

Does attachment style affect development of a
growth mindset in primary school children?



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(MbR)

by

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Declaration

Candidate's declarations:

I, Dawn Sandra Short, hereby certify that this thesis submitted in partial fulfilment of the requirements for the award of Masters by Research, Abertay University, is wholly my own work unless otherwise referenced or acknowledged. This work has not been submitted for any other qualification at any other academic institution.

Signed [candidates signature 

Date 19th December 2016

Supervisor's declaration:

I, Dr Clare Cunnigham, hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of Masters by Research, in Abertay University, and that the candidate is qualified to submit this thesis in application for that degree.



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Certificate of Approval

I certify that this is a true and accurate version of the thesis approved by the examiners, and that all relevant ordinance regulations have been fulfilled.

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Abstract

Local authorities are implementing growth mindset interventions in educational and sports settings, and are currently targeting areas of multiple deprivation in Dundee. Mindset (growth or fixed) is known to affect educational outcomes, as is security attachment style, often associated with home environment. The current studies examined the effect of growth mindset interventions on children beginning school to discover if children with insecure attachment styles were more responsive to growth mindset strategies than their securely attached peers. After assessing security attachment style, problem solving skills and initial mindset, participants completed a sequencing task during which they received either fixed or growth mindset praise. Encouragingly, results found both insecurely attached and initially fixed mindset holding children could perform as well as securely attached, growth mindset participants, when they received growth mindset praise. Interestingly, performance of securely attached and growth mindset peers fell in the presence of fixed mindset feedback. The studies demonstrate the importance of language used in educational settings and the impacts of differing praise types on all children's academic performance.

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1 Introduction

Children from some areas of Scotland achieve much more than others during their school years and this influences their long-term opportunities in life (Scottish Government, 2016a). Education is acknowledged to promote economic development and social and personal wellbeing (Hallam & Rogers, 2008, p 277) and is a human and legal right (United Nations, 1989, 2005). Furthermore, the Scottish Government (2014a; 2016e) recognises education as the best route out of poverty. Although education is freely available to all children in Scotland, attendance and engagement with educational opportunities varies greatly.

Many factors contribute to disengagement with education, including socio-economic status, academic ability and peer and parental influences (Alika & Edosa, 2012; Whannell & Allen, 2011) but insecure attachment style and fixed mindsets increase the difficulties faced by children already challenged by the education system (Petrenko, Friend, Garridoa, Taussiga & Culhanea, 2012). Therefore, finding strategies to promote attendance and maximise educational achievement is beneficial to all children and young people but offers the opportunity for those from the most deprived backgrounds to improve their life chances.

1.1 Educational benefits of growth mindset

Having a growth mindset can improve children's performance in school (Dweck, 2006; Meral, Colak & Zereyak, 2012; Motlagh, Amrai, Yazdani, Abderhim & Souri, 2011) and as many children in Scotland fail to perform well in school (Scottish Government, 2016a), finding strategies to improve children's prospects are of key importance in education. For children from deprived backgrounds, the outcomes are worst therefore, the significance of children's attitudes, motivation and resilience on their academic attainment cannot be underestimated. Dweck (2006) found how children approach challenging situations affected their academic achievement and influenced their learning. Research (Dweck, 2006, 2009) identified that children tend to approach challenges in one of two ways and are therefore categorised as holding a fixed or a growth mindset. These mindsets effect how children approach tasks and

can predict their success. Children with a fixed mindset avoid challenging activities and give up easily on tasks whereas growth mindset-holding children are motivated to face challenges with persistence (Dweck, 2006). Holders of growth mindsets therefore outperform their fixed mindset-holding peers in educational settings (Meral et al. 2012; Motlagh et al. 2011) and so development of growth mindsets in educational settings are desirable and may present a strategy to improve educational outcomes and post school options of children and young people who currently fail to achieve their educational potentials.

Those with a fixed mindset believe their intelligence and talent are fixed attributes, characteristics that they are born with and regardless of amount of effort applied, cannot be changed (Dweck, 2006). If fixed mindset holders apply effort to a new challenge without success, they feel the invested effort was wasted. Consequently, those with fixed mindsets avoid challenges, to prevent failure, believing failure demonstrates an inability to be successful. Children holding a fixed mindset conclude failure defines each individual so their best option is to keep working on what they can already do, avoiding failure and boosting self-confidence (Dweck, 2006).

Fixed mindset produces maladaptive cognition (Martin, Yu, Papworth, Ginns & Collie, 2015) resulting in effort viewed as pointless, constructive criticism ignored and children feeling threatened by others' success. Self-efficacy, defined as an individual's belief in their ability to achieve a future challenge (Bandura, 1977), influences performance. Poor self-efficacy produces negative attitudes towards education and people feel helpless to affect change in their lives, leading to anxiety and behavioural issues (Dweck & Leggett, 1988; Mueller & Dweck, 1998; Plaks & Stecher, 2007).

Having belief in one's own ability to achieve targets, motivates children when they face adversity, a key component of Dweck's (2006) growth mindset theory and research shows a positive relationship between high self-efficacy and academic achievement in students (Meral et al. 2012; Motlagh et al. 2011).

Those identified as having a growth mindset believe intelligence is malleable and individuals can improve their abilities through effort (Dweck, 2006).

Believing effort makes you smart produces children with a desire to learn, with challenges embraced and viewed as opportunities for self-improvement. Pupils

possessing a growth mindset believe they can continually improve their abilities with diligence and self-evaluation. Persistent, motivated, engaged, critical thinkers believe in their own potential for improvement and perform better than fixed mindset peers perform across all curricular areas (Dweck, 2009).

Learning from criticism and persevering when facing difficulties, growth mindset holders believe that through effort, new skills are mastered. Such children can reach their full potential. Dweck (2006, 2009) does not propose all children can become geniuses through this approach but that by adopting a growth mindset, everyone can improve on their current abilities. Developing a growth mindset therefore provides educational benefits whereas fixed mindset beliefs can prevent children progressing in school as we would like.

However, parental beliefs about their child's abilities, in addition to the child's own convictions, can also influence outcomes.

Moorman and Pomerantz (2010) tasked mother and child dyads to work together on Raven's Progressive Matrices (Raven, 2000) a non-verbal, progressively difficult, measure of intelligence. In this task, participants viewed a series of patterns and from a selection of options, selected the next image in the series. Whilst children completed a pre-test practice activity, researchers randomly assigned mothers to either an entity (fixed) mindset or an incremental (growth) mindset group. Researchers verbally induced fixed or growth mindsets in the mothers prior to commencing the experimental task. Mindsets were induced by the information the researchers gave the mothers, those in the fixed mindset condition informed Raven's matrices assessed innate intelligence, which their child was born with and was unchangeable. However, mothers in the growth mindset condition were told the test measured their child's potential intelligence and through studying, performance on future testing could be improved. Both groups received supporting literature which reinforced the verbal messages the mothers heard and they read this whilst their children completed the pre-test.

Mothers and children worked together on a set of forty tasks from Raven's Progressive Matrices (Raven, 2000) during which mothers provided as much help as they wished to their child, within the fifteen minutes permitted to complete the task. Mothers primed to hold growth mindsets supported their children in a more constructive manner than those induced to possess fixed

mindsets and their children were more successful on the task. However, the fixed mindset mothers controlled the child's involvement and reinforced the belief that the task was too difficult for the child to achieve.

Furthermore, Blackwell, Trzesniewski and Dweck (2007) displayed experimentally that it is possible to change children's motivation and beliefs in their own intelligence. They conducted a longitudinal study, following pupils' transition from elementary school and through the two years of junior high school. Motivational questionnaires prior to transition assessed children's beliefs in their own intelligence (growth mindset or fixed mindset). Using this evaluation of their beliefs, and participants' maths grades before transition, researchers accurately predicted the trajectory of academic performance of individuals for the two years of junior high school.

Students who believed they had fixed intelligence found the transition most challenging. Poor motivation and lack of perseverance resulted in maths grades declining over the subsequent two years, especially for those students who had performed well previously and were encountering challenging material for the first time. However, growth mindset students believed their intelligence would grow because of their perseverance and application to the tasks and consequently found their grades increased over time. This effect was evident irrespective of participants' starting level of attainment, meaning participants' finishing grades varied.

To demonstrate this effect empirically, Blackwell et al. (2007) divided the group into experimental and control conditions. All students learned study skills, and studied the physiology of the brain and the effects of stereotypical thinking on performance. Additionally, those in the control condition received training in memory enhancement techniques. However, those in the experimental growth mindset teaching group participated in activities educating them about brain malleability, learning that through effort, their intelligence can improve. Teaching growth mindset attributes improved students' motivation and achievement in maths across all ability levels. Participants in the experimental group who were previously categorised as having a fixed mindset showed no further decline in performance and their levels of attainment began to improve. Students classified as possessing a fixed mindset, in the control group, found their grades continued to fall even though they had received instruction in study

skills. Therefore, Blackwell et al., (2007) demonstrated that children's beliefs in their own intelligence were subject to change, depending on available inputs, and that growth mindset interventions were beneficial to students regardless of whether their starting point was a fixed, or growth disposition. Furthermore, Yeager and Dweck (2012) explained implicit theories of intelligence as the core assumptions a person holds about the flexibility of their individual characteristics. Evidence from Blackwell's (2007) study demonstrated that a person's implicit theory of intelligence (fixed or growth mindset), is key to academic motivation, indicating children's belief in their own intelligence is changeable, leading to improvements in their academic performance over only one academic term. Discussing with children, the brain's malleability, and the benefits to their intelligence to be gained from failure, enabled children to view the experience positively and improve their educational outcomes (Rattan, Savani, Chugh & Dweck, 2015).

Motivation and engagement of children are also important in predicting academic outcomes. Martin et al. (2015) considered many older children from around the world (North America, 1540 participants; United Kingdom, 1554 participants; Australia, 33778 participants; China, 3753 participants) and found a positive relationship between motivation and engagement across all groups. Martin et al. (2015) used Liem and Martin's (2012) Motivation and Engagement Scale for High School (MES-HS) to assess students' attitudes towards education. Students who valued school and believed their effort rewarded with good results, worked diligently until they understood the material. However, students who worried about school and approaching deadlines often had little faith in their own abilities. Their negative attitudes towards schooling resulted in feeling studying was pointless and failure inevitable. These students avoided studying so they would have an explanation to ease their cognitive dissonance regarding their failing performance, and some even wanted to give up on school.

There are similarities between Martin's (2015) and Dweck's (2006, 2009) arguments, that motivation of learners is essential for positive educational outcomes, therefore changing the way both teachers and children consider motivation, performance and praise can support increased academic attainment. Research by Dweck (2009) shows the students most motivated to

do well in school are not those who believe they have an abundance of innate intelligence (fixed mindset) but those who believe their attainment and abilities can expand over time due to their own effort and perseverance (growth mindset). Mindset effects are evident not only in young children but can remain constant through life. Lou and Noels (2016) investigated the effects of mindset on second language learning in college students. Students learning a second language were primed to hold either a fixed or growth mindset with fixed mindset holders predicted to withdraw from class when the course became more demanding and challenges or setbacks were experienced. Results from the study matched predictions, with a significantly greater number of students in the growth mindset condition completing the course. Students in the growth mindset condition applied effort to the task of mastering the new language, embracing the effortful work as a step towards success. However, it could be argued that Lou and Noels' (2016) study was ethically questionable as they induced half the participants to hold a fixed mindset and this group of class participants were more likely to fail than to complete the course, compared to those induced to develop a growth mindset.

1.2 Effect of insecure attachment on attainment

Mindset is not the only potentially negative influence on educational attainment, the type of attachment security relationships held by the child also affects academic performance. Attachment theory (Ainsworth, 1963, 1967, 1969, 1990; Bowlby, 1969, 1976, 1980) holds that children are born with an innate need to form emotional attachments, which enables them to feel secure and safe, and leads to satisfactory social, emotional, and cognitive development (Bowlby, 1969). Secure attachment to the primary caregiver develops in appreciation of responsive and sensitive parenting and the infant's positive experience regarding availability and responsiveness of the carer, to the child's needs. Through development of deep and enduring emotional connections to their primary carers, children's self-identity emerges as lovable and valuable (Bowlby, 1980). These securely attached children use their caregiver as a safe-haven and a base from which to learn, explore, and play. Conversely, when infants experience rejection or unavailability from their primary attachment figure, and care, which is insensitive, inconsistent, and

indifferent, they create a working model of the self as unlovable and incompetent, and consequently, develop insecure attachment styles. The child develops negative expectations of their carer and failure to trust other adults (Cassidy, 1990; Hardy, 2007) due to having no secure base from which to explore their world.

Children learn from a young age to predict the likely responses by their caregiver to their attachment needs. Research (Johnston, Dweck & Chen, 2007) using animations, showed infants' experience of attachment to their primary carer reflected in their mental representations of social interactions of the animated mother and child characters in their study. For example, when shown examples of caring and unresponsive behaviour by an adult figure, towards an animated infant, secure infants lost interest quicker to the expected caring behaviour by the animated mother than to the unexpected unresponsive behaviour. Furthermore, insecurely attached children were more attentive towards the caring animation than to the indifferent animated mother. The children therefore displayed more interest in the behaviour they considered unexpected.

As attachment security is associated with social development and overall self-representation, it can have far reaching consequences, effecting educational outcomes (Belski & Fearon, 2002; Bernier & Meins, 2008; Hasselhorn et al. 2015; Kerns, 2008; Romano, Babchishin, Marquis & Frechette, 2015) and leading to low self-esteem, lack of resilience and vulnerability to depression (Lacompte, Moss, Cyr & Pacuzzo, 2014). Initial attachment is usually to one primary caregiver but as other attachments develop, the security of the original attachment style determines their quality.

Given that up to 40% of children develop some type of insecure attachment to their primary caregiver (Washbrook, Waldfogel & Moullin, 2014), and the effects this can have on their life chances, understanding in this area is of great importance. Secure attachments to the primary carer are central to healthy child development, and secure attachment style positively affects children's social development (Schneider, Atkinson & Tardif, 2001; Weifield, Sroufe, Egeland & Carlson, 2008). Securely attached children develop better peer relationships, self-esteem, academic attainment, and stress coping strategies than their insecurely attached peers.

The literature demonstrates the beneficial effects of secure attachment on school performance and attainment. Granot and Mayseless (2001) examined attachment style of children (age 9/10 years) using a self-report questionnaire measure of attachment security (Kerns, Klepac & Cole, 1996), and the Attachment Story Stems (Bretherton, Ridgeway & Cassidy, 1990), adapted for the age group. Additionally, teachers completed questionnaires evaluating children's academic achievement, emotional and social skills, and behavioural problems. Granot and Mayseless (2001) found teachers rated children more highly on questionnaires on their social and emotional adjustment in school if participants were assessed as securely attached through the self-reported questionnaire responses and Story Stem performances. Furthermore, children rated by teachers as having the poorest levels of adjustment in school, across all examined areas, were children identified with ambivalent or disorganised attachment styles. Although participants may have applied self-presentational bias when completing the self-report measures, aiming to boost self-esteem, and positively influence the researchers' perceptions of them, combining results from the Story Stems and the teacher questionnaires controlled for this. Granot and Mayseless (2001) failed to find a relationship between school performance and disorganised ambivalent attachment style, suggesting some attachment styles are more easily classified than others. However, it could be that no relationship exists between school performance and disorganised attachment or teachers naturally develop better relationships with secure and insecure avoidant children, and therefore know more about them as individuals, than they do with ambivalent children, whose behaviour can be antisocial and challenging. This could negatively influence teachers' engagement with ambivalent children and these children may receive less classroom support from their teachers.

The literature demonstrates children with secure attachments to their primary carer cope better in the school environment. Moss and St Laurent (2001) and O'Connor and McCartney (2007) both found the quality of maternal teaching (van IJzendoorn, Dijkstra & Bus, 1995) explained improved school performance of securely compared to insecurely attached children. Furthermore, securely attached children, benefitting from cognitively stimulating home environments and maternal teaching of high quality, outperformed their insecurely attached

peers on IQ tests at school entry (West, Mathews & Kerns, 2013). The tasks included working together with their primary carer to draw a complex picture on an Etch a Sketch game, playing a card game and completing a geometrical block task. Securely attached children were less anxious when faced with complex problems and, the researchers argued, could therefore concentrate, and focus on classroom instructions better than their more anxious classmates did.

Booth-La Force & Kerns (2009), Wentzel (2009), West et al. (2013) and Groh et al. (2014) found children with secure home attachment relationships, and better peer and teacher relationships, displayed better performance in school.

O'Connor and McCartney (2007) and van IJzendoorn et al. (1995) both found securely attached children more cooperative in experimental testing situations and more motivated to please the adults working with them, an effect which may be replicated in school activities. West et al. (2013) found securely attached children more cooperative when teachers assessed their ability to acquiesce to typical classroom requests.

Although the research shows differences in educational outcomes for children with different attachment styles, attachment alone is not sufficient to account for variances in academic performance. Other factors such as parents' attitudes towards education or children's anxieties about testing procedures or belief in their own abilities could also influence children's intellectual development. If children's own attitudes and mindsets towards education change, because of their own experience, or attitudes and expectations learned from parents and caregivers, their educational performance may also improve independently of their attachment style.

Similarly, in a longitudinal study of children adopted as infants, Stams, Juffer and van IJzendoorn (2002) found the quality of mother-child relationships at age twelve months predicted poor academic performance at seven years. Results showed attachment style, even in those mother-child dyads not biologically related, predicted social skills and cognitive abilities at seven years; securely attached children performed significantly better than those with all insecure attachment styles.

Secure attachment is argued to predict improved academic performance, higher IQ, high quality peer and educator relationships, and self-esteem (Kerns, 2008;

Shmueli-Goetz, Target, Fonagy & Datta, 2008), and has been described as the most significant cognitive skill of the developing infant (Sroufe, 2005).

In a longitudinal study, Moss & St Laurent (2001) measured emotional mother-child relationships, children's cognitive abilities and attachment styles at age six. They conducted and video recorded a Strange Situation separation and reunion test, adapted to be appropriate for older children, more used to maternal separation (Main & Cassidy, 1988), with two periods of separation (45 minutes and 30 minutes) and two reunions. The mother and child worked together on cooperative tasks until the mother left, when the stranger worked with the child on the tasks. The attachment style of the child was classified based on the behaviours displayed by the child on the reunions with the mother, with children categorised as securely attached if they demonstrated animated, reciprocal, and happy conversations with the mother on reunion. Insecure avoidant children physically and emotionally avoided the mother on reunion, with little conversation between the dyad. Children demonstrating defiant refusal to engage with the parent, combined with immature and antagonistic behaviours, received a classification of insecure ambivalent attachment, and an attachment classification of disorganised attachment was levelled at children with suspicious anxiety and illogical sequences of interactions towards the mother.

At age eight years, children's academic motivation was measured using a Goal Orientation questionnaire (Ames & Archer, 1988) where children were asked to rate how much they agreed with certain statements related to their motivation to learn, for example, "It's important to keep trying when you make mistakes". Children's school grades in maths and language were also considered. Based on their attachment style as assessed at age six, Moss and St Laurent (2001) found securely attached children scored better than children with all insecure attachment types on cognitive tasks, communication skills and academic motivation at age eight years.

In a similar longitudinal study, Gloger-Tippelt, Gomille, Koenig and Vetter (2002), followed participants from birth to beginning school. They found children assessed as securely attached infants, later at six years of age, described adults positively, in story stem completion tasks (Bretherton et al. 1990) with stories following a logical order and having positive outcomes. However, children with insecure attachment styles tended to hold a negative view of the

adults in the stories. Consequently, children with disorganised attachment styles as infants told bizarre and unusual stories, featuring death, illness, and danger for the story characters. Avoidant infants, at age six, told stories devoid of emotional engagement with the attachment characters and mundane details, such as eating breakfast, repeatedly filling the stories. Those assessed with insecure ambivalent attachment failed to address the key attachment focus in the story, and often had angry, vulnerable characters.

Murray and Yingling (2000) found insecure attachment style in infancy also impacts language development, reducing intellectual attainment. They conducted interviews and observational sessions with parents of securely attached children and those with insecure attachment styles, considered at risk by social services, in their home environments. The researchers observed the quality of home stimulation and language interactions the children received. Securely attached child-parent dyads engaged in more conversation, developing better language skills than insecure children, experienced age appropriate toys, and challenging activities, suggesting the secure maternal-child relationship supports cognitive and linguistic development. It is therefore important to identify factors contributing to cognitive success for intervention strategies used with struggling children to be most effective.

Factors related to attachment style and cognitive performance in children link to other aspects of children's attitudes towards school, with Geddes (2015) describing the positive impact of secure attachment on development of children's self-efficacy, self-worth and resilience, attributes which are known to support cognitive and emotional development.

1.3 Relationship between mindset and attachment style

Insecure attachment styles and poor attitudes to learning manifested through fixed mindset behaviours, are known to independently impact educational outcomes for children in a negative way. However, the relationship between these areas is not clear. Children with fixed mindsets and children with insecure attachment styles both experience a negative effect on school performance and having both fixed mindset and poor attachment can compound the challenges experienced by the child. However, it is not clear if having an insecure attachment style increases the chances of having a fixed mindset. Nor is it clear

if securely attached children are more likely to have growth mindsets, due to their experience of higher quality of caring relationships. Identifying the relationship between mindset and attachment style could improve the effectiveness of interventions aimed at improving the educational outcomes for children facing challenging situations at home and in school and therefore this is an area of research that requires more investigation.

Research demonstrates similarities in responses from children based on their mindsets and attachments. For example, when considering the influence of insecure attachment styles on children's cognitive performance, West et al. (2013) examined children's self-regulation abilities and found performances of fixed mindset and insecure children very similar. They argued that securely attached children display better academic performance than insecurely attached children due to their improved self-motivation and self-control. Self-regulation was measured (West et al. 2013) by offering children two plates of their favourite sweets, with a choice to eat the smaller plateful now or wait seven minutes and get the larger plateful. Securely attached children could delay gratification and wait for the larger portion whereas insecurely attached children were more likely to choose the "eat now" option. The ability to delay gratification is represented in school by children able to self-reflect on their own performance and consequently improve future performance. Securely attached children can work at a challenging task and persevere to find a solution, behaviour patterns evident in children with growth mindsets (Dweck, 2006) whereas children with insecure attachment styles tend to choose an easier option where a task can be completed more quickly, behaviour typical of those holding fixed mindset beliefs of intelligence (Dweck, 2012b).

In her research, Dweck (2006) found similar challenges affected children in her mindset research group as influenced those with poor attachment security, which determined their learning. Securely attached children can work at a challenging task and persevere to find a solution whereas children with insecure attachment styles tend to choose an easier option where a task can be completed more quickly, patterns of behaviour evident in Dweck's (2006) mindset hypothesis so this does suggest some links between mindset and attachment. As demonstrated by the literature, attachment style has a long-term impact upon children's academic achievements and is a more common

problem for children from poor socio-economic backgrounds (Griffin, 2014). Children from families where poverty is an issue, together with its frequently associated problems of poor health, limited intellectual stimulation opportunities and additional stressors in the home such as violence and instability, are more likely to develop poor attachment bonds. Taken together, these factors can negatively influence academic outcomes for the child.

2 The current research

The current study will look at mindset and attachment style of children from some of the most deprived areas of Dundee. The first experiment will examine performance on a cognitive task by young children from a deprived area of Dundee, in an attempt to identify a relationship between mindset and attachment style of these children. It will also consider how these factors influence children's performance on the cognitive task and predicts those with growth mindsets and secure attachment styles will perform better than other children on the cognitive task.

The second experiment will build upon the results from the first experiment in an attempt to demonstrate the efficacy of growth mindset strategies as a performance-enhancing tool for all children but especially for those children already facing challenges in school due to insecure attachment styles and holding of fixed mindsets. By manipulating children's mindsets, it is hypothesised that those who demonstrated a fixed mindset in the first experiment will gain greatest benefit from the growth mindset intervention in the second experiment. The hope is that growth mindset protocols can be used to improve attainment of children who struggle to become engaged in education.

3 Experiment 1 Introduction

By the age of 5 years, there is already a significant gap in attainment between children from the most and least deprived households, a pattern evident in the differing school catchment areas within Dundee, and this attainment gap follows children throughout their school years (Bertrand, 2012; Sosu & Ellis, 2014). As educational attainment is recognised as the best route out of poverty (Scottish Government, 2014a), efforts are required to improve educational outcomes for

children who are often disengaged with education. Therefore, identifying causes contributing to underachievement of children already facing disadvantages can begin to improve their long-term prospects. That insecure attachment styles, and poor attitudes to learning manifested through fixed mindset behaviours, independently influence performance in school for children in a negative way is demonstrated by the literature. However, the relationships between these areas are not clearly defined. The current research aims to evaluate the influences of attachment style on engagement with growth mindset to investigate any relationship between mindset and attachment, whilst also considering children's performance on a cognitive task. To assess attachment style of participants, it was first necessary to identify the most appropriate measure.

To evaluate attachment styles in infants, researchers use a variety of paradigms, including Strange Situation Procedures, Attachment Story Stem Tasks, and Attachment Q-sort testing.

The Strange Situation Classification system was developed (Ainsworth & Bell, 1970) as an experimental procedure to measure attachment quality in young children (aged 1-2 years). Comprising eight episodes, each lasting around three minutes, it takes place in a playroom of toys. Through observing the interactions between mother and child dyads, and stranger and child dyads, separation anxiety, stranger anxiety and reunion behaviour displayed by the child during the episodes, researchers can identify the attachment style of the child, as described by Ainsworth (1967, 1979) and Main and Solomon (1990).

Although the Strange Situation Procedure is a widely-used attachment assessment, troubled environment and placed with law-abiding peers, youngsters are more likely to avoid criminal behaviours, desiring peer acceptance. Additionally, Field (1996) argues that attachment studies by Bowlby and Ainsworth focus on the mother as the primary attachment figure and this is not necessarily the case, as the child's main caregiver may be an alternative adult. Relationships towards other carers may be characterised by alternative behaviours. Furthermore, the Strange Situation considers only overt behaviours (Field, 1996) although physiological differences such as increased heart rate or crying can be indicative of anxiety or stress in the infant. Field draws attention to cross cultural differences in parenting practices, focussing on the effects of alloparenting on the development of attachment to several

significant others. Stress (Thompson, 1990) placed on the infant, brings in ethical issues, and the unfamiliar and unnatural test environment questions the ecological validity of the method (Bronfenbrenner, 1994).

Addressing some of these issues, Waters and Deane (1985) devised the Attachment Q-sort, as an alternative attachment measure. Issued with a set of one hundred cards, featuring categories including social and emotional intelligence, and exploratory behaviour from a secure base, parents/carers or an independent observer, watched the child for several hours before categorising the cards to represent the characteristics of the child. Observers then assigned the cards to categories that most or least described the behaviour of the child in question. By comparing the resulting profile determined from the card grouping to that of a prototypical secure child, an attachment security score, from very secure to very insecure, is calculated. Research showed strong relationships between Strange Situation Procedure results and those of Attachment Q-sort (van IJzendoorn, Vereijken, Bakermans-Kranenberg & Riksen-Walraven, 2004) however, this was only the case when conducted by an independent observer. Parent/carer observations had poor validity, with parents taking a biased approach and recording children's behaviours to show them positively.

Although Attachment Q-sort demonstrates repeatable findings and can be conducted unobtrusively, making it less stress-provoking than the Strange Situation, it has several drawbacks. Less research has evaluated this method, and it is time consuming to run, requiring several three-hour observation sessions required to ensure validity (Bronfenbrenner, 1994; van IJzendoorn, et al., 2004). Therefore, although ethically better for the child participants, this method of testing has been utilised less than the Strange Situation. However, as discussed by van IJzendoorn et al. (2004) although this methodology identifies secure and insecure attachment along a continuum, it fails to identify different types of insecure attachment. Therefore, the information provided is less useful than that from Strange Situation paradigms and Attachment Story Stems.

Bretherton et al. (1990), amongst others, (Bretherton & Oppenheim, 2003; Goldwyn, Stanley, Smith & Green, 2010; Hodges & Steele, 2000; Oppenheim, 1997) developed a story telling attachment assessment method which enabled

attachment security to be measured in young children without the parental interaction, required for both Strange Situation and Attachment Q-sort methodologies. Young children have limited capacities for self-reflection and verbal self-expression therefore using a story stem task can elicit information about the child's representations of care and care-givers.

Page and Bretherton (2010) argue the theoretical foundation behind using assessment tools such as the doll story completion task is that children's responses reveal their internal working models of their caregiving experiences which are relied upon for moral development and emotional security. Story stems have been widely used as a measure of attachment security for many years (Buchsbaum et al. 1992; Farnfield, 2014, 2015; Page & Bretherton, 2010) and are considered a reliable method of measuring attachment of children in the preschool and early years. For children with attachment security issues or victims of abuse, (Hodges & Steele, 2000), the presence of the parent may negatively affect the child's performance. This non-invasive tool enables examination of children's mental representations of attachment relationships to in a non-threatening manner, as direct questioning of family relationships is avoided. Instead, typical family scenarios feature in a series of stories, each of which examine different aspects of attachment security, including responses to the child's pain and fear, responses to parental authority, and reactions to separation and reunion with parents. The researcher begins acting out each attachment story using small dolls and appropriate props, and asks the child to complete each story, to "show me and tell me what happens next". The child's verbal responses along with dolls' interactions are video recorded and transcribed, enabling an attachment security style to be calculated.

Story Stem methodology is a widely used research and diagnostic tool, with bodies such as the Anna Freud Child Mental Health Research, Training and Treatment Centre in London utilising this methodology to ascertain levels of abuse and attachment relationships in neglected children. Researchers find this methodology reliable (Bereford, Robinson, Holmberg & Ross, 2007; Laible, Carlo, Torquaiti & Ontai, 2004) although children's linguistic development must be of a sufficient standard to understand and participate in the procedure.

In the Strange Situation procedures, in addition to secure attachment, several insecure attachment styles were identified. These different attachment types are

also evident in children's responses to Attachment Story Stems (Bretherton et al.1990). In the story stems, secure attachment was identified by responses that were detailed and logical and had positive outcomes. Carers were available, warm, and supportive. Moreover, relationships had reciprocal features, with spontaneous and relevant emotional responses from children. Similar behaviours were observed between mothers and carers in Strange Situation testing. The securely attached child was distressed on mother's departure and happy when reunited, comfortable around the stranger in the mother's presence but wary in her absence. Additionally, the secure child used their care as a safe base for exploration.

However, children assessed as insecure avoidant typically displayed physical and emotional independence from their primary carer (Behrens, Hesse & Main, 2007). They declined to seek out their carer when upset, or for reassurance when exploring. Their attachment relationship lacked emotional accessibility and the carer appeared insensitive and unavailable to the needs of the child during times of upset. Story stem narratives from this attachment group tended to feature superficial and neutral solutions. In the Strange Situation, avoidant children were not distressed at the mother's departure and were disinterested in her return. The stranger and the mother comforted these children equally.

Main and Solomon (1990) added a fourth category of attachment security style due to the realisation that some children had issues, which did not fit within the existing classification system. Children with disorganised attachment give greatest cause for concern (Bernard et al. 2012), often displaying unconventional role behaviours in the story stems such as the dominant role in the parent-child relationship. The child has developed a mistrust of adults, due to experiences of unreliability and safety uncertainties, often associated with neglect, violence, abuse, and substance misuse in the home. Because of their distressing reality, story stem resolutions from those with disorganised attachment styles often feature implausible, bizarre, and dangerous episodes. The research shows Story Stems are a reliable method of measuring attachment and do not require the carer to be present. Therefore, they are the ideal tool to use with participants where it is challenging to gain parental engagement, as was the case with current participant group.

Family background and attitudes, academic ability, along with insecure attachment relationships and fixed mindset are among the many factors often experienced by children who find school challenging (Alika & Edosa, 2012; Whannell & Allen, 2011). Therefore, tackling the issues associated with attachment and mindset experienced by these children and young people can aid towards improved school attendance and achievement. Previous studies demonstrate children from deprived family backgrounds are more likely than more affluent children to encounter social and emotional problems, related to lack of secure attachment relationships (Bradshaw, 2011; Kerns, 2008; Scottish Government, 2014a). Consequences of these experiences can lead to poorer academic attainment (Hasselhorn et al. 2015).

The current research aims to examine the effect of influences of attachment style on growth mindset. The project evaluated attachment to the primary carer, current mindset and performance on a problem-solving task to provide baseline measures to determine whether children with a more insecure attachment environment were more likely to have a fixed mindset and to compare the cognitive performance between children with different attachment styles and mindsets. It was predicted that children with insecure security attachment would be more likely to hold academic fixed mindsets and those with secure attachment styles would tend to have growth mindsets. Additionally, in line with previous research, it was predicted that securely attached participants would perform better on the cognitive task.

3.1 Experiment 1: Method

In the current research project, local schools participated in experimental sessions to assess children's style of security attachment, academic mindset and to obtain a baseline measure of problem solving. The schools were interested in the potential benefits introducing growth mindset interventions would have for their students but had not yet begun these.

3.1.1 Parents/carers

Standard parent/carers participation information forms (Appendix 1) were produced for distribution by the schools. However, staff raised concerns regarding these and suggested a simplified form (Appendix 2) would be more

appropriate due to significant problems with literacy skills among the parents and carers of the young participants. The revised form used simpler language and larger font size and informed parents that more detailed information, in the form of the original consent form, was available from the school office. It is interesting to note, no parent requested the additional information from any of the school offices.

The participant information sheets for parents were carefully worded to avoid suggesting to parents/carers that they were responsible through poor parenting for their child's academic performance, and in accordance with this, the title of the study was removed and replaced with a generic title "Growth Mindset Research".

Participant consent forms (Appendix 3) were also provided to parents and recognising children's rights to consent to participation in research (Powell & Smith, 2009; United Nations, 1989) participants themselves were asked to consent.

3.1.2 Participants

Participants were forty-nine children from primary one classes (aged 4-5 years) in primary schools in Dundee, Scotland. The schools selected for participation were from the Strathmartine area of Dundee, an area identified by the Scottish Government's Indicators of Multiple Deprivation (Scottish Government, 2016a) as being in the top 20% most deprived areas of Scotland; with two of the schools (Ardler Primary School and St Fergus Primary School) featuring in the top 5% most deprived areas. Twelve participants (5 males, 7 female) came from Ardler Primary School, eighteen (11 males, 7 female) from Craigowl Primary School, seven (3 males, 4 female) from Downfield Primary School and twelve (9 males, 3 female) from St Fergus Primary School.

As the current research came under the umbrella of a larger growth mindset project conducted by Abertay University in conjunction with Leisure and Culture Dundee and Winning Scotland, appropriate permissions to work in these schools were already in place.

For most participants, English was their first language although for four children their first language was Polish and for one child, Hindi was spoken at home but

all were proficient at English therefore understanding the language of the story stems did not present problems for any participants.

The researcher discussed the child friendly information and assent form (Appendix 4) with the child before commencing the study, recognising in line with the legal age of capacity in Scotland (16 years), that children cannot give informed consent but were given the opportunity to assent to participation in the research. The children were informed that participation was voluntary and they could withdraw from the study at any time with no penalty. Additionally, the researcher told the children the sessions would be video-recorded to “help me (the researcher) remember”, and the sessions were transcribed and coded later.

Participants were tested individually in a quiet area of the school and all times current child protection guidelines (Dundee City Council, 2015) were adhered to.

3.2 Materials and Procedure

3.2.1 Doll story stem completion tasks

Doll story stem completion tasks (Appendix 5) (adapted from Bretherton et al., 1990) were used to examine children’s attachment to their primary carer. The sessions were video recorded and later transcribed, utilising Bretherton’s scoring scheme (Appendix 8) to record how many instances of each behaviour or utterance occurred. Details of the scoring scheme are explained in section 3.2.2. Following this methodology enabled each child’s security attachment type to be calculated.

The task was adapted such that the monster in the bedroom story was altered to incorporate the child doll fearing the dark. However, testing of the child’s response to the doll’s fear remained consistent in the adapted story. The changes to the story were made following advice from the schools involved in the study who all reported child protection issues were particularly applicable to children in their schools. It was possible some children may have had experience of a “real monster” in their bedrooms so use of the original story may have triggered severe emotional upset.

Throughout the session, the researcher began each story, acting out the character parts using the doll family (Appendix 6) and the child completed each story using the props (Appendix 7) provided. The session began with a “warm-up” story about a birthday party, to familiarise the child with the equipment and ensure the child understands the procedure.

The attachment stories (Appendix 5) were presented to all children in the same order. Stories considered the attachment figure in an authority role in the spilled juice story, with pain (hurt knee story) and fear (dark bedroom story) as elicitors of attachment and protective behaviour. Separation anxiety and coping behaviours were examined in the parental departure story, and responses to parental reunion (parental reunion story) were considered in the final story. Following the reunion story, the researcher requested the participant tell a “happy story” about a family activity, to reset any negative emotional arousal triggered by the story tasks. Participants were free to take as much time as they wanted on each story. When they seemed to reach a conclusion to the story, the researcher asked “Anything else, or shall we have the next story?” Although no breaks were offered between the stories, children had the option to take a break before beginning the second task, the jigsaw test.

3.2.2 Assessing attachment style

Bretherton et al. (1990) developed scoring criteria to enable attachment style to be determined from performance of the story completion task (Appendix 8). They required the participant to include specific comments or actions in each story in order that the child be classified as secure. For example, in the hurt knee story, it was necessary for the child’s pain to be acknowledged in a positive way, through an action by a “parent” doll such as application of an Elastoplast or parental hug. Although prompts from the researcher were permitted, children were only allowed a maximum of one prompt per story to be categorised as secure. If all five stories were completed with secure attachment style responses, without requiring any prompts, the child was classified as very secure. Responses such as repeatedly saying “I don’t know” or answers which continually avoided tackling the attachment issue, resulted in an insecure avoidant classification. Odd responses which made no sense in the context of the story, such as a crashed car or a bumped head story as a response to the

dark room, categorised the child as having disorganised insecure attachment. Disorganised attachment is typically found in neglected or abused children and as the bumped head demonstrates, their stories tend to feature unexpected abrupt plot shifts, frightening events and display the vulnerability of children. For comparison, a response to the dark room from a securely attached child would be to call for a parent or sibling to switch on the light or cuddle the child. The examination of the data originally produced six attachment styles based on the above criteria (very secure, secure, slight avoidant, avoidant, slight disorganised, disorganised). However, once the analyses began, it was realised numbers in some of the attachment categories were too small to enable robust evaluation. Therefore, children's attachment security was categorised based on whichever attachment type was most evident in their responses, as described above, to produce three attachment categories for analysis (very secure, moderately secure, insecure). As responses to parental separation and reunion are important in attachment security, children's responses to these stories were more heavily weighted in cases where participant's responses were difficult to classify (Bretherton et al. 1990).

3.2.3 Measuring mindset

In the second stage of the experimental session, children completed jigsaw puzzle activities to assess the presence of a growth or fixed mindset. Participants, replicating the methodology used by Dweck (2006), completed jigsaw puzzles of varying difficulty (Appendices 10 & 11) to assess their mindset prior to participating in any mindset interventions. Participants first completed a simple age appropriate four-piece jigsaw puzzle (Appendix 9) and then had the option to complete the easy puzzle again or try a more complex (sixteen piece) puzzle (Appendix 11). It was expected that children with a fixed mindset would choose to repeat the easier puzzle, fearing failure when tackling a demanding task, and those with a growth mindset would prefer the more challenging option, in line with Dweck's (2006) findings.

3.2.4 Cognitive task performance

Block design tasks are a subset of the Wechsler intelligence tests such as the Wechsler Intelligence Scale for Children, 4th edition (WISC-IV) (Wechsler,

2012) and the Wechsler Adult Intelligence Scale, 4th edition (WAIS-IV) (Wechsler, 2011). Providing reliable and robust results (Soares & McCrimmon, 2013), block tests are used to measure visual-spatial and organisational skills, and non-verbal problem solving and perseverance skills. Previous research suggested performance on this task would differ between children with different attachment styles (O'Connor & McCartney, 2007; Pianta, Belsky, Vandergrift, Houts & Morrison, 2008; West, et al., 2013), as children with insecure attachment types have historically tended to demonstrate poorer success rates on cognitive tasks than their more securely attached class mates.

In the final stage of the experiment, participants were presented with the Wechsler block task (Wechsler, 2012), a set of nine identical blocks, each with two white faces, two red faces and two faces divided diagonally into red and white. Participants viewed images of increasing complexity in a stimuli book and had to recreate the series of two dimensional images using the three-dimensional blocks. If the first image was correctly replicated using the blocks, participants attempted the next image in the stimuli book and so on, with a maximum of four puzzles to attempt. However, if incorrect, participants had the opportunity to make changes to their original solution. If still incorrect after two attempts, participants were thanked for playing and the game was finished. The time taken to replicate each image was recorded, along with number of attempts per image and the number of block tasks correctly completed.

3.3 Results

The data collected were analysed using IBM SPSS version 23.

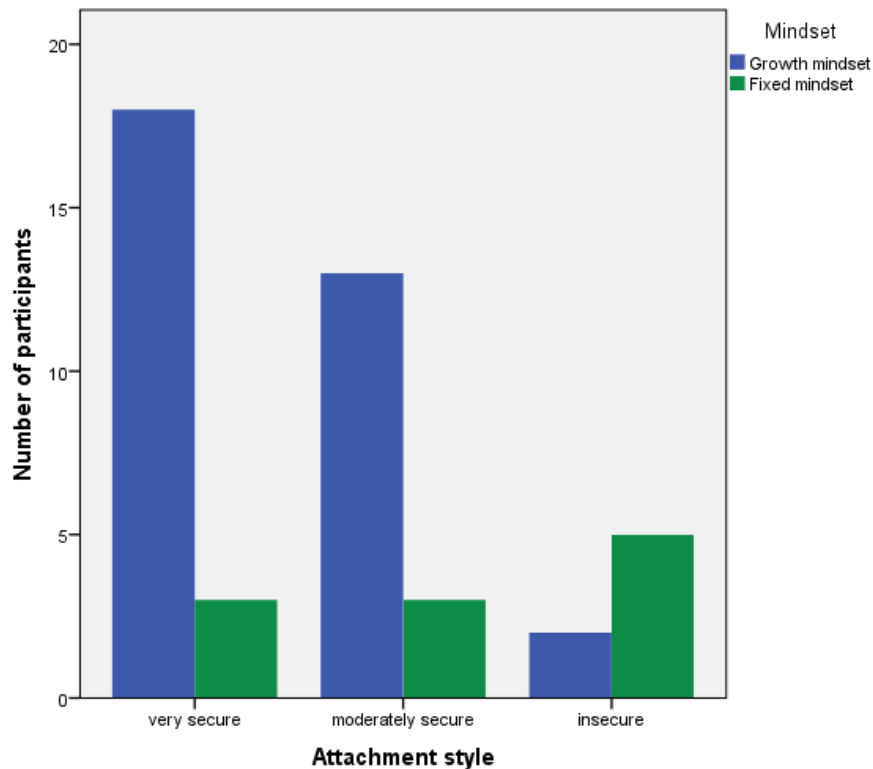


Figure 1 Attachment style and initial mindset of participants

A Chi-square test of independence was calculated comparing frequency of growth mindset for children with very secure, moderately secure, and insecure attachment styles. A significant relationship was found ($\chi^2(2)=9.67$, $p=0.008$) (Figure 1). Very secure participants (87.5%) and moderately secure participants (81.3%) were more likely to have growth mindsets compared to insecure participants (28.6%). Therefore, the results show that children who have an academic growth mindset are more likely to have secure attachments to their primary carer whereas those with fixed mindsets are more likely to develop insecure attachment styles.

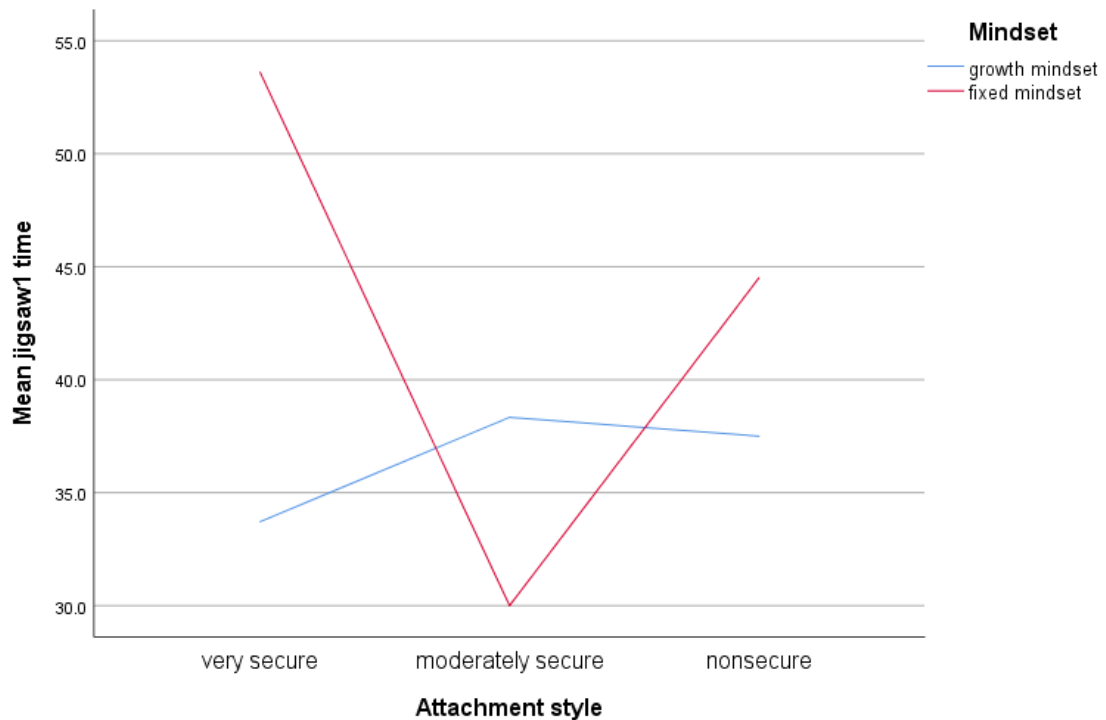


Figure 2 Interaction plot of mindset and attachment style on mean time taken on jigsaw

To evaluate whether attachment style impacted time taken by participants with different mindset types on jigsaw 1, GZLM was specified as linear with a logit link function and time spent on the first jigsaw task as the dependent variable. Attachment style (insecure, moderately secure, or very secure), mindset (growth or fixed) and school were included as factors. GLZM is suited to analyses of small (10 or more subjects) non-normally distributed, dependent data and can support many different types of variable such as binary or counts (Garson, 2013).

There was a significant main effect of attachment on time taken to complete jigsaw 1 ($\chi^2(2) = 9.22, p = 0.01$). Moderately secure participants spent longest on jigsaw 1 (mean = 55.78, CIs 44.24 and 67.31). Insecure participants spent the least time on the task (mean = 28.93, CIs 12.89 and 44.96). Very secure participants on average spent 38.6s on the jigsaw (CIs 27.85 and 49.35) (Figure 3). There was also significant main effect of mindset on jigsaw 1 completion time ($\chi^2(1) = 6.78, p = 0.009$). To evaluate whether mindset impacted performance on the jigsaw 1 differently in participants with different attachment styles, GZLM was specified as linear with a logit link function and number of block tests correct as the dependent variable. Mindset (growth or fixed),

attachment (insecure, moderately secure, or very secure), and school were included as factors.

Participants who had growth mindsets spent less time on the jigsaw task (mean=30.26, CIs 21.29 and 39.23) than those with a fixed mindset (mean=51.94, CIs 39.24 and 64.64) (Figure 3).

The results show a significant effect of mindset and attachment style on time taken to complete the first jigsaw.

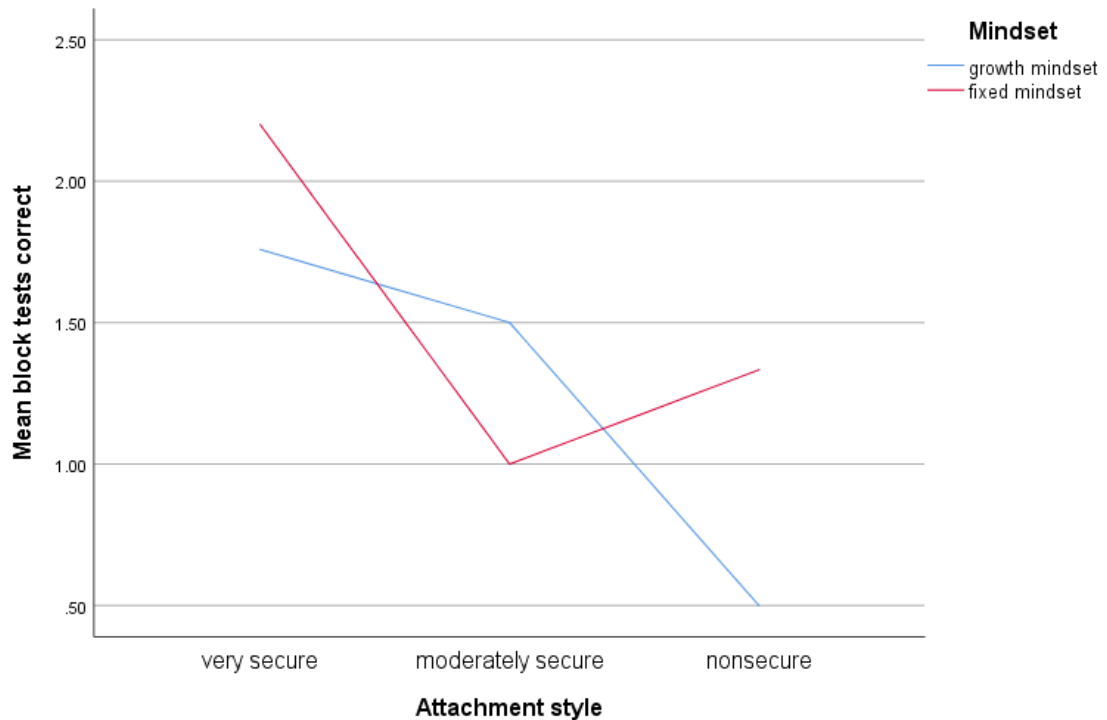


Figure 3 Estimated marginal means, with standard error, for block tests correct by children with different attachment styles and mindsets

To evaluate whether attachment style impacted number of block tests solved correctly for participants with fixed and growth mindsets, GZLM was specified as linear with a logit link function and blocks correct as the dependent variable. Attachment style (insecure, moderately secure, or very secure) and mindset (growth or fixed) were included as factors. There was no significant main effect of attachment ($\chi^2(2)=4.73$, $p=0.094$), or of mindset ($\chi^2(1)=1.12$, $p=0.29$) on block test performance (Figure 3). However, a significant interaction between attachment style and mindset was evident ($\chi^2(1)=11.33$, $p=0.001$).

Very secure participants, on average, scored highest on the block tests (mean=1.97, CIs 1.54 and 2.4), compared to moderately secure (mean=1.57, CIs 0.79 and 2.36) and insecure participants (mean=1.02, CIs 0.31 and 1.74).

Fixed mindset participants typically scored higher (mean=1.73, CIs 1.11 and 2.33) than growth mindset participants (mean=1.32, CIs 0.88 and 1.76).

3.4 Discussion

It was hypothesised that children with insecure attachment styles would be more likely to demonstrate fixed mindsets than children from secure backgrounds, and securely attached children would be more likely to hold growth mindsets than fixed mindsets. The results supported this hypothesis, with 42% of children classified with fixed mindsets found to have insecure attachment styles compared to 5% of growth mindset children. It was also predicted that securely attached participants would be quicker and more accurate on the cognitive block task. However, neither mindset or attachment style influenced performance on this task although an interaction between mindset and attachment was evident. Furthermore, mindset did influence time taken to complete the jigsaw puzzle; children classified as holding growth mindsets completed the jigsaw significantly quicker than those with fixed mindsets.

Interestingly, the numbers of participants with fixed mindsets or insecure attachment styles was unexpectedly low therefore examining the pattern of results in a sample with a greater proportion of fixed mindset and insecure participants, may provide alternative results. Previous research such as the work by Washbrook et al. (2014) and Brooks-Gunn, Han and Waldfogel (2010). found up to 40% of children have poor security attachment to their primary caregiver. In analyses of the data collected in the current study, it is interesting to note only around 14% of participants were classified as holding insecure attachment styles. This is especially surprising given that areas of extreme social deprivation, such as those considered in the current study, typically experience higher levels of poverty and issues associated with it, such as unemployment, physical and mental health issues, addiction, and instability in the home (Griffin, 2014; Scottish Government, 2012, 2016b), all of which contribute to development of insecure attachment. This could be due to sample bias, as only 25% carers consented to their child's participation in the research activities and these parents may represent the proportion of primary caregivers invested in their child's development and progression.

However, this does not explain the high levels of secure attachment, growth mindset and participation displayed by participants from St Fergus Primary School and Ardler Primary School. As these schools are both in the areas of greatest deprivation within the Dundee City area, previous research (Washbrook et al. 2014) would predict these children would demonstrate high levels of insecure attachments and fixed mindsets and the least engaged parents. Yet this was not the case; these two schools had approximately 90% pupil participation, compared to 50% from Craigowl Primary School and 11% from Downfield Primary School respectively, both schools whose catchment areas contain significantly fewer deprived children than St Fergus and Ardler primary schools. Still, this could be explained through the participants, where parental consent was obtained, coming from families where education is valued and parents are actively involved in supporting their children's performance (Moorman & Pomerantz, 2010; Mueller & Dweck, 1998; Zhao & Wang, 2014). Notably, only 25% of possible participants completed the study therefore, those who did perhaps came from the minority of families who feel education is an endeavour worth supporting.

It could also be due to development of secure attachments with the teachers in the school setting. Although primary attachment relationships are usually to the main caregiver, development of secure attachments to the teacher can improve academic and social competencies (Pianta et al., 2008). In a longitudinal study involving children aged four to ten years, who were part of the National Institute of Child Health and Human Development study (NICHD SECCYD) (NICHD, 2001), Pianta et al. (2008) observed the quantity and quality of information and emotional communications between the teacher and pupils. They conducted maths and literacy assessments using subtests from Woodcock and Johnson's (1990) Psycho-Educational Battery-Revised (WJ-R) to assess letter identification, broad reading skill, applied maths problems, and picture vocabulary. Children's socio-emotional classroom experience was associated with level of improvement in maths and literacy. Those who experienced good quality nurturing from their teacher made the greatest gains in maths and literacy; the effect was most marked in children previously identified as holding insecure attachment types and from poor socioeconomic backgrounds. Therefore, it could be that participants from the schools where most children

come from deprived backgrounds are successfully providing attachment opportunities in the classroom environment. These rich surroundings may help compensate for the poor quality home environment many of these children experience.

If the assessment of secure attachment is due to the teacher providing secure attachment opportunities (Washbrook et al. 2014), measuring attachment in the presence of the primary caregiver may provide alternative results. Carrying out testing in the presence of parents may therefore elucidate the findings although gaining parental investment has proven challenging for the schools.

Additionally, the teachers in the schools with greatest numbers of participants were more enthusiastic about growth mindset research than teachers in the other schools were, and repeatedly reminded children to return consent forms. However, it could be the teachers' interest that encouraged pupil' participation. Considering the results from the jigsaw task (Dweck, 2006) used to assess children's mindset, moderately secure participants took longest to complete the puzzle. Anecdotally it seemed that these children were most relaxed in the school environment and often chatted to the researcher, or told stories about the characters in the puzzle, whilst working, consequently increasing the time taken to complete the jigsaw. Very securely attached males and females, and insecurely attached males, were quickest to complete the first jigsaw puzzle. Insecure females took longer than insecure males but were quicker than moderately secure participants. Having a larger number of insecurely attached participants than were present in the current sample would enable further exploration of this pattern of data. Although the researcher measured the time taken to complete the jigsaw puzzle, children were not informed of this. Knowing the significance of time taken on the puzzle, may have changed their performance.

Some limitations of the study became apparent. Whilst acknowledging some young children are fearful of the dark, adapting Bretherton et al.'s (1990) monster story to become a dark bedroom story failed to elicit fear response from the majority of participants which may have reduced the reliability of the measure. If reusing this methodology, an alternative fear elicitor would be beneficial. However, as this was only one of five stories used, its influence should be minimal.

A further issue was the way in which mindset was measured. Dweck (2006) explained the jigsaw methodology used here could determine if children had a fixed or growth mindset, the argument being those with a growth mindset were prepared to attempt the more difficult puzzle. However, several children refused to complete the second puzzle and informed the researcher they disliked jigsaws and requested an alternative game. Therefore, it could be that by offering a selection of tasks with an easy and more complex option, children's mindsets could be more accurately measured.

Furthermore, difficulties were experienced in the presentation of the Wechsler (2011) blocks used in the cognitive task. The Wechsler Intelligence Scale for Children is regarded as reliable (Reverte, et al. 2014; Canivez, Watkins & Dombrowski, 2016) and is designed for use with children aged between two and six years old. However, its price is prohibitive to the research student and as access was available to the adult version, the Wechsler Adult Intelligence Scale, 4th edition (WAIS-IV) (Wechsler, 2008) this was adapted to suit the age of the study participants. However, this product was not as child friendly as the specialised child edition and some problems emerged.

Challenges were encountered using the block tasks as a cognitive measure as presenting the blocks identically to each participant, for each individual challenge, was problematic. Blocks randomly chosen, or turned over during each round of testing, led to some presentations of blocks ending up close to the required pattern, making replication of the pattern displayed in the stimulus book simpler for some participants than others. Therefore, the difficulty level of the task varied between participants and these inconsistencies made comparison of the results challenging.

Additionally, children found replicating the images in the stimuli book demanding, with some participants failing to complete the first task, two red blocks placed side by side. Although the researcher originally planned to use the Wechsler (2008) block tasks in future research, controlling variability in the block presentation for each round led to unreliable results.

As predicted, a relationship between mindset and attachment security was found, with insecurely attached children more likely to have fixed than growth mindsets. However, this research failed to investigate if it is possible to influence the mindsets held by these young children. As holding a growth

mindset improves children's educational outcomes (Dweck, 2006; Martin, Yu, Papworth, Ginns & Collie, 2015) and children from the schools in the catchment area considered here fail to perform as well as children from more affluent backgrounds, research into growth mindset approaches could offer opportunities for these children to improve their educational attainment and consequently their life chances. It may be that mindset of young children can be manipulated, rather than being a static, innate quality, and interventions could enable children's attitudes towards their intellectual potential, to be improved. In Experiment 1, only the effect of current mindset and attachment style on cognitive performance were assessed. However, what underpins the importance of identifying mindset styles in children is the idea that they can be changed to bring about improvements in academic performance and future life success. Therefore, a second experiment aimed to manipulate the same children's mindset through differing verbal feedback regimes whilst completing a task, to see if any differences in performance were evident for children with differing attachment security styles and underlying mindsets identified in Experiment 1.

4 Experiment 2 Introduction

Many children, especially those from deprived backgrounds, fail to benefit from education as much as would be hoped (Claro, Paunesku & Dweck, 2016; Scottish Government, 2016b, 2016c). Strategies to improve academic outcomes typically focus on enhanced educational provision (Wilson & Buttrick, 2016) through improved teacher education and resources, or on improving behaviour and intelligence of students (Jaeggi, Buschkuhl, Jonides & Perrig, 2008). However, psychological approaches propose people's beliefs about their intelligence and capacity for learning have more effect on students' performance than IQ or quality of schooling (Dweck, 2006; Paunesku, et al. 2015; Yeager & Walton, 2011). Therefore, improving children's attitudes towards learning through engaging with growth mindset thinking, could be a way to improve educational outcomes.

Experiment 1 assessed attachment style and mindset of children in schools before they began growth mindset interventions and found a relationship between mindset and attachment style of participants. This demonstrated that

children with insecure attachment styles were more likely to have fixed mindsets and securely attached children to have growth mindsets. Performance on tasks in Experiment 1 varied for children with differing attachment styles and mindsets. Securely attached and growth mindset holding children completed the jigsaw task more quickly than others and growth mindset children tended to be more successful on the block tasks than their fixed mindset holding counterparts. However, children were not aware their jigsaw performance was timed; if asked to complete the task as quickly as possible, different results may have emerged.

Attachment style and mindset are both known to influence academic achievement (Claro et al. 2016; Dweck, 2006; West et al. 2013). Whilst acknowledging some schools provide high quality attachment opportunities, which can positively influence educational engagement of children, research suggests improving children's implicit attitudes towards their intelligence can offer major benefits to performance (Blackwell et al. 2007; Martin et al. 2015). When children receive praise for their effort, strategy used and persistence in reaching a solution rather than for their actual academic achievement, a growth mindset is promoted and children come to understand the value associated with belief in their own capacity for learning. Thus, when faced with a complex challenge, they understand the strategies required for problem solving and know that methods applied in tackling the problem are key. Pawlina and Stanford (2011) successfully displayed this with preschool children. The teachers introduced to children, the idea of growing their brains through effort, and approached this from the developmental level of their pre-schoolers by talking about the sense of achievement gained from writing one's own name on paintings, a skill learned by the children when beginning preschool.

Teachers explained that children could grow their brains by working to achieve tasks and provided a list of challenges from which children chose one each day. Some selected tasks they could already do, fearing failure on new tasks (fixed mindset) and some embraced the new challenges (growth mindset). The variety of tasks available enabled all participants to choose something suitable for their current ability; the challenge faced by teachers was to support reluctant youngsters to try something more demanding.

Teachers taught the children to use strategies to enable them to accomplish the tasks. The children first approached the challenges by identifying the problem and selecting possible solutions, then choosing one approach to try first, along with a back-up plan. After trying the first strategy, children assessed the success of their plan, received praise for their attempts to solve the problem rather than for reaching a correct solution, and were encouraged to try out their back up plan. Over time, the children learned to incorporate personal challenges into their day and associated these with growing their brains. Children were encouraged to see mistakes not as failures but as skills not yet mastered. The children in this preschool class became resilient problem solvers, believing in their abilities to succeed. The way in which teachers used language towards the children affected the children's self-concept. Developing self-efficacy and control over their own actions gave the children confidence to tackle new challenges every day, as they became excited about "growing their brains". However, although all children's abilities improved, the study had no control condition therefore progress which the researchers attributed to growth mindset interventions, could be due to normal developmental processes.

Cimpian, Arce, Markman and Dweck (2007) also demonstrated the effects of language use on young children's performance and found manipulating the type of praise children received whilst completing a task, influenced their performance. Children and the experimenter each chose a hand puppet to use to play a pretend drawing game. The researcher acted out their puppet's role, and asked the child to use their puppet to pretend to draw the requested pictures, using pipe cleaners as pretend crayons. The child's puppet successfully completed three drawings and received either generic praise ("You are a good drawer") or non-generic growth mindset praise ("You did a good job drawing") from the experimenter's puppet. Children completed four short self-evaluation questions such as "Did everything that happened in the apple story make you feel you were good at drawing or not good at drawing?" A fourth drawing was correctly completed, followed by two further drawings that the experimenter's puppet said both contained errors (ears of cat and bus wheels missing). The praise received for these pictures was identical, regardless of which type of praise was given for the first three drawings.

The child then repeated the short questionnaire, with the addition of some persistence-related questions, for example “On another day, when you had the chance to draw one of these again, would you want to draw the bus (unsuccessful), want to draw the tree (successful), or want to draw the cat (unsuccessful)? Finally, the child was asked to reflect on the drawings where mistakes were made and asked what they wanted to do next and responses were categorised as mastery orientated (growth mindset) if they provided a solution to the errors as “Fix it”. All other types of response, (for example, leave it or run away) were coded as helpless (fixed mindset).

Prior to mistakes being made in the drawing task, there was no significant difference in responses to the questionnaire measuring self-evaluation by children in each condition, suggesting both praise types were equally rewarding. However, when the errors made by the puppet were criticised, children who received specific growth mindset praise used the criticism constructively, identifying strategies to improve their drawings and viewed the criticism positively, in line with growth mindset thinking. Those receiving generic fixed mindset praise experienced emotional upset and stated they would avoid subsequent drawing opportunities. As the only difference between the two conditions was the type of praise used, this demonstrates children’s sensitivity to the language used with them.

Praise for achievement rather than effort suggests to the child, an underlying ability is responsible for their performance therefore criticism of this ability reflects badly upon the child. This results in the child displaying helpless behaviour, such as emotional upset, avoidance of future drawing-type tasks, and an inability to develop procedures to correct mistakes, with mistakes interpreted as personal failures. Beliefs of poor abilities and low self-esteem promote development of a fixed mindset in children. Therefore, the research by Cimpian et al. (2007) shows subtle differences in the use of praise language towards young children can significantly affect children’s self-beliefs, and motivation to succeed when facing a challenge.

Mueller and Dweck (1998) also demonstrated the effect of using different types of praise with children. Their participants (aged 10-11 years) tackled a series of logic problems and then received one type of praise (fixed mindset comments “You got a high score because you are so clever”, incremental growth mindset

comments “You got a high score because you worked so hard”, neutral comments “You got a high score”). Participants next completed a more challenging set of problems and all performed poorly. The final task was a set of problems of similar difficulty to the first task. Researchers found those praised for their effort scored highest on the third set of problems and requested more challenging puzzles. Those who received neutral praise demonstrated a similar performance as on the first task but scores for those praised for their intelligence fell by one third and these children requested future problems to be easier.

Furthermore, Claro et al. (2016) found from an extensive study that children experiencing social deprivation were more likely to have fixed mindsets, and achieve less in school, than children from more wealthy backgrounds. As the child participants in the current study came from an area identified as experiencing high rates of extreme social deprivation (Scottish Government, 2016b), it was predicted many participants would demonstrate fixed mindset thinking.

The first experiment assessed children’s attachment to their primary carer, identified their academic mindset and measured their baseline measure of success on a cognitive problem solving task. However, the first experiment did not consider how growth or fixed mindset could impact children’s performance on a task, or explore which children would benefit most from the growth mindset projects schools were about to commence. Therefore, the second experiment aimed to identify if children with poor attachment styles and fixed mindsets were more responsive to growth mindset ideas than securely attached and growth mindset-holding children. Children who do not have a secure attachment to a primary carer typically perform less well on cognitive tasks than secure children do and are more likely to have additional challenges negatively impacting their outcomes. In addition, children holding fixed academic mindsets also achieve fewer academic goals than their growth mindset class mates. However, existing research fails to consider the combined effects of attachment and mindset on educational outcomes. Additionally, previous research has not investigated the effects of manipulating known mindsets of young children completing cognitive tasks.

Therefore, the current study will evaluate the effects of offering different types (growth mindset or fixed mindset) of praise on children's performance on a card sequencing task, particularly the effect of growth mindset praise on children who initially identified with holding a fixed mindset, or who displayed insecure attachment types. Whether providing children with opportunities to develop a growth mindset can compensate for disadvantages they may face due to insecure attachment in academic and cognitive achievements, will be examined.

It was predicted that children assessed in Experiment 1 to have insecure attachment styles and fixed mindsets would perform poorly compared to those with secure attachment styles and growth mindsets on the cognitive problem solving task in Experiment 2; additionally, these children would show the greatest response to receiving growth mindset praise whilst completing the task.

4.1 Experiment 2: Method

The second experiment was carried out in the same schools as participated in Experiment 1, approximately eight weeks later. In this time, schools had begun implementing whole-school growth mindset interventions. Children had read the book "Your Fantastic Elastic Brain" (Deak, 2010) where they were exposed to the idea that through effort, they could stretch and grow their brains and learn new skills and information. Schools introduced Dweck's (2006) ideas of growth and fixed mindsets and children participated in craft activities, making posters and models showing the brain and displaying mindset comments.

4.1.1 Participants

The same participant group completed Experiment 2 as completed Experiment 1, except for two participants whose data were excluded from the second experiment due to their refusal to participate in the sessions. Although appropriate permissions were in place, as previously described, participants assented verbally to participate, and were reminded they could withdraw from testing at any point with no penalty.

4.2 Materials and Procedure

4.2.1 Story sequencing cards

The original methodology for Experiment 2 intended to utilise Wechsler block tasks used in Experiment 1, and measure children's comparative performance dependent on receiving growth mindset or fixed mindset praise from the researcher whilst working on the task. However, since problems were identified using the block test (Wechsler, 2011) during the first experiment, the second experiment instead utilised a sequencing story card task (Carson Dellosa Education, 2011) (Appendix 11) as the cognitive test. Controlling variables was simpler with this test as the researcher could ensure the card sets were presented to all participants in the same order.

After receiving each set of cards, the researcher requested participants place the cards in the correct order to tell the story, and then asked the child to verbally explain the story they had laid out. The complete set of story cards included eight story sets, the maximum number of stories that could be attempted. Each participant was presented the stories in the same order; additionally, the cards for each story were laid out on the table, in the same order each time, for the participants to view.

The number of stories attempted and correctly sequenced by the participant were recorded, along with the time taken for each story, although participants were not aware of this, and no time restrictions were imposed for the task.

Although a "correct" order for the story sequences could be identified, if the child verbalised a logical story to match the order in which they placed their cards, this was considered correct. All participants were asked after each card set "Would you like to do another story or have you had enough?" If children wanted to continue with the task, the next set of cards were presented.

However, if they chose to finish at that point, they were thanked for helping the researcher and taken back to their classroom. If a child did not complete a story, they would have the option to do another, or to stop the test, but incomplete stories were not considered correct. However, no participants chose to finish the task part way through a story and all participants arranged the cards into an order before informing the researcher they wished to stop the test.

4.2.2 Experimental conditions

Children's attachment style was not re-measured for Experiment 2 therefore the attachment style classification identified in Experiment 1 was used in Experiment 2. Growth mindset praise, is sometimes referred to as process praise and fixed mindset comments can be considered person praise. In the first experiment, children's mindset was assessed using Dweck's (2006) jigsaw methodology. Using this information, in the second experiment, participants were divided into two conditions, one group received fixed mindset person praise comments from the researcher whilst working on the sequencing card task (control condition) and the second group received growth mindset process praise comments (experimental condition). Half of those categorised as having a growth mindset and half of those with a fixed mindset, as measured in the first experimental testing phase, were assigned to each condition. Those in the fixed mindset condition received a traditional fixed mindset praise comment after finishing each sequencing task (Appendix 13), such as "Well done! You are so clever!" for successfully completing the story or "Don't worry. Some people find it too hard" if they were unsuccessful. However, those in the growth mindset group were praised using a growth mindset comment (Appendix 14), such as "You worked really well on that!" when successfully completing the story, or " You never gave up, even when it was hard!" if they were unable to find a solution they were satisfied with. Generating word banks of fixed mindset (Appendix 13) or growth mindset (Appendix 14) comments ensured the consistency of comments between participants. However, number of comments received varied between participants due to the differing length of stories told by the children.

4.3 Results

The collected data were analysed using IBM SPSS version 22.

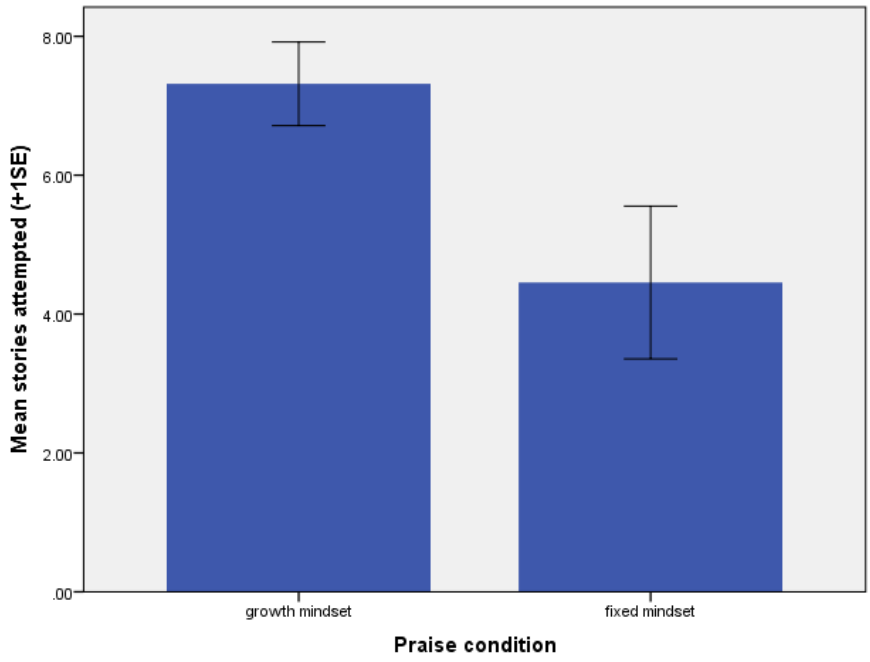


Figure 4 Estimated marginal means, with standard error, for stories attempted by children in growth or fixed mindset praise conditions

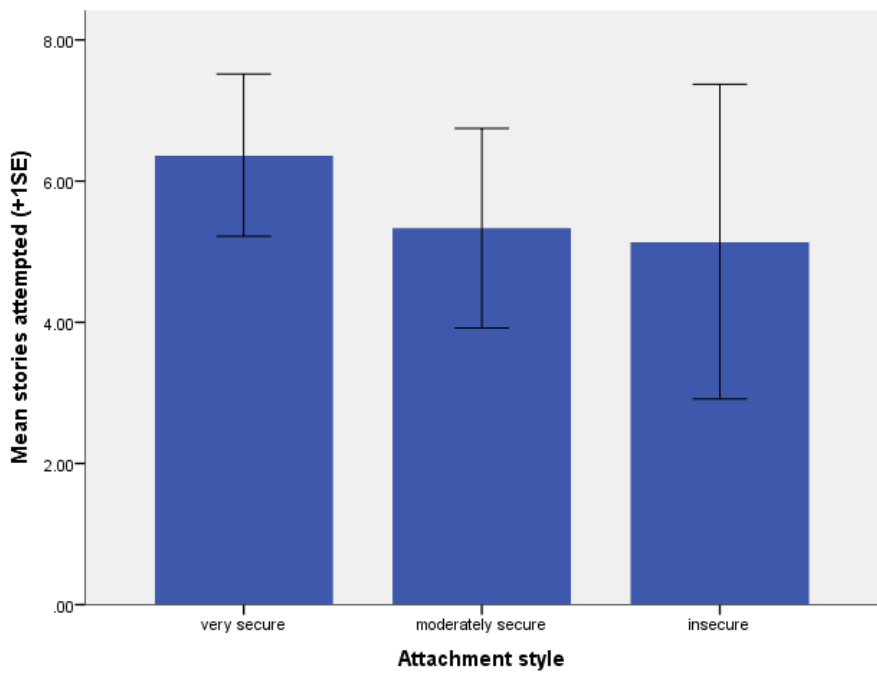


Figure 5 Estimated marginal means, with standard error, for stories attempted by children with three attachment styles



Figure 6 Interaction plot of initial mindset and Experiment 2 praise condition on mean story sequences attempted

To evaluate whether praise condition impacted performance on number of stories attempted, GZLM was specified as linear with a logit link function and number of stories attempted as the dependent variable. Attachment style (very secure, moderately secure, insecure), school and original mindset (fixed mindset or growth mindset) were included as factors. There was a significant main effect of praise condition on number of stories attempted ($\chi^2(1) = 8.52, p = 0.004$).

Those in the growth mindset praise condition attempted more stories (mean=6.88, CIs 5.74 and 8.01) than those in the fixed mindset (mean=4.42, CIs 3.58 and 5.27) praise conditions.

Figure 5 demonstrates that all participants who received growth mindset praise comments whilst completing the story card sequencing task, attempted more stories than any of those who received fixed mindset comments during the task, when controlling for other influencing factors (Figure 5).

To evaluate whether attachment impacted performance on number of stories attempted, in children with growth mindsets and fixed mindsets, GLZM was specified as linear with a logit link function and number of stories attempted as the dependent variable.

Original mindset (growth mindset or fixed mindset) and attachment style (insecure, moderately secure, or very secure) were included as factors,

as were school and praise condition. No significant effect of attachment style on number of stories attempted was found, ($\chi^2(2) = 2.27, p = 0.322$), however, a trend was evident.

Very secure participants attempted the most stories (mean=6.5, CIs 5.5 and 7.5) followed by moderately secure (mean=5.8, CIs 4.72 and 6.87) then insecure (mean=5.22, CIs 3.77 and 6.67) (Figure 6).

To evaluate whether initial mindset impacted performance on number of stories attempted, in children in different praise conditions (growth mindset or fixed mindset), GLZM was specified as linear with a logit link function and number of stories attempted as the dependent variable.

Original mindset (growth mindset or fixed mindset), praise condition (growth or fixed mindset), gender and school were included as factors.

There was a significant effect of praise condition ($\chi^2(1) = 52.95, p < 0.001$). Irrespective of which initial mindset children had, those who received growth mindset praise were more successful (mean= 6.71, CIs 5.93 and 7.49) on the card sequencing task than those who received fixed mindset praise on the task (mean= 3.07, CI= 2.38 and 3.77) (Figure 7).

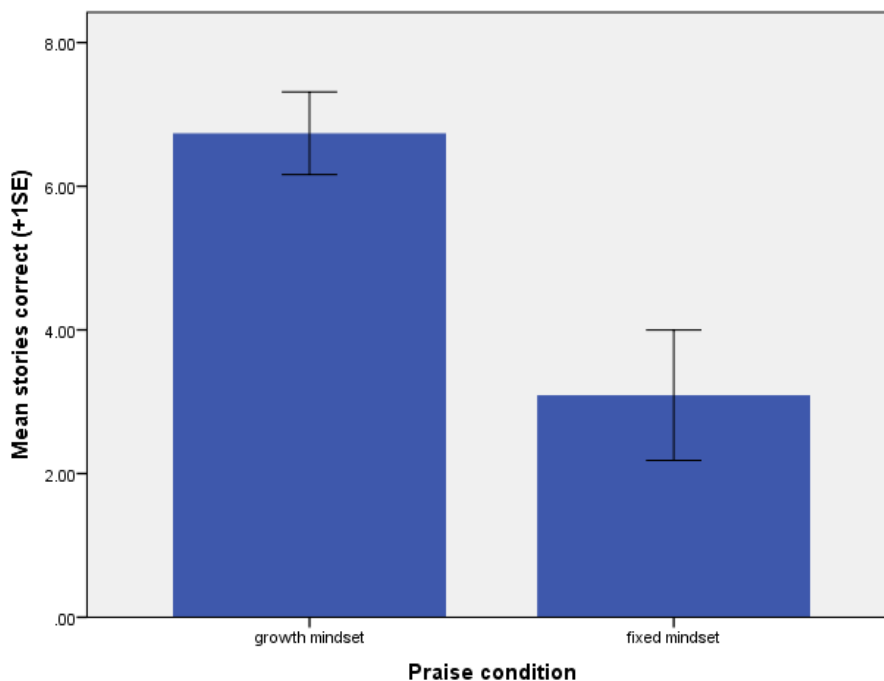


Figure 7 Estimated marginal means, with standard error, for stories correct by children in fixed and growth mindset praise conditions

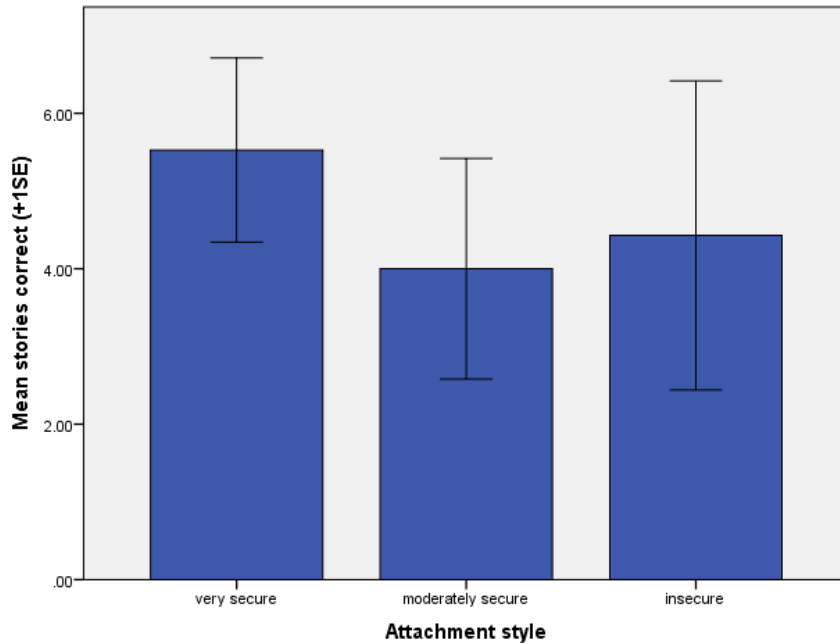


Figure 8 Estimated marginal means, with standard error, for stories correct for children with different attachment styles

To evaluate whether mindset impacted number of stories correctly sequenced by children with receiving different types of praise (growth mindset or fixed mindset comments), GLZM was specified as linear with a logit link function and number of stories correct as the dependent variable. Controlling for attachment style (very secure, moderately secure, insecure) and Experiment 1 mindset (fixed mindset or growth mindset), a significant effect of praise type on number of story sequencing tasks correct ($\chi^2(1) = 51.32, p < 0.001$) (Figure 8).

Participants receiving growth mindset praise comments whilst completing story sequences, correctly solved twice as many stories (mean=6.69, CIs 5.91 and 8) compared to those in the fixed mindset praise condition (mean=3.11, CIs 2.42 and 3.81). Irrespective of which initial mindset participants had, those in the growth mindset praise condition performed better than those in the fixed mindset condition.

For participants who initially had a growth mindset and received fixed mindset comments whilst completing the task, performance was similar and equally poor to that of participants with a fixed mindset who received fixed mindset praise. Additionally, for participants who originally possessed a fixed mindset and received growth mindset type praise, their performance corresponded to that of participants assessed in experiment one as having a growth mindset.

To evaluate whether mindset impacted number of stories correctly sequenced by children with different security attachment styles (insecure, moderately secure, very secure), GLZM was specified as linear with a logit link function and number of stories correct as the dependent variable. Controlling for praise condition (fixed mindset or growth mindset comments) and Experiment 1 mindset (fixed mindset or growth mindset), a significant effect of attachment style on number of story sequencing tasks correct, was found ($\chi^2(2) = 4.58$, $p = 0.04$). Very secure children correctly solved the most stories (mean=5.62, CIs 4.8 and 6.68). However, differences between insecure (mean=4.56, CIs 3.37 and 5.76) and moderately secure participants (mean=4.53, CIs 3.64 and 5.41) were statistically indistinguishable (Figure 9).

Figure 9 demonstrates that participants classified as very secure, correctly sequenced more story card sets than either the moderately secure or insecure participants, with similar performances from those participants categorised as moderately secure or insecure. To evaluate whether mindset (growth or fixed, in Experiment 1) impacted number of stories correctly sequenced by children in different praise conditions (fixed mindset or growth mindset), a GZLM was specified with a logit link function and time spent on stories as a dependent variable.

4.4 Discussion

Experiment 2 predicted children with insecure attachment and fixed academic mindsets would respond positively to feedback on their work in a growth mindset framework, and the results support this hypothesis. In the story sequencing card task (Carson-Dellosa, 2011), participants classified using the story stem completion task in Experiment 1 (Bretherton, et al. 1990) as very secure attempted and correctly solved more story card sequencing tasks than other children.

Furthermore, all participants assigned to the growth mindset process praise experimental condition attempted more story tasks than any participants in the fixed mindset person praise group, irrespective of their attachment security classification. Likewise, participants in the growth mindset praise condition all correctly solved more of the story sequences than any of the fixed mindset group. Therefore, regardless of children's initial mindset, those receiving growth

mindset praise comments outperformed those in the control fixed mindset condition, with all participants in the growth mindset group correctly sequencing more stories than any children in the control condition. In fact, all participants receiving growth mindset praise comments during the task attempted and correctly completed twice as many story sequences as any participants in the fixed mindset praise condition, irrespective of their mindset classification or attachment style, thus demonstrating how influential the type of praise used can be on children's attainment. Although participants did not each receive the same number of comments, due to differing lengths of story utterances, the researcher ensured continuity of comment type by development of a bank of fixed mindset (Appendix 13) and growth mindset (Appendix 14) comments. Interestingly, even though the all participants had been exposed to growth mindset interventions in school, the current study demonstrated participants who originally identified as holding a growth mindset in the jigsaw task (Dweck, 2006) in Experiment 1, were equally vulnerable to the fixed mindset praise. Those who originally had growth mindsets, on receiving fixed mindset praise showed performance falling in line with that demonstrated by participants previously categorised as holding a fixed mindset. This key finding highlights the importance of maintaining a growth mindset environment in school. It is not enough to carry out interventions to elicit a growth mindset; for children as young as the current participants, growth mindset interventions need regular reinforcement to offer greatest benefit.

Previous results suggest children from deprived backgrounds gain greatest benefit from growth mindset interventions (Claro et al. 2016; Paunesku et al., 2015). The current findings support this work, suggesting growth mindset may compensate for educational disadvantages some children may face.

Attachment security style did not affect performance on the sequencing task. Children from deprived backgrounds often have poor attachment styles, which can negatively influence cognitive performance (Griffin, 2014; O'Connor & McCartney, 2007; Shmueli-Goetz et al. 2008; West et al. 2013). However, the findings show the type of praise comments children received had a significant effect on their performance. This therefore shows when children challenged by the negativity associated with insecure attachment, receive growth mindset interventions, their performance can be as good as that of securely attached

and already growth minded children. Equally, those with growth mindsets demonstrate reduced performance in the presence of fixed mindset language.

5 General discussion

5.1 Key findings

Prior research indicates that attachment style and mindset are associated with children's achievement. This study extended such findings by examining these factors together and went beyond prior research in this area by manipulating mindsets and examining how the type of praise they hear whilst completing a cognitive task can influence children's initial mindset.

In Experiment 1, it was predicted that children with insecure attachment styles would be more likely to have fixed mindsets, and children with secure attachment styles to have growth mindsets. The results support this hypothesis. Experiment 2 hypothesised that children identified in Experiment 1 as holding fixed mindsets and insecure attachment styles would demonstrate poorer performance, attempting, and solving fewer story tasks than their growth mindset holding, securely attached peers. Additionally, it was expected that insecure, fixed mindset holders would gain more benefit from the growth mindset intervention than the other participants. These hypotheses were also supported; fixed mindset and insecure children performed as well on the task in Experiment 2 as growth mindset holding and securely attached children, when they received growth mindset process focussed praise. However, the children with fixed mindsets and insecure attachments, who received fixed mindset person praise, demonstrated the poorest performance on the task overall. As teacher instructional practices can influence children's mindsets (Park, Gunderson, Tsukayama, Levine & Beilock, 2016), it is of great importance that what children hear in school promotes the most desirable beliefs of intelligence. Of critical importance is the finding that fixed mindset praise comments can negatively influence performance of growth mindset holders, shown by the poor performance on the sequencing task by initially growth mindset children who heard fixed mindset comments whilst completing the sequencing task. This significant result can have far reaching consequences for educational practices

and adds to the literature, as it demonstrates the importance of consistent use of growth mindset language with young children.

5.2 Previous findings and future directions

The current findings are consistent with previous research and add to previous work. West et al. (2013), O'Connor and McCartney (2007) and Pianta et al. (2008) all found that children with insecure attachment styles or from socially deprived backgrounds (Wilson & Buttrick, 2016) typically found cognitive tasks more challenging than their secure peers. This was the case with participants completing the current tasks. Children assessed as very secure were more successful on both number of stories attempted and correctly solved whereas those considered to have insecure attachment styles typically attempted the fewest stories.

Additionally, those induced to hold growth mindsets by the praise type received during the second experiment successfully completed more sequencing tasks than those who heard fixed mindset praise. Similarly, Lou and Noels (2016) found students learning a new language performed better when they were induced to hold a growth mindset rather than a fixed mindset, and Martin et al. (2015) discovered a positive relationship between motivation and engagement on school performance. Those who valued school and believed effort worthwhile outperformed those with negative attitudes and little faith in their own capacity for improvement. This is a key argument in Dweck's (2006, 2009) growth mindset argument, that motivation of learners is essential for positive educational outcomes, therefore changing how teachers and children consider motivation, performance, and praise, can support increased academic attainment.

Blackwell et al. (2007) demonstrated empirically that manipulating children's mindsets could improve their academic performance, showing that children's beliefs in their own intelligence were subject to change, depending on available inputs, and that growth mindset interventions were beneficial to students, regardless of whether their starting point was fixed or growth disposition. Results from the current study were similar; regardless on initial mindset, performance on the story sequencing task in Experiment 2, depended on the

type of praise (fixed or growth mindset) comments the children received whilst completing the task.

Furthermore, Cimpian et al. (2007) demonstrated subtle differences in the type of praise utterances used with young children such as those in the current study, can significantly influence children's self-motivation and beliefs in their abilities, when faced with a challenging task.

Although previous research has found similar results to the current research, it has not examined attachment style and mindset together. However, attachment style is often associated with socioeconomic status; Claro et al. (2016) considered socio-economic status and mindset together, factors known to independently effect school performance. Their extensive research demonstrated poorer children who had growth mindsets achieved more in school than their fixed mindset peers. As mindset has the capacity to be influenced by external factors, Claro et al. (2016) propose it as a useful intervention for improving attainment and the findings of the current study are consistent with this argument.

However, prior research tends to focus on older children, failed to identify mindset of young children prior to the interventions, and compared performance based on this. The finding of greatest importance from the current work, is the finding that even once a growth mindset has been instilled in children, they remain equally vulnerable to future exposure to fixed mindset thinking.

5.3 Educational implications and limitations

The findings of this study may have implications for programs aimed at improving educational outcomes of children who experience poor attachment relationships or have already developed fixed mindsets by the time they begin school. Schools are already utilising growth mindset strategies in areas of Dundee where most families experience deprivation (Scottish Government, 2016b). Similar to Claro et al. (2016), the findings from the current research demonstrate the affect of growth mindset approaches on children who may be facing multiple disadvantages in life. Extending prior research, the findings show how experiencing fixed mindset attitudes can negatively impact performance of children already holding growth mindsets. This therefore demonstrates the importance of consistency in growth mindset approaches in

educational environments, as the benefits gained by growth mindset beliefs can be easily undone in the face of fixed mindset negativity.

One limitation of the current study was the low number of children with fixed mindset and insecure attachment styles. This pattern of attachment styles and mindsets was not expected as previous research suggests around 40% of children present with insecure attachment styles (Washbrook et al. 2014). Additionally, the area participants were recruited from is recognised to have high levels of deprivation (Scottish Government, 2016b; 2016c which are often associated with attachment issues and lowered attainment. In an area with high levels of adult illiteracy, utilising an opt-out recruitment method may be more appropriate for future studies.

Furthermore, it would be beneficial to compare the effects of the intervention on a control group of participants from a more affluent area where higher levels of secure attachment and growth mindsets would be predicted (Claro et al. 2016). It is possible introducing parents and carers to the value of growth mindset thinking could assist in improving children's attendance and performance in school as research (Alika & Edosa, 2012; Cheung, Lewin & Jenkins, 2012) shows parental engagement with education significantly affects educational outcomes for children.

6 Conclusion

Research recognises a significant difference in school achievement for children based on socioeconomic status (Conger et al. 2010; Schoon, Hope, Ross & Duckworth, 2010) and the Scottish Government (2014b, 2015, 2016b, 2016c, 2016d) have identified that children's attainment in school continues to fall, despite implementation of strategies to improve outcomes. The significant attainment gap which is evident for children beginning school (Scottish Government, 2016d; Sosu & Ellis, 2014), continues to stretch during the school years, between the most and least wealthy families (Pears, Kim & Fisher, 2008; Petrenko, et al. 2012; Romano, et al. 2015), influencing levels of achievement in school. Furthermore, educational attainment is recognised as the best route out of poverty (Scottish Government, 2014a; 2016d) therefore strategies leading to greater success in school can improve post school outcomes for children from these backgrounds (Sosu & Ellis, 2014). As many factors contribute to

disengagement with education, having attachment insecurity and a fixed mindset can compound the challenges already experienced by some children (Alika & Edosa, 2012; Whannell & Allen, 2011). Therefore, implementation of effective interventions is of paramount importance.

As mindset is known to predict academic achievement as accurately as socioeconomic status (Claro et al. 2015), having a fixed mindset alongside poor SES can compound the problems faced. Growth mindset strategies are recognised as an effective and cost effective tool (Rattan et al. 2015), therefore learning growth mindset techniques can help compensate for the disadvantages faced by some children and can go some way towards closing the education attainment gap currently present in Scottish education (Sosu & Ellis, 2014).

The current work makes an important contribution to the growth mindset research. Whilst previous research has highlighted the effects of children's mindsets on cognitive task performance and manipulated mindsets with a view to improving achievement, the effect of fixed mindset praise interventions on children previously assessed as having growth mindsets has not been considered. Given that the Scottish Government is investing in interventions to improve attainment of all children and especially those from deprived backgrounds, this is an important discovery. Research demonstrates mindsets can be changed and consequently promoting growth mindsets in school can improve children's attainment and engagement with education. However, the current findings highlight the importance of a consistent growth mindset approach in the classroom. It is not enough to provide growth mindset lessons if teachers and support staff fall back into fixed mindset language use at other times. The current project illustrates how vulnerable children are to the language they hear and shows how easily experiencing fixed mindset comments can undo the benefits which come from developing a growth mindset.

As schools roll out growth mindset promoting interventions, it is crucial they are aware how susceptible children are to the language around them and ensure all adults working in schools maintain a growth mindset environment to enable every child to achieve their potential. Used appropriately, implementation of growth mindset strategies can help to close the attainment gap currently faced by Scottish children.

7 Appendices

7.1 Appendix 1. Participant parent/guardian information – full version



Growth mindset research information sheet

My name is Dawn Short and I am a postgraduate student at Abertay University, Dundee.

I am working on a research project which is part of a larger study being conducted by Abertay University and Dundee City Council. The overall aim of the study is to improve attainment of pupils in Dundee schools as many Dundee children do not perform as well in school as children do in other parts of Scotland. I would like to invite your child to participate in my study.

Other research has discovered that children who are motivated to learn and believe it is possible to do well in school, tend to perform better than children who are not motivated to attend school or to work hard to learn new things. The children who are excited about learning are said to have a *growth mindset* as they believe their intelligence and ability can grow through learning. Children who believe their intelligence is what they were born with and who think it is not possible to become any smarter, are said to have a *fixed mindset*. The research project hopes to change the way children think about their intelligence and abilities so those with fixed mindsets can develop growth mindsets and all children can do the very best they can in school.

My particular project will examine the relationships children have with their parents and teachers to see if this makes a difference to how they think about their learning. The child participants will be primary 1 children from several different schools in Dundee. I will play some

games with one child at a time in the classroom or the school library. The first game will use puppets and I will take turns with the child to act out some stories. A second game using puzzles will be completed with the child. The third game will involve matching patterns. The stories and puzzles used will be suitable for the age of the child participants and children will have the opportunity to take breaks between tasks if desired. I will visit the children again in school later in the year and give them the opportunity to play the patterning game again.

The games will be recorded so the conversations between the child and researcher can be examined and transcribed. Children will be given a number to allow me to match their details to their puppet and puzzle videos and to anonymise the data. However, this information will be kept confidentially on a secure university server, in line with the Data Protection Act (2003) and will only be accessible to the research team. Once the study is complete, the recordings will be destroyed. Participation in the study is completely voluntary and at any time during the study, the parent or child may withdraw from the study. However, once the data collected has been anonymised this will no longer be possible. There are no known risks from this study and the findings may benefit all children as they may help the schools to develop strategies to success in school and beyond. The data gathered from the study will be used to write about the children but no names or other identification will be used.

If you agree to your child taking part, we will also ask the child if they want to take part before each session. Once the study is complete, we will provide more information to you. However, this will be general as the performance of individual children will not be available.

This research complies with the British Psychological Society Guidelines for Ethical Practice in Psychological Research and has been

passed by Abertay University School of Social and Health Sciences Research Ethics Committee.

If you need any more information about the study or wish to ask any questions, please contact me ([REDACTED] [abertay.ac.uk](mailto:[REDACTED]@abertay.ac.uk)) or my supervisor, Dr Clare Cunningham [REDACTED], Tel no. [REDACTED]).

Thank you for reading this information.



Dawn Short

Masters by Research student

7.2 Appendix 2. Parent/guardian information sheet- short version



Growth mindset research

My name is Dawn Short and I am a postgraduate student at Abertay University, Dundee.

I am working on a research project which is part of a larger study being run by Abertay University, Leisure and Culture Dundee and Dundee City Council. The aim of the project is to help Dundee children to do better at school. I would like to invite your child to take part in my study.

Other research has discovered that children who are excited about learning do better in school. We say they have a *growth mindset* and children who are not interested in learning have a *fixed mindset*. We want to find ways to help all children have growth mindsets.

My project will look at how children's relationships influence how they feel about school. I will play with the child with little dolls and we will use them to act out stories. I will ask the child to do jigsaw puzzles and make patterns with coloured blocks.

The sessions will be recorded so they can be analysed and recordings will be stored securely at the university.

However, all recordings will be destroyed when the study is complete. Information from the study will be used to write

reports but children's names will not be used. Taking part in the study is voluntary.

The study has no known risks and taking part could help improve how all children do in school.

If you agree to your child taking part, I will also ask the child if they want to take part.

More information about the study is available from the school office. If you need additional information or wish to ask any questions, please contact me

[REDACTED]) or my supervisor Dr Clare

Cunningham [REDACTED], Tel no. [REDACTED]
[REDACTED])

Thank you for reading this information.

[REDACTED]

Dawn Short

Masters by Research student

7.3 Appendix 3. Participant consent form



Abertay
University

Growth mindset participation consent form

I have read and understood the participant information form and have had the opportunity to ask questions of the researchers which they have answered satisfactorily.

I understand participation in the study is entirely voluntary and my child and I have the right to withdraw at any time without giving a reason or incurring a penalty.

I understand arrangements are in place to protect the confidential data relating to my child and me.

I am happy for my child to take part in the research study described and understand he or she will also be asked if they are happy to participate.

Child's name

.....

Date of birth

.....

School

.....

Parent/guardian name

.....

Parent/guardian signature

.....

7.4 Appendix 4. Child assent form



Abertay
University

Growth mindset research

My name is Dawn and I would like to play some games with you.

I have some dolls/puzzles/problem solving tasks. Would you like to play with them?

We will sit at a table in your classroom and play while the other children do something else. It will only take a little while then you can go back and join your friends and I will play with someone else. I have a video camera so I can make a film of us playing with the toys. Is that ok with you? If you do play with me and then you want to stop, just let me know!

If you are happy to play with my toys, write your name here

.....

7.5 Appendix 5. Story Completion Task Transcripts

Transcripts of each child's story completion task narratives are contained on the memory stick attached to the back of this thesis

7.6 Appendix 6. Revised Doll Story Completion Tasks

This assessment consists of five story beginnings that are to be acted out with small family figures and other simple props. Each story is designed to elicit responses regarding a particular attachment issue. The issues addressed in the story stems are 1. The attachment figure in an authority role (the spilled juice story), 2. Pain as an elicitor of attachment and protective behaviour (the hurt knee story), 3. Fear as an elicitor of attachment and protective behaviour (monster in the bedroom story), 4. Separation anxiety and coping (departure story), 5. Responses to parental return (reunion story).

Researcher: "I'm going to tell you some stories about a family" (Doll family brought out). "Here is Mum and Dad. Here is Granny, and here are the girls, Chloe and Maisie (the boys, Calum and Mark)" Dolls are brought out one at a time and named. For female participants, the child dolls are girls, for males the child dolls are boys.

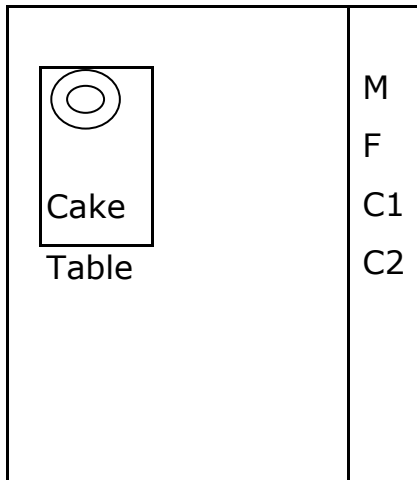
Researcher: Points to the dolls and asks "Who do we have here?"
Child names dolls.

Researcher: "I've got an idea. Let's make up some pretend stories about them. I'll start off a story about our family and you can finish it"

Warm up story: Birthday cake

Birthday cake on dolls' table. Mum, Dad & children

Child



Researcher

Researcher: "Here's **their table and what's this?**" Cake shown to child and wait for child to name it. "What kind of cake?"

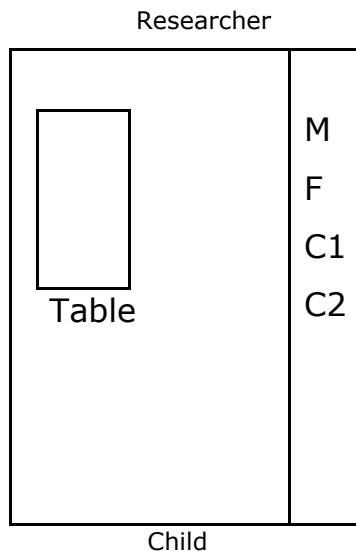
..... **"Yes it's a beautiful birthday cake. You listen carefully to the story. Mummy has baked this beautiful birthday cake and she calls out":**

Mummy doll "Come **on Granny, come on Dad, come on boys (girls), let's have a birthday party"**

Researcher: "Show **me what happens now.**" Inviting tone of voice; let the participant play with the figures and tell the story or researcher tells a story if participant does not.

1. Spilled juice story

Researcher: "OK, I have an idea for a new story". Granny doll is put away and table is set up as below.



Researcher: (Shakes the box with dishes). "Can you help me set the table for tea?" (Give the box to the child and wait until they have set the table, help if necessary.)

Researcher: "Now put the family round the table so they're ready to eat their tea" (Wait until the participant has placed the family round the table ready to eat tea.)

Researcher resumes: "Here is our family eating tea and Calum (Chloe) gets up and reaches and spills their juice" (Make child figure knock toy cup off the toy table so cup is visible to participant).

Mummy doll "Calum (Chloe) you spilled your juice!" (Reproachful tone of voice but not too severe. Mum towards Calum (Chloe) and move her up or down while she is talking.)

Researcher: "Show me what happens next"

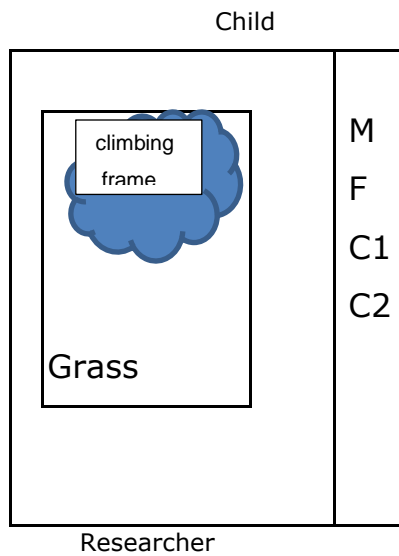
Prompting procedure

Researcher prompts if child does not spontaneously mention: "What do they do about the spilt juice?". Researcher prompt if participant

only gives one response: "Anything else?" "What else?" or "Then what?" If participant performs ambiguous actions with the dolls ask "What are they doing?" and if the participant uses an ambiguous pronoun when talking about the figures, ask "Who was doing it?". The tester can also repeat the child's statement in question form, to verify what the child said ("The mummy wiped up the juice? Then what?" If the child asks for the Granny doll say "She's not in the story just now, we'll get her out later"

Prompts should not suggest precise ideas to the participant, except in the case of the spilt juice, if that issue has not been addressed

2. Hurt knee story



Researcher: "OK I have another idea for a story. You put our family there and get them ready for the next one while I put these away."

(Researcher points to the side of the table below. It is **important that the rest of the family be about 30cm away from the climbing frame the story child will climb.**) "OK Look what I've got." (Set out cloth grass and climbing frame box.) "This is the park. Do you sometimes go to the park with your mum and dad?" "Here is our family and they're out walking in the park, and at the park is really high climbing frame."

Child doll: "Look mummy and daddy. Watch me climb this really high climbing frame". (Make child doll climb rock then fall off). "Boo hoo (or ouch), I've hurt my knee" (crying voice).

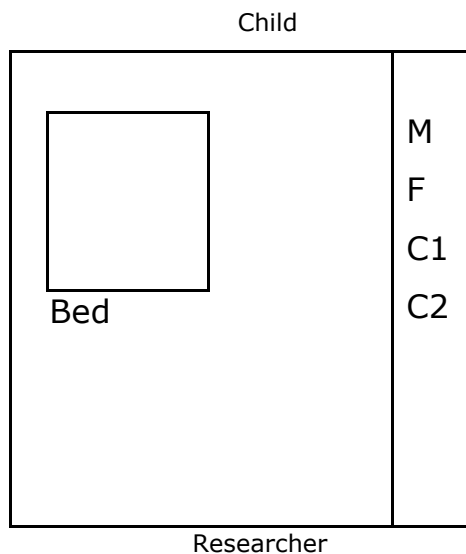
Researcher: "Show me what happens now"

Researcher prompt (if participant does not spontaneously mention): "What do they do about the hurt knee?" Other prompts can be used as in the Juice story if the figures actions are not accompanied by words "What are they doing?" Prompts can be used for elaboration

"Anything else?". If the child becomes repetitive or seems finished, say "All done? Shall we have another story?"

3. Dark bedroom story

Researcher: "Can you get the family ready for the next story?" (Set out the props if the child does not do it. Important again to have the **family at least 30cm away from the bed** in the "bedroom")



Researcher: "Look what happens now. Listen carefully."

Mummy doll: (Face M towards story child and move her slightly as she speaks.) "It's bedtime. Go up to your room and go to bed."

Dad doll: "Go up to bed now." (Same actions as mum)

Child doll: "OK mummy and daddy, I'm going." (Make child figure walk to bed.)

Researcher comment: "Calum goes upstairs to his room and then he shouts":

Child doll: "Mummy! Daddy! It's really really dark in my room! It's too dark in my room!" (Alarmed tone of voice)

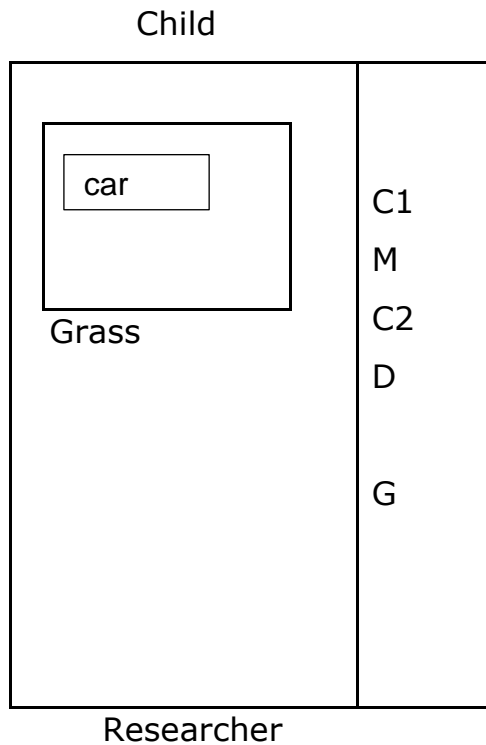
Researcher: "Show me what happens now"

Researcher prompt if child does not mention spontaneously "What do they do about the monster in the room?" Use other prompts as necessary. If child stops playing or becomes repetitive or stops playing, move onto next story.

Researcher: "Are you ready for the next story?"

4. Departure story

Researcher: "Let's use the granny this time." (Set out family and granny at the side of the table, with fabric grass and car as below. It is important to have the car in front of the child and the parents facing the granny and the two children.)



Researcher: "Here is our story family on the grass in front of their house. Here is their car, this is the family car." (Make Mum and Dad face the granny and children with car in front of the participant.)

Researcher: "Do you know what I think, (participant's name)? I think it looks like mummy and daddy are going away overnight."

Mummy doll: "OK boys (girls). Your daddy and I are going away overnight. We are leaving for our overnight trip now." (M moves slightly as she speaks to child dolls)

Daddy doll: "See you tomorrow. Granny will stay with you." (Daddy doll moves slightly while speaking)

Researcher: "Show me what happens now."

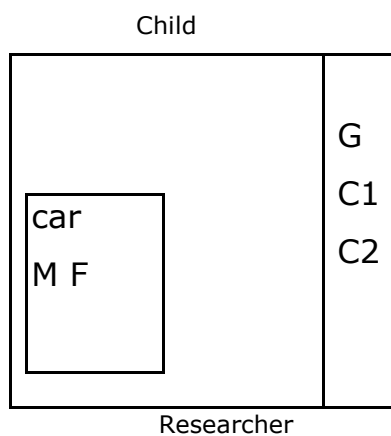
Important: **researcher should let the participant put the parents in the car and make the car drive off. Only intervene if the participant seems unable to make the car drive off.** If the participant puts the children in the car say “No, only the mummy and daddy are going.” After the child or if necessary, the researcher, makes the car drive away, researcher puts the car under the table out of sight. If the child wants to retrieve the car, say “No they’re not coming back yet.”

Researcher: “And **off they go.**” (As the car moves under the table.)
 Researcher prompt if participant does not spontaneously mention **“What do the children do when the mummy and daddy are gone?”** and use other prompts to clarify actions, or actors and ask the participant to act out what is happening.

5. Reunion story

Same props as departure story

Bring the car with the two parents back out from under the table and set it on the table at a distance from the family (i.e., keep it near the researcher, so the participant has to reach for it and can make the car drive home). If the participant has put the child and granny dolls in the middle of the table during the previous story, put them back close to the participant to create distance between the returning car and child dolls.



Researcher: "OK. And you know what? It's the next day and the granny looks out the window (make granny look towards the car and move her as she speaks) and she says":

Granny: Look boys (girls), Look who I see! Here comes your mummy and daddy. They're home from their overnight trip"

Researcher: " Show me what happens now." (Let the participant drive the car towards "home". Only intervene if the participant does not do so.)

Prompt if the participant does not spontaneously take the parents out of the car. "What do we do now mummy and daddy are home?" Also use other prompts as necessary.

If the participant asks for other props for example the bed, bring it out, but do not bring out the granny during the earlier stories. Just say, "She'll come back later" or "We'll use her in another story later." It is very important to adhere to the spatial arrangements suggested in each story, especially the distance between parent and child figures in the hurt knee, dark room and reunion stories.

7.7 Appendix 7. Doll family



7.8 Appendix 8. List of props

The props used to enact the story stems were birthday cake, a tiny tea set in a box, dining table, bed with a blanket, a box decorated to represent a car, piece of green card to represent grass and a decorated box to represent a climbing frame) used by the researcher and child to act out the stories. The size of these materials was 1/12 scale.

7.9 Appendix 9. Attachment stories scoring scheme

Securely attached

Spilled juice: juice cleaned up, parental discipline/anger mild

Hurt knee: parents/older child hugged child or applied Elastoplast, positive ending if child's pain acknowledged

Dark room: parents dealt with child's fear of dark or child approached parents for comfort, allowing child to go to sleep

Departure story: coping behaviours displayed by child (looking for parents, playing with granny, going to sleep)

Reunion: family hugged each other, engaged in reunion conversations, undertook a joint activity

To be scored as secure, responses had to be given following no more than one prompt per story.

If participants completed all 5 stories appropriately and without requiring any prompts, they were categorised as very secure (B3 of the strange situation).

If participants demonstrated slightly avoidant or odd responses to one or two stories they were categorised as fairly secure (B1 and B2 of the strange situation)

Insecurity of attachment

2 types of criteria for scoring insecure responses were used: avoidance of the story issue and incoherent or odd responses (Cassidy et al., 1988) (Kaplan, 1984)

Scored as avoidant if child responded only after several "don't know" answers and prompts or gave no answer other than defensive answers such as "I don't know" or "I want another story", for 3 or more of the stories. Also if participant started to re-enact the story but avoided the issue raised by the story, this was also classified as avoidant insecurity as the avoidant behaviour was attributed to "defensiveness with respect to attachment issues".

If a participant repeatedly requested a new story after giving only a brief response to the current story this was categorised as mild insecure avoidant attachment.

Disorganised or odd responses to the stories, such as throwing the characters on the floor aggressively, reporting that the car crashed, or giving answers which made no sense in the context of the story e.g. reporting a bumped head in response to what parents did about the child being scared of the dark, were categorised as disorganised attachment responses. Children were classified as having disorganised attachment if they gave such responses to 3 or more of the stories.

Therefore, children’s attachment security was categorised based on whichever attachment type was most evident in their responses. As responses to parental separation and reunion are important in attachment security, children’s responses to these stories were more heavily weighted in cases where participant’s responses were difficult to classify (Bretherton et al. 1990)

Table 1. Responses to the spilled juice story

Dealing with the mess:				
Wiping or cleaning juice off the floor				
Mother				
Father				
Younger child				
Older child				
Participant				
Unspecified				
Picking up the cup				
Mother				
Father				
Older child				

Younger child				
Participant				
Discipline				
Get no more juice				
Reproach				
Mother				
Father				
Children cry at reproach				
Mother is angry				
Child or children sent to room				
Mother				
Father				
Child or children are spanked				
Mother				
Father				
Get more juice				
Mother				
Father				
Older child				
Younger child				
Unspecified				
Re enactments				
With spilling				
Mother				
Father				

Older child				
Younger child				
Without spilling				
Younger child				
Older child				
No resolution attempted				

Table 2. Responses to the hurt knee story

Empathetic responses:				
Someone helps hurt child with Elastoplast				
Mother				
Father				
Sibling				
Participant				
Unspecified				
Hurt child taken to doctor or hospital				
Hurt child taken home				
Hurt child picked up, hugged, kissed				
By mother				
By father				
By sibling				
Concerns about carefulness:				
Parents issue warnings to be careful				
Participant says child will not do that again				

Participant reprimands child for climbing				
Non empathetic responses:				
Parents leave child in park				
Parent spans child				
Participant smiles at the injury				
Ignoring of hurt:				
Child gets up after falling and hurting knee, gets better by self				
Re-enactments:				
Participant re-enacts fall and hurt knee				
With mother				
With father				
With mother and father				
With older child				
With younger child				
With both children				
Participant re-enacts climbing without a fall				
With mother				
With father				
With older child				
With younger child				
With both children				
No resolution attempted				

Table 3. Responses to the dark bedroom story				
Empathetic responses:				
Child reassured by				
Mother				
Father				
Sibling				
Light switched on by				
Mother				
Father				
Sibling				
Non empathetic response:				
Child told to be quiet				
Told not getting light put on				
Told to go to sleep				
Child ignored				
No resolution of dark room problem				

Table 4. Responses to departure				
Departure				
Participant puts parents in the car and Makes them leave without a problem				
Participant reluctant for parents to leave				
Tries to put children in the car				

Takes parents out of the car after initiating departure or Puts them in car without driving off				
Family enacts special leave taking behaviour				
During separation:				
Participant enacts or talks about child or parental activities (not related to separation anxiety)				
Children sleep whilst parents are gone				
Children stay with granny				
Children play				
Children walk				
Children have to clean house				
Parents have dinner				
Participant enacts or talks about separation anxiety or reunion				
Children search, call or cry for parents				
Participant talks about or tries to make parents come back				
Participant does not know what children might do in parents' absence				

Table 5. Responses to the reunion story

During reunion:			
Drives car home (after experimenter puts car back on table)			
Takes parents out of car and places near children (or reunion takes place in car)			
Enacts greetings or welcome			
Denies parental return			
Removes granny from scene immediately			
After reunion:			
Reports or acts out family activities			
Children or family go to sleep			
Family goes on joint trip or engages in joint activity (going out to eat, Going to church)			
Children stay home with mother			
Children stay home with father			
Children go home with both parents			
Re-enacts separation			
Parents leave again (without children)			
Granny leaves with child/children			
Don't know what happens after reunion			

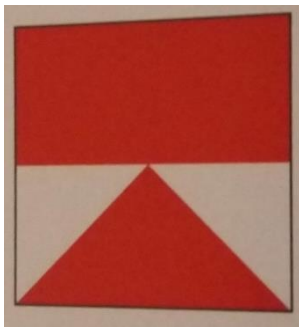
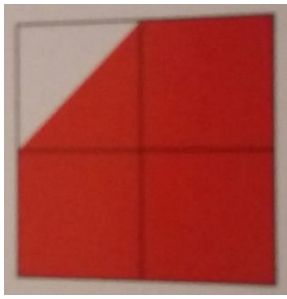
7.10 Appendix 10. Easy jigsaw puzzle



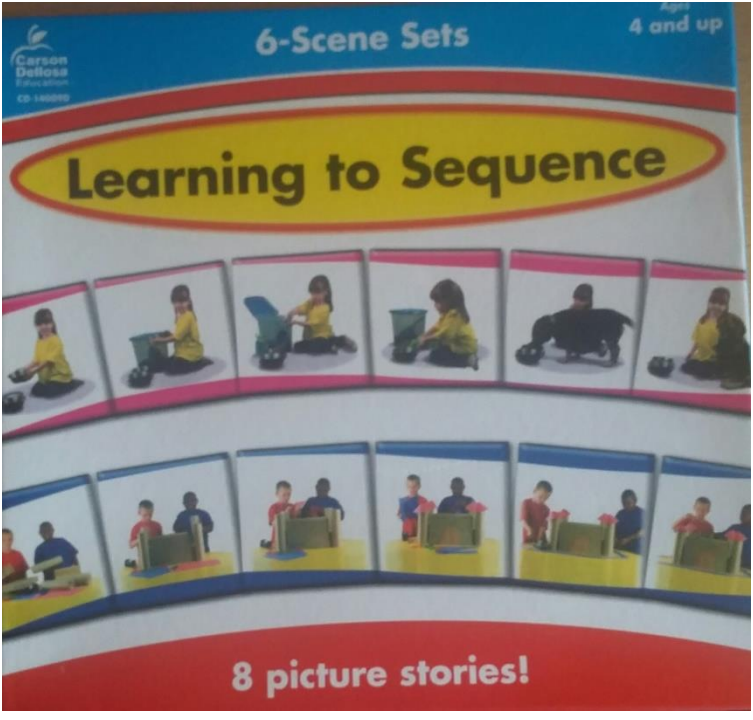
7.11 Appendix 11. Difficult jigsaw puzzle



7.12 Appendix 12. Wechsler Block Tasks



7.13 Appendix 13. Learning to sequence cards



7.14 Appendix 14. Fixed mindset praise

Today we're going to look at some story cards. We'll look at the pictures and put them in order to tell a story. Is that ok with you?

We'll work on the first story together.

The first story is about a girl **making a sandwich** and putting it in her lunch bag with a drink. *Can you put the cards in order to tell the story?*

Your story was amazing. Would you like to do another one?

The next story is about a girl **feeding her dog**. She gets the dog's bowls and the food and water and gives the dog its tea.

The next story is about a boy decorating and eating a **cupcake**.

Our next story is about a girl having her **breakfast**.

In our next story, two boys are making a model **castle from junk**.

Our next story is about a girl setting the table and having a **snack**.

Now a boy is **packing his school bag** for school.

In our next story, a boy is going **roller blading**. He has to wear lots of safety equipment.

Content praise (FM control group)

Well done! You are so clever at telling stories

Your stories are amazing! They are the best I've heard

That was great! You told me the best story!

You're so fast! That was amazing

Wow! You're so great at stories

See! I told you it would be easy! You're so clever

Wow! you did great on that story! You're so clever

Some people are just not good at telling stories. Don't worry about it.

Don't worry. Some people find it too hard.

That was amazing! Very good!

Great job! You did that so quickly

You're a great story teller! That was a fantastic story

7.15 Appendix 15. Growth mindset praise

Today we're going to look at some story cards. We'll look at the pictures and put them in order to tell a story. Is that ok with you?

We'll work on the first story together.

The first story is about a girl **making a sandwich** and putting it in her lunch bag with a drink. *Can you put the cards in order to tell the story?*

You worked well on that. You did a great job telling that story. Would you like to do another one?

The next story is about a girl **feeding her dog**. She gets the dog's bowls and the food and water and gives the dog its tea.

The next story is about a boy decorating and eating a **cupcake**.

Our next story is about a girl having her **breakfast**.

In our next story, two boys are making a model **castle from junk**.

Our next story is about a girl setting the table and having a **snack**.

Now a boy is packing his school bag for school.

In our next story, a boy is going **roller blading**. He has to wear lots of safety equipment.

Process praise (GM group)

Wow! You did it! Look at that!

You worked really well on that!

You never gave up, even when it was hard

Well done- that took so much work

Good! Its making you think! Your brain is growing!

You worked/ tried really hard

You did a great job working with the story cards/ telling the story

I like the way you are Thinking about the story

Be brave. Have another go. Maybe this time you could

You thought of that all by yourself! Let's see what you did

I like the way you keep trying/working to make the stories

You are concentrating really hard- that's great

You have great ideas for the stories!

7.16 Appendix 16. Research ethics approval

Conditional Appro

1. [Ethics Submission Form SHS 1003612.doc](#)

Feedback to Learner 06/10/15 16:52

REVIEWER 1

This is a lengthy procedure for children and I would expect there to be breaks or rest periods between the task unless there is some reason why they must be conducted in a continuous manner. The conversational aspect (description in the consent form) is not clear with respect to the tasks and therefore this needs to be brought more into line with the nature of the research - i.e., to examine if children's thinking related to their home environment influences approaches to learning tasks (see Reviewer 2's point #1).

REVIEWER 2

Accepted with conditions. I have two concerns:

- 1) Information sheet -

“My particular project will examine how relationships children have with their families and teachers influence how they think about their own abilities. We are looking to see whether making very simple changes in conversations you have with children can make them better able to make use of learning opportunities at school.”

I think this wording might cause undue concern and technically the research appears as if it is not directly measuring/concerned with the above. Personally I think this bit could be omitted and replaced with something along the lines of “We are looking to see whether a child’s thoughts about the home environment influences how they learn and respond to tasks in the classroom. The child will play games that..... Please note we will not ask the child personal questions about their life at home.”

2. Opt-out: The BPS allows a consent procedure for schools where parents indicate if they wish their child to opt out rather than opt-in. Please adapt the consent sheet accordingly. If the researchers feel the demographic information on the current sheet is necessary, they may instead choose to ask the child to inform them of their age (or DOB) and who it is they live at home with.

3. The procedure seems quite long, so opportunity for short rest breaks for the child should be incorporated into the design (to ask if they wish to carry on or would like a short break).

OK

7.17 Appendix 17. Dundee City Council Research Approval

DUNDEE CITY COUNCIL: EDUCATION DEPARTMENT APPLICATIONS TO UNDERTAKE RESEARCH

NOTES OF GUIDANCE

Dundee City Council is anxious to encourage and support educational research. Normally, the Director of Education will give approval to proposals to undertake research in schools and other educational establishments in Dundee subject to the following conditions:

- 1 All relevant details of the research project are disclosed on the appropriate application form.
- 2 The involvement of all Council staff with research projects is understood to be entirely voluntary.
- 3 The methodology involved in conducting the research does not in any way impair the educational process for students.
- 4 Any research project which examines directly the attitudes, achievements or learning processes of young people may only take place if the written parental consent of each young person involved has been obtained.
- 5 All research staff working with young people in schools and educational establishments are required to disclose any criminal convictions and must have been cleared through the Criminal Records system.

DISCLOSURE OF CRIMINAL CONVICTIONS BY THOSE WITH ACCESS TO CHILDREN

The Rehabilitation of Offenders Act 1974 permits certain criminal convictions to be regarded as 'spent' after the lapse of a number of years. This means that no reference need be made to such convictions or any circumstances relating to them.

However, the Rehabilitation of Offenders Act 1974 (Exceptions) (Amendments) Order 1986 excepts from the provisions of Section 4(2) of the Act any office or employment concerned with the provision to persons under 18 years of age of accommodation, care, leisure and recreation facilities, schooling, social services, supervision or training, being an office or employment of such a kind as to enable the holder to have access in the course of his/her normal duties to such persons and any other office or employment, the normal duties of which are carried out wholly or partly on premises where such provision takes place. Researchers who intend working with young people in schools and educational establishments are excepted under Section 4(2) of the Act and are therefore not entitled to withhold information about previous convictions (or impending prosecutions). All "spent" and "unspent" convictions must be disclosed and may be taken into account when determining the application to undertake research.

- 6 No disclosure to the findings of the research project is to take place before a date specified at the outset of the project, unless with the specific permission of the Director of Education.
- 7 A copy of the findings of the research project is to be made available, free of charge, to the Director of Education on completion of the report.
- 8 Strict observation of confidentiality must be respected and in particular the researcher must comply with the terms of the Data Protection Act.
- 9 Copyright for the published research project rests with the researcher.

Every effort will be made to convey a timely decision to researchers regarding their application. In all circumstances, the approval of the Headteacher/Head of Establishment will be sought. The Head Teacher may also require to consult with the School Board if the project specifically relates to an area where they have a statutory function. There may therefore be an interval of several weeks between the submission of an application form and the intimation of the Council's decision.



**APPLICATION FOR UNDERTAKING RESEARCH IN
DUNDEE CITY COUNCIL'S EDUCATION
DEPARTMENT**

- 1 Title of Research Project:
Does rearing history affect development of a growth mindset in primary school children?
- 2 Name and Address of corporate body you represent (if appropriate)
Psychology Department, School of Health and Social Sciences ~~_____~~
Kydd Building, Abertay University, Bell Street, Dundee
_____ Fax: _____
Postcode DD1 1HG
- 3 Name(s) and designation(s) of individual(s) conducting the research (first name should be head of project)
Dr Clare Cunningham
Dawn Short (Masters by Research student)
- 4 Address and telephone number of research base (if different to 2 above)

- 5 Details of funding granted/ applied for (delete as appropriate)
None

- 6 Please list all other agencies involved in the project, the nature of their involvement and a contact name. (This may be attached on a typewritten sheet).

- 7 Anticipated timescale of project Start September 2015 Finish August 2016
- 8 Synopsis of project (including methodology) (*This may be attached in typewritten form*)

9 Describe the output of the project in terms of reports/theses/articles/books etc.

Output from the study will be used to develop my masters thesis.

10 Are you an undergraduate/**postgraduate**? (delete as appropriate)

If so what course are you studying? Masters by Research

what stage are you at? _____

11 Are you an employee of Dundee City Council NO (delete as appropriate)

If YES, please give your work address if different from 4 above.

_____ Tel: _____

_____ Fax: _____

_____ Postcode: _____

12 Please list the access and facilities you require from Dundee City Council (describe data; names of establishments and categories of personnel as appropriate)

A minimum of 40 child participants, spread across three different primary schools, will be required.

A child's table and two chairs will be needed, situated in a quiet area, perhaps the school library or class break out area.

13 Any other relevant information (including any likely benefit to the Education Authority)

The current study is part of a larger body of work being conducted by Abertay University, looking at Growth Mindset implementation in the city's schools.

14 Criminal Convictions

Please give details of any prosecutions for which you, or any of the research team, have been found guilty. If NONE, please state "NONE".

Date	Details of Offence	Sentence
NONE		

Rehabilitation of Offenders Act 1974 - Please read Note 5 in the Notes of Guidance.

15 Declaration by Applicant/Corporate Body

I certify that the information given in this application is accurate and complete and that I and all research staff working with young people in schools and educational establishments have been cleared through the Criminal Records system.



Signature

Date 24th September 2015

Signature and name of officer of corporate body

Signature _____

Name _____

Date _____

To be completed by Dundee City Council

16 Approval of research request

(a) Approved without conditions

(b) Approved with conditions

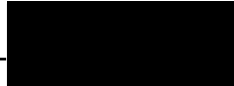
(c) Undecided

(d) Refused

(d). Please tick the appropriate box and give further details/reasons below for categories (b), (c) and

Approved to work in

Signature of Authorised Officer



Date

5/10/15

Please return this form to: [Redacted] Education Support Officer, Learning Resources, Dundee City Council, Education Department, Sidlaw View Primary School, Helmsdale Place, Dundee, DD3 0NE Tele ([Redacted] e-mail: [Redacted]

8 List of References

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