & Somech, 2018)	Intervention group CU behaviours were reduced but increased for the control group. Reliable change: CU behaviours. Odds Ratio = 5.44, 95% CI: 1.58-18.69 (Somech & Elizur, 2012). A reduction in ineffective parenting predicted reduced CU behaviours ($\beta = 0.19$, $p < 0.05$). Ineffective parenting mediates CU, Effort Control (EC) and Conduct disorder (CD). (Elizur et al., 2017) CU and EC at post treatment mediate CD treatment effects at follow up (Somech, 2018)	Large effects at post intervention (ES=.76, p< .001) and a medium effect at follow-up (ES=.63, p< .001). Mediation of ineffective parent = 0.28	Intervention Pre (29.24), post (26.71) and 1 year follow up (26.70). Control: Pre (28.65) and post (30.68).	Yes but no control
Kjøbli et al. (2018)	BPT or Parent Management Training, Oregon Model (PMTO) or Individual Social Skills Training (ISST) PMTO: 12 weekly sessions that. last 2.5 hr (30 hr in total) delivered to groups of families, with a maximum number of 16.	For both BPT and PMTO the paths from intervention allocation to CU behaviours were significant, which showed that allocation to either of these groups lead to a reduction in CU behaviours at post intervention. For ISST it was non-significant.	BPT: 0.32= medium PMTO: 0.39= medium	Pre-post and 6 months follow-up.	The reduction in CU behaviours was only maintained for the PMTO group at follow up (d=0.48).

Kolko et al. (2009)	Child CBT Medication for ADHD. PMT. Parent/child/Family Therapy. School Programming/Teacher Consultation Peer Relations/Community Activities Development. Case/Crisis Management.	CU behaviours significantly decreased between pre-post for both outpatient and clinic groups ($p<0.001$) and there was no significant change in CU behaviours between post and follow-up ($p=0.708$). There was no significant difference between outpatient and clinic outcomes in terms of reducing CU behaviours ($p=0.702$).	Medium effect sizes- 0.44 at post treatment and 0.48 at 3-year follow-up.	Pre-Post and Follow-ups at 6, 12, 24 36 months.	Yes
Lockman et al. (2018)	Coping Power or Control after baseline (T1) assessment in the summer after 4th grade. Booster intervention (CP-B) or not (CP) at T2 in the summer after 5th grade. 34-session child component and a 16-session (50 hours) parent component. 24 and 10 (34 hours)	Children in the Coping Power condition had significantly greater negative slopes for callous-unemotional traits, $t(236) = -2.08$, $p<0.05$.	0.41= medium effect	Pre-post, 1, 2 and 3-year follow-up.	Yes

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Murator et al. (2015 and 2019)	COPING POWER: focused on active mechanisms underlying children's aggressive behaviour. BOYOND THE CLOUDS (CONTROL) generic multi-component treatment model that uses cognitive behavioural principles Parents and child. Treatment as usual (TAU): Child offered therapy.	The improvement in the CU behaviours in the CP group was greater than the improvement in both the BtC and TAU (P<0.01).	For the CP treatment CU improvements 0.42 =medium	ASPD CU Pre (5.40), Post (3.60) and 1-year follow-up (3.90). ICU Pre (27.98), Post (24.04), 1-year (21.46) 6-year Follow-up (21.59).	Yes
McGrath et al., (2013). Sourander et al., (2016, 2018)	Strongest Families Smart Website (SFSW) intervention with telephone coaching 11-session Internet-assisted parent training program, included weekly telephone coaching or an education control (EC).	At 12-month follow-up, improvement in the SFSW intervention group was significantly greater compared with the control group CU measures (P=0.03).	Small effect 0.19	Pre-post, 12 & 24 month follow up.	Reductions in CU behaviours were maintained at 12 months but not 24 months.

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Hawes & Dadds (2005, 2007)	Manualized parent training intervention based on Sanders and Dadds (1993). The intervention commenced with a 2-hr 1 assessment session, followed by nine weekly 1-hr treatment sessions. 11 hours.	Significant reductions in CU behaviours after treatment and a reduction in the percentage within clinical range. High CU scores increased the likelihood of ODD diagnosis at follow-up (B=0.46, p<0.05). Time out was found to be less effective for children with CU behaviours (r=0.31, p<0.02, n=38), but not reward strategies (r=0.08, p<0.29, n=38).	Pre-post change in CU behaviours. d=0.49 Medium Pre to follow-up change in CU behaviours d=0.57, Medium	CU behaviours: Pre (9.42), post (7.78) and 6-month follow-up (7.39). % in clinical range: Pre (50), post (22.2) and follow-up (20.5).	Yes
Agazzi et al. (2020)	Parent–Child Interaction Therapy (PCIT) for Callous Unemotional Traits (PCIT-CU; Kimonis et al., 2019).	Parent ratings of Luca's CU behaviours using CUI were 32 at the initiation of treatment and 23 at the last PDI session. No change in the teachers rating.	N/A	Pre-treatment and weekly and 4-month follow-up.	Not measured.
Kimonis & Armstrong (2012); Datyner et al. (2016)	PCIT and an adjunctive token economy system. Follow-up study 7-months later: Coaching and Rewarding Emotional Skills (CARES).	Luke's total ICU scores were 52 (M = 2.17), 56 (M = 2.33), and 38 (M = 1.58) according to mother, father, and teacher ratings. 5 months post-treatment were Luke's mother rated CUI at 31 (M = 1.29), which was a 21-point reduction from pre-treatment. Mother rated ICU at 19 post-treatment. The teacher was 14 post-treatment.	N/A	PCIT: Pre-treatment and weekly. Follow-up at 1, 5 weeks & 5-months. CARES: Pre-treatment & weekly, plus follow up at 24-months.	Yes

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Fleming et al. (2017)	PCIT sessions conducted via VTC, with the family located at home and the PCIT-trained therapist located at the university clinic.	Matthew's total ICU scores at pre-treatment were 13 (M = 0.54), 15 (M = 0.71), 40 (M = 1.67), and 57 (M = 2.36) according to his mother, father, grandmother, and teacher, respectively. Teacher ratings were 38 (M = 1.58) at the 3-month follow-up. No report of parents or grandparents rating after pre-treatment.	N/A	Pre-treatment, weekly, post and 3-month follow-up.	Yes
Mills et al. (2018)	Eight BPT sessions over 15 weeks. Treatment was intended to be delivered weekly, but there were gaps in treatment lasting up to 3 weeks	Maternal ratings of CU behaviours on the ICU declined from 47 to 32 at Post-Treatment. Paternal ratings of CU behaviours declined from 45 to 32 at Post-Treatment.	N/A	Pre-mid and post treatment.	No follow up.