

**Mentalization: The Impact of Arousal on Mentalizing Ability
in Parent-Adolescent Dyads**

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Overview

This thesis is focused on the psychological concept of mentalization using a developmental psychopathology approach and is presented in three parts.

Part one is a literature review which explores how well the concept of mentalization can be measured in adolescents, taking into consideration the impact of social changes and the continual development of brain structures during this period. The review identified 13 measures that have been used to assess mentalizing ability in adolescents. The psychometric properties of these measures are discussed.

Part two is an empirical research paper focusing on the impact of arousal on mentalizing ability in parent-adolescent dyads. Thirty-six securely attached parent-adolescent dyads completed a mentalizing measure before and after completing stress or control condition tasks. The findings of the study and implications for research and clinical practice are discussed.

Part three is a critical appraisal of the process of completing the thesis. The critical appraisal offers a formal reflection on the challenges and learning gained from completing the literature review and the empirical paper as well as discussions about the future directions for research.

Impact Statement

Mentalizing is the human ability to make sense of the behaviours of others by making inferences about their mental processes. Though mentalizing capacities develop from birth to adulthood, theoretical and empirical study has focused on childhood and adulthood with little focus on adolescence. Understanding of adolescent mentalizing is vital as deficits in mentalizing have been linked to Borderline Personality Disorder, Autism and Schizophrenia. Also, the age of onset for a number of mental health difficulties occur during adolescence. This thesis used a developmental psychopathology approach to explore how well the concept of mentalizing can be measured in adolescents, taking into consideration the impact of the adolescent's developing brain structures and social changes. The thesis also investigated whether the relationship between mentalization and arousal observed in adults would be observed in adolescents.

The literature review found that measuring a concept as broad as mentalizing in an adolescent population where abilities differ greatly is inherently complex, and found no established 'gold standard' of measurement, highlighting the need for a developmentally appropriate measure capable of sustaining the interest of adolescents. Though the empirical paper found that arousal had no impact on mentalizing ability, the changes in parental mentalizing following stress were able to predict change in adolescent mentalizing following stress. The findings of this study indicate that parental mentalizing plays a key role not only in how adolescents mentalize, but is able to predict the extent to which mentalizing will be affected by arousal.

These findings have implications for clinicians working with adolescents as they raise questions about how clinicians observe, measure and conceptualise adolescent experience. Dissemination of these findings through publication will allow clinicians to review how they identify adolescents who have difficulties of clinical significance and how interventions are delivered. The results demonstrate a potential for extending existing mentalization-based therapies to be used with parent-adolescent relationships. By working systemically there is the potential to shift the intergenerational deficits in mentalizing to the transmission of positive mentalizing across generations.

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Part 1: Literature Review

The Measurement of Adolescent Mentalizing

Abstract

Aims: Mentalizing is the human ability to make sense of the behaviours of others by making inferences about their mental processes (Bateman & Fonagy, 2013). While mentalizing capacities change across development, theoretical and empirical study has focused on childhood and adulthood with little focus on adolescence. The developmental stage of adolescence is characterised by marked social and cognitive change, which has an impact on mentalizing ability. Accurate and appropriate measurement of mentalizing is required in order to develop models and theories of normative and pathological mentalizing. The purpose of the current review was to provide a critical review of instruments that have been used to assess adolescent mentalizing.

Method: A systematic literature search of the electronic databases PsycINFO, MEDLINE, Embase and Web of Science identified 13 instruments that have been used to assess mentalizing ability in adolescents. The quality of the measures identified was assessed using criteria set by Halle and Darling-Churchill (2016).

Results: Of the 13 instruments identified, six were specifically developed for use with adolescents. There was much variation in the amount of psychometric information provided by authors.

Conclusion: The findings of this review demonstrate that there is no one instrument that is considered 'gold standard' within the field. The measures that have been used to assess adolescent mentalizing rely largely on verbal ability and are time consuming, which may have a negative impact on their appropriateness and utility with this demographic. The increasing knowledge of the underlying neurological processes of mentalizing can facilitate operationalisation of constructs to be developed into appropriate subtests of mentalizing in order to truly capture the complex nature of mentalizing.

Introduction

In the past decade there has been exponential growth in publications exploring mentalization. In particular, there has been a rise in papers on the clinical application of mentalization-based treatments both with individuals and families. Though the term mentalization has existed in psychoanalytic literature for the past 50-60 years (Choi-Kain & Gunderson, 2008), use of the term has evolved to describe an individual's capacity to conceive of conscious and unconscious mental states (in terms of thoughts, feelings and beliefs) in oneself and others; and that these mental states inform intentions and behaviours (Fonagy, 1991; Fonagy et al., 2002, Fonagy & Target, 2006). The capacity to mentalize affords humans the ability to develop a sense of self and to participate in human society with other beings whom also share this unique capacity (Fonagy et al., 2002).

Mentalizing ability varies across and within individuals, with temporary lapses in mentalizing being recognised as part of normal functioning (Bateman & Fonagy, 2013). When the capacity to mentalize insufficiently develops, the ability to acquire self-awareness and self-regulation are impaired. An individual can completely lack the ability to mentalize, be under-mentalizing, hyper-mentalizing or pseudo-mentalizing (Sharp & Venta, 2012), all of which result in the individual being unable to understand their own mind, or that of others' (Fonagy et al., 2012). More pervasive difficulties with mentalizing have been associated with disorders such as Borderline Personality Disorder (Bateman, 1998; Fonagy, 1998; Fonagy, Target & Gergely, 2000), Autism (Baron-Cohen et al., 1985) and Schizophrenia (Langdon et al., 2005).

Development of Mentalization

Mentalizing is a developmental achievement that begins to form from birth and continues throughout childhood and adolescence. The Social Biofeedback Theory (Gergely & Watson, 1996) describes the process by which infants learn to regulate their own affective states and

to develop a sense of self through relationship with their caregiver. Interactions with caregivers provide the infant with opportunities to have their emotions mirrored by their caregiver. This process of mirroring allows the infant to observe, and then learn to attribute mental states to the self and others (Fonagy et al., 2002; 2007) which result in the infant's ability to regulate affect and distress. The quality of the attachment relationship with the caregiver and the experience of interacting with a mature and sensitive mind therefore determine how well an individual is able to acquire the skill of mentalizing (Fonagy & Allison, 2012).

The development of mentalizing ability does not remain a developmental task for the infant alone, but extends beyond infancy. The development of mentalizing is demonstrated by the young child moving from experiencing their internal world as being equivalent to their external world, to the young child inferring that mental states must be represented in action. It is thought that this integration that typically occurs around age four is why typically developing children being able to pass most false belief tasks by the age of five (Blakemore, 2007; Gopnik, 1993; Katznelson et al., 2014; Wellman et al., 2001).

The ability to understand complex mental states and intentions in the self and others is thought to change beyond early childhood and throughout adolescence (Rutherford et al., 2012). A study conducted by Choudhury and colleagues (2006) found that there was a significant difference between the reaction times of children's responses to questions on third person perspectives compared with simpler, first person perspectives. Studies have also shown that speed of mentalizing increases with age (Keulers et al., 2010). These studies demonstrate a refinement in mastery of mentalizing ability with age as the speed at which they respond to questions of mentalizing increases.

The development and refinement of mentalizing throughout adolescence has been attributed to neural plasticity that is seen in the adolescent brain throughout the teens and continues into the early twenties (Blakemore, 2008). Studies using Magnetic Resonance Imaging (MRI) of adolescent brains have demonstrated a linear increase in the volume of

white matter in the frontal cortex and parietal cortex compared with younger children who show a higher volume of grey matter in the same regions (Blakemore & Choudhury, 2006). Increase in white matter indicates axonal myelination, which is indicative of an increase in the speed of transmission of electrical impulses between neurons. The frontal cortex and parietal cortex are regions that are associated with social cognition in terms of thinking about mental states, observing faces and biological motion (Blakemore, 2008). MRI studies have also shown that during puberty grey matter volume in the frontal lobe reaches a peak, followed by a plateau after puberty and then a decline throughout adolescence until early adulthood. These observations in grey matter changes are suggestive of evidence of synaptic pruning in response to environmental and experiential learning during adolescence (Blakemore & Choudhury, 2006).

The transition from childhood to adolescence is a developmental milestone, where there are significant biological and social changes (Blakemore, 2008; Lamb et al., 1992). The developmental tasks at this stage include developing self-differentiation and individuation as a result of increasing emotional and economic independence from parents. It is also a time of increasing attachment to peer groups and consolidation of the roles and rules of adult society (Vrouva & Fonagy, 2009). Owing to the vast cognitive and social changes during adolescence, it is expected that there will be normative difficulties in mentalizing capacity for most teenagers as they acquire and refine the skill of mentalizing.

Measuring Mentalizing

The accurate measurement of mentalizing allows researchers and theorists to build and construct theories of normative, individual differences in mentalizing ability as well as models of psychopathology using a developmental framework. The ability to accurately define and measure mentalizing also allows researchers to empirically test and develop theories in this field.

One of the difficulties with the measurement and assessment of mentalizing is how broad and multifaceted a concept it is. It is a concept that can be organised along four polarities. These include automatic and controlled mentalization, which describes the mode and speed of processing. Internally or externally focused mentalizing, which refers to whether the focus of mentalizing is on the internal experience and unseen aspects of the self or the others; or external visible clues such as emotional expression and behaviour. There is also cognitive and affective mentalizing, which makes a distinction between having a cognitive awareness of mental states and being in touch with the affect of the mental states (Fonagy et al., 2012). All of these polarities highlight the vastness of the concept of mentalizing and the importance of sufficient operationalization of the entire structure or at the very least each of the polarities. A robust instrument would be expected to measure all of the conceptual polarities of mentalizing, or be able to discreetly and accurately measure one without the influence of the others.

Accurate measurement can also facilitate insight into clinical practice in terms of diagnosis and the measurement of treatment outcomes. Accurate measurement helps to differentiate between normative and pathological experiences. By determining what experiences fall beyond the range of normative experience, clinicians can determine whether the experiences of the clients meet criteria for diagnosis. Similarly, accurate measurement helps clinicians to measure outcomes of interventions, whether they are conducting specific mentalization-based interventions or not (Vrouva et al., 2012). This is because all therapies require the formation of an attachment relationship between therapist and client. In this attachment relationship the therapist will most likely be trying to actively and accurately mentalize their client, as well as mentalizing of the therapist by the client (Fonagy & Allison, 2012). This relationship facilitates the development of client mentalizing through modelling by the therapist and practice by the client in a safe space. An example of this would be assessing whether a client's interpersonal conflicts, and by extension, distress at work have reduced because they are better able to mentalize their colleagues. Current mentalizing

instruments are too broad to capture such clinical changes would therefore need to be adapted to specifically target the areas where therapeutic change would occur.

In summary, though difficulties exist in the ability to operationalise and accurately measure mentalizing ability, the benefits and rewards of doing so have far reaching implications for theory development and clinical practice.

Measuring Adolescent Mentalizing

As with measuring any developmental phenomena, there are a range of difficulties inherent in measuring adolescent mentalizing. The principal difficulty is that adolescent measures of mentalizing must be appropriate for a broad age range and range of cognitive abilities (Rutherford et al., 2012). The abilities of a 12 year old are markedly different to that of an 18 year old though they are both classified as being adolescents. To date there are few measures that are applicable to a broad developmental age range (Rutherford et al., 2012; Vrouva et al., 2012). Researchers have attempted to either use mentalizing measures developed for young children to assess adolescents, or employ adult measures. The use of child measures of mentalizing with adolescents poses the risk of tasks being too simplistic for the adolescent. Though the use of child measures may ensure that the adolescent understands the task, the simplicity of the task can mean that the adolescent is not engaged enough to complete the task. This would mean that adolescent performance on a task designed for younger children may measure the level of interest and motivation and not necessarily mentalizing ability due to the task not being challenging enough (Hartman, 1992).

Attempts to remedy this problem with the use of measures developed for adults can however prove just as problematic as the tasks may be too sophisticated for adolescents, both in language and ability. It is therefore crucial that developmentally appropriate measures be used to assess adolescent mentalizing ability. Any task or measure of

mentalizing for adolescents needs to be understood by individuals with a broad range of abilities, ensuring that the measure is challenging enough to minimise ceiling effects in participant performance, but not so simple that it ceases to be engaging for older participants. Such measures have the difficult task of ensuring that the measures are able to detect the subtle changes and nuances in cognitive, affective and social change during this crucial period of development.

Aims of the Current Review

While mentalizing capacities change across development, theoretical and empirical study has focused on childhood and adulthood with little focus on adolescents. To gain clearer understanding of normative and pathological adolescent mentalizing there needs to be a clear picture of the available tools to accurately and appropriately measure this ability in this population.

The aim of the current review was therefore to identify and critically evaluate measures that have been used to assess mentalizing ability in adolescents. It was anticipated that the search would identify studies where measures not specifically developed for use with adolescents were included.

Method

Identification of Measures

In order to identify measures that have been developed to assess mentalizing ability in adolescents, a systematic search of the literature was carried out to find studies that fulfilled the following inclusion criteria.

- ***Inclusion Criteria:***

- i. Described a measure that assess individual differences in mentalizing
- ii. Study population of adolescents, aged 13-17 years
- iii. English language

The electronic databases PsycINFO, MEDLINE, Embase and Web of Science were individually searched in September 2016. Additional papers were also found by looking through the reference lists of identified studies.

Search terms were operationalised by exploring all variations of the words (see table 1). As discussed in the introduction, the term mentalization overlaps with many other theoretical concepts. The terms not included were “ToM”, “social cognition”, “affect consciousness” and “emotion attribution”. These terms were not included in the final search in order to be as focused as possible and reduce the number of irrelevant papers found.

“Reflective functioning” was included in the search terms because it is an operationalization of the term mentalizing. It is the demonstration of an individual’s capacity to balance internal mental states and interpersonal processes (Vrouva et al., 2012) and has been used interchangeably with mentalizing (Fonagy et al., 1998).

Table 1: Operationalisation of Search Terms

Search Term	Mentalizing	Measure	Adolescent
Keyword	Mentalize=mental?e Mentalization=mental?ation Mentalizing = mental?ing Reflective Function*	Measure= measure* task* scale* test*	Adolescent/Adolescence=adolescen*
			Teenager = teen*

The final search included a combination of the keywords (*mentali*e OR mentali*ation OR mentali*ing OR "reflective function*" adj10¹ (measure* OR task* OR scale* OR test*) AND (adolescen* OR teen*)*.

Results from the four databases were combined and duplicates removed. The titles and abstracts of all the papers were screened to identify eligible studies. The full texts of the shortlisted studies were read to identify measures of mentalizing.

Analysis of Psychometric Qualities of Measures

Information about measures that met the inclusion criteria was obtained from the original papers, manuals, validation studies and literature reviews. The criteria used for assessing the measures were a modified version of the criteria used by Halle & Darling-Churchill (2016, see table 2).

¹ The search terms were linked within 10 words of each other in order to be as accurate as possible and reduce the number of irrelevant papers.

Table 2: Scoring Criteria for Papers

	Strong	Moderate	Weak
Score	2	1	0
Reliability	"Acceptable" reliability ($\geq .70$) for 2 or more types of reliability. If no statistic is given, then description using language similar to acceptable (e.g. good evidence, adequate)	"Acceptable" reliability $\geq .70$ for 1 type of reliability. If no statistic is given, then description using language similar to acceptable (e.g. good evidence, adequate) OR does not meet criteria for strong	Does not meet criteria for moderate
Validity	"Acceptable" validity ($\geq .30$) for 2 or more types of validity or one acceptable and one "moderate" (.20- .29).	Acceptable validity ($\geq .30$) for 1 type of validity	Does not meet criteria for moderate OR demonstrates evidence for poor predictive validity. Cannot be recommended even if other criteria are rated strong
Size and diversity of norming/validation sample	Large sample (more than 300) AND diverse with respect to race/ethnicities AND socioeconomic status	Diverse with respect race/ethnicities OR diverse with respect to socioeconomic status OR large sample (more than 300)	Does not meet criteria for moderate
Availability in other languages	Available in other languages	Not available in other languages	
Requirement for trained administrator	Does not require trained administrator		Requires a trained administrator
Length of time to administer	Less than 10 minutes	10- 20 minutes	More than 20 minutes

Results

A total of 38 studies were shortlisted from the search (see figure 1), identifying 13 instruments used to assess mentalizing ability in adolescents (see table 3).

Figure 1: Process of Selecting Papers

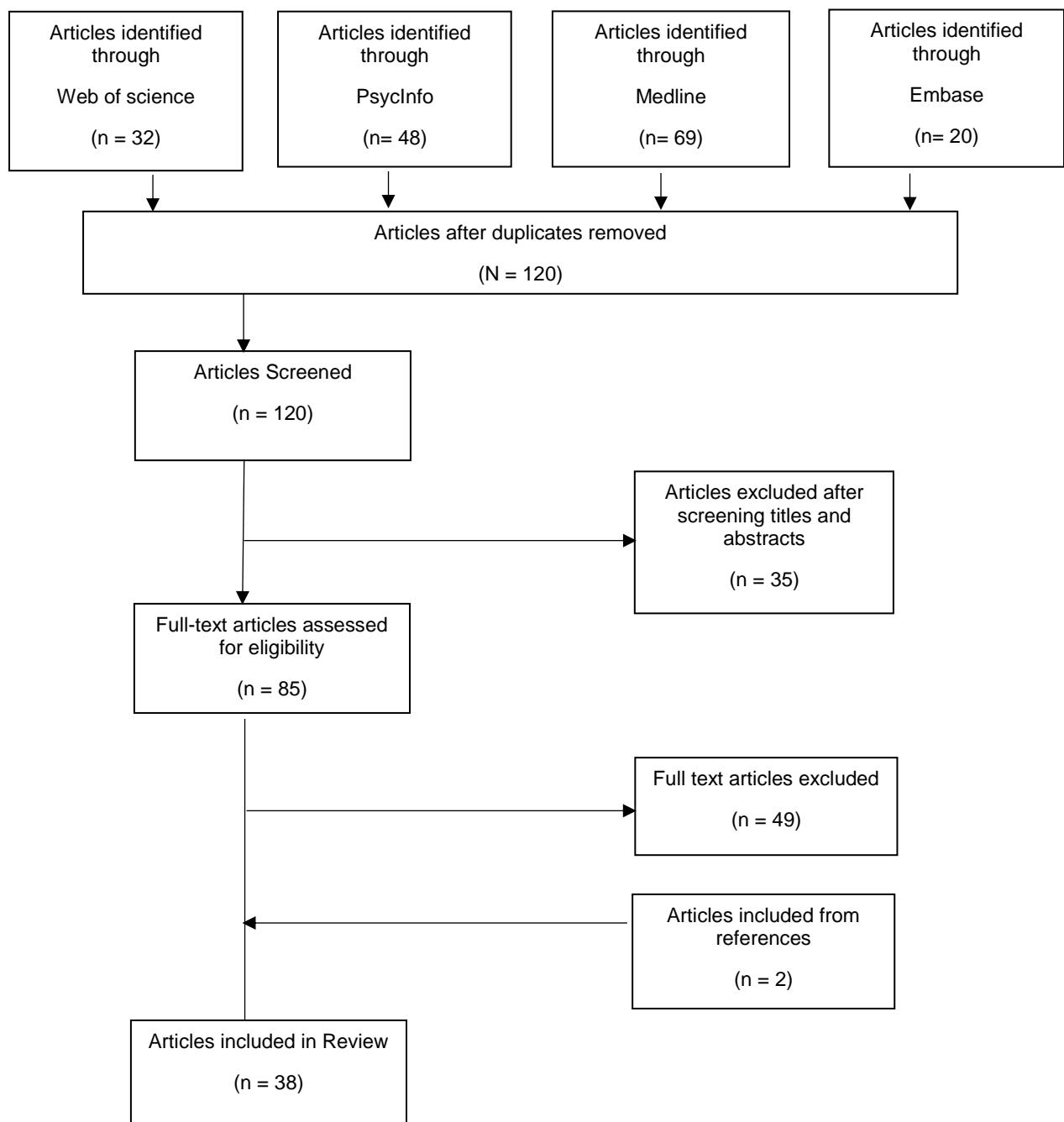


Table 3: Shortlisted measures, listed by date of publication (N=13)

Measure (Author, date)	Population developed with (N)	Brief Description of measure	Method used to present stimuli	Participant response
Social Situations Task <i>(Dewey et al., 1991)</i>	Adult males with ASD (7)	10 short stories describing 22 social situations. Participants rate the appropriateness of the behaviour of the characters in the stories.	Vignette	Multiple choice
Object Relations inventory <i>(Blatt et al., 1979 & 1992; Diamond et al., 1990, Green & Blatt, 1990)</i>	Adult, undergraduate students (121)	The participant is asked to describe a significant other, pet and themselves, and if applicable their therapist.	Interview	Free speech
Reading The Mind in the Eyes Test <i>(Baron-Cohen et al., 1997)</i>	Autism & high functioning Autism (15), Normal adults, Students & IQ matched controls from general population (239)	25 pictures of the eye region are shown to participants, they are asked to choose the word that best describes the emotion in the eyes.	Pictures	Multiple choice

Reflective Function Scale <i>(Fonagy et al., 1998)</i>	Adults, first time mothers (100) and people with personality disorder on an in-patient unit (82)	Responses from the Adult Attachment Interview are coded to assess the individual's ability to reflect on their relationships.	Interview	Free speech
Child's Eyes Test (<i>Baron-Cohen et al., 2001</i>)	Children	28 pictures of the eye region are shown to participants, they are asked to choose the word that best describes the emotion in the eyes.	Pictures	Multiple choice
Stories From Everyday Life (<i>Kaland et al., 2002</i>)	Children and adolescents with Asperger's syndrome (21), 'normal' controls (20)	26 short stories about social situations with a complex contextual background. Participants are asked if statements made by characters are true, and the motive of the characters.	Vignette	Free speech, Reaction time of responses measured
Movie for the Assessment of Social Cognition (<i>Dziobek et al., 2006</i>)	Adults with Asperger syndrome (19), matched controls for age, gender, education and IQ (20)	Participants asked to watch a video about a social situation. They are asked to answer questions about the characters' thoughts, emotions and intentions.	Video	Multiple choice
Reflective Function Questionnaire for Youth <i>(Sharp et al., 2009)</i>	Adolescent patients from a clinic (53)	Participants are asked to rate how much they agree or disagree with statements of reflective function.	Questionnaire	6-point Likert-scale

Mentalizing Stories for Adolescents (Vrouva & Fonagy, 2009)	Adolescent pupils (114)	20 vignettes about social situations are given. The participant is asked to explain why characters perform certain behaviours and the justifications provided by participants scored if they involve emotional state of the character and do so accurately.	Vignette	Free speech
Maastricht Mentalizing Task (Keulers et al., 2010)	Adolescents from secondary school and university (252)	36x 2 hypothetical situations are presented on a computer followed by a question. Participants are asked to make a decision either from a first person or third person perspective.	Vignette	Multiple choice, reaction times measured
Mentalizing Stories for Adolescents Version 2 (Rutherford et al., 2012)	Adolescents from a longitudinal study (53)	21 short stories of everyday scenarios likely to be encountered as adolescents. The participant is asked a question and must choose from 3 answers.	Vignette	Multiple choice
How I feel (Walden et al., 2003)	School students grade 1-9 (1,264)	Brief vignettes are presented where a protagonist (sometimes the participant) has an interpersonal dilemma. The participant must then answer two questions, each presented with multiple choice.	Vignette	Multiple choice
Child Reflective Function Scale (Ensink et al., 2013)	Mother-child dyads (94)	Responses from the Chid Attachment Interview are coded to assess the individual's ability to reflect on their relationships.	Interview	Free speech

Of the 13 measures identified, six were specifically developed to be used with adolescents, five to be used with adults and two to be used with children.

The measures were not all uniform in the aspect of mentalization that they measured. Some tasks assessed the participants' ability to mentalize others (n=7), whilst some measures assessed the individual's ability to reflect on their own experience in relationships (n=3) and others required the participant to do both (n=3).

Use of vignettes to present the stimuli is by far the most popular choice with 6/13 measures using this method of presentation, followed by interview (3/13), then pictures (2/13). Only recently have researchers created measures where the stimuli are presented in video form (1/13) and as questionnaires (1/13).

Responses of the participants are also often either multiple choice (7/13) or free speech (5/13). Two of the measures, the *Stories from Everyday Life* (SEL) and the *Maastricht Mentalizing Task* (MMT) measure the reaction times of participants. Only the *Reflective Function Scale* measure (RFS) uses Likert scales.

Overall Quality of studies

The checklist developed by Halle and Darling-Churchill (2016) was used to assess the psychometric qualities of the identified measures and can be seen in table 4. The amount of available information about the psychometric qualities of the measures varied greatly, with some papers providing very minimal information. Where this occurred and information could not be gathered, a search to find the original papers, manuals, validation studies and literature reviews was conducted. A score of 0 was given for the key criteria being assessed if the search could not find any psychometric properties.

The *How I Feel* (HIF) questionnaire received the highest score of 12 (out of a possible 12), with the MMT scoring two.

Table 4: Psychometric evaluation scores per measure

Measure	Validity	Reliability	Size and diversity of validating/norming sample	Availability in other languages	Requirement for trained administrator	Length of time to administer	Total
Social Situations Task	0	2	0	2	2	0	6
Object Relations inventory	1	2	0	2	0	0	5
Reading The Mind in the Eyes Test	2	2	2	2	2	0	10
Reflective Function Scale	1	1	0	2	0	0	4
Child's Eyes Test	1	1	1	2	0	0	5
Stories From Everyday Life	1	2	0	0	0	0	3

Movie for the Assessment of Social Cognition	2	2	0	2	0	0	6
Reflective Function Questionnaire for Youth	2	1	0	0	2	0	5
Mentalizing Stories for Adolescents	1	2	0	0	0	0	3
Maastricht Mentalizing Task	0	0	0	0	2	0	2
Mentalizing Stories for Adolescents-V2	1	0	0	0	2	0	3
How I feel	2	2	2	2	2	2	12
Child Reflective Function Scale	2	1	0	2	0	0	5

Validity

The validity of a measure is concerned with whether it measures the specific characteristic or construct that it claims to, and that it does so accurately. Five of the shortlisted measures were rated as having 'strong' validity, six 'moderate' and two 'weak'.

When assessing the validity of a measure, there are many forms of validity that can be measured. The first is the criterion validity. Criterion validity indicates whether the scores obtained on the measure you're interested in are comparable to already established, 'gold standard' criterion. This 'gold standard' criterion can either be a 'gold standard measure' or diagnosis. A high correlation between the scores obtained on the measure you're interested in and the 'gold standard' criterion suggests good criterion validity.

The present study found that there is not one measure that is considered the 'gold standard' to measure mentalizing in adults, children or adolescents. The shortlisted measures that sought to establish criterion validity tested how accurate they were at facilitating diagnosis. If a test is said to have good criterion validity it is able to accurately detect the proportion of people who have been diagnosed with a disorder as well as correctly identify the proportion of patients who are known to not have a diagnosis. In the present study the RMET was found to be good at differentiating between groups with varying ToM abilities such as people with schizophrenia (Bora et al., 2009; Maurage et al., 2011 & Olderbak et al., 2015). Similarly, authors compared scores on the *Social Situation Test* (SST; multiple-choice version) with scores on the ADOS (Autism Diagnostic Observation Schedule; Lord et al., 1989) a measure designed to diagnose and assess Autism Spectrum Disorder (ASD). It was found that the ADOS scores for social interaction and communication for children were correlated positively with scores on the SST explicit social cognition measure ($r = .53$ and $.35$, $p < .03$), but negatively with spontaneous perspective taking ($r = -.32$ and $-.40$, $p < .03$) and the implicit social measure (Calenmark et al., 2014).

The Spanish SEL test found that only scores on the physical inference and mental inference were significantly correlated with clinical and functional scores (Lera-Miguel et al., 2016). The CRFS also demonstrated good criterion validity as there was a significant difference in the reflective function of children who had been sexually abused compared to controls matched on socio-economic status (Ensink et al., 2014). The Reflective Function Scale (RFS) though it did not meet criteria for ‘strong’ validity demonstrated good discriminant and predictive validity as there was a strong relationship between RF in parent’s and infant attachment at age one (Fonagy et al., 1998).

In the absence of a ‘gold standard measure’, authors also focused on establishing the construct validity of their measures. This form of validity explores how well the measure performs according to the theory of the underlying construct. Comparing scores on the target measure with scores on other similar measures that are thought to measure the same construct is the typical way of establishing construct validity. The RMET was reported as having good convergent validity with other ToM measures such as the SST and the *Faux Pas Test*. Performance on *Mentalizing Stories for Adolescents- version two* (MSA-v2) was compared with the RMET. A positive correlation was found between the MSA-v2 and the RMET ($r (49) = .45$, $p < .001$; Vrouva & Fonagy, 2009). Similarly, authors of the MASC correlated scores on the MASC with SST. They found that scores on the MASC for people in the Asperger’s group were significantly correlated with performance on the SST ($r = .47$, $p < .05$) which is deemed as ‘acceptable’ reliability.

The *Reflective Function Questionnaire for Youth* (RFQ-Y) demonstrated marginal construct validity as authors found significant positive correlation between total scores on the RFQ-Y and Child Reflective Function Scale global reflective function (CRFS; $rs = .24$, $p = .004$) and the MASC total scores (MASC; $rs = .28$, $p = .001$).

In regards to testing the construct of mentalizing and other theoretically unrelated constructs, many authors validated their measures against cognitive abilities such as IQ. The MASC was found to have no correlation between scores and IQ (Dziobek et al., 2006). The

Spanish SEL test found mental inference scores correlated mildly with non-verbal intellectual indexes and mildly to moderately with clinical variables and mildly with functionality scores (Lera-Miguel et al., 2016). The RFS was compared to the Mother-Father-Peer scale (Epstein, 1983) that looks at independence encouraging vs. over-protective parenting, the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975), Sources of self-esteem Inventory (O'Brien, 1981) and the Lagner 22 (Lagner et al., 1962) a test that assess psychiatric caseness. None of the measures showed any relationship to RF scores (Fonagy et al., 1998).

However, some measures were found to be correlated with scores on supposedly unrelated constructs. There was a correlation between scores on the MSA-v2 and receptive language ($r (47)=.50$, $p<.001$) suggesting that MSA performance is not purely assessing an individual's ability to mentalize, but is influenced by how well they are able to understand information that is read or spoken.

Overall, most measures of mentalizing demonstrated good validity as they were able to highlight clinical differences in mentalizing ability in their samples and when compared with other measures of mentalizing, scores demonstrated correlations suggesting similar constructs.

External validity refers to how well the results seen in an experiment can be reproduced in the general population. The generalizability of results is mainly influenced by how representative the sample population is of the general population. The majority of the measures shortlisted used norming samples with less than 300 participants as set in the scoring criteria. Included in the scoring was also the diversity of the populations, such as gender, race and socio-economic background. Most studies (10/13) in the current review scored 'weak' on this item. This is largely due to the small sample sizes used, but also to the lack of diversity of the sample populations. The HIF test was validated with the highest sample size with 1, 264 students.

Related to external validity is the number of languages that the measure is available in. Having a measure available in multiple languages allows it to be used with a broad range of people from different cultures and backgrounds, thus being truly representative of the general population. Nine of the shortlisted measures had been translated into other languages, these languages however, were often Western, specifically European languages. The measure that had been translated into the most languages was the RMET which has been translated into 11 languages (Japanese: Kunihira et al., 2006; Bosnian: Schmidt & Zachariae, 2009; Swedish: Hallerback et al., 2009; Turkish: Yil-dirim et al., 2011; Persian: Nejati et al., 2012; Romanian: Miu et al., 2012; Spanish: Fernandez-Abascal et al., 2013; German: Pfaltz et al., 2013; Italian: Vellante et al., 2013; Greek: Vogindroukas et al., 2014 and French: Prevost et al., 2014).

Reliability

The reliability of a measure is the consistency of the assessment over repeated assessments of the same individual over time, or by multiple assessors. This concept takes into consideration the range of error of a single score from natural variation in performance as well as the precision of the test. Six measures were rated as having 'strong' reliability, five as having 'moderate' and two 'weak'.

Internal consistency explores how much of the observed variance in an individual's scores is attributable to the underlying 'true' scores and how well the items on a measure tap the same construct. This review found that the internal consistency was highest for the MASC (Cronbach's $\alpha = .84$) and the HIF (Cronbach's $\alpha = .847$), followed by the MSA (Cronbach's $\alpha = .81$; Vrouva & Fonagy 2016). The Cronbach's alpha for the total RFQ-Y score was = .71 (Ha et al., 2013).

In a review of the psychometric properties of the RMET, the internal consistency for the RMET was described as 'typically poor' (Olderbak et al., 2015) with Cronbach's alpha's

ranging from .58 in a college students sample (Harkness et al., 2010) to .78 in the Spanish version (Lera-Miguel et al., 2016). Authors postulate that this is due to the fact that items on the RMET may not be measuring the same construct as the RMET includes emotions with positive, negative and neutral valence. Also, the commonness of the response words is not the same in all 11 languages it has been translated to (Olderbak et al., 2015).

Test-retest is another form of reliability that demonstrates the consistency of a measure over two time points. Test-retest provides insight into the stability of a measure whilst taking into consideration the range of error of a single score from natural variation in performance. The present review found the MASC to have the highest test-retest reliability (ICC= .97 for the whole sample, ICC= .92 for Asperger's group and ICC= .89 for controls; Dziobek et al., 2006).

The test-retest reliability for the HIF test in 119 students after 3 weeks was .501 for children in schools with the Socio-Emotional Training (SET) intervention and .828 for children in schools without intervention. Items on the 'feel' scale had a reliability of .563 in school with the SET and schools without the SET had a reliability of .768, this was compared to the 'Do' items that had a reliability of .426 and .724 respectively (Sandell et al., 2012).

The CET had ICC= .6 (Hallerback, Lugnegard, Hjarthag & Gillberg, 2009). The SST had test-retest reliability (Pearson r) for spontaneous perspective taking and implicit social awareness scores for 10 typically developing participants, after an average interval of 5.4 months, reached $rtt = .68$ ($p = .01$) and $rtt = .59$ ($p = .04$), respectively. After 6 weeks, the ORI demonstrated 'marginal' to 'good' test-retest reliability for ambivalence ratings for mothers (Huprich et al., 2015).

Finally, inter-rater reliability (IRR) explores whether the same scores will be achieved when scored by different people. This measure provides insight into how susceptible a measure is to rater bias. The IRR for the *Child Reflective functioning Scale* (CRFS) ranged between .80-.90 (which is deemed as 'excellent'). IRR for cognitive development in the ORI

was good, the ICC indicated fair to excellent interrater reliability for CL scales (.88 for self-description and .80 for parents descriptions) and for the content subscales (ranging from 0.72 to 0.90; Rothschild-Yakar et al., 2013). Scores for the RFS were ascertained by scoring answers on the Adult Attachment Interview. Four judges rated the interviews for the mother's interviews, and father's interviews rated by three. RFS Coefficients ranged between .59 and .835 for mothers and .792 and .891 for the father interviews (Fonagy et al., 1998).

IRR of the Spanish version of the SEL was 'moderate' to 'high' in physical and mental inference scores, as well as the number of prompt questions used (0.76, $p=0.024$); mental inference (0.95 , $p<0.001$) physical inference prompt questions (0.92 , $p<0.001$; mental inference prompt questions (0.84 , $p=0.006$).

The MSA IRR was deemed 'acceptable' (Cohen's kappa= .69). For the intentional state component kappa was .62 ICC for the ESJ, ISJ and total MSA were .92, .89 and .92 respectively.

SST measured the IRR for rating spontaneous perspective taking and implicit social awareness was examined by an independent lay person, blind to the data. They found 'substantial agreement' between the raters ($ric= .70$, confidence interval = $0.66\text{--}0.74$). In summary measures of mentalizing on the whole demonstrate variability in the reliability of measures, with some demonstrating 'excellent' test-retest reliability, while others 'poor'. The IRR demonstrated much less variation.

Utility of Measures

Measures that were most convenient to administer were deemed to have the greatest utility as it reflects how practical a measure is for use both clinically and within research. Judgements of the utility of a measure were made based on the length of time it takes to administer a measure and whether administrators required training.

The coding system rated measures that took longer than 20 minutes to administer as ‘weak’. The majority of measures were presented as vignettes, with the number of scenarios per measure ranging between 10 and 36 therefore taking longer than 20 minutes to administer. For all the shortlisted measures, only HIF met criteria for ‘strong’, taking under 20 minutes to administer.

Regarding the level of training required for the administrator, training was required for six of the measures. The level of training required varied for each measure with some requiring training to administer the measure, to score it or both. Very few authors commented on the length of training required for raters. Authors of the CRFS did include this information and stated that 12 hours of training are required to reach agreement of 85% between the first author and doctoral students.

Discussion

The aim of this review was to identify and critically evaluate measures that have been used to assess mentalizing ability in adolescents. A systematic search of the literature found 13 instruments that had been used to evaluate adolescent mentalizing, six of which were specifically designed for adolescents.

Study quality and methodological considerations

Overall the studies in this review were of good quality with authors reporting on at least one psychometric quality of the measure being used to assess adolescent mentalizing. However, there was much variation in the amount of psychometric information reported by authors.

The majority of measures shortlisted in this review required participants to read. Measures were presented as vignettes for participants to read, or answers to stimuli required reading. The heavy reliance on the use of text introduces a confounding variable that can

create advantageous bias in performance for those who have superior linguistic ability. This was highlighted in particular by a study by Kaland and colleagues (2008) which compared the performance of children with and without Autism Spectrum Disorder (ASD) on mentalizing tasks presented as vignettes (the SST and SEL) and mentalizing tasks presented with images (CET). They found that in people with ASD, there was a stronger, significant correlation between verbal IQ and performance on the SST and SEL, which was not evident on the non-verbal CET. In the control group, there were no significant correlations with verbal IQ and any of the three measures of mentalizing. These results suggest that individuals with and without deficits in mentalizing may employ a number of strategies during social cognition tasks, which may differentially draw upon verbal IQ. If researchers only use vignette measures that require verbal ability without controlling for verbal IQ it may mean that differences in scores on mentalizing measure may not truly reflect mentalizing ability, but rather, linguistic ability. This is particularly important in work with adolescents as there are marked differences in verbal IQ within this developmental period (Ramsden et al., 2011).

A further methodological consideration in measures of mentalizing is the ecological validity of using images and vignettes. In the current review there was only one measure (out of 13) that used video to present stimuli, with the majority presenting static test stimuli in the form of vignettes or images. Static stimuli such as pictures and images lack ecological validity because mentalization is not a static, but a dynamic process (Bateman & Fonagy, 2013) that occurs fluidly in the context of social interaction, therefore the use of static pictures and images do not truly reflect real life experiences. Though vignettes may capture some of the dynamic elements of mentalizing by generating an image and context in the imagination of the person being assessed, there are a number of factors that may impair an individual's ability to generate images presented by vignettes. These include, but are not limited to memory, attention and verbal IQ that may influence the comprehension of the vignette being presented. There are also issues with cultural differences in the interpretation

of the words and descriptions used in the vignettes, thus calling to question whether the use of a vignette is capable of generating the exact same image in multiple individuals within and across cultures. This therefore limits the validity of such measures, as there is no certainty that the same image is being evaluated across individuals.

Presentation of stimuli through video allows for a more realistic experience of the demands of everyday life on social cognition and creates greater sensitivity of responses (Dziobek et al., 2006). It is important to assess mentalizing in a context-dependent manner to provide increased motivation for the individual to mentalize in a way that they would in a real-life situation (Ceci et al., 1994; Humfress et al., 2002). To get a true picture of mentalizing ability, researchers and clinicians can combine both experimental tasks and naturalistic observations (Dunn, 1996). This of course does not solve the problem of cultural differences in the interpretation of social faux pas and non-verbal gestures, but it is closer to ensuring that the intended scenario is observed in the same way by all.

Finally, a key difficulty with the methodology of this review is how broad the concept of mentalizing is. The decision to exclude terms describing overlapping concepts (such as 'ToM', 'Social cognition', etc.) from the search terms was made in order to focus the relevance of papers found in the search. However, it is possible that some mentalizing measures were not captured in the search if they were described by authors using any of the overlapping excluded terms. This review has highlighted that there is no 'gold standard' assessment of mentalizing ability, and that those that exist are varied in the form of mentalizing that they assess. Attempting to measure the psychometric qualities of all the measures that measure all the various forms of mentalizing may have been too ambitious. A more focused search on measures designed to evaluate specific forms of mentalizing (e.g. automatic, controlled, etc.) may have been more beneficial. It is possible that having a much more focused search on one polarity of mentalizing may have allowed the direct comparisons of psychometric qualities to be more meaningful.

Limitations of the Review

This review has certain limitations, one of which is that it only included studies published in English. Though this decision was made for the practical reason that the author can only speak English, the inclusion of only English studies limits the cultural perspective one can take on mentalizing. Despite the limitation to English language studies only, subsequent searches for the original measures found that some of the measures were validated in other languages. Measures that were validated in other languages did so in languages that were often from Western and European countries. The small and homogenous samples in the shortlisted studies mean that the results may have limited generalizability to countries and cultures outside of Europe and the West. Thus, creating a literature on the psychometric qualities of measures of Western mentalizing. It is therefore crucial to build on these findings with cross-cultural studies. However, direct comparison of measures in other languages and cultures may prove difficult as some words for mental states and emotions do not directly translate cross culturally. Authors have attempted to remedy this by back translating measures.

The second limitation of this study is that the quality tool to evaluate the psychometric qualities of the shortlisted measures may have been too broad and simplistic. Though it is a useful tool and provided a standardised means of comparing the measures, it did not capture completely the detail in some of the psychometric requirements. One such example is that ceiling scores were reached quite quickly as the blanket score of two was given if ‘validity was $\geq .30$ for two or more types of validity or one acceptable and one “moderate” (.20-.29)’. Therefore if a measure was reported to be valid along five forms of validity, it was scored equally with a measure that scored on two forms of validity, thus ceiling effects were reached quickly and detail on the differences between measures not easy to identify. A more detailed tool would be beneficial for future research.

Clinical Implications and Future Research

Within psychology, the challenges faced in measuring mentalizing ability bear similarities with challenges in the measurement of intelligence. The intelligence of individuals has been measured for many years, with the generation of tests such as the Binet-Simon test (1905) and the Stanford-Binet test (1916). However, more recently in Western regions of the world, intelligence has moved from being conceptualised as being one unitary construct to one that is made up of several underlying constructs such as verbal comprehension, perceptual reasoning, working memory and processing speed (Georgas et al., 2003). This shift in the definition of intelligence has been reflected in the construction of measures of intelligence. Measures such as the Wechsler Adult Intelligence Scale (WAIS) and the Wechsler Intelligence Scale for Children (WISC) have several subtests, which are designed to measure each of the underlying constructs of intelligence. The scores for each of the subtests can be collated to develop one overall score of intelligence. The shift from one overall intelligence score, to individual subtests has proven to be helpful clinically and within research as scores on subtests provide insight into where strengths and deficits may lie. They also provide further evidence of the structures underlying intelligence.

A similar process that has taken place in the field of intelligence measurement is occurring within the field of mentalization. The first phenomenon within this process is the use of neuropsychological research to refine definitions. In the field of intelligence measurement, the shift in the definition of the construct of intelligence was empirically supported by neuropsychological research (Lezak et al., 2012, p.22). This appears to already be happening within the mentalizing field with developments in the understanding of the underlying constructs of mentalizing (Blakemore, 2008, Blakemore & Choudhury, 2008; Nolte et al., 2010; 2013).

With increased clarity of the functions of the underlying constructs of mentalizing there are two potential benefits. The first is the operationalisation of these constructs to be

developed into appropriate subtests of mentalizing. The use of subtests allows for more focused tests that will measure just one underlying structure of mentalizing. Thus allowing the four polarities in which mentalizing can be divided into to be assessed more discreetly. Researchers will then be able to more easily test the individual constructs and compare psychometric results across studies. Secondly, a clearer understanding of the underlying constructs of mentalizing through the generation of subtests will also provide insight into where deficits lie in mentalizing for the individual. This is useful both in clinical practice to help focus intervention and within research to further develop theories.

Many of the existing measures of mentalizing generate scores that cannot be compared with each other in a meaningful way. Though a high score on one measure of mentalizing was often correlated with high scores on other similar measures of mentalizing, this correlation provides very minimal information or relevance for the individual. The development of measures that could be easily compared across studies would also be beneficial for meaningful interpretation of scores. If an individual could obtain a score for a specific type of mentalizing, such as an internal mentalization score, based on subtests of mentalizing ability as they could receive a score for perceptual reasoning using three of the subtests of the WAIS, there would be much more clarity in statements about mentalization scores. It is also possible that this would facilitate a shift towards the establishment of standard scores or use of percentiles seen in other psychometric measures of ability such as the WAIS. With this, there can be clearer inferences made about how much an obtained score deviates from the average and whether this is normative and whether this has any clinical implications for the individual.

As mentioned above, the majority of the shortlisted measures scored 'weak' for the length of administration. This is because the majority of measures were interviews or vignettes. A consequence of measures that require a lot of time is the impact on its utility. Time-consuming measures reduce their utility within clinical practice within an already time-pressed National Health Service as well as within research settings. It is of note that the HIF

test, the shortest measure to administer was also the measure validated with the highest sample size ($N=1,264$). It is possible that the brevity of the measure meant that it was received well by participants, allowing them to complete it without much time and effort. The implication of creating measures that are brief, and time limited are that they can be used more frequently and with wider populations in clinical and research settings, to further develop the evidence on mentalizing. Therefore, it would be of benefit for clinicians, researchers and participants to create measures that are reasonably brief to administer and score.

Conclusion

The findings of this review demonstrate that there is no one measure that claims to assess all aspects of mentalizing, or a 'gold standard' within the field. The measures that have been used to assess adolescent mentalizing are largely verbal and time consuming, which may have a negative impact on their appropriateness and utility with this demographic. The increasing knowledge of the underlying processes of mentalizing can facilitate the generation of robust measures of adolescent mentalizing that are able to capture the complex nature of mentalizing.

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Part 2: Empirical Paper

The Impact of Arousal on Mentalizing Ability in Parent-Adolescent Dyads

Abstract

Aim: The ability to mentalize varies across and within individuals, with temporary lapses in mentalizing being recognised as part of normal functioning (Bateman & Fonagy, 2013).

Studies have demonstrated the impact of arousal on mentalizing in children (Dunn et al., 1995), healthy adults (Smeets et al., 2009) and people with BPD (Deckers et al., 2015).

There have been no studies to date examining this phenomenon in adolescents. This study aimed to test the impact of arousal on mentalizing in the context of parent-adolescent dyads.

Method: Thirty-six securely attached parent-adolescent dyads completed the Movie for the Assessment of Social Cognition (Dziobek et al., 2006) before and after completing experimentally induced stress or control tasks from the Trier Social Stress Test (TSST; Kirschbaum et al., 1993).

Results: Contrary to hypothesis there was no difference in HR between baseline and time two for adolescents or parents in the stress condition. There were also no significant differences in mean percentage of correct or incorrect mentalizing scores for adolescents or parents in the stress condition. These results suggest that there was no effect of the stress tasks on physiological arousal or mentalizing ability for securely attached adolescents and parents. The study also found that the changes in parental mentalizing following stress were able to predict change in adolescent mentalizing following stress.

Conclusion: Though the present study did not find an effect of attachment stress on mentalizing in securely attached dyads, it found that parental mentalizing in response to stress could account for 32.5% of the variance in the difference in adolescent mentalizing score after stress. The findings of this study indicates that parental mentalizing plays a key role not only in how adolescents mentalize, but is able to predict the extent to which mentalizing will be affected by arousal.

Introduction

Mentalization describes the human ability to understand the behaviours of others by making inferences about their mental processes (Bateman & Fonagy, 2013). Originating in psychoanalytic literature, the theory of mentalization has largely emerged from clinical observations, which have been progressively and empirically tested by neuroscientists, child development researchers and clinical psychologists (Bateman & Fonagy, 2013; Fonagy & Target, 2006). This has led to a wealth of empirical literature on mentalization as well as the development of treatment approaches that have been applied to a number of clinical populations (Bateman & Fonagy, 2004; Kaland et al., 2015).

Mentalization is a broad concept that includes a number of social-cognitive functions such as emotion recognition, theory of mind (ToM) and reflective function (Ha et al., 2013). It can be said to serve two main functions. Firstly it is one of the mechanisms through which individuals develop a sense of self. Secondly, it facilitates social engagement and interaction by allowing individuals to form beliefs about the mental states of other individuals during social interactions (Bateman & Fonagy, 2013). Difficulties with mentalizing have been associated with difficulties with aspects of social interaction such as recognising emotions in others and understanding the intentions behind people's behaviours (Baron-Cohen et al., 1985). Physiological arousal and stress are known to have an effect on cognitive functions (Yerkes & Dodson, 1908). The present paper aims to investigate the effect of physiological arousal on mentalizing ability. The present study will explore this effect in the context of parent-adolescent dyads to represent the family as the family is arguably the first site of social interaction and the foundation for the developmental of mentalization.

Difficulties with Mentalizing

Mentalization can be split across four polarities with evidence of distinct neurological correlates for the different forms of mentalizing (Lieberman, 2007; Satpute & Lieberman, 2006). The four polarities include: internally focused vs. externally focused; implicit vs.

explicit; self-oriented vs. other oriented; and automatic vs. controlled (Fonagy et al., 2012). It has been hypothesised that most people do not use just one form of mentalizing all the time, but switch between the various modes. Full discussion of these concepts goes beyond the scope of this present paper, but has been fully elucidated by other authors (Choi-Kain & Gunderson, 2008; Fonagy & Bateman, 2012). The focus of the present paper will be on the factors that are associated with automatic and controlled mentalizing.

The automatic system is faster than controlled mentalizing, and is typically reflexive, requiring little attention, awareness or intention (Fonagy, Bateman & Luyten, 2012, p. 20). Daily interactions usually rely on an individual operating more on the automatic system than controlled. This is because most people rely on well-established assumptions about themselves and others during routine social interactions, allowing cognitive resources to be freed up for other tasks. Most individuals are able to move towards the more controlled form of mentalizing when needed.

The controlled system (Lieberman, 2007) is the more effortful form of mentalizing, requiring attention, intention, awareness and effort. Controlled mentalizing is more detailed and occurs when there is a change to regular functioning, or the active need to understand the internal experience of another (Fonagy, Bateman & Luyten, 2012, p. 20). An example of this would be in a novel social situation or if well-known individuals behave out of character.

The different forms of mentalizing do not suggest that there is a correct or incorrect way to mentalize, rather, the evidence suggests that the different forms of mentalizing can be adaptive, and or detrimental dependent on the context (Allen et al., 2008). Difficulties can arise if there is limited flexibility to switch from one mode to another at the appropriate time, in what is known as ‘adaptive flexibility’ (Allen et al., 2008). The inability to flexibly shift from one mode of mentalizing to another can result in individuals making incorrect inferences about the intentions of other’s behaviours. Mentalizing ability varies across and within individuals, with temporary lapses in mentalization being recognised as a part of normal

functioning. However, prolonged or more frequent lapses can be indicative of symptoms of psychopathology (Bateman & Fonagy, 2013).

It is thought that arousal plays a key role in people shifting between automatic and controlled mentalizing. The Biobehavioural Switch Model (Fonagy & Luyten, 2009) attempts to account for the underlying mechanism of the impact of arousal on mentalizing ability. The model applies a similar logic to the theory by Yerkes and Dodson (1908), which describes the commonly observed phenomenon of performance on a task improving with arousal up to a peak, where performance begins to decline due to arousal becoming too high. The Biobehavioural switch model accounts for the interplay between arousal and mentalization by proposing that people switch from controlled to automatic mentalizing at a certain level of arousal. It is thought that the increase in arousal reduces the capacity for controlled mentalizing, resulting in a switch to more automatic mentalizing. It is thought that automatic mentalizing in stressful environments is associated with more mentalizing errors.

Smeets and colleagues (2009) found that social stress had differential effects on mentalizing ability in men and women. Specifically, increased physiological arousal was associated with increased mentalizing performance in men, however increased arousal appeared to be associated with poorer mentalizing in women. These results would suggest that arousal has a negative impact on mentalizing for women but not for men. Authors of this study did not comment on the mechanism that contributes to their findings. According to the switch model, one could hypothesise that the results were obtained due to men and women having different switch points, with women switching to automatic mentalizing with lower levels of stress than men.

Similarly, Nolte and colleagues (2010) measured the effect of attachment related stress and general stress in performance on mentalization tasks in participants with no history of mental health difficulties. The authors found a significant reduction in the accuracy of scores on the mentalizing task after stress induction. There was also a reduction in reaction times following stress induction but this was only significant for attachment

related stress. These results provide initial evidence of an adverse effect of stress on mentalizing as seen by reduction in the accuracy of scores and lend support to the notion that arousal causes a switch from more effortful controlled mentalizing to faster, automatic mentalizing.

To assess the decoupling effect of mentalizing following arousal, Deckers and colleagues (2015) administered facial recognition and social evaluation tasks before and after social stress. They compared the performance of people with Borderline Personality Disorder (BPD), a cluster C Personality Disorder and a non-patient control group. They found that in all three groups, emotional arousal was accompanied by an increase in their 'borderline views' of others, such as attributing negative characteristics to others (e.g. unkind) as well as experiencing negative emotions. These changes in attributing negative characteristics to others can be viewed as deficits in aspects related to mentalizing. The study also found higher accuracy on the emotion recognition task after stress induction compared to baseline. The improvement in facial recognition appears to be inconsistent to the theory, as arousal seems to have had a positive effect on emotion recognition and in effect mentalizing. However, as there was no control group, practice effects cannot be ruled out.

These studies demonstrate that social, physiological and attachment related arousal have an impact on mentalizing. The effect of arousal on mentalizing however is not consistent across the studies, with some studies demonstrating improvements in mentalizing and others showing a reduction. The studies have not been able to provide clear evidence of the underlying mechanisms for the change in mentalizing performance in response to arousal. It is thought that people with robust mentalization are able to continue to mentalize even under stressful circumstances and recover much quicker following a lapse in mentalization. Conversely, individuals with a genetic predisposition, and/or those who have early experiences or environments that limit the appropriate development of

mentalizing ability, are more likely to abandon their capacity to mentalize at lower levels of arousal than the general population (Fonagy & Target, 2006; Bateman & Fonagy, 2013).

Mentalizing and the family

The ability to mentalize develops in the context of the family, starting with the infant-caregiver relationship. As the infant interacts with her primary caregiver, her caregiver mirrors her emotions. The caregiver mirrors the infant's emotions first by identifying the emotion for the infant, and then re-presenting the emotion of the infant into an action that the infant can understand (Fonagy et al., 1991). For example, a caregiver may respond to their smiling infant with a smile while uttering 'you look very happy! That was fun wasn't it?' The appropriate mirroring of the infant by the caregiver allows the infant to eventually internalize the caregiver's representation of her emotional state, which results in the infant attributing mental states to the self and others. This early mirroring process between caregiver and infant will eventually support the infant in learning to regulate her own affect and distress (Fonagy et al., 2002; 2007; Gergely & Watson, 1996). Affect regulation plays a key role in the unfolding of a sense of self and agency and can be said to be a prelude to mentalizing (Fonagy & Target, 2006).

In light of the relationships between caregiver mirror and infant emotional development, it is not surprising that infant development of mentalizing ability has been linked with caregivers' reflective function and attachment. This has been demonstrated through studies that show that a caregiver's accurate mirroring of their infant is contingent on the caregiver's own reflective function (Fonagy et al., 1991), and the absence of marked mirroring by the caregiver is linked with later disorganized attachment (Gergely et al., 2002). Also, mothers' mental representation of relationships before giving birth was predictive of their infant's attachment status (Fonagy, Steele and Steele, 1998).

Studies have explored the pre-birth mentalizing ability of mothers and found that it was linked to their child's performance on ToM tasks at five years old (Steele et al., 1995) and mothers' overall score on the Reflective Function Scale (RFS) predicted their children's

overall RFS score (Rosso & Airaldi, 2016). Rosso and Airaldi (2016) found that maternal ability to mentalize mixed-ambivalent mental states predicted the same in their children. The results of this study supports the notion that a parent's ability to not be overwhelmed by negative emotions and continue to mentalize even in conditions of increased arousal, are more likely to promote the corresponding mentalizing ability in their children. These studies demonstrate that mentalizing ability develops in the context of the caregiver-child relationship, with the mentalizing capacity of the caregiver playing a crucial role in how robust the infants' mentalizing capacity can develop.

The majority of papers on the intergenerational transmission of mentalizing ability have focused on infants or children and their parents. There have been very limited studies on adolescent mentalizing and whether it is in anyway connected to parental mentalizing. A study by Benbassat and Priel (2012) explored the relationship between parent and adolescent mentalizing by comparing the Reflective Function (RF) scores of 105 Israeli adolescents and their parents. The study found maternal and paternal RF scores were positively associated with adolescent RF and social competence.

To our knowledge, there are no studies that directly explore the relationship between arousal and mentalizing in parents and adolescents. Existing studies have found a link between parent and child autonomic arousal such as heart rate, temperature and cortisol, the effects of which are moderated by maternal sensitivity. It has been hypothesised that the similarities found in parent and child arousal facilitate the child's ability to self-regulate (Ebisch et al., 2012; Feldman et al., 2011; Hibel et al., 2015; Saxbe et al., 2015). This effect has been shown in adolescence, with studies demonstrating that the link between parental physiological arousal and adolescent physiological arousal was stronger for adolescents that spent more time at home and shared more activities with their parents (Papp et al., 2009).

More recently, Saxbe and colleagues (2015) explored the link between cortisol levels and neural activity in entire families. During the first visit families took part in a family conflict task where they discussed family issues and had their cortisol levels measured. During the

second session participants individually completed tasks whilst having a Magnetic Resonance Imaging (MRI) scan. Authors found that adolescent and parental cortisol levels were related, and that the cortisol linkage during the first visit was able to predict neural activation on the second visit. They found that the more strongly youths' cortisol was associated with their parents, the more neural activation they showed when rating those same parents' emotions in regions associated with the mentalizing network (Saxbe et al., 2015). These results suggest that the ability of the adolescent to mentalize their parent was related to the level of similarity in physiological response to conflict.

Rationale and Aims of the study

The aim of this study was to investigate the impact of arousal on mentalization in parent-adolescent dyads. The study recruited securely attached parent-adolescent dyads to complete measures of mentalizing ability before and after an experimentally induced stress condition or control condition where participants read a text aimed for primary school children and counted upwards in 5's.

Owing to the lack of research on the effect of arousal on mentalizing in families and adolescents it is uncertain whether the effects of arousal on mentalizing observed in adults will also be observed in adolescents. It is also uncertain whether the effect of arousal will be positive or negative. Existing research suggests that parental and adolescent responses to arousal and mentalizing are associated, therefore we can predict that adolescent responses to arousal will be similar to their parents' response to arousal.

Securely attached dyads provide the opportunity to understand the impact of arousal on mentalizing without introducing the effect of disorganized attachment style on mentalizing ability. Similarly, by recruiting participants from the non-clinical adolescent population firmer conclusions can be made on the impact of arousal on mentalizing in a developmental context without confounding factors that would exist in a clinical population. These insights

can then be compared to future findings from a clinical adolescent population where it can be hypothesised that the effects of arousal on mentalizing would be greater.

We hypothesised that:

1. Teenagers and their parents in the control condition would not show any significant changes in physiological arousal and mentalizing ability following control condition tasks.
2. Teenagers and their parents in the stress condition would have a significant increase in physiological arousal and significant decrease in mentalizing ability following induced stress.
3. The pre-post changes in parent mentalizing ability will be able to predict the pre-post changes in adolescent mentalizing.

Method

Ethical Approval

The study received ethical approval from the University College London Research Ethics Committee in September 2016 (8915/001; see appendix 1). All participants were provided with information about the study and gave informed consent prior to testing. Where appropriate, assent was given by participants under the age of 16 (see appendix 2).

Design

The present study used a between-subjects design where each dyad was randomly allocated to the stress condition or control condition. All participants completed a mentalizing measure before and after completing tasks determined by the condition they were randomised to.

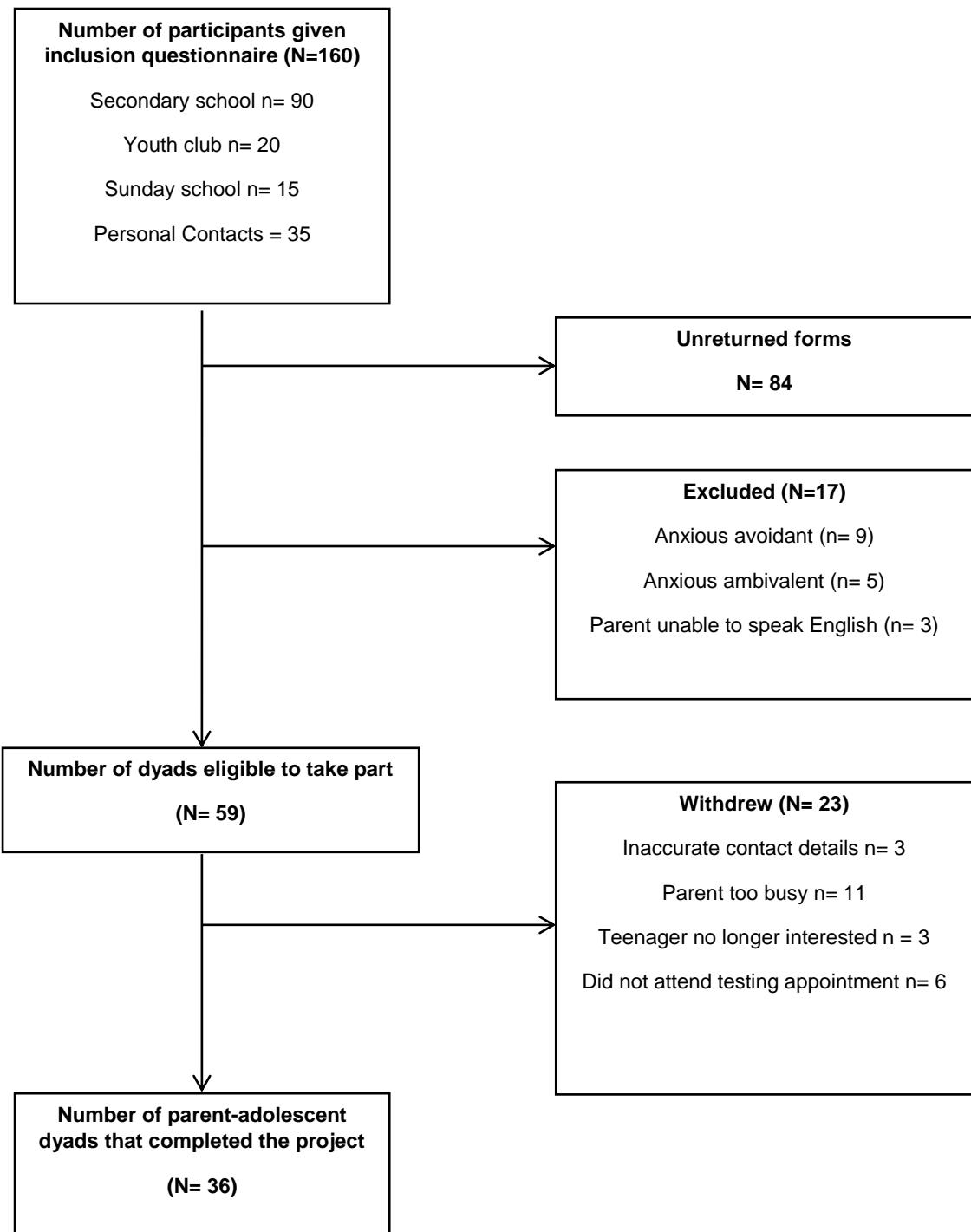
Participants

Eligibility criteria. Participants were securely attached parent-adolescent dyads consisting of one adolescent (age 12-17) and one parent/carer. Dyads where an adolescent or parent could not read or write English were excluded.

Power Calculation. No previous studies have investigated the influence of stress on mentalizing in families; the effect size required for this study is therefore unknown. Previous studies have demonstrated a large effect size ($d=0.88$) of experimentally induced arousal on social cognition (Deckers et al., 2015). This study however did not calculate the effect size of the arousal x time interaction. To be cautious the present study attempted to detect a small to medium effect size ($f=<0.25$). G*Power (3.1) calculated that with 80% power and 5% alpha we would need a minimum of 36 participants to achieve an effect size of 0.24.

Recruitment. Participants were recruited through personal contacts as well as from a secondary school, youth club and Sunday school in the city of London. The researcher, a trainee clinical psychologist attended the aforementioned locations to present the study, providing age appropriate information to the young people. The researcher was also provided with contact details of the parents of the young people in order to speak to them directly and inform them of the project, providing information sheets via email and text message.

Figure 1. Flow diagram of recruitment process



Setting

The study was conducted at the UCL Institute of Education.

Procedure

Teenagers and parents that expressed interest in the study were given attachment questionnaires electronically or on paper to ascertain their attachment style. Dyads that were deemed to have secure attachment styles based on their questionnaire scores were contacted and invited to proceed to the testing phase of the study. Those who provided verbal consent during the call were randomised before they attended the testing session. Randomisation was completed using an online tool (<http://www.randomization.com/>).

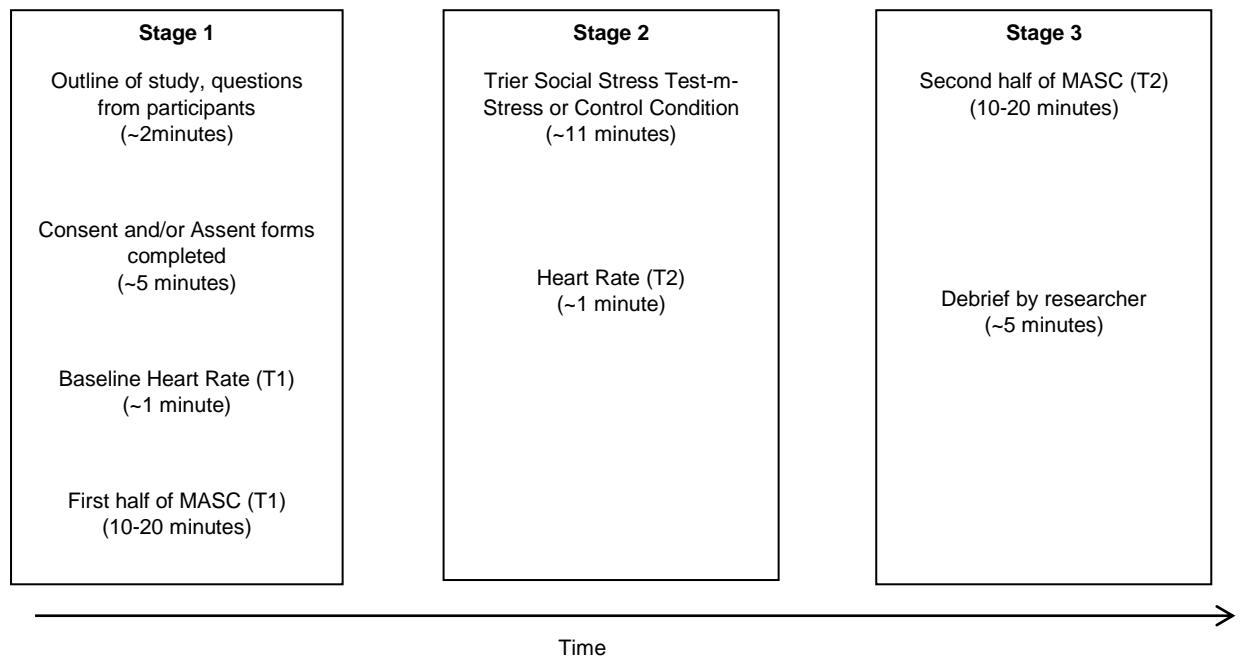
On the day of the testing session (Figure 2), written informed consent (and where appropriate, written assent) was obtained at the beginning of the testing session. Both the parent and teenager were given opportunities to ask questions or raise any concerns about the study. Testing sessions were held in a comfortable, non-clinical room set up with two seats for the participants across from a desk with two seats for the researchers. In the Stress Condition an additional feature to the room set up was a camera facing the participants and sheets for the researchers to make notes, to further induce stress. In the Control Condition there was no camera in the room and the researchers did not have any sheets for making notes on.

Each testing session had just one dyad present at a time. Though the tasks varied for parents and teenagers, tasks were completed together in the same room. Parents and adolescents simultaneously had their baseline heart rate measured and completed the first half of the MASC before being invited to complete tasks specific to the condition they had been randomised to. Parents and adolescents then had their heart rate measured for the second time and completed the second half of the MASC.

Following completion of the experimental procedure, participants were debriefed by the researcher. Participants were asked open ended questions about how they found each section of the testing condition, systematically asking about the speech, arithmetic task and completing the MASC. Participant responses were noted down before the rationale and

explanation of the tasks was given. Duration of testing ranged between 43 minutes and two hours.

Figure 2: Flow Diagram of Testing Session Procedure



Measures

Attachment Security. Attachment questionnaires were provided in paper form and electronically using Qualtrics Software (<https://www.qualtrics.com/uk/>). Attachment security of parents was determined by scores on the Experiences in Close Relationships Questionnaire-Revised (ECR-R; Fraley et al., 2000). The ECR-R is a 36-item self-report measure of adult attachment. The questions on attachment anxiety and attachment avoidance are mixed to be positively and negatively worded. Participants provide answers to questions on a 7-point Likert scale (1= disagree strongly, 7= agree strongly). Scores for questions relating to attachment avoidance or attachment anxiety are totalled to give two scores that can be plotted on a graph to provide one of four categories; secure, preoccupied, fearful or dismissing. It is one of the most commonly used adult attachment measures, with high and stable reliability over time. It has also been demonstrated as being able to predict interactions with romantic partners (Wilkinson, 2011).

Adolescent attachment security was calculated by using the Inventory of Parent and Peer Relationships-Revised (IPPA-R; Gullone & Robinson, 2005). The IPPA-R is a self-report measure that explores the quality of relationships. This measure acknowledges that adolescence is a period of individuation and independence from parents, and increasing attachment to peer groups (Vrouva & Fonagy, 2009) and therefore scores peer and parent relationships separately. Scores are obtained for the three subscales Trust, Alienation and Communication. Scores on the Trust and Communication subscales are summed before subtracting Alienation scores to calculate summary Parental and Peer scores. The high security (secure style) classification was given to participants who scored at least medium for Trust or Communication and low or medium on Alienation. Given the theoretical importance of trust in the attachment figure (Bowlby, 1969; 1982), the secure style was not assigned if both Trust and Alienation were equally scored as medium. Families where the parent scored 'secure' and the adolescent scored 'high security' were included in the study.

Heart rate. Participant's heart rates were measured at baseline and immediately after the TSST-m in order to provide an objective measure of their physiological arousal. Heart rate was measured using Fingertip Pulse Oximeters (<http://www.argos.co.uk/product/5152513>). The reading was taken after the device had been attached to the middle finger of the participant for 30 seconds, as measured by a stopwatch.

Mentalizing. All participants had their mentalizing ability measured using the Movie for the Assessment of Social Cognition (MASC; Dziobek et al., 2006). The MASC is a video based test that measures mentalizing in typical social situations involving peer and romantic relationships. The MASC assesses both internal and external mentalizing ability. The MASC has been validated and found to be sensitive to detect difficulties in mentalizing in people with Asperger's. It has excellent test-retest reliability with intraclass correlation coefficients of .97 for the whole sample and good internal consistency (Cronbach's alpha=.84; Dziobek et al., 2006).

Participants watched the 15-minute movie about four characters getting together for a dinner party. The video was paused 46 times and participants were asked questions about the characters' feelings, thoughts, and intentions. Participants chose one of four possible responses, with 3 of the 4 responses indicating an incorrect response. The four response options indicate 1) accurate mentalizing- responses that indicate the accurate judgement of the emotional and mental states of the characters; 2) hypermentalizing- a response that is deemed as making assumptions that are 'too excessive' for the amount of information presented; 3) undermentalizing- responses deemed as not sufficiently using the information available; and 4) non-mentalizing- responses that indicate causation outside of mental states, e.g. physical causation. A score of 1 was given to each form of mentalizing so that participants had a score for each form of mentalizing (Dziobek et al., 2006; Sharp et al., 2013).

Task

The present study used a modified version of the Trier Social Stress Test (TSST) developed by Kirschbaum and colleagues (1993; see Appendix C). The TSST is a well-established task designed to experimentally induce moderate psychological stress in a laboratory setting. The test generates anxiety about performance and social evaluation by asking participants to present a speech and perform mental arithmetic in front of observers. It has been demonstrated to be effective in generating physiological arousal in adults (Kirschbaum et al. 1993), male and females (Kelly et al., 2007), groups (TSST-G; von Dawans et al., 2010), adolescents (Hackman et al., 2013), groups of adolescents (TSST-G; Hostinar et al., 2014) and children as young as seven years old (TSST-m; Yim et al., 2015).

During the stress condition, parent-adolescent dyads were concurrently given a brief period of time to prepare a speech that they would present in front of the investigators. They were informed that their speech would be filmed in order for their behaviour and responses to be analysed by behavioural experts. The present study manipulated the stress condition to generate attachment related stress by altering the focus of the participant's speech to

focus on an attachment-invoking situation they had experienced. The attachment stress topics for the speech were determined by using examples from the Child Attachment Interview in a pilot study. Topics for the speech included separation from a parent or a loved one as a result of hospital admission, school trip, bereavement or a break up. Once the preparation time elapsed, parents and adolescents took it in turns to present their speech to the investigators. The order in which adolescents or parents completed the speech was counterbalanced across dyads. Though participants were allowed to make notes in preparation for their speech, they were not able to use their notes during their speech.

Following completion of the speech by the parent and adolescent, they then took it in turns to complete the arithmetic tasks in the same order in which they completed the speeches. The arithmetic task required participants to subtract serially from a 4 digit number (for example subtract 10, then 9, then 8, etc. from 1027). The difficulty of the mental arithmetic task was modified according to the age of the participants, with parents subtracting from 10 and adolescents from 5. During the arithmetic task in the stress conditions, the researchers highlighted incorrect responses and the participant asked to start again from the beginning to make participants feel under increased pressure.

In the control condition, participants read from a simplified scientific text created for primary school children to parallel the speech component in the stress condition. To minimise anxiety participants were informed that they would not be evaluated on their performance on this task and given the opportunity to familiarise themselves with the text before reading aloud. They also completed an arithmetic task of counting up in 5's. Participants were encouraged during the task and provided the correct answer if participants were unsure of the answer.

Data analysis procedures

The Statistical Package for Social Sciences (SPSS) version 24 was used to analyse the collected data and to test our hypotheses. To compare dyads in the stress and control condition and ensure there were no biases in randomisation, demographic data was compared using t-tests.

To test the impact of the stress test and the control task on physiological arousal and mentalizing ability, pre-post test scores were compared within groups using t-tests.

To explore whether changes in parent mentalizing following the stress task could predict adolescent changes in mentalization following stress task, a linear regression analysis was conducted.

Results

Table 1: Demographic data of Parents and Adolescents

	Control Condition		Stress Condition	
	Parent	Adolescent	Parent	Adolescent
Gender				
<i>Male (%)</i>	3 (17)	9 (50)	2 (11)	10 (56)
<i>Female (%)</i>	15 (83)	9(50)	16(89)	8 (44)
Age Mean (SD)	47.17(8.21)	14.67 (1.53)	47.33 (5.61)	14.78 (1.59)
Ethnicity N (%)				
<i>Black British</i>	2 (11)	2 (11)	2 (11)	6 (33)
<i>Black African</i>	7 (39)	6 (33)	5 (28)	2 (11)
<i>Black other</i>			3 (17)	2 (11)
<i>White British</i>	5 (28)	5 (28)	6 (33)	4 (22)
<i>White European</i>	3 (17)	3 (17)	2	1 (6)
<i>Mixed-White & Asian</i>		2 (11)	(11)	3 (17)
<i>British Asian</i>	1 (6)			
Highest level of education				
N (%)				
<i>A-levels</i>	1 (6)		1(6)	
<i>Bachelor's Degree</i>	3 (17)		3(17)	
<i>Masters</i>	3 (17)		4 (22)	
<i>LLB</i>	1 (6)			
<i>N/A</i>			1 (6)	
<i>Missing</i>	10 (55)		9 (50)	
Employment status N (%)				
<i>Employed</i>	18 (100)		16 (89)	
<i>Unemployed</i>				
<i>Retired</i>			2 (11)	

Demographics and Baseline Measures of participants

Thirty-six parent-adolescent dyads took part in the project, with 18 dyads randomised to each testing condition. Overall, the demographics (gender, age, ethnicity, employment status and level of education) of participants in the stress condition and control conditions were comparable (see table 1). Gender was equal for adolescents in both testing conditions. There were significantly more females than males in the parent sample, with father's making up just 17% (N= 3) of parents in the control condition and 11% (N=2) of parents in the stress group. The maternal bias was equal in both testing conditions.

Independent samples t-tests found that adolescent age in both conditions were also proportional. The mean age for adolescents in the control group was 14.6 years (SE =.36) and the mean age of adolescents in the stress group was 14.78 (SE .38). This difference was not significantly different ($t (34) = .21, p= .83; CI -.95-11.17$). There was a broad range in parental age with the youngest parent being 35 years-old and the eldest 66 years. The broad range in age was similar in both testing conditions as there was no significant difference in the mean age for parents in the control group ($M= 47.17, SE= 1.93$) and the stress group ($M= 47.33, SE=1.32$) ($t (34) =.07, p =.94, CI -4.59-4.93$). Ethnicity was equally divided across both conditions, with self-identified ethnicity being equally diverse across adolescents and parents in both testing conditions.

To ensure that participants in the stress and control conditions were truly comparable in mentalizing ability and physiological arousal, independent samples t-tests were conducted. Adolescents in the stress group were compared to adolescents in the control group, as well as parents across groups. Baseline performance of adolescents showed no significant differences across testing conditions on any mentalizing scores, or physiological arousal.

Baseline performance of parents in the stress and control group was largely comparable, with no differences in scores on hypermentalizing ($p=.065$), undermentalizing

($p = .185$) or non-mentalizing ($p = .612$). However, there was a significant difference in the number of correct mentalizing responses, with parents in the control group scoring higher than parents in the stress condition ($p = .046$).

Table 2: Scores at Time one and Time two

	<u>Adolescents</u>		<u>Parents</u>	
	Control Condition	Stress Condition	Control Condition	Stress Condition
Mean Heart Rate (SD)				
Time 1	72.78 (11.05)	74.22 (13.91)	68.72 (8.14)	70.39 (11.15)
Time 2	68.22 (11.09)	71.83 (9.72)	68 (5.08)	69.28 (10.30)
Mentalizing Scores				
(Time 1)				
M% (SD)				
Correct Responses	68.44 (14.11)	66 (13.36)	81.28 (9.44)	71.06 (18.68)
Hyper Mentalizing Responses	14.44 (8.52)	20.72 (10.77)	8 (6.84)	14.17 (11.89)
Under Mentalizing Responses	11 (7.03)	7.44 (7.73)	7.44 (5.82)	10.39 (7.16)
Non Mentalizing Responses	6.33 (6.44)	5.94 (5.08)	3.33 (2.83)	3.83 (4.40)
Mentalizing Scores				
(Time 2)				
Correct Responses	66.44 (12.86)	65.56 (14.30)	74.06 (10.96)	68.56 (18.99)
Hyper Mentalizing Responses	18.33 (9.34)	24.06 (13.32)	14.44 (8.75)	13.22 (11.14)
Under Mentalizing Responses	9.39 (5.66)	6.94 (6.72)	7.61 (6.14)	12.22 (10.59)
Non Mentalizing Responses	5.39 (6.09)	3.56 (4.33)	3.83 (4.25)	6.17 (7.25)

NB: Mentalizing scores were calculated as mean percentages to allow direct comparison between T1 and T2 scores.

Effect of Arousal on Mentalizing

Control Condition-To test whether there was an impact of the control tasks on physiological arousal and mentalizing ability repeated measures t- tests were conducted by comparing participants' scores at baseline to scores at time two.

As hypothesised, the difference in HR between baseline and time two of adolescents in the control condition was not significant ($t(17)= 4.56, p= .061; CI=-.24-9.35$). Also, for adolescents in the control condition, the mean difference in the percentage of correct mentalizing score ($M= 2.00$) and incorrect mentalizing score ($M= 2.56$) were not statistically significant.

Similarly for parents in the control condition, the mean difference in HR ($M=.72$) between baseline and time two was not statistically significant. However, contrary to prediction, the percentage of correct mentalizing scores decreased at time two by a mean of 7.22 and the percentage of incorrect mentalizing increased at time two by a mean of -7.22. These differences were significant ($t(17)=2.67, p= .02; CI=.1.52-12.92$) ($t(17)=-2.67, p= .02; CI=-12.92-1.52$) respectively. Further analysis found that parents in the control condition were more likely to make errors of hypermentalizing, which is indicated by significant increase of hypermentalizing scores at time two ($M=-6.44; t(17)= -2.893, p= .01; CI=11.14—1.75$).

Stress Condition- To test whether there was an impact of the stress tasks on physiological arousal and mentalizing ability repeated measures t- tests were conducted by comparing participants' scores at baseline to scores at time two.

Contrary to hypothesis there was no difference in HR between baseline and time two for adolescents or parents in the stress condition. There were also no significant differences in mean percentage of correct or incorrect mentalizing scores for adolescents or parents in the stress condition. These results suggest that there was no effect of the stress tasks on physiological arousal or mentalizing ability for adolescents and parents.

Parent and Adolescent Mentalizing- A linear regression was calculated to predict adolescent change in correct mentalizing following stress tasks (AdolChange) based on change in parent correct mentalizing (ParChange). A significant regression equation was found $F(1, 16) = 7.71, p = .013$ with a R^2 of .33. AdolChange is equal to $.74 + (.73 \times$ ParChange). The results therefore demonstrate that 32.5% of the variance in the difference in adolescent mentalizing score after stress is explained by the model.

Discussion

Summary of Main Findings

The current study is one of the first to test the impact of arousal on mentalization in parent-adolescent dyads. Securely attached parent-adolescent dyads completed measures of mentalizing ability before and after they took part in experimentally induced stress and control tasks. There were two main findings from the study. Firstly, the study found that experimentally induced stress did not have a significant effect on mentalizing ability of securely attached parents and adolescents. Secondly, the study found that the changes in parental mentalizing following stress were able to predict change in adolescent mentalizing following stress.

Contrary to findings from previous papers, the current study found that mentalizing scores were not influenced by the tasks in the stress condition. The findings from the current study would suggest that arousal does not impact mentalizing ability in adolescents and their parents. This is contrary to previous research demonstrating that arousal is capable of improving accuracy in emotion recognition (Deckers et al., 2015) and mentalizing tasks, (Smeets et al., 2009) as well as being capable of improving reaction times in mentalizing tasks (Nolte et al., 2010).

It is possible that the study found no effect of stress on mentalizing due to participants not experiencing a sufficient level of stress to impact mentalizing. Adolescents and adults in the present study did not demonstrate any physiological arousal as a result of the stress tasks as demonstrated by the lack of change in heart rate between time one and time two. The absence of physiological arousal in participants in the stress condition can be interpreted to mean participants did not experience psychosocial arousal either. However, this was not the case as feedback from the debrief was that all participants in the stress condition reported that they had felt a level of discomfort whilst completing the stress tasks. This creates a discrepancy between participants' subjective experiences of arousal and objective measures of arousal. The comments of one parent may explain the discrepancy between the absence of physiological arousal and the subjective experience of psychosocial stress. One parent reported that he felt an 'immediate' sense of relief as soon as the stress tasks were completed. It is therefore possible that the stress tasks did elicit psychosocial stress in participants in the stress condition, but the effects were not sustained for long enough to impact mentalizing or heart rate. It is therefore possible that the study found no effect of stress on mentalizing because the effects of the stress tasks were not sustained long enough to impact mentalizing.

It is also likely that the results were obtained due to the participants having secure attachment relationships, thus needing a higher level of arousal to disrupt their mentalizing capacity than people with insecure attachment styles. Studies have shown that people who are securely attached are more likely to have more robust mentalizing than people with insecure attachments. Studies have also shown that people with robust mentalizing are able to continue to mentalize themselves and others when under stressful circumstances and are able to recover quicker following a lapse in mentalizing (Fonagy & Target, 2006). It is therefore likely that the securely attached parents and adolescents in the current study were able to continue to mentalize under the arousal generated by the stress tasks, potentially needing higher levels of arousal to disrupt their mentalizing ability.

The second key finding of the present study was that the change in parental mentalizing ability following arousal was able to predict the amount that adolescent mentalizing ability would change. The present study found that the change in parental mentalizing in response to stress could account for 33% of the variance in the difference in adolescent mentalizing score after stress. These findings support existing literature on parent-child mentalizing which has found that maternal “Coherence of mind”, maternal overall reflective function (RF) score, and maternal references to mixed-ambivalent mental states could account for approximately 21% of the variance in pre-adolescent's overall RF score (Rosso & Airaldi, 2016). Similarly, a study looking at parent-adolescent mentalizing found the paternal and maternal variables accounted for 36% and 28% of the variance in adolescent RF, respectively (Benbassat & Piel, 2012). Overall the findings of these studies indicate that parental mentalizing plays a key role not only in how adolescents mentalize, but is able to predict the extent to which mentalizing will be affected by arousal.

Owing to the limited amount of studies focusing on adolescent populations, the underlying mechanisms for these findings is yet unknown. Further research is needed to understand whether the observed results are due to the role of physiological co-regulation observed in parents and adolescents (Ebisch et al., 2012; Feldman et al., 2011; Hibel et al., 2015; Saxbe et al., 2015), modelling by parents (Rosso & Airaldi, 2016) or parental mentalizing influencing parental behaviour that facilitates robust mentalizing in their adolescents (Benbassat & Piel, 2012).

Limitations

There were several limitations to this study, one of which was the possibility that there were genuine differences in participants in both testing conditions. There were baseline differences in the percentage of correct mentalizing responses for parents in the control condition having higher percentage of correct responses than parents in the stress condition. This would suggest that parents randomised to the control condition were better mentalizers. However, it is also possible that these differences in mentalizing ability at baseline may

reflect the small sample size. It is likely that the differences in parental mentalizing would be less marked with a larger sample population.

The second limitation of the study is the use of a modified version of the original TSST with the aim of eliciting attachment stress. The original TSST asked participants to convince researchers about their suitability for a job and has been demonstrated to be effective in generating physiological arousal in adults (Kirschbaum et al. 1993), male and females (Kelly et al., 2007), groups (TSST-G; von Dawans et al., 2010), adolescents (Hackman et al., 2013), groups of adolescents (TSST-G; Hostinar et al., 2014) and children as young as seven years old (TSST-m; Yim et al., 2015). The present study attempted to generate attachment related stress by altering the focus of the participant's speech to focus on an attachment-invoking situation they had experienced, using themes from the CAI. It is possible that the modification of the stress tasks meant that arousal from the task was not sustained for long to be accurately captured.

Also, studies that have found significant effects of the impact of the TSST on physiological responses have used continuous HR monitors and averaged scores across 1-minute intervals (von Dawans, 2010; Kirschenbaum et al., 1993). The current study used pulse oximeters at singular time points which may not have detected the subtle changes in HR. It is therefore likely that the modifications of attachment focus and method of measurement have contributed to the non-significant results.

Thirdly, it is possible that the tasks in the control condition could have elicited some anxiety in participants despite being designed to not be. The current study found a reduction in the percentage of correct mentalizing scores and an increase in the percentage of incorrect mentalizing for parents between T1 and T2 for participants in the control condition. It is likely that reading aloud, no matter how simple the task may have generated some worries in some participants. It is possible that reading out loud may be problematic for people for a range of reasons including but not limited to concerns about how they sound, their academic ability (which wasn't assessed) or reading in front of a stranger. However, it is

also likely that these results were a reflection of the small sample size as the current study used the same control condition of the TSST by Het and colleagues (2009) and von Dawans (2010) who had larger sample populations and found no changes in physiological arousal in response to control tasks.

Finally, the present study had mainly female parents/carers. Studies have demonstrated the differential effects of stress on male and female mentalizing (Smeets et al., 2009) with physiological arousal improving male performance in mentalizing tasks, and reducing performance in women. It is therefore possible that having a sample population with males and females who responded differentially to arousal could have resulted in a cancelling out of any observed effects. Future studies would benefit from limiting sample populations to one gender in order to limit the effect of gender.

Research Implications

The findings from the present study produced many implications for future studies in the field. The first is the importance of recruiting a large enough sample population. The effects of mentalizing are subtle which may be difficult to detect in small samples. Future studies with large sample populations will provide more statistical power, thus allowing authors to make firmer conclusions and run more exploratory analyses.

Though the present study did not find an effect of attachment stress on mentalizing, understanding the impact of attachment stress remains a worthy endeavour. It would be important to pilot the attachment stress task with a sufficient sample size to ensure that it produced a sufficient and sustainable amount of arousal. The introduction of a general stress condition alongside attachment stress condition in future studies, as seen by Nolte and colleagues (2010) would also help to differentiate between the effects of different forms of stress on mentalizing ability.

Lastly, there remains uncertainty about the mentalizing errors adolescents from non-clinical populations make. Understanding of how mentalizing ability develops in this

population may give insight into typical development of the skill. Understanding typical development of mentalization in adolescents could then be extended to generating research that incorporates adolescents from the clinical population in order to distinguish between deficits associated with typical adolescent development and errors predictive of clinical conditions.

Clinical Implications

For many, adolescence can be a time of emotional turmoil and psychosocial stress. Peter Fonagy and colleagues (2017) have postulated that the role of mentalization is not only to promote attachment and relationships, but for the development of epistemic trust. Their ideas that 'an experienced elder' is needed to explain the intricacies of the social and cultural environment is particularly pertinent for adolescents who at this point of transition from childhood to adulthood face many unknowns. These hypotheses in combination with the findings of the present study that an adolescent's ability to mentalize is influenced by the mentalizing ability of at least one parent support the notion that mentalizing interventions should be targeted at parents.

Though the mechanism through which parental mentalizing influences adolescent mentalizing remains unknown, having a parent that mirrors, contains and does not themselves become overwhelmed by the emotions of the adolescent models for the adolescent how to manage the emotional turmoil experienced by adolescents.

A number of interventions targeted at developing mentalizing ability in parents have been developed. A review by Camoirano (2017) found that mentalization based clinical interventions were effective in improving maternal mentalization and quality of caregiving. This would suggest that adolescents who may have difficulties with mentalizing during the transitional phase of adolescence would benefit from indirect support. However, the review found limited evidence to suggest change at a behavioural level therefore further study would need to be conducted to understand the underlying mechanism of change.

Conclusion

This study is the first to explore the impact of arousal on mentalizing in parent-adolescent dyads. The current study found that experimentally induced stress did not have a significant effect on the mentalizing ability of parents and adolescents. But found that the changes in parental mentalizing following stress were able to predict change in adolescent mentalizing following stress.

Adolescent mentalizing remains a largely under-researched field with further study needed to delineate the form and frequency of mentalizing errors typical in the adolescent development of the skill. While it is accepted that errors in mentalizing will be common at this developmental stage as the skill is developed, these errors may be misinterpreted as reflecting deficits associated with clinical conditions. It is therefore important to continue to conduct studies with parent-adolescent dyads in order to develop a clear understanding of how the skill develops across the lifespan and the role of parents and families in the development of mentalizing.

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Part 3. Critical Appraisal

Introduction

The aim of this critical appraisal is to formally reflect on the process of completing the thesis. The theoretical background to the research will be outlined before discussing the challenges encountered. These include the absence of a standardised way of validating psychometric measures, the need for a coherent framework for conceptualising mentalization and developmentally appropriate measures of mentalizing. The critical appraisal will then go on to outline barriers that are faced in recruiting adolescents and propose potential solutions for this. This paper will conclude with discussions on future directions for research.

Background Interests and Theoretical Orientation

The overarching theoretical orientation of the thesis was developmental psychopathology. While development occurs across the life span, the focus of the thesis was on the period of adolescence and how a developmental framework could be used to assess and interpret adaptive and maladaptive behaviours and experiences during this transitional phase from childhood to adulthood. The thesis focused on understanding more about mentalizing at a time where it is thought that neurodevelopmental and social changes result in much variation in cognitive ability among adolescents. Though adolescence is thought of as a unitary concept, it encapsulates a period of roughly five to nine years with adolescents demonstrating a broad range of skills and cognitive abilities (Rutherford et al., 2012). There is also variation in skills and abilities across contexts and time points for individual adolescents depending on social cues, motivation and mood (Rutherford et al., 2012). A major theme across the thesis was considering and critiquing the appropriateness of how variation in adolescent experience was understood and categorised as normative or indicative of pathology.

I was drawn to this approach as a result of questions raised during my clinical experiences. These experiences led me to question the categorization of experiences as

normative or pathological. My experiences working on acute wards for adolescents introduced me to working with young people with a range of difficulties such as psychosis, low mood, anxiety and what clinicians termed ‘emerging personality disorder (PD)’. The young people that were referred to as having ‘emerging PD’ were often those who were experiencing difficulties with their identity, regulating their emotions, impulsivity and interpersonal conflicts. When hearing adolescents being referred to in this way I was often struck by how difficult it was to differentiate between normative adolescent experience and more problematic experiences that could be indicative of long-term pathology. I was also very aware that the discourse of pathologising normative behaviour of young people could have negative consequences on the development of their identity. This is because adolescence is a time where young people are forming their identity and sense of self. The labelling of normative experiences as negative or somehow problematic can result in the adolescents internalizing aspects of themselves as being pathological, when in fact it is a normative experience of adolescence.

The example of emerging PD and diagnosis of PD will be used to highlight the difficulties clinicians and researchers face with categorisation for two reasons. Firstly, the deficits often associated with PD such as difficulties with identity, regulating emotions, impulsivity and interpersonal conflicts are linked with deficits in mentalization. Secondly, diagnosis of PD represents one of the many psychological disorders that can be viewed as being on a continuum with which people who do not have a diagnosis may have difficulties with some of the symptoms to a lesser degree than people who have received a diagnosis, thus raising questions about how categories are defined and by whom.

The notion that young people identified as having ‘emerging PD’ will go on to receive diagnosis is supported by studies that have shown that the prevalence of Borderline Personality Disorder (BPD) in adults is similar to the prevalence of BPD in adolescents (Miller et al., 2008). Studies have also shown that the criteria used to diagnose BPD in adults is just as reliable, valid and stable in adolescents (Chanen et al., 2004; 2007a; 2007b;

Westen et al., 2003). The correlation between adolescent and adult pathology would suggest that people with difficulties specific to BPD do not have to wait until they are 18 to be diagnosed, but can receive an early diagnosis if they are showing symptoms in adolescence. Early diagnosis may be beneficial in identifying adolescents that may go on to develop PD in the future, which can facilitate early intervention during what some researchers call a ‘critical risk period’ (Bornovalova et al., 2009). However, not all adolescents who demonstrate symptoms consistent with PD will continue to demonstrate these symptoms as adults (Miller et al., 2008). It is therefore important to differentiate between developmentally appropriate difficulties in mentalizing and deficits that are associated with pathology in adulthood.

The dilemma of differentiating between typical and atypical presentations in adolescence is not unique to PD, but can be seen across a range of disorders. It can be said that having a diagnostic system is a way of setting parameters for what behaviours and experiences are deemed typical, labelling anything that falls outside of these parameters as pathological. There have been a number of methods of categorizing experiences throughout history, with contemporary methods including the International Classification of Diseases and Related Health Problems (ICD) and the Diagnostic Statistical Manual of Mental Disorders (DSM). Mental Health professionals in their practice rely on a combination of sources of information such as observation, clinical interview and more recently psychometric assessments to move diagnosis away from being subjective, to a more objective endeavor. The use of psychometric assessments has provided clinicians with an objective, standardised tool to aid diagnosis. With mental health services being expected to deliver evidence-based practice, there are implications for psychometric assessments to be used routinely in clinical practice to measure treatment outcomes. However, psychometric measures are themselves not infallible, requiring validation to ensure that they are indeed measuring what they purport to measure and that they do so accurately and reliably. The difficulty with employing psychometric measures to diagnose PD and any other mental health difficulty is that the core deficits of PD such as emotion regulation and mentalization

are experiences shared by people within the general population. Most people within the general population will have had experiences where they struggle with regulating emotion and mentalizing, thus emphasising the limitations of categorical diagnoses, and questioning at what point the boundaries of typical experiences and disorder are set.

This thesis used a developmental psychopathology approach to explore how well the psychological concept of mentalizing could be measured in adolescents, taking into consideration the impact of the adolescent's developing brain structures and social changes. It also attempted to investigate whether the relationship between mentalization and arousal observed in adults would also be observed in adolescents. The thesis highlighted that measuring a concept as broad as mentalizing is inherently complex, and as such found no established 'gold standard' of measurement. Measurement of mentalizing ability in adolescence was found to be further complicated by the vast range of abilities within this demographic.

Learning from the Literature Review

The aim of the literature review was to evaluate the psychometric properties of measures developed to assess mentalizing ability in adolescents. The biggest challenge with the review was the lack of a standardised method for validating and reporting the psychometric properties of measures of mentalizing. This meant that it was difficult to directly compare quality across measures.

The literature review found much variation in the level of psychometric information (i.e., reliability and validity) reported. The variability in the amount of psychometric information reported in papers could exist for a number of reasons, ranging from the personal style of the author, journal word limits, to not having any of the psychometric information available to report. In order to meaningfully and directly compare results across studies systematic reviews typically employ methodological approaches such as converting

means to standardised effect sizes. Comparing standard effect sizes is an approach that cannot easily be employed with the literature review as it is not feasible to convert psychometric properties such as reliability and validity into effect sizes. This highlights the potential for a move towards a more standardised way for the psychometric properties of measures to be reported. By having researchers publish findings on all measures of validity and reliability such as face validity, construct validity, concurrent validity, predictive validity, internal reliability, test-re-test reliability, etc. would allow researchers and clinicians to more easily to make direct and meaningful comparisons. A more standardised way of reporting and synthesising psychometric results across papers facilitates direct and meaningful comparisons of the psychometric properties of instruments.

A standardised way of reporting psychometric results is particularly pertinent in the field of mentalization due to the broad and imprecise nature of the concept. As discussed in the literature review, the overlap of mentalizing with other psychological constructs as well as its vastness means that clearly defined comparisons will help to identify what aspects of the construct are being measured, which will in turn further develop understanding in the field.

Finally, a further learning from the literature review is the tension between developing a coherent developmental measure and making sure that it is useful for those that it has been designed for. The literature review highlighted that measures used with adolescents were often time-consuming and required training to be administered or scored. This highlights dilemmas faced by scientist-practitioners when selecting measures for adolescents. When selecting an instrument for research purposes the emphasis may be on the validity and reliability of a measure, with less consideration about the time taken to complete and score the measure. This may be different if selecting a measure for clinical purposes where the utility of the measure may take precedence, while still needing a reliable and valid measure. Affecting both clinical practice and research are the financial constraints of employing a time-consuming and complex measure. Time-consuming measures have

financial implications in terms of the resources that would be required to train up users, to administer and to score measures. This may result in services and individuals becoming reluctant or even unable to use objective psychometric measures in their practise. An example of this would be the use of attachment questionnaires such as the Child and Adult Attachment Interviews. These measures of attachment whilst being useful clinically require extensive training and coding, and are not conducive to assessments in clinical environments.

Learning from the Empirical Paper

There were many learning opportunities from completing the empirical paper. They include overcoming barriers to recruiting participants from the non-clinical adolescent population and how technology and social media can be used to facilitate research.

In completing the empirical paper, there were a number of barriers to recruiting parent-adolescent dyads from the general population. I have previously worked as a research assistant within large research teams. In these roles, I became accustomed to recruiting ambitious participant samples and was familiar with the processes and procedures to ethically and effectively recruit study participants. However, recruiting 36 adolescent-parent dyads to take part in my research project in order to have sufficient power proved to be quite challenging. The barriers I had were two-fold; the first was gaining access to secondary schools to recruit participants and the second was participants completing screening questionnaires in an efficient way.

Secondary schools were considered to be a good resource to recruit non-clinical adolescents. However gaining access to speak with school staff for permission to recruit presented with many barriers. There were many barriers to gaining access to secondary schools to recruit students for several reasons. One barrier was gaining telephone access to senior members of staff in order to promote the study. Telephone calls and emails were

often unreturned by members of school staff. As a result, attempts to recruit from schools where there was no personal relationship with school staff were abandoned. Instead personal contacts and relationships with local secondary schools, churches and youth clubs were utilised. Participants were also asked to invite their personal contacts to also take part, using a snowball sampling approach. Though this was effective to gain access to a non-clinical, adolescent population, other researchers who are not fortunate enough to have personal links with the afore mentioned organisations and settings would struggle with recruitment. This experience has highlighted that a key barrier to recruiting pupils within a school setting to take part in research was the lack of a system or process that allows researchers to present their research to school staff in a way that is time efficient and for schools to express interest in taking part in research.

A crucial step towards overcoming this barrier to accessing permission to recruit from schools and for schools to be aware of what research studies are available for them to take part in would be a unified system to facilitate research in secondary schools. Presently, such a unified system does not exist. Various systems to facilitate research within National Health Service Trusts throughout England have been developed. Local ethics committees as well as Research and Development departments facilitate clinical research within local health services. One particular example would be the South London and Maudsley (SLAM) NHS foundations development of Clinical Academic Groups (CAGs). Services across SLAM are arranged along CAGs of specialist interest (e.g., psychosis), with the aim of bringing academic and clinical experts in their field to work together to facilitate care and treatment. The CAGs help to facilitate clinical research by providing researchers access to clinical populations, while providing an overview of the various types of research being conducted within the service. This approach allows transparency to know which service users are being approached to take part in research, thus managing the impact of research on service users and ensuring service users are not exploited or overburdened by researchers. SLAM in their collaboration with the Institute of Psychiatry, Psychology and Neurology (IoPPN) at King's

College London are said to produce the most highly cited publications in psychiatry and mental health (Scopus, 2016) than any other university in the world as a result of their approach.

The Schools in Mind Network (SiMN) is the closest example of this within schools. The network provides information and resources to school staff to support the mental health and wellbeing of the children and young people in schools. The network allows school staff to sign up to receive access to events, resources and training. It also provides schools with opportunities for students and teachers in their school to take part in research through links to brief vignettes outlining studies and contact details of the investigators. School staff interested in the research would then contact the investigator for more information and to register interest.

The SiMN network agreed to post details of my study to recruit participants from schools signed up to the network. This avenue for recruitment however proved ineffective for a time-limited doctorate. This is because the SiMN requires the investigator to wait to be contacted by schools. Thus once the advert for the study has been posted there are no active ways to contact members of the network. School staff are very pushed for time and resources, therefore placing the onus on school staff to take time out of their busy schedules to contact a researcher is ambitious. While there was one teacher that expressed interest in taking part in the project, communication with him was sporadic, he expressed that this was a result of time-constraints in preparation for exams. Other schools where I was able to speak with a member of staff expressed similar concerns about their time being very pressured.

Owing to the difficulties in gaining access to secondary schools, a recommendation for future research would be for local schools to develop a more streamlined system to facilitate research with secondary schools combining strategies employed by SLAM CAG with existing SiMN structure. Strategies employed by the SiMN could be further developed by having small committees made up from educational professions from a number of

schools within the local area. These small committees could review vignettes or presentations from researchers, which they could take back to their individual schools. Although schools cannot be arranged along CAGs as seen in healthcare settings, there may be scope for Local Authorities to champion the facilitation of research within schools and hold a central database of research being conducted within the local schools. This would also help to maintain an overview of what students, families and school staff are involved in research in order to prevent a small pool of people being excessively contacted by researchers, as well as ensuring equity across schools.

The second difficulty I experienced with recruitment was with timely completion and returning of the screening questionnaire. Adolescents that expressed interest in the study were given attachment questionnaires to fill in themselves and a copy to take home for their parents to fill in to ensure they were eligible to take part in the study. Adolescents would often report the loss of, and forgetting of screening questionnaires despite expressing a genuine interest in taking part in the project. This resulted in delays and attrition between presenting the study to students and assessing eligibility to take part in the project. Throughout training, I have had experiences of clients forgetting homework tasks, or questionnaires. This would be discussed in sessions, with exploration about ways to remember items for the subsequent sessions. However, this approach was not feasible when recruiting participants during assemblies, or in youth clubs. To remedy this challenge, paper copies of the attachment questionnaires were converted to electronic copies, using Qualtrics. Qualtrics software allows users to upload questionnaires, which can be disseminated to participants via text or email, allowing participants to complete the brief survey on their smartphone, tablet or desktop. The software also allows reminders to be sent to participants if they have not completed the questionnaire. The shift from paper to electronic saw an increase in completion rates of the screening measure. This highlighted to me the growing use of technology and social media in recent times and more specifically

with adolescents. The use of these technologies by researchers may also increase the probability that adolescents will engage in research.

Reflection has highlighted the potential benefits of technology and social media in research. Online technology in the form of software and apps on mobile devices and social media can support research in a number of ways, ranging from recruitment, data collection and scoring of measures. The use of technology and social media both in personal and professional settings have increased in recent years. A recent Pew internet survey in America found that nearly 75% of teens had access to a smart phone, with only 12% reporting that they did not have any type of phone (Lenhart, 2015), these results are similar to UK figures that show 90% of 16-24 year olds own a smartphone (OFCOM, 2015). The increased number of teenagers with smartphones has been linked with an increase in the use of social media with 94% going online daily, or more often (Pew). Owing to the pervasiveness of mobile phones and smart devices with adults and the increasing access adolescents have to them, it seems intuitive that researchers incorporate the use of technology in as many aspects of research as possible to make research as accessible as possible.

Firstly, recruitment for studies can be done via social media, with researchers posting information of their studies on social media sites such as Twitter, Instagram and Snapchat to name a few. As several parents involved in my study did, a short blurb about the study can be sent via WhatsApp to friends and family. It would be important for researchers to consider this in the planning stages of research and for supervisors and ethics committees to consider how recruitment via social media can be done in an effective and safe way.

Secondly technology can facilitate the collection of data in a number of ways. Software such as Qualtrics have unlimited capabilities for presenting questionnaires and experimental tasks through a medium that is accessible for most people as it can be accessed on computers, tablets and mobile phones. This type of software means that data collection no longer needs to only be done in a lab, or specific location, but rather can be

done more flexibly, at the convenience of participants. This increases the likelihood that participants will agree to taking part in studies and completing questionnaires. It also means that research no longer has to be bound to geographic location. Questionnaires and tasks can now be completed by participants around the world, assisting cross-cultural studies.

The use of technology can also greatly improve the quality of data collected. Some software has built in mechanisms and checks such as reminders for incomplete questionnaires and prompts if information is entered incorrectly or incomplete, minimising the likelihood of missing data. If programmed, some software can also score measures, limiting the amount of human error. They are also able to collate the results to be exported to excel for further analysis, saving time on entering data.

Finally, some authors have suggested using social networking sites to capture more naturalistic observations of adolescent experiences, with authors emphasising the ‘rich, ecologically valid data about the nature of adolescents’ computer mediated communications’ (Underwood et al. 2012; Huffaker & Calvert, 2005; Subrahmanyam et al., 2004, Forest & Wood, 2012). Some authors have even gone on to discuss the potential contribution of social networking sites in the early identification of young people who are at an increased risk for a number of psychosocial challenges, including social isolation, deviant behaviour, and psychopathology. This approach moves beyond the scope of research and into a more clinical domain. While having ecologically valid data is incredibly helpful for research, using the data to identify clinical populations has ethical considerations. The first consideration is the issue of consent as adolescents and their parents would need to consent for their data to be used in this way. While parents may agree to it, adolescents may not. For those under 16 who do not legally have to consent this may become a contentious issue. Researchers would also need to carefully consider whether they have the appropriate training and support should they discover a clinical difficulty with any participants.

Despite the challenges and barriers to recruiting from an adolescent population, it has helped me to build on existing skills and develop new strategies in recruiting. The vast

opportunities that technology and social media provide help to overcome many of the barriers to recruitment. They also provide opportunities for creativity and innovation for researchers as the horizon for research locations are expanded beyond the lab and physical locations, but to broader and cyber spaces.

Conclusions

The formal reflection of completing the thesis has generated some interesting insights into how a developmental psychopathology approach can be used to evaluate both clinical and research practice. The process of conducting the thesis has highlighted the need for a standardised approach in reporting and synthesising the psychometric properties of measures in order to make meaningful comparisons of measure quality across studies. It has also highlighted the difficulty of finding an adolescent measure of mentalizing that is developmentally appropriate with good psychometric properties and time-limited. Despite the difficulties faced with measuring mentalization within this demographic reflections on completing the empirical paper provide optimism about how technology can be used in innovative ways to facilitate research at every stage.

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Appendices

Appendix 1. Ethics Approval



UCL RESEARCH ETHICS COMMITTEE ACADEMIC SERVICES

27th September 2016

Dr Stephen Butler Research Department of Clinical, Educational and Health Psychology UCL

Dear Dr Butler

Notification of Ethical Approval Re: Ethics Application 8915/001: The impact of arousal on mentalizing ability in parent-adolescent dyads

I am pleased to confirm in my capacity as Chair of the UCL Research Ethics Committee (REC) that your study has been ethically approved by the UCL REC until 27th September 2017.

Approval is subject to the following conditions:

1. You must seek Chair's approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing the 'Amendment Approval Request Form':
<http://ethics.grad.ucl.ac.uk/responsibilities.php>
2. It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Chair or Vice-Chair will decide whether the study should be terminated pending the opinion of an independent expert. The adverse event will be considered at the next Committee meeting and a decision will be made on the need to change the information leaflet and/or study protocol.
3. For non-serious adverse events the Chair or Vice-Chair of the Ethics Committee should again be notified via the Ethics Committee Administrator (ethics@ucl.ac.uk) within ten days of an adverse incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair or Vice-Chair will confirm that the incident is non-serious and report to the

Committee at the next meeting. The final view of the Committee will be communicated to you.

On completion of the research you must submit a brief report of your findings/concluding comments to the Committee, which includes in particular issues relating to the ethical implications of the research.

Academic Services, 1-19 Torrington Place (9th Floor), University College London Tel: +44 (0)20 3108 8216
Email: ethics@ucl.ac.uk

<http://ethics.grad.ucl.ac.uk/>



Yours sincerely

Professor John Foreman Chair, UCL Research Ethics Committee

Cc: Dami Onagbesan, Applicant

Appendix 2. Participant Information Sheets and Consent forms

Participant Information Sheet for Adolescents

How becoming stressed effects how parents and teenagers talk and get along with each other

Introduction

This information sheet invites you to take part in a research project. We are interested in finding out about the effects of stress on how parents and teenagers talk and interact with each other. Specifically, we think that when parents or teenagers are stressed, like when one of them is going through a stressful time, this can influence how they get along with each other.

So we want to study how stress influences how teenagers and parents get along. By understanding how stress may influence their interactions and relationships, we hope to help young people and parents cope with these stressful times and situations.

Why we would like your help

We would like your help because you are a teenager.

What happens if you agree to take part?

If you agree to take part in the study we will ask you and your parent to first fill in a questionnaire that will determine if you are eligible to take part in the study. This questionnaire will only take about 15 minutes to fill in. Once you fill it in and return to us, we will let you know within 48 hours and arrange a convenient time for you and your parent or carer to attend an appointment that will last approximately 1.5-2 hours.

On the day of your appointment you will have a researcher go through this information sheet with you, answering any questions that you might have. If you are happy to take part in the project you will sign a form to say that you are. You and your parent will then be asked to watch a video and asked some questions about things that you notice in the video. You will also complete a brief task with your parent.

While you are watching video and completing the task, you will be given a portable device that will measure your heart rate for the time that you are with us to let us know how stressed you are. It won't hurt and you will hardly notice it is there.

Rules we must follow:

1. Consent

You do not have to take part in this study unless you want to. If you do not take part, your relationship with the school will not be affected. Everything will carry on as normal.

2. Confidentiality

All the information you give us is confidential, that means it will not be shared with anyone. Only the people helping with the research will have access to any answers that you give. Your parents and teachers will not be able to get access either.

However, if we learn in the course of the study that someone is planning to seriously harm another person or themselves then we would need to inform people that would be involved in stopping that harm. Where we can, we will discuss this with you before we contact any other agencies.

3. Reporting the findings of the study

A report will be written about the results of this study. In that report the results will be presented in a way that no one can identify you or your parent. We can guarantee that information about you will be anonymous because we will talk about groups not individuals.

Conclusion

We hope that what we learn in this study may be used to have a better understanding about how stress influences how parents and young people talk and get along with each other. Understanding these things better can hopefully be used to help parents and young people understand each other better and to deal with the effect of stress on the family.

We do not anticipate that you will become upset or distressed from the discussions you have together for our study, but if you do at any point, we will of course stop.

All young people that take part in the study will be given a £10 voucher for a store of their choice.

If you have any further questions or concerns about this project please contact:

Dami Onagbesan, Chief Investigator on Email: oluwadamilola.onagbesan.14@ucl.ac.uk or Tel:

Stephen Butler Senior Lecturer at UCL Email: stephen.butler@ucl.ac.uk or Tel:

Research Department of Clinical, Educational and Health Psychology, 1-19

Torrington Place, WC1E 7HB

Consent Form – Adolescent

Please complete the following:

1. I have read the information that describes this study
2. I have had an opportunity to ask questions and discuss this study
3. I have received satisfactory answers to all my questions
4. I understand that I do not have to take part in this study and I am free to say I no longer want to take part at any point without giving explanation
5. I understand that any information collected about me from this study will not be shared with anyone it will be kept secure and for the purposes of the study
6. I agree to take part in this study

Name of participant in capitals

Signed

Date

Name of researcher

Signed

Date

Parental Consent Form

Please complete the following:

1. I have read the information that describes this study

2. I have had an opportunity to ask questions and discuss this study

3. I have received answers to all my questions

4. I understand that my child does not have to take part in this study and (s)he is free to say I no longer want to take part at any point without giving explanation

5. I understand that any information collected about my child from this study will not be shared with anyone it will be kept secure and for the purposes of the study

6. I agree for my child to take part in this study

Name of adolescent

Name of parent in capitals

Signed

Date

Name of researcher

Signed

Date

Assent Form

Please complete the following:

7. I have read the information that describes this study

8. I have had an opportunity to ask questions and discuss this study

9. I have received answers to all my questions

10. I understand that I do not have to take part in this study and I am free to say I no longer want to take part at any point without giving explanation

11. I understand that any information collected about me from this study will not be shared with anyone it will be kept secure and for the purposes of the study

12. I agree to take part in this study

Name of participant in capitals

Signed

Date

Name of researcher

Signed

Date

Participant Information Sheet for Parents or Carers

How becoming stressed effects how parents and teenagers talk and get along with each other

Introduction

This information sheet invites you to take part in a research project. We are interested in finding out about the effects of stress on how parents and teenagers talk and interact with each other. Specifically, we think that when parents or teenagers are stressed, like when one of them is going through a stressful time, this can influence how they get along with each other.

So we want to study how stress influences how teenagers and parents get along. By understanding how stress may influence their interactions and relationships, we hope to help young people and parents cope with these stressful times and situations.

Why we would like your help

We would like your help because you are a parent or carer of a teenager.

What happens if you agree to take part?

If you agree to take part in the study we will ask you and your teenager to first fill in a questionnaire that will determine if you are eligible to take part in the study. This questionnaire will only take about 15 minutes to fill in. Once you fill it in and return to us, we will let you know within 48 hours and arrange a convenient time for you and your parent or carer to attend an appointment that will last approximately 1.5-2 hours.

On the day of your appointment you will have a researcher go through this information sheet with you, answering any questions that you might have. If you are happy to take part in the project you will sign a form to say that you are. You and your teenager will then be asked to watch a video and asked some questions about things that you notice in the video. You will also complete a brief task with your parent.

While you are watching the video and completing the task, you will be given a portable device that will measure your heart rate for the time that you are with us to let us know how stressed you are. It won't hurt and you will hardly notice it is there.

Rules we must follow:

1. Consent

You do not have to take part in this study unless you want to. If you do not take part, your relationship with the school will not be affected. Everything will carry on as normal.

2. Confidentiality

All the information you give us is confidential, that means it will not be shared with anyone. Only the people helping with the research will have access to any answers that you give. Your teenager and teachers from the school will not be able to get access either.

However, if we learn in the course of the study that someone is planning to seriously harm another person or themselves then we would need to inform people that would be involved in stopping that harm. Where we can, we will discuss this with you before we contact any other agencies.

3. Reporting the findings of the study

A report will be written about the results of this study. In that report the results will be presented in a way that no one can identify you or your teenager. We can guarantee that information about you will be anonymous because we will talk about groups not individuals.

Conclusion

We hope that what we learn in this study may be used to have a better understanding about how stress influences how parents and young people talk and get along with each other. Understanding these things better can hopefully be used to help parents and young people understand each other better and to deal with the effect of stress on the family.

We do not anticipate that you will become upset or distressed from the discussions you have together for our study, but if you do at any point, we will of course stop.

All young people that take part in the study will be given a £10 voucher for a store of their choice.

If you have any further questions or concerns about this project please contact:

Dami Onagbesan, Chief Investigator on Email: oluwadamilola.onagbesan.14@ucl.ac.uk or Tel:

Stephen Butler Senior Lecturer at UCL Email: stephen.butler@ucl.ac.uk or Tel:

Research Department of Clinical, Educational and Health Psychology, 1-19

Torrington Place, WC1E 7HB

Consent Form – Parent or Carer

Please complete the following:

7. I have read the information that describes this study

8. I have had an opportunity to ask questions and discuss this study

9. I have received satisfactory answers to all my questions

10. I understand that I do not have to take part in this study and I am free to say I no longer want to take part at any point without giving explanation

11. I understand that any information collected about me from this study will not be shared with anyone it will be kept secure and for the purposes of the study

12. I agree to take part in this study

Name of participant in capitals

Signed

Date

Name of researcher

Signed

Date

Appendix 3. Testing Procedure

Script/Procedure

-**Welcome**, seats, water, fire alarm and toilet locations

-**Explanation** of the study:

"Today you will be helping us to find out how parents and teenagers react to challenging situations. You will have these monitors attached to you, they do not hurt, and they will be measuring your heart rate throughout the session.

You will also be doing a number of tasks, you will watch a few videos of people interacting with each other, and you will then answer some multiple choice questions about the video you have watched.

You will also do some tests that have been designed to be mildly stressful and challenging. Most people report that they feel mildly stressed, though some people can respond more strongly. If either if you have any concerns throughout today with any of the tasks let us know and you can stop any part of the activity at any point.

Everything we do here will be confidential. We will not share anything that happens here with anyone outside of the research team. Do you have any questions?"

-**Consent** and Assent forms

-Personal detail forms (ask about highest educational attainment)

- Attach **Heart Rate** monitor to index finger, wait 30 seconds, record reading

- State **Anxiety Measure**

- **MASC** (1st half)

Stress condition

Room set up: Inside the room 2 seats behind a desk, researchers sat down, 2 extra empty seats opposite researchers, camera facing participants' seat. Note pad, pencils.

Stress Task instructions for parent and adolescent

"You will now both be given 2 minutes to prepare a speech that you will present to us. We will make notes, analysing your behaviour and responses. You will also be recorded (point to camera) and the videotape used to analyse and rate your performance by behavioural experts. You will not be able to use your notes during your speech."

Adolescent

Preparation- Give written instructions, paper and pencil (2 minutes)

If they are struggling to think of something to write about, give prompts or cues such as "have you ever been on holiday without your parents/child? Have you ever lost them? Have any of these things happened with another loved one?" If nothing comes to mind, then ask them to imagine if any of these situations occurred.

Take paper and instructions for the speech off them before they begin their speech.

Speech (3 minutes)

If they stop before time is up 'You still have ** seconds left'. ask open ended questions, 'Can you explain that a bit further?' Pick up on specific things they have said and ask them to clarify, focusing on emotions

Arithmetic task – set timer (80 seconds)

"Your second task will require you to work quickly and accurately. You will be given a 4 digit number and will be asked to continue to subtract 5, 4, 3, 2 and then 1 from each answer until told to stop. For example, if I say 20, your answers would be 15, 11, 8, 6, 5 and 0. The task is difficult, so when you make a mistake, you will be corrected and will need to start over again." "Please start from 1027"

If they get any wrong: "stop. Please start again from 1027", 'you need to improve your performance'

[Answers: 1022, 1018, 1015, 1013, 1012, 1007, 1003, 1000, 998, 997, 992, 988, 985, 983, 982, 977, 973, 970, 968, 967, 962, 958, 955, 953, 952, 947, 943, 940, 938, 937]

Measure heart rate

Parent

Preparation - Give written instructions, paper and pencil (2 minutes)

If they are struggling to think of something to write about, give prompts or cues such as "*have you ever been on holiday without your parents/child? Have you ever lost them? Have any of these things happened with another loved one?*" If nothing comes to mind, then ask them to imagine if any of these situations occurred.

Take paper and instructions for the speech off them before they begin their speech.

Speech (3 minutes)

If they stop before time is up '*You still have ** seconds left*'. ask open ended questions, '*Can you explain that a bit further?*' Pick up on specific things they have said and ask them to clarify, focusing on emotion

Arithmetic task – set timer (80 seconds)

"Your second task will require you to work quickly and accurately. You will be given a 4 digit number and will be asked to continue to subtract 10, 9, 8, 7, 6, 5, 4, 3, 2 and then 1 from each answer until told to stop. For example, if I say 30, your answers would be 20, 11, 3, -4, do you understand? The task is difficult, so when you make a mistake, you will be corrected and will need to start over again. "Please start from 2013"

If they get any wrong: "stop. Please start again from 2013", 'you need to improve your performance'

[ANSWERS: 2003, 1994, 1986, 1979, 1973, 1968, 1964, 1961, 1959, 1958, 1948, 1939, 1931, 1924, 1918, 1913, 1909, 1906, 1904, 1903, 1893, 1884, 1876, 1869, 1863, 1858, 1854, 1851, 1849, 1849]

Measure heart rate for both

Control Condition

Room set up: Inside the room 2 seats behind a desk, researchers sat down, 2 extra empty seats opposite researchers. No notes and camera.

Control task instructions for parent and adolescent

"You will now read from this sheet and perform another brief task in front of two researchers. Your reading will not be assessed. You will be given 2 minutes to read through the sheet to make sure you're comfortable with it before reading it aloud. If there are words that you do not know how to pronounce let us know and we can help you. You can make notes."

Preparation – Give reading (2 minutes)

Reading task (3 minutes)

"Please remember your reading will NOT be evaluated. Please begin reading"

Arithmetic task – set timer (80 seconds)

Adolescent & Parent: Researcher B “Your second task we would like you to count up in 5's for example, 5, 10, 15, 20. Again, it doesn't matter if you get these right or wrong. We will give you the next answer and continue.”

If they get any wrong: offer encouragement, give the correct answer and smile.

Measure heart rate

Room A

Second half of **MASC**

Debrief

“Once again we would like to thank you for agreeing to participate in the research that we have conducted today.

We would now like to explain a few things that happened today.

How did you find watching the video?

The video that you watched and questions that came with it were to measure how well we are able to put ourselves in the shoes of others. How well we are able to guess what a person is thinking or feeling. Though you will not get individual feedback about your performance on this task, we will be writing a report of the overall findings and summary of what we have found.

How did you find the speech and numbers tasks?

We have randomly allocated participants to various groups in this project. The tasks were designed to cause participants to experience stress. Research has shown that public speaking and arithmetic can feel quite stressful for most people. When this is combined with the idea that you will be watched and evaluated by others then that stress increases. The reason why we did this was to test to see if the way you felt (stressed) affected your performance on answering the questions from the video. Some people were in the control condition, which was hopefully not stressful at all. This condition was so that we can see how people perform without feeling stressed at all. We hope to see a difference in performance between people who did feel stressed and those that didn't.

You will be pleased to know that we were actually not being scored on your speech or in the arithmetic task. We just wanted you to think you were. You will also be pleased to know that we were not really filming you.

How do you feel hearing that?

Do you have any questions?