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Research report

Pathways of Care Longitudinal Study: Outcomes of Children and Young People in Out-of-Home Care

Temperament of Children in Out-of-Home Care: Stability, Differences and Relationship with Socio-Emotional Wellbeing

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Research Report No.23

Temperament of Children in Out-of-Home Care: Stability, Differences and Relationship with Socio-Emotional Wellbeing

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All the analyses presented in this report are based on a final version of the wave 1–4 unweighted data collected in face-to-face interviews with children, young people and caregivers.

Pathways of Care Longitudinal Study Clearinghouse
All study publications including research reports, technical reports and briefs can be found on the study webpage www.facs.nsw.gov.au/resources/research/pathways-of-care

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Preface

The Pathways of Care Longitudinal Study (POCLS) is funded and managed by the New South Wales Department of Communities and Justice (DCJ). It is the first large-scale prospective longitudinal study of children and young people in out-of-home care (OOHC) in Australia. Information on safety, permanency and wellbeing is being collected from various sources. The child developmental domains of interest are physical health, socio-emotional wellbeing and cognitive/learning ability.

The overall aim of this study is to collect detailed information about the life course development of children who enter OOHC for the first time and the factors that influence their development. The POCLS objectives are to:

- Describe the characteristics, child protection history, development and wellbeing of children and young people at the time they enter OOHC for the first time
- Describe the services, interventions and pathways for children and young people in OOHC, post restoration, post adoption and on leaving care at 18 years
- Describe children's and young people's experiences while growing up in OOHC, post restoration, post adoption and on leaving care at 18 years
- Understand the factors that influence the outcomes for children and young people who grow up in OOHC, are restored home, are adopted or leave care at 18 years
- Inform policy and practice to strengthen the OOHC service system in NSW to improve the outcomes for children and young people in OOHC.

The POCLS is the first study to link data on children's child protection backgrounds, OOHC placements, health, education and offending held by multiple government agencies; and match it to first-hand accounts from children, caregivers, caseworkers and teachers. The POCLS database will allow researchers to track children's trajectories and experiences from birth.

The population cohort is a census of all children and young people who entered OOHC over an 18-month period for the first time in NSW between May 2010 and October 2011 (n = 4,126). A subset of those children and young people who went on to receive final Children's Court care and protection orders by 30 April 2013 (2,828) were eligible to participate in the study. For more information about the study, please visit the study webpage www.facs.nsw.gov.au/resources/research/pathways-of-care.

The POCLS acknowledges and honours Aboriginal people as our First Peoples of NSW and is committed to working with the DCJ Aboriginal Outcomes team to ensure that Aboriginal children, young people, families and communities are supported and empowered to improve their life outcomes. The POCLS data asset will be used to

improve how services and supports are designed and delivered in partnership with Aboriginal people and communities.

DCJ recognises the importance of Indigenous Data Sovereignty (IDS) and Indigenous Data Governance (IDG) in the design, collection, analysis, dissemination and management of all data related to Aboriginal Australians. The POCLS is subject to ethics approval, including from the Aboriginal Health & Medical Research Council of NSW. DCJ is currently in the process of scoping the development of IDS and IDG principles that will apply to future Aboriginal data creation, development, stewardship, analysis, dissemination and infrastructure. The POCLS will continue to collaborate with Aboriginal Peoples and will apply the DCJ research governance principles once developed.

1 Executive summary

This study examines the association between a child's temperament and a child's socio-emotional wellbeing for children in Out-of-Home Care (OOHC). This study can be considered a first step in examining the usefulness of using a child's temperament to identify children who may later develop issues and to tailor interventions to address their needs. Temperament is defined as behavioural styles that are typical to a child and that are usually present from birth. This research examined three different dimensions of temperament:

- Sociability: tendency to be shy or outgoing in new situations and when meeting new people
- Reactivity: strength of emotional reactions to positive and negative experience
- Persistence: capacity to maintain attention, despite distractions.

It is argued that while a child's temperament is neither good nor bad, a child may have more difficulty fitting into OOHC due to their temperament (Smart 2007). For example, a child may have a low level of sociability (i.e. is shy) and while this shyness may hinder a child coping with certain situations, this does not mean a child being shy is inherently a negative trait.

In order to examine the association of temperament and a child's outcomes, this paper focuses on the child's socio-emotional wellbeing as measured by the Child Behaviour Checklist (CBCL). Three research questions are examined in order to provide insights on this potential relationship.

- Is temperament generally stable for children in the POCLS interview cohort?
- Does temperament differ for children in the POCLS compared to those in the general population (i.e. children who are not in OOHC)?
- Is children's temperament style related to their socio-emotional wellbeing while in OOHC?

The stability of temperament is examined by comparing a child over time on a range of different measures commonly used within the literature. For the most part, the analyses of this report indicated stability for all three temperament traits. This indicates that early observed measures of temperament remain accurate from wave 1 to wave 4 (approximately 4.5–5 years).

To evaluate the difference between temperament of the POCLS interview cohort and children in the general population, a comparison was made of toddlers aged 2–3 years

between the POCLS and the Longitudinal Study of Australian Children (LSAC).[1] It was found that, on average, reactivity was higher for children in the POCLS sample than in the general population.

In order to explore whether there is an association between the levels of socio-emotional wellbeing and temperament, statistical modelling was conducted. Children's socio-emotional wellbeing was measured using the CBCL (Achenbach & Rescorla 2000; Achenbach & Rescorla 2001) total problems, externalising and internalising scores.

The key findings are:

- Results showed that all three CBCL scores were associated with the three temperament traits while controlling for other factors (e.g. demographics, trauma history, carers' characteristics, etc.).
- The results also indicated large associations between temperament traits and socio-emotional wellbeing.
    - Reactivity was found to have sizeable positive association with CBCL total problems, internalising and externalising scores. Thus, children who were inclined to react strongly and intensely were more likely to be reported by carers as having behaviour problems.
    - Persistence was observed to have sizeable negative association with CBCL total problems, internalising and externalising scores. Thus, children who showed less persistence with a task were more likely to be reported by carers as having behaviour problems.
    - Sociability was observed to have a negative effect on total problems and internalising CBCL scores. Thus, children who were less outgoing and tended to be shy were more likely to be reported by carers as having behavioural problems.

The findings of this report fill an important gap in knowledge about the relationship between socio-emotional wellbeing and temperament, and provide some valuable insights that can inform policy and practice.

- Temperament is generally stable for children in the POCLS interview cohort.

[1] The Longitudinal Study of Australian Children is an Australia-wide sample of children evaluated over time, and measures a wide variety of a child life course in the current environment. Australian Institute of Family Studies (2018). Longitudinal Study of Austalian Children Data User Guide – December 2018. Melbourne: Australia, Australian Institute of Family Studies.

- The POCLS interview cohort may be different in terms of temperament from that of the general population, that is the children and young people who are not in OOHC. This could indicate that children in OOHC differ in their temperament from that of the general population.
- The significant associations between temperament traits such as reactivity, sociability and persistence and children's socio-emotional wellbeing indicate that temperament measures could be useful for identifying and assisting children before problems develop or escalate.

Further research is needed to ensure that these findings are robust and consistent for all children in OOHC and to develop targeted interventions in order to improve children's socio-emotional wellbeing.

2 Introduction

A better understanding of the risk and protective factors associated with socio-emotional wellbeing could help improve the outcomes of children in OOHC. Despite considerable evidence suggesting a relationship between socio-emotional outcome and a child's temperament in general population samples (Sanson, Hemphill & Smart 2004), the topic remains under-researched in the context of children in OOHC. This report seeks to fill this gap in the literature. To the best of our knowledge this is the first study to examine the three temperament traits of sociability, persistence and reactivity together for children in OOHC.

This research investigates whether temperament could be considered a risk or protective factor in terms of socio-emotional wellbeing for children in the POCLS. Temperament refers to an individual's way of reacting and responding to their environment. This includes the intensity of such reaction, as well as tendencies towards specific behaviours. Evidence indicates that temperament is something a person is born with and matures into an adult's personality. Temperament has previously been observed to be stable over time.

Temperament can be expected to influence the wellbeing of a child in care in a number of ways. For example, it would be expected to affect the ease with which children settle into a placement, new school, preschool or child care centre; whether placements are stable or unstable; and children's ongoing wellbeing while in care. It is expected that temperament can be an important factor in many aspects of a child's wellbeing and experience in OOHC, and this motivates the research questions of this analysis.

This report will examine three key research questions:

- Is temperament generally stable for children in the POCLS interview sample?
- Does temperament differ for children in the POCLS compared to those in the general population?
- Is there an association between the levels of socio-emotional wellbeing and differences in personality temperament?

The POCLS data consists of children who entered OOHC in NSW for the first time over the 18 months between May 2010 and October 2011. The final order cohort is taken from this population and consists of those children who had received final Children's Court care and protection orders by 30 April 2013. Carers of these children were invited to undertake the survey interview in each wave, and the interview sample consists of those carers and children who responded to the survey. Further information about the POCLS cohort can be found in the POCLS baseline statistical report (Australian Institute of Family Studies et al. 2015).

The POCLS study collects a wide range of information on children in OOHC, including information on temperament, which is lacking from many other studies. This means that it is uniquely suited for examination.

The first analysis will examine the rank-order stability of temperament traits to see if POCLS children remain in broadly the same position relative to other children within the sample over time. The second analysis will compare children in the POCLS with a sample of the general population to see if mean levels of these traits differ between these groups. The third and final analysis will see if there is a statistical relationship between each of the temperament traits and CBCL scores for internalising, externalising and total problems behaviours using random intercept regression models.

Temperament is an under-examined aspect of a child's makeup. Analysis of temperament could lead to insights into the wellbeing of children and young people in OOHC. Temperament is defined as the 'difference between individuals, visible from birth, in how they typically behave and react to their social surroundings' (Sanson & Oberklaid 2013).

In order for temperament to be a useful measure, firstly, it needs to be relatively stable. While temperament stability is well established in the existing literature for the general population (Akaike 1974; Pedlow et al. 1993; Roberts & DelVecchio 2000; Sanson & Oberklaid 2013), the analyses in this report seek to confirm that it applies to the children in the POCLS and, by extension, to children in general who are in OOHC.

Secondly, it could be argued that due to traumatic experiences shared by the majority of children in the OOHC system, there may be systematic differences in the temperament between children in OOHC and children in the general population. Using a sample of Australian children from the Longitudinal Study of Australian Children (LSAC), the mean level of temperament is compared among similarly aged children to identify if systematic differences exist between the children in the POCLS and those in LSAC.

Thirdly, the association of temperament with socio-emotional outcomes will be examined while taking into account the effects of various confounding factors. This section will examine what aspects of a child's temperament are associated with socio-emotional outcomes and the relative importance of the effect.

Taken together this research is a first step in identifying whether temperament is a risk or protective factor for the socio-emotional outcomes of children in OOHC.

3 Literature review

3.1 What is temperament?

Temperament is defined as the 'difference between individuals, visible from birth, in how they typically behave and react to their social surroundings' (Sanson & Oberklaid 2013). Temperament can be thought of as a precursor to a personality, in that it is an important initial state on which life experiences combine to create personality (Prior et al. 2000). This means that a child with a particular temperament will tend to act in a certain way in many, but not all, situations and environments they experience.

While a number of different temperament traits are examined in the literature, much of the research, including other longitudinal studies in Australia, have focused on three broad dimensions of temperament. These are reactivity, persistence and sociability.

A summary of these traits is provided in Table 1 adapted from Sanson and Oberklaid (2013).

Table 1: Dimension and age-specific names of temperament

Temperament dimension and definition	Infancy and early childhood	Primary school years	Adolescence	Adulthood
Sociability: tendency to be shy or outgoing in new situations and when meeting new people	Approach/sociability	Approach Sociability Shyness	Approach	Approach/ sociability
Reactivity: strength of emotional reactions to positive and negative experiences	Irritability Cooperation	Inflexibility Reactivity Emotionality	Negative reactivity	Negative reactivity Positive emotionality Flexibility
Persistence: capacity to maintain attention, despite distractions	Persistence Distractibility	Persistence Task orientation	Persistence Task orientation	Persistence Distractibility

Source: Sanson and Oberklaid (2013)

The differing levels of each trait represent different behaviours in various situations. For example, a child with a high level of sociability is going to be more comfortable meeting new people and exploring new environments, while children with lower levels of sociability are going to be more shy and reserved. Similarly, a child who has a high level

of reactivity will have a strong reaction to positive and negative experiences (such as childhood trauma) compared to a child with a low level of reactivity. Finally, persistence refers to attention and concentration on a particular task. A child who has a high level of persistence will more likely finish a task compared to a child with a lower level of persistence. It should be noted that temperament is a general tendency or preference as opposed to a rule governing a child's behaviour. For example, it is incorrect to say a sociable child will always act in a sociable manner; rather, a child who is sociable will be more likely to act in a sociable manner than a child who is less sociable.

Temperament has been argued to be a precursor to adult personality (Prior et al. 2000; Rothbart 2007). Similar personality traits have been found in one of the main models of personality psychology, the five factor model[2] (McCrae & Costa 2003). It could be argued that these temperament traits are analogous to a number of the personality traits from the five factor model, with approach analogous to extraversion, reactivity to neuroticism, and persistence to conscientiousness (Rothbart 2007).

3.2 Stability of temperament

Temperament, as a measure of enduring behavioural tendencies, has been argued to be stable over time in a large number of studies. Some of the research on temperament stability is discussed in this section.

The concept of stability of temperament can be looked at in a number of ways. The majority of studies considered temperament stability as being related to rank-order stability (Roberts & DelVecchio 2000). Rank-order stability means that the rankings of children in terms of a temperament trait (e.g. most sociable to least sociable) will be consistent over time (Roberts & DelVecchio 2000). This concept is only concerned with the relative order and whether this is preserved. It does not consider changes in the 'amount' of temperament. For example, children in general change as they mature and develop, but the rank ordering of children may be stable over time. Other concepts of stability include intra-individual differences in consistency (individual growth over time), ipsative consistency (relative importance) and mean-level consistency (mean growth over time). Given the primary focus in the literature is on rank-order stability, the same concept is used for the analysis in this report (section 4).

A large number of studies have identified the rank-order stability of temperament. Pedlow et al. (1993) in a study of the Australian Temperament Project (ATP) found that temperament, as reported by mothers, was stable between infancy and 8 years of age in a longitudinal sample of 450 children. Sanson et al. (1996) identified that the trait of shyness is stable for children from the ages of 1 to 2 years. Other international studies also find consistent evidence of stability of temperament traits (McClowry, Halvorson &

[2] The five factor model consists of Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism. This is commonly expressed with the mnemonic OCEAN.

Sanson 2003; Neppl et al. 2010). Roberts and DelVecchio (2000) conducted a meta-analysis of stability from over 3,000 studies which showed considerable temperament stability in childhood. However, much more stability was present with adult personality, compared to childhood temperament.

Several theoretical explanations exist for why temperament would be stable in an individual over time. The most commonly explored explanation is genetic factors. Saudino (2005) reports that current evidence, generated by twin studies, finds that '…genetic differences among individuals account for approximately 20% to 60% of the variability of temperament within a population.' Roberts and DelVecchio (2000) highlight a number of other potential theoretical mechanisms that could result in the stability of temperament, including a consistent environment, traits reinforcing themselves, goodness of fit, person-environment transactions, and a reinforcement of an identity or self.

3.3 Comparisons of temperament across populations

A number of studies have attempted to compare and contrast temperament levels between different populations. Research indicates that the three broad dimensions of temperament examined in this analysis (sociability, reactivity, persistence) have been identified in a number of other cultures, as well as in animal studies (Rothbart 2007).

Cross-cultural studies often focus on the examination of differences between children in different cultures in temperament dimensions similar to those of sociability, reactivity and persistence (Gartstein, Slobodskaya & Kinsht 2003; Gartstein et al. 2006; Gaias et al. 2012).

The ATP found a considerable amount of cross-cultural difference in temperament, with Australian children being most similar to American children (Prior et al. 2000).

Little, Sanson and Zubrick (2012) found that Aboriginal and non-Aboriginal children are similar in temperament in the dimensions of sociability and persistence, but non-Aboriginal children demonstrate slightly higher (but not significantly different) levels of reactivity.

Smart and Sanson (2005) conducted an examination of temperament data from the ATP and the LSAC to see if Australian children differed in temperament over a 20-year period. The authors conclude that there is no difference in temperament traits of irritability, approach-sociability, reactivity, anxiety, peer problems or pro-social behaviour of Australian children over this time. A similar methodology will be explored in section 5 of this report to examine how children in the POCLS differ in temperament from the general population.

It should be noted that none of this research explores the difference between children in OOHC compared to the general population.

On the basis of the limited literature on temperament traits of children in OOHC, it is difficult to formulate a hypothesis on whether temperament differences will exist between children in the POCLS and children in the general population. Therefore, this research will be more exploratory in nature, but it posits that there is no difference between the two groups.

3.4 The association of temperament with socio-emotional outcomes

Within the field of psychology, there is well-established literature on the relationship of temperament with a child's socio-emotional outcomes. Researchers have argued that temperament traits in children could be linked to a number of psychological conditions, including conduct disorders, personality disorders, attachment disorders and attention deficit disorders (Frick 2004; Nigg, Goldsmith & Sachek 2004; Zeanah & Fox 2004; Widiger, De Clercq & De Fruyt 2009). Roberts et al. (2008), in their study of prisoners from England and Wales, observed an association between personality disorders, temperament and childhood adversity, noting that interaction existed between these factors. Sayal et al. (2014) examined children from a Longitudinal Study of Parents and Children for temperamental characteristics at 6 and 24 months, and found that emotional reaction was a strong predictor of a psychological disorder at age 7. Karevold et al. (2011), in a study of Norwegian families, found that a child's shyness is a risk factor in internalising behaviour as measured by the CBCL. Smart (2007) has highlighted that a child's temperament is neither good nor bad, that it is more appropriate to think of a child's temperament in terms of fit with their environment. Each of the three temperament traits can be associated with strengths but also with possible concerns. Smart (2007) provides examples in Table 2.

.

Table 2: Temperament style: Strengths and possible concerns

Temperament style	Strengths	Possible concerns
High sociability	Friendly, outgoing, willing to try new things or meet new people	May take too many risks, talk to strangers, try dangerous things
Low sociability	Does not rush into things, tends to be careful, considered	Shy, unwilling to try new things, meet new children or adults
High reactivity	Can be enthusiastic, do things with gusto	Can be volatile, intense, moody, negative
Low reactivity	Calm, placid, easy to get along with	May go along with the group too readily, may need to be more assertive
High persistence	Reliable, usually completes tasks with a lot of reminders	May have trouble stopping once a task has begun, can be a perfectionist
Low persistence	Can easily switch from one activity to another, can be very creative	May need help or supervision to complete home and other tasks

Adapted from Smart (2007).

It can be seen that a child's temperament can be a factor influencing their wellbeing in OOHC as they interact with carers, caseworkers and the environment.

In addition to the effects of personality traits on socio-emotional outcomes, previous research has highlighted that personality traits may also potentially have an influence on a range of life outcomes, including unemployment duration, wages, schooling decisions and occupational outcomes (Heckman et al. 2006; Cunha & Heckman 2009; Wells et al. 2016; Cuesta & Budría 2017).

García-Martín et al. (2015) conducted a study profiling children in foster care to predict high-risk, medium-risk and low-risk placements with foster care families. The variables that most influenced classification were identified as child behavioural problems and impulsivity, level of burden on the foster carer[3] and an authoritarian parenting style. The reader should note the contribution of impulsivity, a dimension similar to reactivity, a temperament trait examined in this research.

Stams, Juffer and Ijzendoorn (2002), in their study of international adopted children, identified that having a difficult temperament was positively associated with a child's socio-emotional development in middle childhood.

[3] It should be noted that this is the language of the original study.

Sanson, Hemphill and Smart (2004), in a review of the literature regarding the relationship between temperament and social development, concludes that there are well-established links between temperament dimensions and aspects of social development. This includes higher levels of reactivity being associated with both externalising and internalising behavioural problems.

Little, Sanson and Zubrick (2012) conducted an analysis looking at the influence of temperament on emotional problems, conduct problems, and inattention/hyperactivity problems using the Longitudinal Study of Indigenous Children (LSIC).[4] Findings indicate that reactivity is a strong predictor of emotional and conduct problems, children with high levels of sociability are less likely to have emotional problems, and children who are less persistent are at greater risk of inattention/hyperactive and conduct problems.

Christensen et al. (2017) conducted a study of socio-emotional wellbeing and development, using the LSAC data to estimate the influence of temperament and other covariates on socio-emotional development, including both internalising and externalising behaviour problems. The model found that lower levels of persistence and sociability, along with higher reactivity, were associated with poorer socio-emotional outcomes. The study also highlighted a number of other factors which made a small contribution to poorer outcomes. These factors include the child's gender, maternal psychological health, socio-economic status and parental style. Each of these factors has its own influence and no one factor could be identified as having a predominant effect. This research also noted that the effects persist over time and that children's increasing age was the main driver of socio-emotional development.

Tung et al. (2018) conducted a longitudinal study on 82 children adopted from foster care to examine the relationship between reactivity and externalising behaviour. The study found that, even after controlling for variables such as trauma experiences and demographics, reactivity predicts higher levels of externalising behaviour both at initial entry and across childhood. To the best of the author's knowledge, this is the only study that has examined this relationship. In fact, in their review of foster family characteristics and their relationship with behavioural and emotional problems of children in foster care, Orme and Buehler (2001) stated, 'We are unable to find any studies that examined the association between foster children temperament and their social and emotional adjustment'.

In addition to the direct influence of temperament, the literature argues that temperament is associated with different responses to parental warmth and parental hostility. Numerous authors have stated that the effects of parenting on a range of behaviours and outcomes such as socio-emotional wellbeing are expected to be different for children on

[4]The Longitudinal Study of Indigenous Children in Australia collects a range of quantitative and qualitative data about Indigenous children and their development (Department of Families, Housing, Community Services and Indigenous Affairs).

the basis of their temperament (Paterson & Sanson 1999; Collins et al. 2000; Morris et al. 2002; Stams, Juffer & Ijzendoorn 2002; Zeanah & Fox 2004; Hong & Park 2012). This theory argues that children with certain temperament traits may be more resilient to hostile parenting while others are less responsive to parental warmth, as opposed to a constant influence of temperament for all children regardless of parenting.

Morris et al. (2002) found in their analysis of American children that there was a significant interaction between parenting style and the child's temperament. Children who had low levels of irritability (related to reactivity) were less affected by covert parental aggression compared to those with high levels of irritability. This effect was not apparent with effortful control (persistence) or parental aggression (hostility).

Prior et al. (2000), in their work on the ATP, found that children who had a greater number of 'difficult' temperament factors, such as high levels of reactivity and low levels of persistence, were more likely to be affected by parenting practices such as high punishment and low warmth than children with average or better levels of these temperament traits.

In regards to children in OOHC systems, Duelling and Johnson (1990) conducted an analysis of the success of a foster placement, measured by the level of satisfaction of the caseworker and the foster mother, based on the degree of fit between a foster mother5 and child temperament traits. They found that children who had a low score for mood as well as a foster mother with a high degree of inflexibility were found to have lower levels of caseworker and mother satisfaction.

This current study will therefore make a significant contribution to the literature by using a larger longitudinal study to examine the relationship between temperament and socio-emotional development for children in the POCLS. The identification of such a relationship has potential to provide early information that allows a child's OOHC placement to be adapted to a child's needs. Smart (2007) has reviewed previous research that has successfully implemented programs to adapt parenting to suit a child's temperament and reduce child behavioural problems.

On the basis of this literature, it is hypothesised that each of these temperament traits will be associated with children's socio-emotional wellbeing such that high levels of reactivity and low levels of sociability will be associated with higher levels of behavioural problems; while high levels of persistence will be associated with lower levels of behavioural problems. In addition, we expect sociability to be more salient for internalising behaviour problems. As suggested by the literature, we will investigate the possibility of interaction effects between parenting warmth/hostility and temperament.

[5] This is the term used in the original text.

4 The stability of temperament in the POCLS

This section of the report discusses the methodology, analysis and results of an analysis to assess the stability of temperament style of the children in the POCLS. It details how temperament is measured, the analysis tools being used and the findings.

4.1 Measures

The POCLS draws its temperament measures from the previous work of researchers on the ATP (Prior et al. 2000) and the LSAC (2005). The POCLS measures temperament in the three key dimensions of sociability, reactivity and persistence as reported by the child's primary carer. Examples of the items included in each dimension are:

- Sociability
    - Is pleasant (smiles, laughs) when first arriving in unfamiliar places (13–42 months)
    - Is shy with adults he/she doesn't know (reversed) (8–17 years)
    - Approaches people his/her age even when he/she doesn't know them (8–17 years)
- Reactivity
    - Reacts strongly to a disappointment or failure (cries or complains) (8–17 years)
    - If the child wants a toy or a sweet while shopping, he/she will easily accept something else instead (reversed) (43–95 months)
    - Shows much bodily movement (stomps, writhes, swings arms) when upset or crying (13–42 months)
- Persistence[6]
    - Plays continuously for more than 10 minutes at a time with a favourite toy (13–42 months)
    - Goes back to the same activity after a brief interruption (e.g. a snack or trip to the toilet) (13–42 months)
    - Remembers to do homework without being reminded (children 8–17 years)

Different measures are used for children in different life stages, that is, infants (0–12 months)6, toddlers (13–42 months), children (43–95 months) and school-aged (8+ years). Infant and toddlers use the Abbreviated Temperament Scales for Infants,

[6] It should be noted that no measure of persistence is collected for infants (i.e. children aged 0–12 months).

Toddlers and Children (Prior et al. 2000)[7] while school-aged children use a different version of the School Aged Temperament Inventory (SATI) (McClowry 1995). These measures are harmonised by transforming them to a common scale (1 to 5) as measures from the Abbreviated Temperament Scales for Infants, Toddlers and Children use a six point scale. Further details of these measures can be gained from the POCLS Measures Manual (NSW Department of Communities and Justice 2020).

4.2 Methodology

The POCLS interview cohort is examined over the first four waves of the POCLS data collection. The data is used in its unweighted format.

The standard method for examining the stability of psychological traits over time is to examine the test-retest correlation in order to determine rank-order consistency (Roberts & DelVecchio 2000). Rank-order consistency is based on the idea that if all the samples were ranked in order of the level of their traits, the rankings would be stable across differing waves. In order to assess rank-order consistency at the individual level over time, Spearman's Rho[8] was estimated and examined.

As discussed in the literature review, other approaches to assessing stability do exist. Rank-order stability is the most widely used within the literature and is the primary focus of this section. This is due to the focus of the literature on comparing differences between individuals rather than changes in the population and within individuals over time. Additional analyses examining mean level and intra-individual stability over time are also undertaken.

Two different approaches for assessing the rank-order stability of temperament over time were used. This is due to the POCLS design consisting of a sample of children aged between 0 and 17 years who entered care for the first time during May 2010 and October 2011. Many other longitudinal studies focus on children of particular ages and thus can investigate stages and development over time by re-examining the same sample of children with homogenous ages.

The approach taken here was to examine the consistency of temperament for children: a) between waves (e.g. wave 1 to wave 2, etc.), and b) across differing stages of development regardless of which wave the change occurred in (i.e. from infant to toddler, toddler to primary school-aged child, primary school-aged child to secondary school-aged adolescent). For example, a child can be record in one stage in wave 1 but in the next stage in wave 3 as these stages are not required to be adjacent waves. For the wave

[7] Further adapted by the LSAC (2005).

[8] Spearman's Rho is also known as rank correlation. This measure assesses the correlation of the ranking between two variables. For example: if we ranked the heights of children and then compared how much those rankings stayed the same. This would be a Rank Correlation Test.

approach, we used the temperament scores of the entire POCLS sample at the waves, which therefore ignored the stage of development children were in at the time of the wave. A limitation of this approach is that any differences found could in part be due to a change of instruments across stages of development, as the instruments used differed in content to reflect children's differing capacities at differing stages of development (see examples in section 4.1). With regard to the stage analyses, only the score at the youngest age of a particular stage of development was used (e.g. the 5-year-old score is the youngest one available for the primary school-aged stage, while the 12-year-old score is the youngest one for the secondary school adolescent stage). Therefore, these scores were compared if available, and scores from older ages within the same developmental stage were ignored.

A combination of these approaches should demonstrate if the results are robust to measurement issues.

In order to assess temperament stability at the population level over time, a paired sample t-test was conducted to assess the mean level of a temperament trait between waves. This test compared each individual who had scores in two adjacent waves. In terms of intra-individual stability, random intercept models[9] are estimated.

The sample used from the POCLS consists of all children who responded to any of the four waves of interview, with casewise deletion of individuals conducted for each analysis to ensure the largest possible sample of individuals. That is, individuals were excluded from the analysis if they lacked data about two adjacent waves or two adjacent life stages, respectively. This sample selection was used for all the analyses in this section and results in different sample sizes for each of the analyses.

It should be reiterated that the measures of temperament are based on a carer's observations of a particular child and not the responses of these children.

In regard to the selection of the alpha to determine statistically significant association, a 99% confidence level ($\alpha = 0.01$) was selected. This is due to the desire to examine only robust effects and to reduce the probability of type 1 errors.[10]

4.3 Results on temperament stability

This section presents the results from the analyses of temperament stability. The results for temperament stability between waves and between stages are presented in Tables 3

[9] Random intercept models are regression models well suited to longitudinal studies and allow persistent individual differences to be accounted for as an additional error component.

[10] A type 1 error is the rejection of the null hypothesis when it was true. This means the finding of significant differences or effects which are not true in later analyses.

and 4 respectively. Table 5 reports the results from mean level stability analysis, and Table 6 reports the results from intra-individual stability analysis.

Table 3: Rank-order correlation of temperament between waves

	Sociability	Reactivity	Persistence[11]
Wave 1 to 2			
Number of observations	1,008	1,006	921
Spearman Rho	0.46	0.46	0.43
P value	0.00	0.00	0.00
Wave 2 to 3			
Number of observations	976	975	953
Spearman Rho	0.54	0.53	0.43
P value	0.00	0.00	0.00
Wave 3 to 4			
Number of observations	818	819	787
Spearman Rho	0.50	0.51	0.55
P value	0.00	0.00	0.00

Note: N varies due to availability of data for each dimension between waves of comparison.

Table 3 shows that there is a moderate amount of stability between waves. All correlation coefficients are statistically significant at the 99% confidence level. All three dimensions of temperament have similar levels of stability, ranging between 0.43 and 0.55, with stability its lowest in wave 1–2. This is consistent with previous research which has highlighted that stability grows as children get older (Sanson et al. 1996; Roberts & DelVecchio 2000).

[11] Persistence is not measured for infants and as such has a low sample size in all periods examined.

Table 4: Rank correlation of temperament between stages

	Sociability	Reactivity	Persistence
Infant to toddler			
No. of observations	65	66	-
Spearman Rho	0.28	0.19	-
P value	0.03	0.12	-
Toddler to child			
No. of observations	510	509	508
Spearman Rho	0.37	0.37	0.30
P value	0.0000	0.0000	0.0000
Child to primary school aged[12]			
No. of observations	340	340	327
Spearman Rho	0.50	0.35	0.45
P value	0.00	0.00	0.00
Primary school aged to secondary school aged			
No. of observations	140	-	-
Spearman Rho	0.43	-	-
P value	0.00	-	-

Note: N varies due to availability of data for each dimension between waves of comparison.

Table 4 tells a similar story, with most stages showing a low to modest correlation (range 0.19 to 0.50) with the next stage for all three dimensions. As expected, the correlations are lower between stages, which may be due to the reduced sample size. This reduction in sample size is a result of children not changing stages between waves and a lack of children at certain ages. For example, due to wave 1 taking place approximately 12 months after a child's entry into care, there were very few infants in the POCLS sample.

[12] Note that for sociability there are differing measures during the school-aged period for those aged less than 14 years and those aged 14 years and over.

Table 5: Mean level stability test for temperament stability

	Sociability	Reactivity	Persistence
Wave 1 to 2			
N	1,008	1,006	921
Wave 1 mean	3.47	2.74	2.95
Wave 2 mean	3.46	2.74	3.13
P value	0.7221	0.7909	0.000
Wave 2 to 3			
N	976	975	953
Wave 2 mean	3.47	2.73	3.17
Wave 3 mean	3.46	2.68	2.93
P value	0.6527	0.1569	0.0000
Wave 3 to 4			
N	818	819	787
Wave 3 mean	3.49	2.68	2.91
Wave 4 mean	3.46	2.73	2.96
P value	0.3411	0.1910	0.1550

Table 5 provides results on stability of temperament of children assessed over two waves using paired sample t-tests to compare means of children who were reported on in both waves. Given the lack of significant differences on mean levels of reactivity and sociability, these temperament dimensions appear to be relatively consistent over the entire period. With regard to persistence, a spike in persistence level is observed in wave 2 which reverts to previous level in waves 3 and 4. This spike could be argued to be erroneous, and due to changes in the sample sizes between waves; however, no clear-cut pattern to explain this spike is apparent.

Table 6: Intra-individual stability test for temperament stability

	Sociability	Reactivity	Persistence
Number of observations	4,441	4,441	4,226
Number of individuals	1,505	1,505	1,480
Coefficient of wave	-0.013	-0.000	-0.026
Wave (P value)	0.236	0.975	0.041
Constant	3.471	2.746	3.041
Constant (P value)	0.000	0.000	0.000
Variance (random intercept)	0.487	0.512	0.493
Variance (residual)	0.616	0.662	0.747
Chi 2 test P value	0.236	0.975	0.041
LR test for random intercept P value	0.000	0.000	0.000

Table 6 shows that on the basis of the 99% confidence level, there is no significant trend in instability for any of the three temperament traits.[13]

As a result of this analysis, there is evidence to suggest that temperament in the POCLS sample does exhibit rank-order stability. In addition, there is some evidence supporting both mean level and intra-individual stability, suggesting that POCLS children's temperaments tended to be relatively stable across waves. This suggests that temperament could be viewed as an indicator of consistent differences between children in OOHC in a similar way as it is for children in the general population. That is, a child with a particular level of a trait (e.g. low sociability) is more likely to have a similar level of the trait (e.g. low sociability) in later waves and stages of development.

[13] The reader should note that these models are random intercept regression models and are able to adjust for unobserved individual factors (i.e. unobserved heterogeneity).

5 A comparison of temperament between children in the POCLS and LSAC

This section of the report examines the differences in temperament between the POCLS children and children in the general population. This has the potential to inform policy and practice in their efforts to assist children in OOHC to settle well, develop and thrive.

5.1 Methodology

The POCLS interview cohort is examined over the first four waves of the POCLS data collection. The data is used in its unweighted format.

The analysis in this section draws from Smart and Sanson (2005) and Little, Sanson and Zubrick (2012). Smart and Sanson (2005) compared the mean levels of the temperament of two different representative cohorts over 20 years to examine if children are changing in their temperament over time. Using data from the ATP and the LSAC, the authors found no major differences between the cohorts of children over time, with all exhibiting similar levels of temperament.

Little, Sanson and Zubrick (2012), in their analysis of temperament differences between Aboriginal children from the LSIC and non-Aboriginal children from the LSAC, identified that Aboriginal children had slightly higher but not statistically significant levels of reactivity over time, a trait that reflects children's responses to external events. This has important ramifications for this analysis as over a third (35.1% at wave 1) of children in the POCLS are Aboriginal (Australian Institute of Family Studies et al. 2015).

This current study adapts the methods used by these two papers to compare children in the general population (i.e. the LSAC sample) to those in the POCLS. While both the POCLS and LSAC use the same measures of temperament, thus allowing comparison using the same metric, it should be noted that there are some major differences in their designs which require some consideration. The LSAC follows two cohorts of children (0–2 and 4–5 years at wave 1), who, within each cohort, are of a similar age at the separate waves. The POCLS follows one cohort of children aged 0 to 17 years at wave 1 over multiple waves, with heterogeneity of child age apparent at all waves. In order to be able to make a comparison, a subset of both samples is selected for the analysis. Only one wave of the POCLS and LSAC was used in order to compare unique individuals.

Due to the relatively smaller sample size of the POCLS, compared to the LSAC, the approach here is based on maximising the sample size from the POCLS while ensuring that the two groups are as similar as possible in terms of age. In the POCLS, the most numerous reports of temperament style were for children aged 2–3 years (toddlers), and therefore this age band constituted the POCLS cohort for this analysis.

A similar sample was selected from the LSAC B cohort, children aged 2–3 years from wave 2. It should be noted that the POCLS wave 2 data was collected between April 2013 to March 2015, while LSAC wave 2 was conducted in 2006. However, one can argue that because there is evidence that children's temperament was relatively stable over 20 years (Smart & Sanson 2005), any changes are unlikely to be associated with the fact that the data was collected at different time points.

For the purposes of both analyses, only children who had complete data on all three temperament traits were included in this analysis. The sample consists of 343 children from the POCLS and 3,529 from the LSAC. Both groups consist of children aged 2–3 years, have similar proportions of females (LSAC 49.0% to POCLS 51.0%) and are reasonably similar in terms of children who are culturally and linguistically diverse (CALD) (POCLS sample 17.5% vs LSAC sample 9.9%). The two samples differ considerably in the proportions of Aboriginal and Torres Strait Islander children (LSAC sample 3.9% vs POCLS sample 41.4%).[14]

Smart and Sanson (2005) conducted the comparison using two sample t-tests to examine the differences in mean levels for all three temperament traits. The same methodology is replicated for this analysis.

In order to assess the effect size of temperament differences between the two groups, Cohen's d is computed for each of the comparisons (Cohen 1988), while the effect size is assessed on the basis of the guidelines determined by Sawilowsky (2009) Monte Carlo simulations.[15] Cohen's d can be interpreted as an estimate of the difference in the means of the two distributions measured in standard deviations.[16]

In terms of alpha selection, a 99% confidence interval ($\alpha = 0.01$) was selected in order to assist with the selection of robust effects.

Table 7, Table 8, and Table 9 present the results for the comparison of the POCLS and LSAC sample means for the three temperament traits.[17]

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[14] In regard to the statistical significance of these difference, t-tests of the mean found that gender has no difference, while significant differences are found for both CALD status and Aboriginal status at the alpha of 0.01.

[15] These guidelines are 0.01 = Very Small, 0.2 = Small, 0.5 = Medium, 0.8 = Large, 1.2 = Very Large and 2.0 = Huge.

[16] It has been argued that Cohen's d can be biased and Hedges' g (Hedges 1981) can correct for this bias. Kelley (2005) has argued that both estimates approach the true difference between the two distributions, and so both can approximate each other if the sample is sufficiently large. Cohen's d and Hedges' g are observed to be very similar in this analysis, and Cohen's d is reported only for brevity.

[17] It is important to note that all the temperament dimensions for both samples were tested for the normality assumption on the basis of a skewness and kurtosis test. Each temperament trait for both samples failed

Table 7: Mean level differences in *Sociability* between the POCLS and LSAC samples

Sample	Observations	Mean	Standard error	Standard deviation	Lower bound (99%)	Upper bound (99%)
POCLS	343	3.970	0.069	1.275	3.792	4.150
LSAC	3,529	3.928	0.016	0.973	3.887	3.971
Combined	3,872	3.932	0.016	1.003	3.891	3.974
Difference	-	0.071	0.071	-	-0.140	0.226
Cohen's d[18]	3,872	0.042	-	-	-0.104	0.188
P value (Two sided)		0.5536				

Table 8: Mean level differences in *Reactivity* between the POCLS and LSAC samples

Sample	Observations	Mean	Standard error	Standard deviation	Lower bound (99%)	Upper bound (99%)
POCLS	343	3.467	0.069	1.280	3.288	3.646
LSAC	3,529	2.983	0.016	0.956	2.941	3.024
Combined	3,872	3.025	0.160	0.998	2.984	3.067
Difference	-	0.485	0.071	-	0.301	0.668
Cohen's d[18]	3,872	0.490	-	-	0.337	0.642
P value (Two sided)		0.0000				

Table 9: Mean level differences in *Persistence* between the POCLS and LSAC samples

Sample	Observations	Mean	Standard error	Standard deviation	Lower bound (99%)	Upper bound (99%)
POCLS	343	4.252	0.062	1.149	4.091	4.413
LSAC	3,529	4.266	0.013	0.744	4.234	4.298
Combined	3,872	4.265	0.013	0.788	4.232	4.298
Difference	-	-0.014	0.063	-	-0.178	0.150
Cohen's d[18]	3,872	-0.018	-0.018	-	-0.164	0.128
P value (Two sided)		0.8260				

this assumption ($\alpha = 0.01$). In order to ensure robust estimation despite this violation of the assumption, Kelley (2005) conducts a Monte Carlo analysis that suggests bootstrapping can be used to correct for non-normality in the estimation of Cohen's d. Bootstrapping was conducted for each t-test and the calculations of Cohen's d in order to correct for issues with non-normality. The results were similar to those in tables 7, 8 and 9, and have been omitted for brevity.

[18] It has been argued that Cohen's d can be biased and Hedges' g (Hedges 1981) can correct for this bias. Kelley (2005) has argued that both estimates approach the true difference between the two distributions, and so both can approximate each other if the sample is sufficiently large. Cohen's d and Hedges' g are observed to be very similar in this analysis, and Cohen's d is reported only for brevity.

In regard to temperament traits of sociability and persistence, no significant differences were observed. This, combined with the small difference in means (0.071 and -0.014, respectively) and Cohen's d (0.042 and -0.018, respectively), indicate that there is no meaningful difference observed in these two traits when comparing the two samples (Table 7 and Table 9 respectively). This provides evidence that there is no substantial difference between the general population and children in the POCLS in their level of sociability or persistence.

Reactivity, the temperament trait related to how intensely children react to situations, was found to be significantly different, suggesting that the two groups differ in their average level of reactivity. Children in the POCLS are observed to have a mean of 3.5 while those in the LSAC have a mean level of 3.0 (as seen in Table 8). This suggests that children aged 2–3 years in the POCLS may have, on average, a higher level of reactivity than the general population of children of the same age.

The Cohen's d of the effect size is 0.490, which according to the guidelines provided by Sawilowsky (2009) can be considered close to a medium effect size (d = 0.5). This suggests that mean levels of reactivity differ between children aged 2–3 years in the general population and in the POCLS. Based on Cohen (1988), an effect size can be converted to an estimate of the probability that a randomly selected member of a group is above the mean of the other group.[19] That is, if a random individual from the effect group (i.e. the POCLS) was selected, what is the probability they would be above the average of the control group (i.e. the LSAC representing the general population)? Based on the results in Table 8, there is a 68.9% chance that the reactivity score of a randomly selected child from the POCLS sample will be higher than the average reactivity score for children in the general population.[20]

Given the size of the effect and the previous research suggesting there is limited change in trait levels over time (Smart and Sanson 2005), it is unlikely this effect is caused by the gap in time between when the information was collected for the two samples.

A similar but insignificant result was identified by Little, Sanson and Zubrick (2012), with Aboriginal children and young people observed to have slightly higher levels of reactivity than the general population of Australian children. The results of the current analysis may have been partially due to over-representation of Aboriginal children in the POCLS sample, as well as in OOHC in general, with a large proportion of Aboriginal children in NSW (8.3 per 1,000) receiving child protection services compared to non-Indigenous

[19] This is calculated by inserting Cohen's d into the cumulative standard normal probability density function. This is often referred to as Cohen's U_3 (Cohen 1988).

[20] This measure would be 50% if the populations exhibited no difference.

children in 2018–19 in NSW (0.8 per 1,000) (Australian Institute of Health and Welfare 2020).[21]

An important limitation of this study is that it only examines one age group (2–3-year-olds) and thus these differences may not be apparent in other age groups. However, evidence of previous stability does also suggest that these differences may persist over time.

[21] Available in Table S5.1 in the data tables.

6 The relationship between temperament and socio-emotional wellbeing

This section examines the relationship between temperament and socio-emotional outcomes of children in the POCLS. Identifying evidence that suggests a relationship between temperament and socio-emotional outcomes would establish its usefulness, along with the stability examined in section 4, as a way to identify children who are at risk of having poorer socio-emotional outcomes.

6.1 Methodology

The POCLS interview cohort is examined over the first four waves of the POCLS data collection. The data is used in its unweighted format.

Socio-emotional wellbeing in the POCLS is measured using the CBCL (POCLS Team Forthcoming). The CBCL is described in the user manual as a way to '. . . quickly obtain standardized ratings, and descriptive details of children's function . . .' (Achenbach & Rescorla 2000). The CBCL groups together problems that tend to co-occur into seven syndromes, which can then be grouped into internalising and externalising behaviours (Table 10).[22]

Table 10: Groupings and syndromes of the CBCL

CBCL grouping	CBCL syndrome	Example item
Internalising	Emotionally Reactive	Disturbed by change
	Anxious/Depressed	Nervous/fearful
	Somatic Complaints	Feels dizzy or lightheaded
	Withdrawn/Depressed	There is very little he/she enjoys.
Externalising	Attention Problems/Rule Breaking	Can't concentrate
	Aggressive Behaviour	Argues a lot
Not grouped	Sleep Problems	Trouble sleeping

The total CBCL score comprises the sum of both composite scores of the CBCL. The externalising, internalising and total problems scores are the focus of this analysis. It should be noted that higher CBCL scores indicate a higher level of problematic

[22] It should be noted that the CBCL measure does vary with age group, each age group having differing syndromes and items. Two age groups are examined with the POCLS children aged 1.5–5 years and children aged 6–18 years.

behaviour. This section of the report will examine total CBCL scores as well as externalising behaviour and internalising behaviour CBCL scores by estimating separate models for each measure and their relationship with the risk and protective factors discussed in the literature review.

Due to the longitudinal nature of the data, a random intercept linear regression model is used for this analysis as it accounts for the time-invariant, individual specific factors.[23] A series of indicator variables were used to capture period-specific and ageing effects. As these methods are suited for use of longitudinal data, variables are able to vary within a child over observations, although many variables are expected to not change between waves (e.g. gender and cultural status).

Previous literature found two competing effects of age on socio-emotional wellbeing. The first is that socio-emotional problems peak in later adolescence, a common finding in the criminology literature (Odgers et al. 2008; Moffitt 2018).[24] The second is that the later a child enters care, the more likely they are to have developmental issues often associated with increased exposure to trauma. For the POCLS children, age at interview and age at entry are highly correlated; these effects cannot be separated. Furthermore, the variation in the socio-emotional outcomes that would be captured by one variation is often perfectly mirrored in another parameterisation. Considering this, age at interview was chosen for inclusion in this analysis as it has the least number of parameters (two versus four).[25] The random intercept models were estimated using Stata 14.2 xtreg command, which means they were estimated using generalised least squares. Similar results were obtained when estimated using the mixed command, which estimates the same function via maximum likelihood.[26]

A standard feature of regression modelling methods is that the associations of particular variables need to be interpreted in a ceteris paribus (all other things being equal) context. This means that each of these associations is controlling for all other observed variables and that the significance of association is after other potential factors are adjusted for. Thus association that may be commonly observed can often change. Further, these

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[23] As is standard practice in longitudinal data analysis, available observations of children and different times are 'pooled' together, with adjustment made for the correlation within an individual by the estimation of random intercepts. This allows for individuals to be analysed over multiple time periods while capturing factors not explicitly observed that may influence their outcomes.

[24] This is commonly characterised by a quadratic term for age as a simple functional form that allows for peaking of socio-emotional problems.

[25] In addition, the model with age at interview in its quadratic form had a slightly better fit than the age at entry model (57.0% to 56.1%).

[26] The mixed command produces non-nested test statistics such as the Akaire and Bayesian Information Criteria. This was required when examining potential interactions as discussed below.

results may change with the inclusion of additional factors that may influence socio-emotional wellbeing.

Another issue is the possibility of using the previous values of temperament as the independent value in order to provide additional evidence of potential causation. While this method does have an intuitive appeal, there are a number of reasons why this approach may be problematic.[27]

A confidence level of 99% ($\alpha = 0.01$) was selected for the regression models in this section. This was chosen in order to generate the most robust models and to reduce the chances of a type 1 error. The reader should note the importance of a variable's influence is governed by a number of different aspects. Statistical significance indicates that an association was unlikely to have occurred by chance and thus could be a robust relationship, which could suggest some sort of link between the two variables. Other factors should be considered in their evaluation. One aspect to be consider is the notion of effect size.

Effect size refers to the size of a risk or protective factor's influence on an outcome. A common goal in research is to compare different risk and protective factors in similar terms. While this approach can be done easily with categorical variables due to their nominal nature, it is harder to apply for continuous variables as they are often measured in different units. In order to look at the relative size of risk and protective factors in this analysis, it is important to keep in mind the range of the variables as well as their distributions. By doing this you can see the total potential difference a factor could make in outcome. This is analogous to categorical variables, which are always examined at their maximum possible range as they are represented by binary indicators which can only take on values of zero or one. It should be noted that this approach is the largest potential difference and should not be viewed as a typical response, nor does it indicate how successfully this risk (or protective) factor can be mitigated (or enhanced). It acts as an exploratory device to show how different risk or protective factors might compare in terms of the size of their association with socio-emotional development within the context

[27] Using previous values of temperament has a number of problems. It is established that the measure of temperament exhibits stability over time. This stability implies a significant correlation between past values of temperament and present values. This means that both past values can be considered a proxy for contemporary values and present values can be used as a proxy for past values. Consequently, even if lagged values are used, it could be that the influence is actually a contemporary influence, but it is measured with a proxy of a past value. This, coupled with the inherent loss of observations associated with using lagged variables, indicates that this approach may be sub-optimal. This approach could be considered in a structural equation modelling process in which a latent variable of the temperament traits informed by the observations at different points of time and their influences on other variables could be examined. This is left for future research.

of the regression model. Throughout this analysis, reference will be made to the underlying distribution and their potential influence on outcomes.

In addition to the three dimensions of temperament (sociability, reactivity and persistence), a number of other variables found to be associated with socio-emotional wellbeing by Walsh et al. (2018) were included in this analysis, including:

- Demographic factors: gender, age at interview, Aboriginal and CALD status
- Trauma history: number of risk of significant harm (ROSH) reports prior to entry, type of harm experienced by the child prior to entry
- Placement type at time of interview: foster care, relative/kinship care, residential care
- Carer characteristics: age, income, culture, education
- Carer satisfaction with OOHC supports
- Neighbourhood Social Cohesion and Trust Score
- Carer's distress: K10 measure of mental health screening (Kessler et al. 2002)
- Carer's parenting style: warmth (Paterson & Sanson 1999)[28] and hostility (Institut de la Statistique du Quebec 2000)[29]
- Interactions between a carer's parenting style and a child's temperament.

Model selection was done by backwards elimination at the 99% confidence level. Only final models are reported here. As item non-response differs between variables, the sample size of each model varies slightly.[30] It should be noted that several control variables (age, gender, etc.) remained in the final specifications of the model regardless of statistical significance as these are important factors to control for.[31] A complete list of the variables included in the full models can be seen below.

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[28] The same as the parental warmth scale use in the LSAC, it consists of questions regarding a carer's behaviour, including 'How often do you express affection by hugging, kissing and holding this child?' and 'How often do you enjoy doing things with this child?'

[29] The same as the parental hostility scale use in the LSAC, it consists of questions regarding a carer's behaviour, including 'I have raised my voice with or shouted at this child' and 'I have insulted or sworn at the child'.

[30] Royston and Sauerbrei (2008) review and discuss a wide range of variable selection procedures and find many advantages to backward elimination over forward selection and all subset approaches, including fewer problems of selection bias and limited reduction of fit compared to the full model.

[31] One issue that is common to multivariate regression modelling is the comparison of effect size. This is often problematic due to different units of measurement. A common solution is to convert all measures into standardised units and compare them on the basis of standard deviation. One problem with this approach is that it does not work with categorical (nominal) variables. As per Stevens (1946), nominal variables cannot be described by standard deviation. One possible avenue for comparison is to look at the maximum effect of continuous variables which would be analogous to a nominal change. Caution should also be

- Dependant Variables
    - CBCL total score (BE_CRR_CBCL_PROBSCL_T)
    - CBCL Internalising Score (BE_CRR_CBCL_INTSCL_T)
    - CBCL Externalising Score (BE_CRR_CBCL_EXTSCL_T)

- Independent Variables
    - Age (Derived based on KD_ADMIN_CHILD_AGE_MNTHS)
    - Child's sex (KD_ADMIN_STUDYCHILD_SEX)
    - Aboriginality (KD_ADMIN_STUDYCHILD_ATSI)
    - CALD status (KD_ADMIN_STUDYCHILD_CALD)
    - ROSH report prior to entry (rosh_sum_A)
    - Indicator of physical abuse ROSH report prior to entry (Derived from RI_Physical_A)
    - Indicator of sexual abuse ROSH report prior to entry (Derived from RI_SEXUAL_A)
    - Indicator of neglect ROSH report prior to entry (Derived from RI_NEGLECT_A)
    - Indicator of psychological abuse ROSH report prior to entry (Derived from RI_PSYCH_A)
    - Indicator of domestic violence ROSH report prior to entry (Derived from RI_DV_A)
    - Indicator of carer's mental health ROSH report prior to entry (Derived from RI_CARERMH_A)
    - Indicator of carer's emotional state ROSH report prior to entry (Derived from RI_CAREREMOT_A)
    - Indicator of carer's drug and alcohol issue ROSH report prior to entry (Derived from RI_CARERDA_A)
    - Indicator of carer's other issues ROSH report prior to entry (Derived from CARERO_A)
    - Indicator of child risk behaviour prior to entry (Derived from RI_CYPRISK_A)
    - Indicator of prenatal report (Derived from RI_PRENATAL_A)
    - Child placement at time of interview (PL_ADMIN_CHILD_PLACEW1)
    - Carer's income (Derived from CD_CRR_FIN_INC)
    - Carer's age group (CD_CRR_AGE_WAVE)
    - Carer's culture (CD_CRR_CARER_CULT)

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exercised when only looking at the maximum possible differences due to a variable as these differences may not be typical. Examination should look at the distribution of the variables, for while extreme changes may be associated with large effects, the underlying variable may not exhibit these large differences.

- Carer's education (Derived from CD_CRR_CARER1_EDUC)
- Carer's satisfaction with ability to reach caseworker (Derived from PC_CRR_CW_ACCESS)
- Carer's satisfaction with assistance from caseworker (Derived from PC_CRR_CW_ASSIST)
- Carer's satisfaction with working relationship with other agencies (Derived from PC_CRR_OTHAGENCY_RELN)
- Carer's satisfaction with having enough information about Study Child
- Carer's satisfaction with opportunities to meet other foster or kinship families (Derived from FS_CRR_SATIS_FAM)
- Neighbourhood Social Cohesion and Trust Scale (NE_CRR_SCTS_SCORE)
- Carer's mental health stress (CH_CRR_K10CUT)
- Child's sociability (Derived from TE_CRR_AT_APPR_INFSCR, TE_CRR_AT_APPR_TODSCR. TE_CRR_AT_SOC_CHILDSCR, TE_CRR_SATI_V1_SCORE, TE_CRR_SATI_V2_SCORE)
- Child's reactivity (Derived from TE_CRR_AT_IRRIT_INFSCR, TE_CRR_AT_REACT_TODSCR, TE_CRR_AT_REACT_CHILDSCR, TE_CRR_SATI_NEG_SCORE)
- Child's persistence (Derived from TE_CRR_AT_PERSIST_TODSCR, TE_CRR_AT_PERSIST_CHLDSCR, TE_CRR_SATI_PERSIS_SCORE)
- Carer's parental hostility (RC_CRR_CARER_HOSTSCORE)
- Carer's parental warmth (RC_CRR_CARER_WARMSCORE)

Separate models were estimated to examine if interaction between parenting styles and temperament was a factor in a child's socio-emotional wellbeing. Comparison of the interaction and non-interaction model was done using non-nested model metrics provided[32] via Akaike and Bayesian Information Criteria (Akaike 1974; Schwarz 1978). The results favour the non-interaction model in all cases. In addition, in all cases the model fit in terms of r-squared was better compared to the non-interaction models. As such, this study will report and discuss the results of the three non-interaction models only.

The results for the three separate models on socio-emotional wellbeing will be provided in separate result sections. These are CBCL total problems scores in section 6.2.1, CBCL internalising problem score in section 6.2.2, and CBCL externalising problem score in section 6.2.3.

[32] Calculated using the models estimated using the mixed command in Stata.

6.2 Results on relationship between temperament and socio-emotional wellbeing

The estimation sample for each of the models consists of children with one or more observations in the POCLS over the four waves. The descriptive statistics for the continuous variables used in the models for CBCL total problems, internalising and externalising scores are presented in Table 11 and Table 12. As mentioned earlier, the results are based on estimation sample[33] and reduced models only.

6.2.1 Result for CBCL total problems scores

This section estimates a random intercept model for the dependent variable of CBCL score for internalising behaviours.

Table 11 provides descriptive statistics of continuous variables used for CBCL Total Problems model. All the variables appear to be within the range and distribution expected. It should be noted that the variables of carer's hostility and carer's warmth have very few observations at the extreme of their range, which suggest the more common values of these variables is smaller.

Table 12 shows descriptive statistics for the categorical variables. Most variables have reasonable coverage. A noted exception is that of residential care children; only one child is observed in the current sample. This explains the lack of significance regarding the estimated effect of this placement type in Table 13.

Table 11: Descriptive statistics of continuous variables used for CBCL total problems model

Variables	N	Mean	Std.Dev	Min	Max	p1[34]	p99[35]	Skew.[36]	Kurt.[37]
CBCL total problems score	2,854	52.87	13.71	24	93	24	83	0.11	2.37
Age at interview (years)	2,854	7.08	3.63	2	17	2	16	0.68	2.69
Number of ROSH reports prior to entry	2,854	9.05	8.32	0	48	1	41	1.67	4.31

[33] Casewise deletion (i.e. the removal of observation that lack complete information) was employed for observations in which an individual lacked data on items for a specific wave.

[34] Value of the 1st Percentile

[35] Value of the 99th Percentile

[36] Skewness

[37] Kurtosis

Sociability	2,854	3.46	1.06	1	5	1	5	-0.43	2.38
Reactivity	2,854	2.76	1.10	1	5	1	5	0.27	2.09
Persistence	2,854	2.94	1.13	1	5	1	5	-0.10	1.97
Carer's hostility	2,854	7.09	4.17	3	30	3	21	1.41	4.96
Carer's warmth	2,854	17.77	2.63	4	20	10	20	-1.46	5.90

Table 12: Descriptive statistics of categorical variables used for CBCL total problems model

Variables	Observations	Proportion
Gender		
Female	1,403	49.2
Male	1,451	50.8
Aboriginality		
Non-Aboriginal	1,665	58.3
Aboriginal	1,189	41.7
CALD status		
Non-CALD	2,449	85.8
CALD	405	14.2
Placement at time of interview		
Foster care	1,632	57.2
Relative/kinship care	1,221	42.8
Residential care	1	0.0
Carer's age group		
<=40 years	521	18.3
41–50 years	998	34.6
51–60 years	897	31.4
>=61 years	448	15.7
Satisfied with opportunities to meet other foster families		
No	300	10.5
Yes	2,554	89.5
Kessler – K10 cut off		
Low	2,320	81.3
Moderate	375	13.1
High	108	3.8
Very hHigh	51	1.8
Satisfied with information on study child		
Not	336	11.8
Yes	2,518	88.2

In regard to CBCL total problems score, Table 13 reveals that the model finds a number of significant variables at the 99% confidence level.[38]

Temperament was found to have a significant association (α= 0.01) with total problems scores on the CBCL, with higher levels of sociability and persistence associated with lower levels of socio-emotional problems, while higher levels of reactivity were associated with higher levels of problematic behaviour. Reactivity had the largest effect size, being associated with a 4.3 point increase in total problems scores for each additional point of reactivity.

Table 13: Random intercept linear regression model for CBCL total problems score

Dependent variable: Total CBCL score	Coef.	St.Err.	t-value	p-value	99% confidence interval	
Age at interview	**1.865**	**0.184**	**10.15**	**0.000**	**1.392**	**2.339**
Age at interview squared	**-0.090**	**0.011**	**-8.24**	**0.000**	**-0.118**	**-0.062**
Male	**Baseline**					
Female	-0.039	0.448	-0.09	0.931	-1.192	1.114
Non-Aboriginal	**Baseline**					
Aboriginal	-0.598	0.454	-1.32	0.188	-1.769	0.572
Non-CALD	**Baseline**					
CALD	-1.392	0.642	-2.17	0.030	-3.047	0.262
Foster care	**Baseline**	.	.	.	.	.
Relative/kinship care	**-2.588**	**0.447**	**-5.79**	**0.000**	**-3.740**	**-1.436**
Residential care	-10.104	9.095	-1.11	0.267	-33.532	13.324
Carer age ≤ 40 years	**Baseline**					
Carer age 41–50 years	-0.629	0.537	-1.17	0.241	-2.011	0.753
Carer age 51–60 years	-1.304	0.564	-2.31	0.021	-2.757	0.149
Carer age ≥61 years	**-2.226**	**0.681**	**-3.27**	**0.001**	**-3.980**	**-0.471**
Not satisfied with opportunities to meet other foster families	**Baseline**					
Satisfied with opportunities to meet other foster families	**-2.008**	**0.519**	**-3.87**	**0.000**	**-3.345**	**-0.671**
K10 low distress	**Baseline**					
K10 moderate distress	**3.174**	**0.485**	**6.55**	**0.000**	**1.926**	**4.422**
K10 high distress	**2.957**	**0.806**	**3.67**	**0.000**	**0.880**	**5.033**
K10 very high distress	**3.677**	**1.282**	**2.87**	**0.004**	**0.374**	**6.980**

[38] The 99% confidence level is used to keep the model parsimonious (i.e. explaining the data with as few variables as possible) and to help improve the robustness of the model.

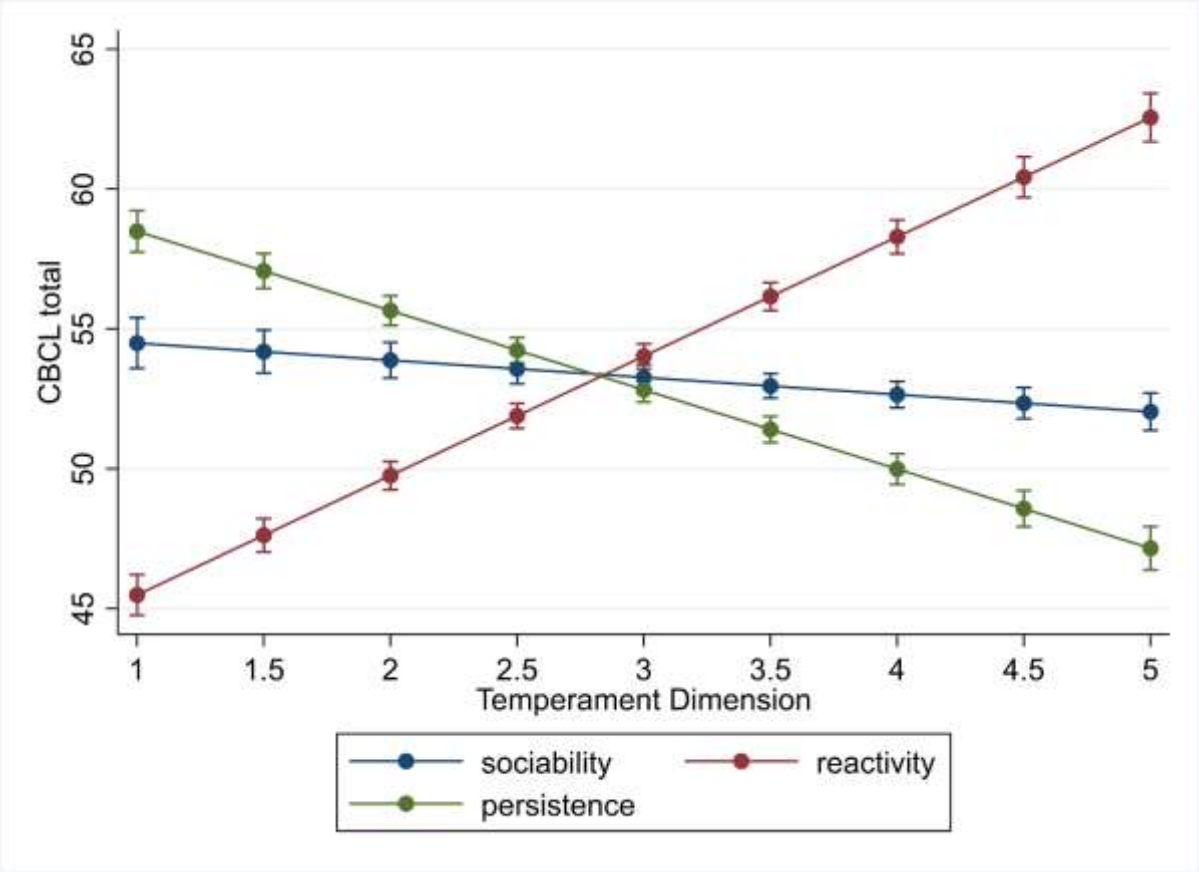
Table 14: Random intercept linear regression model for CBCL total problems score (continued)

Dependent variable: Total CBCL score	Coef.	St.Err.	t-value	p-value	99% confidence interval	
Not satisfied with information on study child	**Baseline**		**.**	**.**	**.**	**.**
Satisfied with information on study child	**-2.700**	**0.499**	**-5.41**	**0.000**	**-3.986**	**-1.414**
Sociability	**-0.614**	**0.165**	**-3.72**	**0.000**	**-1.038**	**-0.189**
Reactivity	**4.268**	**0.169**	**25.31**	**0.000**	**3.834**	**4.703**
Persistence	**-2.833**	**0.158**	**-17.88**	**0.000**	**-3.241**	**-2.425**
Carer's hostility	**0.471**	**0.047**	**10.08**	**0.000**	**0.350**	**0.591**
Carer's warmth	**-0.271**	**0.071**	**-3.82**	**0.000**	**-0.454**	**-0.088**
Constant	**51.763**	**2.004**	**25.83**	**0.000**	**46.601**	**56.924**
Mean dependent variable	52.872	SD dependent variable				13.714
Overall r-squared	0.570	Number of observations				2,854
		Number of children				1,221
Chi-square	2628.354	Prob > chi2				0.000
R-squared within	0.320	R-squared between				0.634

As can be seen in Figure 1, the difference between a child who has the lowest level of reactivity (1) and a child who has the highest level of reactivity (5) is estimated to be 17 points (62.5–45.5) on the CBCL. This effect is not surprising, given that strong reactions to experiences are likely to be associated with problematic behaviours. The effects for the other two dimensions of temperament are small, albeit significant, with persistence being associated with a 2.8 point per unit reduction in the total problems score and sociability being associated with a 0.6 point per unit reduction. As can be seen in Figure 1, those with the highest compared to the lowest scores are associated with an 11.3 (58.5–47.2) and a 2.5 point (54.5–52.0) reduction, respectively. The effect on persistence also makes sense as higher levels of persistence would be associated with diligence and sticking to a task. It could be argued that persistence could be beneficial for a child's socio-emotional wellbeing as it limits a child's desire to change activities, some of which may be associated with more problematic behaviours. For example, a more persistent child may continue playing with a particular toy, as opposed to seek out a new source of entertainment, which could be a problematic behaviour. The observed finding regarding sociability also conforms to expectations. It could be argued that children who have higher sociability would be more likely to question and not engage in problematic behaviours and thus have better socio-emotional wellbeing. For example, a child who is very sociable will have a higher desire to please and get along with other people and thus

will be less likely to engage in problematic behaviours. As discussed in section 6.2.2, this relationship alters in regard to internalising behaviours.

Figure 1: Predicted CBCL total problems scores on temperament dimensions (sociability, persistence and reactivity)



In terms of demographics, age at entry had a significant positive association with total problems scores, with more problematic behaviours occurring at older ages. As is standard practice in the developmental literature, these effects were estimated as a quadratic, which shows that while growth occurs it diminishes each year.

No significant association was found between CBCL total problems scores and demographic variables such as gender, Aboriginal and CALD status.

Furthermore, no significant association between previous trauma types and total problems scores was observed. This suggests that for each child, the trauma they had before entering OOHC did not differentiate them from each other in terms of total problems scores.

Children in relative/kinship care were observed to have significantly lower total problems scores, with a reduction on average of 2.6 points relative to those in other types of care. It is not possible to determine if these lower scores are attributable to the care

environment or to a selection effect, with relative/kinship carers preferring to care for children whose behaviours are less problematic.

A similar reduction (2.2 points) in total problems scores was observed in children placed with carers who are over 61 years old. This could be attributable to multiple characteristics of these carers, including the greater level of experience these carers have with children, that many of these carers are grandparents, and the higher levels of resources these household may have, often in the form of higher wealth.

No significant association between neighbourhood cohesions score and total problems scores was observed.

Other important factors identified include whether carers are satisfied with opportunities to meet other carer families. Children whose carers are satisfied were on average 2.0 points lower in terms of total problems scores. A carer's information about the child has a similar relationship, being associated with a 2.7 point reduction in score. This suggests that support for carers can have a positive association on a child's socio-emotional wellbeing. It could also indicate that children with behavioural issues often need higher levels of support and that the relationship is reflecting the lack of satisfaction associated with carers' higher needs.

Levels of carer psychological distress above a low level are associated with more problematic behaviours among children. On the basis of the confidence intervals of these measures as well as a joint test for equality ($p = 0.88$, $\alpha = 0.01$), we cannot reject the possibility that moderate, high and very high levels of distress have equal effects, suggesting that any level of distress above low has a similar impact and the effect of distress appears to plateau.

A carer's parenting style in terms of warmth and hostility appears to have a significant association with child socio-emotional wellbeing. For each additional unit of hostility, a child can be expected to have half a point (0.5) increase in total problems score, while the same unit increase in warmth is associated with a 0.3 point decrease in total problems score. The scales for these two measures are 3 to 30 to 4 to 20, respectively. This means that the total potential improvement for these two variables is 13.5 points and 4.8 points respectively. It should be noted that while the theoretical range of the variables is potentially large, in fact 99% of carers have hostility scores of 21 or below and that 99% of the sample have warmth scores above 10 (see Table 11). If one considers the lower bound of this 99% group, the effective potential of improvement is approximately 5 CBCL units for hostility and 1.8 units for warmth. This suggests that the association of these variables may be smaller due to carers already exhibiting low levels of hostility and high levels of warmth compared to the potential range of the measure.

Unlike parenting style, children are often observed having the full range of temperament, as seen in Table 1.This is uncommon for many psychometric measures such as those of carers' warmth and hostility. As these measures do not have a common metric, an

approach to compare the relative size of these effects is by examining the total possible effects. On the basis of this, the potential difference between children with different levels of a temperament trait are quite large. While the association of all temperament measures was substantial, reactivity had the largest effect. The effect at the extreme could potentially be higher than the influence of age, parenting style and other factors examined in this model. This would provide some support that temperament is related to socio-emotional outcomes for children in OOHC and that it could be useful in identifying children who may potentially have problems with socio-emotional wellbeing.

The model shows a reasonable fit of data, with the overall fit being 57.0%. Furthermore, the within and between R-squared results of the model are 32.9% and 63.4%, respectively, which indicate that the model is more successful in predicting between individual differences than within. Thus, the model appears to be better at predicting differences between individuals rather than changes in a child's socio-emotional wellbeing.

6.2.2 CBCL internalising behaviours

This section estimates a random intercept model for the dependent variable of CBCL score for internalising behaviours.

Table 15: Descriptive statistics of continuous variables of reduced model for CBCL internalising estimation sample

Variables	N	Mean	Std.Dev.	Min	Max	p1[39]	p99[40]	Skew.[41]	Kurt.[42]
CBCL internalising score	2,853	16.646	12.005	29	90	29	80	0.41	2.514
Age at interview (years)	2,853	7.085	3.629	2	17	2	16	0.675	2.697
Number of ROSH reports prior to entry	2,853	9.052	8.321	0	48	1	41	1.666	6.038
Sociability	2,853	3.462	1.056	1	5	1	5	-0.425	2.38
Reactivity	2,853	2.757	1.103	1	5	1	5	0.266	2.088
Persistence	2,853	2.943	1.131	1	5	1	5	-0.1	1.97
Carer's hostility	2,853	7.085	4.17	3	30	3	21	1.413	4.959

[39] Value of the 1st Percentile

[40] Value of the 99th Percentile

[41] Skewness

[42] Kurtosis

Table 16: Descriptive statistics of categorical variables of reduced model for CBCL internalising estimation sample

Variables	Observations	Proportion
Gender		
Female	1,402	49.1
Male	1,451	50.9
Aboriginality		
Non-Aboriginal	1,666	58.4
Aboriginal	1,187	41.6
CALD status		
Non-CALD	2,448	85.8
CALD	405	14.2
Placement at time of interview		
Foster care	1,633	57.2
Relative/kinship care	1,219	42.7
Residential care	1	0.04
Carer's age group		
<=40 years	521	18.3
41–50 years	987	34.6
51–60 years	897	31.4
>=61 years	448	15.7
Satisfied with opportunities to meet other foster families		
No	300	10.5
Yes	2,553	89.5
Kessler – K10 cut off		
Low	2,319	81.3
Moderate	375	13.1
High	108	3.8
Very high	51	1.8
Satisfied with information on study child		
Not	336	11.8
Yes	2,517	88.2

Table 17: Random intercept linear regression model for internalising CBCL

Internal CBCL score	Coef.	St.Err.	t-value	p-value	99% confidence interval	
Age	0.492	0.196	2.51	0.012	-0.012	0.997
Age squared	-0.020	0.012	-1.69	0.092	-0.049	0.010
Male	Baseline					
Female	0.191	0.442	0.43	0.665	-0.948	1.330
Non-Aboriginal	Baseline					
Aboriginal	-0.777	0.449	-1.73	0.083	-1.933	0.378
Non-CALD	Baseline					
CALD	-0.220	0.634	-0.35	0.729	-1.853	1.414
No carer issue with mental health	Baseline					
Carer issue with mental health	**2.741**	**0.525**	**5.22**	**0.000**	**1.388**	**4.094**
Foster care	Baseline					
Relative/kinship care	-1.026	0.452	-2.27	0.023	-2.189	0.138
Residential care	-4.278	9.302	-0.46	0.646	-28.239	19.682
Carer age ≤ 40 years	Baseline					
Carer age 41–50 years	-0.656	0.555	-1.18	0.237	-2.085	0.772
Carer age 51–60 years	**-1.603**	**0.580**	**-2.76**	**0.006**	**-3.098**	**-0.109**
Carer age ≥61 years	**-1.753**	**0.700**	**-2.50**	**0.012**	**-3.557**	**0.050**
Carer not satisfied with information on study child	Baseline					
Carer satisfied with information on study child	**-3.228**	**0.533**	**-6.06**	**0.000**	**-4.600**	**-1.856**
Not satisfied with opportunities to meet other foster families	Baseline					
Satisfied with opportunities to meet other foster families	**-2.207**	**0.555**	**-3.98**	**0.000**	**-3.635**	**-0.778**
K10 low distress	Baseline					
K10 moderate distress	**3.915**	**0.516**	**7.59**	**0.000**	**2.587**	**5.243**
K10 high distress	**4.279**	**0.866**	**4.94**	**0.000**	**2.049**	**6.509**
K10 very high distress	**4.435**	**1.362**	**3.26**	**0.001**	**0.926**	**7.944**
Sociability	**-2.136**	**0.173**	**-12.35**	**0.000**	**-2.581**	**-1.690**
Reactivity	**3.140**	**0.178**	**17.60**	**0.000**	**2.681**	**3.600**
Persistence	**-1.738**	**0.168**	**-10.38**	**0.000**	**-2.170**	**-1.307**
Carer's hostility	**0.248**	**0.048**	**5.17**	**0.000**	**0.125**	**0.372**
Constant	**54.786**	**1.474**	**37.16**	**0.000**	**50.989**	**58.583**
Mean dependent var	49.646	SD dependent var				12.005
Overall r-squared	0.414	Number of observations				2853
Chi-square	1382.129	Prob > chi2				0.000
R-squared within	0.155	R-squared between				0.488

In regard to internalising behaviour, we see a different range of associations compared to total problems scores. Reactivity continues to have a large and significant effect (α = 0.01), with higher reactivity being associated with higher levels of internalising behaviours. While sociability and persistence continue to both have a negative and significant (α = 0.01) effect (i.e. increased sociability and persistence are associated with fewer internalising problems), sociability has a larger effect than persistence. Sociability is associated with a decrease of 2.1 points in internalising scores for each point of sociability, while persistence reduces scores by 1.7 points for each unit of persistence.

In terms of other associations, we see that all demographic factors, including age, fail to have a significant effect. This suggests the effect seen in age from the total problems scores model is exclusively around externalising behaviours. No significant difference was observed regarding care type at interview with children in foster care, residential care and relative/kinship care (α = 0.01) in terms of internalising behaviour.

In regard to trauma, children who were reported prior to entering care as having parental mental health issues had a 2.7 point higher internalising score. This provides evidence that a parent's mental health can have an association with children's internalising problems. A possible mechanism for this relationship is the inheritability of mental health issues which are associated with internalising behaviour. Other explanations are possible; for example, the experience of living with a parent who has mental health problems may engender stress and internal distress in children.

Carer age effects are only significant for those aged between 51 to 60 years, while the greater than 61 year group is just above the selected alpha (p = 0.012, α = 0.01) and has a similar sized effect. A carer age of 51–60 years was associated with a reduction in the child's internalising score by 1.6 points.

Similar effects as found for total problems were observed regarding a carer's information about the child and a carer's satisfaction with their opportunities to meet other carer families, with more information and opportunities being associated with lower internalising behaviour scores of 3.2 points and 2.2 points, respectively.

Carer's stress levels of moderate, high and very high (as measured by the K10) were associated with increases in internalising behaviour scores of between 3.9 and 4.4 points. This change suggests that a carer's experience of distress may be an important factor, but any distress above a low level appears to have a similar impact.

In regard to parental style, warmth was not a significant factor in this full model and was removed in the backwards elimination process. However, hostility was found to be significant, with each unit increase in hostility associated with a 0.25 point increase in internalising behaviour scores. Hostility has 99% of values observed in only part of its range, hence the total possible effect is considered to be smaller (Table 11).

6.2.3 CBCL externalising behaviours

This section estimates a random intercept model for the dependent variable of CBCL score for externalising behaviours.

Table 18: Descriptive statistics of continuous variables of reduced model for CBCL externalising estimation sample

Variables	N	Mean	Std.Dev.	Min	Max	p1[43]	p99[44]	Skew.[45]	Kurt.[46]
CBCL externalising	3,004	53.814	13.574	28	100	28	85	0.234	2.453
Age at interview (years)	3,004	7.086	3.635	2	17	2	16	0.665	2.683
Number of ROSH reports prior to entry	3,004	9.026	8.351	0	48	1	41	1.699	6.166
Reactivity	3,004	2.743	1.1	1	5	1	5	0.28	2.105
Persistence	3,004	2.951	1.132	1	5	1	5	-0.105	1.973
Carer's hostility	3,004	7.042	4.149	3	30	3	21	1.4.7	5.089
Carer's warmth	3,004	17.772	2.624	4	20	10	20	-1.433	5.782

[43] Value of the 1st Percentile

[44] Value of the 99th Percentile

[45] Skewness

[46] Kurtosis

Table 19: Descriptive statistics of categorical variables of reduced model for CBCL externalising estimation sample

Variables	Observations	Proportion
Gender		
Female	1,402	49.1
Male	1,451	50.9
Aboriginality		
Non-Aboriginal	1,666	58.4
Aboriginal	1,187	41.6
CALD status		
Non-CALD	2,448	85.8
CALD	405	14.2
Placement at time of interview		
Foster care	1,633	57.2
Relative/kinship care	1,219	42.7
Residential care	1	0.04
Carer's age group		
<=40 years	521	18.3
41–50 years	987	34.6
51–60 years	597	31.4
>=61 years	448	15.7
Satisfied with opportunities to meet other foster families		
No	300	10.5
Yes	2,553	89.5
Kessler – K10 cut off		
Low	2,319	81.3
Moderate	375	13.1
High	108	3.8
Very high	51	1.8
Satisfied with information on study child		
No	336	11.8
Yes	2,517	88.2

In regard to externalising behaviour, while the model is similar to that of total problems scores, it also shows some profound differences.

Table 20: Random intercept linear regression model for externalising CBCL

External CBCL score	Coef.	St.Err.	t-value	p-value	99% confidence Interval	
Age	**2.381**	**0.178**	**13.35**	**0.000**	**1.922**	**2.841**
Age squared	**-0.118**	**0.011**	**-11.20**	**0.000**	**-0.145**	**-0.091**
Male	**Baseline**	**.**	**.**	**.**	**.**	**.**
Female	0.214	0.424	0.51	0.613	-0.878	1.307
Non-Aboriginal	**Baseline**	**.**	**.**	**.**	**.**	**.**
Aboriginal	0.386	0.431	0.89	0.371	-0.725	1.497
Non-CALD	**Baseline**	**.**	**.**	**.**	**.**	**.**
CALD	-1.459	0.599	-2.44	0.015	-3.002	0.084
Foster care	**Baseline**	.	.	.	.	.
Relative/kinship care	**-2.259**	**0.421**	**-5.36**	**0.000**	**-3.343**	**-1.174**
Residential care	-3.911	8.059	-0.48	0.627	-24.670	16.848
Carer age ≤ 40 years	**Baseline**	.	.	.	.	.
Carer age 41–50 years	-0.489	0.521	-0.94	0.348	-1.830	0.852
Carer age 51–60 years	-1.147	0.542	-2.12	0.034	-2.544	0.250
Carer age ≥61 years	**-2.047**	**0.653**	**-3.14**	**0.002**	**-3.729**	**-0.366**
K10 Low distress	**Baseline**	.	.	.	.	.
K10 moderate distress	**2.661**	**0.474**	**5.62**	**0.000**	**1.441**	**3.882**
K10 high distress	1.492	0.797	1.87	0.061	-0.562	3.546
K10 very high distress	2.089	1.158	1.80	0.071	-0.894	5.072
Reactivity	**4.651**	**0.164**	**28.35**	**0.000**	**4.228**	**5.073**
Persistence	**-2.645**	**0.154**	**-17.21**	**0.000**	**-3.041**	**-2.249**
Carer's hostility	**0.599**	**0.046**	**13.14**	**0.000**	**0.482**	**0.717**
Carer's warmth	**-0.337**	**0.069**	**-4.86**	**0.000**	**-0.515**	**-0.158**
Constant	**42.720**	**1.803**	**23.70**	**0.000**	**38.076**	**47.364**
Mean dependent var		53.814	SD dependent var			13.574
Overall r-squared		0.576	Number of observations			3,004
Chi-square		2984.958	Prob > chi2			0.000
R-squared within		0.351	R-squared between			0.639

Table 19 reveals that the influence of sociability is insignificant at the 99% confidence level, unlike the findings for total behaviour problems. Reactivity and persistence continue to have a significant association, with increases in each being associated with a 4.7 point increase and a 2.6 point decrease in externalising behaviour scores, respectively.

Age is again significant in its quadratic form and indicates similar patterns of increase and decline apparent in the total problems scores model. This indicates that socio-emotional wellbeing increases at a decreasing rate with age at interview. That is, each additional year of age at time of interview increases a child's external CBCL score, but this increase gets smaller with each additional year. Demographic variables such as gender, Aboriginality and CALD status continue to have no significant association. This is likely due to other non-demographic variables that are often correlated, with demographics being included for in the regression model.

Externalising behaviour is significantly related to a child's type of care at the time of interview, with relative/kinship care being associated with a 2.3 point reduction in externalising behaviour scores compared to children in foster care.

Carer's age is statistically significant, with children whose carers were older than 61 years significantly different from children whose carers were less than 40 years old. It should be noted that none of the other age categories are significantly different from the baseline. A carer being aged over 61 years is associated with a decrease in externalising behaviour score of 2.0 points.

Carer's stress has an interesting effect, with only moderate stress levels being statistically significant at the 99% confidence level. This suggests that the effect is not so robust and may be a result of the power reduction ensuing from the conversion of continuous measures to categorical variables (Royston, Altman & Sauerbrei 2006). It is not possible to reject the joint hypothesis that each of the three levels of distress is equal ($p = 0.386$, $\alpha = 0.01$), which could indicate, similar to other models, that any level of distress above low is equally harmful to a child's socio-emotional wellbeing.

Carer's parenting style was found to have a significant influence, with externalising behaviour scores increasing by 0.6 points per unit increase of carer hostility, while increases in carer warmth reduces the externalising behaviour scores by 0.3 points. It should be noted again that due to the majority of carers in the POCLS having relatively high warmth and low hostility, the potential difference of these effects is more limited than the full range measurement would indicate.

In summary, each of these three models provides support for the association of temperament with socio-emotional wellbeing. These observed associations are consistent with the literature examining the general population.

Of the temperament measures, reactivity, the dimension associated with how intensely a child responds to both positive and negative experiences, is found to have the largest association with total, internalising and externalising problem behaviours. Persistence, the trait associated with remaining on task and not being distracted,, also has a strong and persistent effect in all three domains of socio-emotional wellbeing. Sociability, the trait associated negatively with anxiety and being withdrawn, is not significantly associated with externalising behaviours but was found to be significantly associated with

internalising and total problems scores, suggesting its most pertinent salience is for internalising behaviours.

This research therefore provides evidence that temperament can potentially be used as a factor when considering early and targeted interventions to improve socio-emotional wellbeing outcomes for children in OOHC.

6.3 Limitations

Several key variables were unavailable at the time of this analysis (e.g. placement data and other administrative data). Wave 4 data was not yet available, and the DCJ administrative linkage data is currently only available to 30 June 2016. As such the models presented in this report do not estimate or control for these variables. It is possible that the inclusion of these variables could change these results.

Another limitation of this study is the use of indicator variables for some continuous variables which may have reduced power to detect less robust effects. This includes variables such as carer's age, K10 distress, as well as binary indicators for trauma history and some carer's responses. Alternative approaches that could be used to characterise these variables include the use of multivariate fractional polynomials. These methods are outside the scope of the current analysis.

Finally, further improvements to the models, including investigations around potential non-linearity, could be examined. It is possible that many of the relationships studied here are more complex than present modelling has examined.

7 Conclusion

This exploratory report sought to investigate the factors associated with socio-emotional wellbeing of children in OOHC, with a particular focus on children's temperament. This report is an important first step that provides evidence that the temperament style of children in OOHC tends to be stable, differs from the general population, and has a strong association with their socio-emotional wellbeing while in care.

The first research question addressed was whether temperament was stable for a child in the POCLS over time. Examining children in terms of rank-order stability, we find evidence that temperament exhibits moderate stability both between waves and life stages from toddlerhood and beyond. As mentioned previously, the exception of infants is likely to be an artefact of the POCLS observing very few infants due to the gap between entry to OOHC and first interview. The finding of stability indicates that a child's future temperament is likely to be related to their present temperament.

The second question looked at whether there were differences between children in the POCLS and children in the general population on temperament style. Using the LSAC data as a basis for comparison, we found that there was a moderate to large statistically significant ($\alpha = 0.01$) difference between 2–3-year-olds in the POCLS and in the LSAC in terms of reactivity. Reactivity, as a trait reflecting the tendency to react strongly to positive and negative experiences, could be an important mediator of the influence of trauma on children. That is, children who are more reactive are more likely to have a more intense experience to the trauma that resulted in the child entering OOHC and may have more difficulties adjusting to their new environments. Identifying these children so that additional support could be provided may be a useful strategy in facilitating their socio-emotional wellbeing. This, coupled with the fact that reactivity was found to be associated with the largest differences in CBCL total problems, externalising and internalising scores, could indicate that the socio-emotional wellbeing of children in OOHC could, in part, be attributable to differences in temperament. Further studies are needed to confirm the findings of this analysis and whether these differences between children in the POCLS and the general population are persistent and robust. The cause of this difference is not clear, that is, whether it is a result of trauma or a selection effect.

The third research question was regarding the relationship between the temperament and socio-emotional wellbeing of children in the POCLS. It was observed that all three temperament dimensions have a significant association with socio-emotional wellbeing. Reactivity has the largest effect, exhibiting an influence on total problems, internalising and externalising behaviours, which in many cases are larger than the associations of any other variable including age.

Children with higher levels of reactivity are observed to have higher levels of total problems, internalising and externalising behaviours. As this trait is also observed to be moderately higher in the POCLS children compared to a group of similarly aged children

from the LSAC, this could be argued to be a factor in the difference in socio-emotional wellbeing for children in the POCLS as well as possibly for children in OOHC in general.

Persistence, the trait associated with remaining on task and not being distracted, is also seen to have similar effects on all three CBCL scores but to a slightly smaller magnitude. That is, children who are more persistent are observed to have lower total problems, internalising and externalising scores.

Sociability, the trait associated with a child's ease in interacting with others, is found to be related to lower levels of total problems and internalising behaviours. The influence on total problems behaviours was relatively small, suggesting the effect of sociability is mainly on reducing internalising behaviours.

Other factors such as parental warmth, placement type, carer's mental health, carer supports, carer's age and the child's age were significantly associated with CBCL scores, but these effects were relatively small.

Given the findings of this research, an increased focus on the temperament profile of a child may yield positive results in improving how a child adjusts to OOHC. For example, if a child is identified as having a highly reactive temperament, strategies could be employed to help the child better fit their environment. These strategies could address different aspects that may be potentially related to how a child's temperament influences the child's experience entering OOHC. This can include settling in to a new place, the degree of fit between a child and their placement, the placement stability a child experiences, and the effectiveness of various supports and interventions. Since temperament is a stable measure, these measure can be done prior to a child experiencing any difficulties in their placement. Previous research, as discussed in the literature review, has shown these intervention can be successful in reducing a child's behavioural problems.

In conclusion, the analyses here highlight the importance of temperament traits for children's socio-emotional wellbeing and development. Further research is required to ensure these findings are robust and consistent for all children in the OOHC system. A wide range of future analysis can continue to examine the utility of temperament measures as potential predictors of a child's experience in OOHC. Such examination can look at the likelihood of a child exiting or re-entering care, the stability of a child's placement while they are in care, and how the child responds to particular placements or interventions.

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