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An overview of three research placements and a final written report exploring:

**TACTILE PERCEPTION IN ADOLESCENTS WITH ASD: A PSYCHOPHYSICS
INVESTIGATION INTO TACTILE THRESHOLDS AND THEIR RELATED
SENSORY EXPERIENCES.**

By

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ABSTRACT

The following thesis concerns the experiences, procedures and findings of three individual placements. Although the separate pieces differ in topics, all three research projects are relevant to the area of clinical psychology. During the course of the research placements I have found that the three studies link in terms of providing a foundation for intervention.

The first research project concerns the initial analysis of a scale measuring treatment fidelity of therapists delivering the 5-Step Method, an intervention for family members of individuals with an addiction.

The second piece of research investigated the relationship between Attention Deficit Hyperactivity Disorder (ADHD) and aggression. This research involved a questionnaire analysis of 293 adolescents to assess how ADHD subtypes influence the specific form of aggression manifested.

The final research project investigated tactile sensitivities in adolescents with Autism Spectrum Disorders (ASD). This research assessed both the sensory experiences of individuals with an ASD and how these related to physical tactile thresholds.

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Thesis Overview

The following thesis concerns the experiences, procedures and findings of three individual placements. Although the separate pieces differ in topics, all three research projects are relevant to the area of clinical psychology. During the course of the research placements I have found that the three studies link in terms of providing a foundation for intervention. My initial placement directly concerns intervention delivery through the assessment of a measure of treatment fidelity. Although the later research did not intend to investigate intervention, both concerned core features of neurodevelopmental disorders and have the potential to inform practice, with regards to incorporating associated features into intervention practices, with further investigation.

Throughout my involvement in the various investigations I have gained an insight into the professional standards of research through working collaboratively with supervisors. Professional supervision during the three placements has improved my ability to work as an independent researcher, particularly during my final research project as I continued to work with my supervisor from placement 2 which allowed for more responsibility to be entrusted to me in this final stage. The following three sections reflect upon my experiences and development during the course of the three research projects.

Treatment fidelity and the 5-Step accreditation (V4): A preliminary exploration of a measure of fidelity for implementation of The 5-Step Method.

Placement one centred upon measures of treatment fidelity and the initial exploration of inter-rater reliability for the 5-step accreditation (V4) measure, an observational measure assessing treatment fidelity to delivery of the 5-step

method (a psychosocial intervention for family members affected by a relatives substance addiction: Copello, Templeton, Orford & Velleman, 2010), as well as a qualitative exploration of the raters' comments. Therefore this placement provided an insight into the core foundations of developing and assessing protocols for delivery of an intervention.

The nature of this research allowed for personal development in two main areas: (1) intervention development knowledge and (2) analytical application. Due to having no previous experience with intervention development the notion of treatment fidelity was unfamiliar, as such a primary objective was to conduct a brief literature review. Through this process I have gained knowledge of treatment fidelity and the implications of consistency and adherence to intervention implementation. Due to the research utilising both quantitative and qualitative analysis I was able to apply previous experience with statistical methods and thematic analysis to allow for a coherent and complementary synthesis.

Adolescents, Attention and Aggression: ADHD predictors of aggressive behaviours.

The second placement I was involved in aimed to examine attention deficit hyperactivity disorder (ADHD) in relation to the four distinct manifestations of aggression; Overt, Relational, Reactive and Instrumental (Coie & Dodge, 1998), in order to establish a greater depth to the this acknowledged relationship. The research exposed me to the limitations of the existing literature surrounding associated conditions in ADHD and how conditions such as aggression are related to the core features of this disorder.

Thesis Overview

During the course of this placement I was able to progress as an independent researcher in one core area, participant contact and data acquisition. This study had a large participant sample (N=293), the majority of which were tested in one school day by myself and my supervisor. This has provided me with an insight into the organisation required for test administration to a large sample. It also provided me with the opportunity to develop my skills of delivering test instructions suitable for an adolescent sample.

Tactile perception in Adolescents with ASD: A psychophysics investigation into tactile thresholds and their related sensory experiences.

The final research placement was concerned with another neurodevelopmental disorder category, Autism Spectrum Disorders (ASD). The research centred around tactile processing in ASD, with a focus on tactile thresholds using psychophysics experiments. Throughout this research I became aware of the developing nature of psychological understanding of disorders and the implications of changes in diagnostic criteria.

This placement provided the opportunity for personal development in several areas: (1) the experience of administering both psychophysics and psychometric tests (the British Picture Vocabulary Scale: BPVS-III), (2) knowledge of the application of psychophysics experiments which I had not previously encountered, (3) knowledge of sensory processing within the clinical group of ASD and (4) and an understanding of the changes to the DSM-5 (American Psychological Association, 2013) and how these necessitate the direction of research into recently acknowledge core features of disorders.

Thesis Reflection

During my progression through the individual placements of this MRes I have honed my skills in (1) analysis, through the application of qualitative analysis, varying quantitative statistical techniques and the analysis of psychophysics data, (2) applying appropriate methodology and (3) conducting rigorous literature searches. These skills have developed my ability to not only apply critiques to my own research but to critically appraise the research within my early literature search process to allow for the appropriate inclusion of literature.

Over the course of my research placements I have developed and refined essential skills, particularly reflection within the supervision process and organisational tools. I transferred the use of minutes I first implemented during placement one and continued to keep a record of each supervision. This allowed for the efficient identification of issues raised in supervision due to the numerous objectives, enabling for actions to be prioritised according to time constraints. The minutes also held a further benefit as they acted as an audit trail during the process of writing up the various investigations, allowing for a detailed account of my procedure and enhancing validity

Placement One

TREATMENT FIDELITY AND THE 5-STEP
ACCREDITATION (V4): A PRELIMINARY
EXPLORATION OF A MEASURE OF FIDELITY
FOR IMPLEMENTATION OF THE 5-STEP
METHOD.

Introduction

The 5-Step Method

When examining the historic perspective of substance misuse, both research and policy can be viewed to take an individualistic approach, emphasising the individual addict and ignoring the implications this problem has on family members (Velleman, 2010). Where family members were taken into account they were predominantly considered as pathological or co-dependent (Asher & Brissett, 1988; Orford et al, 2005; Orford, Copello, Velleman, Templeton & Ibanga, 2010). Although recent policies relating to substance misuse have incorporated the needs of family members (National Treatment Agency, 2008; Home Office, 2010), models for therapeutic practice specifically relating to family members affected by substance misuse are lacking (Orford, Copello, Velleman & Templeton, 2010).

In order to address this, the Stress-Strain-Coping-Support model (SSCS model) has been developed (Velleman, Copello & Maslin, 1998). The focus of this model is on the family members affected by a relative's drug or alcohol problem. The model addresses four important areas related to having a relative with an addiction. Firstly it outlines that due to the extreme attachment to an addiction competing with the individual's previous role within the family unit stress can occur for the family members as a result of a reduction in intimacy (Adams, 2008; Orford et al, 2010). Subsequent strain from this stress is evidenced within the literature as affected family members (AFMs) often experience both physical and psychological (depression) health problems. The latter two issues addressed are

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considered to be highly inter-connected as both coping strategies and social support available to AFMs have the potential to influence the stresses experienced by AFMs (Copello, Templeton, Orford & Velleman, 2010a; Orford et al, 2010).

The 5-Step Method is a psychosocial intervention, related to the research of the U.K alcohol, drugs and the family research group, whose core principles originated from the SSCS model in an attempt to address the specific stresses of AFMs and support these individuals in their experiences independent of the relative to whom the addiction remains a problem (Copello et al, 2010a; Orford et al, 2010). The method therefore, attempts to examine the stresses and strains of the family member from their perspective, allowing for providers to equip the individual with information, both about addiction and available support, which will aid their coping behaviours (Copello et al, 2010a). The current coping style of the AFM can then be addressed allowing for exploration of alternative coping behaviours and strategies to employ in the future in response to the stresses of an addicted relative. Once the individual is equipped with methods of coping and accessing further social support the final step of the method aims to address any additional issues that may have become apparent during the sessions to ensure that the individual is able to transfer the skills learned to the real world and establish whether further sessions are needed, network sessions may be employed for this (Copello et al, 2010a; Copello, Orford, Hodgson, & Tober, 2009).

The 5-Step Method has been found to be an effective intervention for supporting AFMs through continuous research evaluating the method both quantitatively and qualitatively. This has been achieved via a series of single cohort studies

demonstrating a reduction in stress and strain symptoms and an increase in effective coping styles (Copello, Templeton, Krishnan, Orford, & Velleman, 2000; Copello et al, 2010b; Templeton, Zohhadi, & Velleman, 2007). However, the level of treatment fidelity has not previously been assessed. The training of providers has over time been expanded to full day workshops, DVD and supplementary training manuals as sufficient training and continuous support is considered to be an important aspect of the method (Copello et al, 2010a). However the extent and level of implementation of the intervention and adherence to the method by the providers is yet to be established.

Treatment Fidelity

Treatment fidelity addresses the implementation of an intervention in accordance of the treatment protocols (Campbell et al, 2012; Gearing et al, 2011; Orwin, 2000). Treatment fidelity often measures the treatment integrity, the level at which the intervention was delivered as intended, and treatment differentiation, the level at which critical facets may differ within the intervention (Borrelli, 2011). However, across the literature reference to treatment adherence and therapist competence are universally acknowledged as core elements to treatment fidelity, being conceptually associated (Resko, Walton, Chermack, Blow & Cunningham, 2012; Schimmel-Bristow, Bricker, & Comstock, 2012). Treatment adherence relates to the extent to which essential facets of the treatment model are delivered within an intervention (Schimmel-Bristow et al, 2012; Tober et al, 2008). Therapist competence refers to the qualitative components of intervention implementation (Breitenstein et al, 2010; Resko et al, 2012). It embodies the level at which the therapist delivered the intervention with regards to their skillset (Breitenstein et al, 2012; Hogue et al, 2008). Skills may relate to communication, responsiveness,

familiarity and comprehension of client issues (Hogue et al, 2008; Resko et al, 2012; Stiles, Honos-Webb & Surko, 1998).

Borrelli et al (2005) state that treatment fidelity concerns the assessment and monitoring of a method in order to enhance an intervention and determine the validity. This procedure is vital as Calsyn (2000) argues that poor treatment fidelity has the potential to affect construct, content and convergent validity, with negative consequences to implementation and outcomes. Treatment fidelity fosters external validity via enabling replication through sufficient guidelines of the treatment model (Bellg et al, 2004; Mowbray, Holter, Teague & Bybee, 2003). This is of particular importance when the intervention is delivered across multiple sites and the instance of therapist diversity in expertise is increased (Campbell et al, 2012; Carroll et al, 2000).

Therefore, accurate measurement of treatment fidelity is necessary for determining treatment effects (Borrelli, 2011; Campbell et al, 2012) and the vital components related to treatment outcomes (Madson & Campbell, 2006; Resko et al, 2012). Treatment fidelity assessment can also identify low fidelity items, allowing for elimination of components of a treatment model which are unnecessary or hinder effective implementation (Resko et al, 2012) and can provide an adequate guide for delivery and monitoring of an intervention (Bond, Evans, Salyers, Williams & Hae-Won, 2000; Mowbray et al, 2003). The importance of this is demonstrated as strong treatment fidelity enhances outcomes of interventions (Durlock & DuPre, 2008), numerous programs assessed as having high-fidelity outperform those with a reported low-fidelity, as stated by Borrelli (2011). There are various methods in the rating procedure for treatment fidelity measures, one method is accounting for the occurrence of

prescribed or proscribed behaviours during a session whereas a more sophisticated scale may incorporate a measure of frequency or the level of adherence to items (Borrelli, 2011).

Borrelli (2011) states that treatment fidelity of therapist training comprises of the regulation of training across therapists to the specification of the model and to monitor the adherence to treatment. Increasing the level of training in providers attenuates deviation from the model, in terms of adherence and therapist competence, to implement the intervention as intended (Kazdin, 2003; Borrelli, 2011). For research purposes, accurate documentation of treatment fidelity can abet clinical supervision and is a crucial factor for the dissemination of a treatment model (Breitenstein et al, 2010). However, despite researchers using scales to rate treatment fidelity, empirical validation of these scales is scarce (Baer et al, 2007).

The nature of the present study was to conduct an initial exploration of a developing measure for treatment fidelity of therapists delivering the 5-step method following training. The investigation consisted of two stages; (i) quantitative and (ii) qualitative analyses and three key study aims were established. These are as follows:

- 1) To conduct a preliminary comparison of (a) inter-rater agreement between two raters who developed the method and conducted the training, and (b) agreement between one of the above raters and the self-rating by the therapists' delivering the 5-step method following a training initiative.

- 2) To perform a qualitative analysis of the comments made in the rating scale (as described in more detail later) to establish (i) issues within the scale overall and (ii) in relation to each of the individual steps.
- 3) To consider the findings from 1 and 2 and make recommendations for refining and further development of the measure.

Method

The 5-step accreditation (V4) measure

Due to the fact that the 5-step method was derived from a theoretical framework (SSCS model) there is an existent framework by which the critical elements of the intervention can be identified and fidelity be assessed for adherence to these using the current scale (O'Donnel, 2008). The 5-step accreditation (V4) measure (Appendix 3) consists of 26 items overall. There are 20 items relating to each of the 5 individual steps (4 for each step), and 6 items related to the therapists general skills (e.g. displaying empathy etc.). For each of the items there is also a qualitative section where the rater is asked to record specific comments for the therapist's delivery. The measure uses a 5-point Likert scale in order to measure the degree to which the therapist conforms to each item, the literature supports the use of a Likert scale often ranging from 5 to 7-point scales (Hogue et al, 2008; Schimmel-Bristow et al, 2012). The scale was used to rate the evidence for each of the items after listening to recorded tapes of the full intervention delivered by each therapist. Each intervention consisted of 5 sessions each covering one step. A total of 55 sessions were audio recorded and were rated using the measure described.

Development of a checklist

Mills and Ragan (2000) identify a five-step process for developing a fidelity checklist; (i) the identification of innovation components, (ii) the identification of further components, (iii) refinement of program, (iv) construction of a checklist and (v) collection of data. During the course of this study a checklist was developed comprising of components which were deemed essential to the program (i) and variations of components (proscribed behaviours ii). A search of the literature was also conducted (Appendix 4) to establish any dominant aspects of fidelity criteria which were apparent across the literature and related to the 5-step method.

After reviewing the full text articles a final sample of 20 articles were deemed relevant for the current study, these were divided into research articles (Appendix 5A) and literature reviews (Appendix 5B). A description of the measures used in the research articles were recorded and were also viewed independently, from this, items for assessment which were consistent throughout the measures were obtained and added to the current checklist (Appendix 6) to enhance the fidelity criteria. Items were incorporated into the checklist if they met the inclusion criteria that the item was (a) a consistent item with a prevalence across the reviewed articles and (b) conducive to the 5-step method. Items were not added to the checklist if they were deemed to not be consistently represented across the articles reviewed or if the item was not appropriate to the style of delivery for the 5-step method. Thus, the checklist comprises of the recommended unique, nonspecific and differentiation components (Bond et al, 2000).

Participants

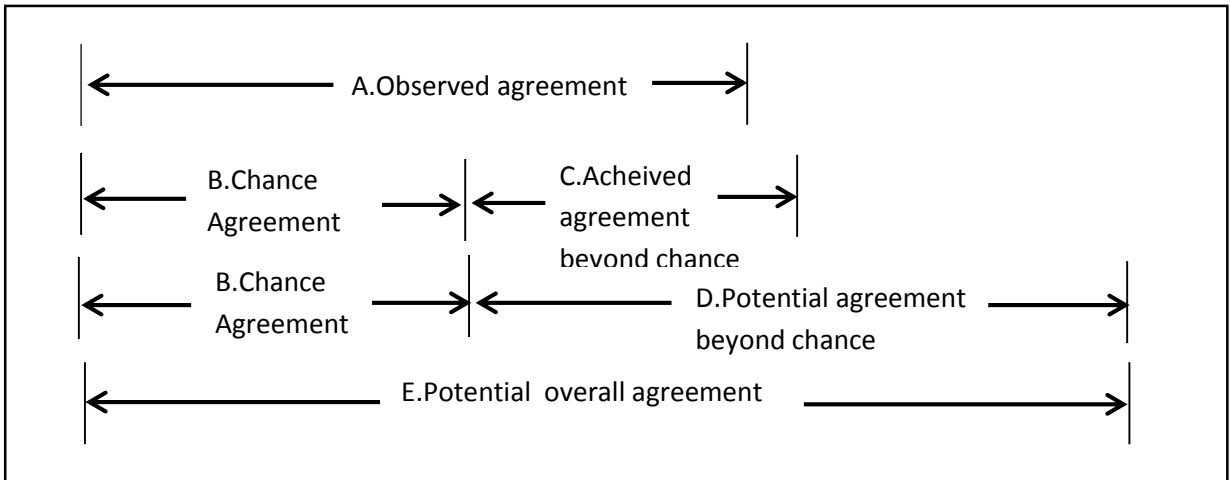
The therapists who delivered the 5-step intervention were selected by a Family Services Network organisation in Ireland, who's clientele consists of family members affected by addiction problems (N= 12). One therapist withdrew from the study resulting in all data for this individual being excluded from analysis, therefore, the analysis is derived from all 5 sessions of each of the 11 therapists. Initially all therapists participated in a one day training workshop on the 5-step method, materials had been provided prior to this including a manual describing the 5-step method and a DVD with descriptions and illustrations on the delivery for each step. Issues covered in the workshop included skill practice, the principles of the 5-step method and discussion on implementation issues.

The raters (N=2) had both been involved in developing the 5-step method and delivered the training workshop to ensure a thorough knowledge of the intended implementation procedure. Sessions were rated by scoring the therapists on the components identified for each step according to the measure (V4) after listening to the tape in its entirety for each session. Due to a limited time scale only 4 therapists cases were co-rated by the two training raters (A & B), however, all 11 cases have been rated by 1 of the training raters and scales were also completed by each therapist as a self-assessment.

Quantitative analysis

Cohen's kappa (1960) measure of agreement was identified as being an appropriate measure of analysis for inter-rater agreement as it takes into account the amount of agreement to be expected by chance.

Figure 1: representation of kappa in relation to chance and overall agreement, Sim and Wright (2005) adapted from Rigby (2000).



$$Kappa = C/D$$

However, a basic kappa does not consider the degree of agreement between observers. Due to the 5-step accreditation (V4) measure being ordinal, as categories reflect varying levels of adherence to the measure there was a need to account for the fact, for example, that a disagreement by 2 scale points carries greater difference than a disagreement of 1 scale point. Therefore, when using an ordinal scale a weighted kappa (Cohen, 1968), is necessary to allow differing levels of agreement to contribute to the kappa (Sim & Wright, 2005). Thus, the kappa coefficient with linear weighting was used for the analysis as this analysis is proportional to the number of categories apart (Brenner & Kliebsch, 1996).

$$K_{lw} = \frac{P_{observed} - P_{expected}}{1 - P_{expected}}$$

Qualitative analysis

Thematic analysis was conducted on the qualitative sections of the scale (V4), within which raters described reasons for the score given for each item and any particular praises or concerns. Thematic analysis was deemed appropriate as it is

a theoretically flexible method for analysing qualitative data (Holloway & Todres, 2003; Braun and Clarke 2006). A theme can be defined as a construct which has a level of prevalence throughout the entire data set and captures an area of the research question (Braun and Clarke, 2006). Boyatzis (1998) define a theme as a concept which demonstrates a pattern throughout the data set, which at a minimal level is descriptive and organises the apparent observations and at a maximum level interprets the construct. The data was therefore coded and categorised into main themes and subthemes according to the apparent prevalence and significance as evidenced in the dataset.

Results

Quantitative data

The data for the scales for each rater (A & B) and the therapists' self-assessments was entered into SPSS 20, however, only a basic kappa was performed using this programme as it does not provide a weighted kappa. Another application was subsequently used to apply linear weighting to the analysis using Vassarstats. Cohen's weighted Kappa (Cohen, 1968) was calculated for the two training raters (A & B) in relation to the 4 cases that were rated by both. This was an attempt to measure the degree of agreement between the expert raters A and B. Agreement between rater A and therapists' ratings was subsequently calculated for all 11 cases.

The mean rating score for rater A was 3.84 (SD, 1.11) whilst rater B had a mean score of 3.15 (SD, 1.09). The value of kappa for this comparison was $K_{lw}=.34$. The interpretation of the observed kappa was conducted according to the suggested categories by Landis and Koch (1977) (Appendix 7). Following this values of kappa

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below 0 show less than chance agreement, .01-.20 slight agreement, .21-.40, fair agreement, .41-.60 moderate agreement, .61-.80 substantial agreement and .81-.99 almost perfect agreement. Following this interpretation of kappa, a 'fair agreement' was found between the two training raters when using the scale to rate therapist implementation of the 5-step method ($K_{lw}=.34$). The therapists' self-assessments had a mean score of 3.39 (SD, .94). Therefore, when ratings between rater A and the self-assessments were compared the value of kappa also falls within the fair agreement category ($K_{lw}=.22$).

Qualitative data

Thematic analysis was conducted on the written section of the measure in two stages; firstly the scale was assessed overall in order to code the data and identify themes relating to issues within the measure as a whole. Three dominant themes were found from the analysis; **structure**, **consistency** and **skillset**. Structure consisted of issues relating to focus and oversight which formed the two subthemes of this theme. Implementation and relevance were outlined as subthemes for consistency as they embodied the main issues within this theme.

Secondly these themes were addressed in relation to each of the individual 5 steps of the measure to assess where within the measure the identified themes were predominantly associated. General skills and the use of the handbook were also included in this second stage of analysis as these were considered crucial components of the method. The results of the analyses for the two stages can be found in tables 1 and 2.

When considering the two stages it can be viewed that the qualitative analysis revealed that whilst the competence of the therapists exceeds the level of

adequacy needed for implementation, the adherence of therapists to the 5-step method needs to be refined. It is likely therefore, that weakness of therapists evident in this rating scale is more likely to emerge from issues of adherence rather than competency.

Table 1: Themes derived from qualitative sections completed by trainer raters A and B and therapists

Theme	Subthemes	Description	Quotes
Structure		The lack of session structure and adherence to the 5-step strategies for individual steps was evident across the board.	'FM described her life. L needed to structure the session more.'
	Focus	One of the apparent subthemes of this was a low level of focus throughout the session and aimless discussion.	'Counsellor uses some reflection but not focused on topic of session'
	Oversight	Ultimately key issues relating to the 5-step method including stresses and coping were often not addressed as a result of poor focus and structure.	'Missed opportunities. Limited exploration' 'Risk not explored in depth here.'
Consistency		This theme concerned the variation in delivery across the therapists and consisted of two subthemes:	
	Implementation	Implementation referred to the inconsistency in following the outlined process for the 5-step method.	'needs to follow 5 step process more' 'Good use of network diagram'
	Relevance	Relevance also occurred within this theme as it appeared that certain items on the scale may not be appropriate for that session depending on client progression, resulting in inconsistency in scoring for these items.	'Could have explored this more but B may have felt not necessary' 'Was not really necessary as a good range of support'
Skill-set		This theme refers to the ability of the therapists in reference to generic therapy skills. All therapists demonstrated excellent ability here and observations were much more positive for generic skills in comparison to 5-step specific implementation.	'Excellent encouraging skills.' 'Good skills to create right atmosphere, encouraging and supportive style'

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Table 2: Key issues identified for each of the 5-steps and general processes

Step	Key Issue	Description
1	Structure	During the first step, therapists demonstrated a need to structure the session more in order to facilitate greater focus, more specific questions and probing in regard to stresses are needed.
2	Consistency	During the session for step 2 it appears that there is an inconsistency between the therapists asking about additional needs of the client and there is an overall lack of assessing the helpfulness of the sessions for the client.
3	Structure	The therapists need to explore the issue of coping further and the advantages and disadvantages of this issue. A few therapists still demonstrate a lack of structure, however the majority of therapists were following the 5-step structure adequately.
4	Consistency	The issues demonstrated during the session for the third step appear to be resolved by the fourth step, there is a good use of the diagram across all therapists. There is also an increased use of checking helpfulness of sessions and use of handbook for FM. There are variations across the therapists during this step, this appears to be due to differentiations in the clients' needs by this point. It does need to be taken into account when using the scale for items 4.3 and 4.4 that these items were shown not to be relevant for many clients. Thus consideration of this is needed to ensure appropriate marking of the therapist when these issues are lacking for appropriate reasons
5	Consistency	The issue of relevance of items for step 5 for clients also needs consideration when marking, there was variation across the board for the need of all 4 items at this stage as clients were progressing at different levels. Another issue which became apparent at this stage was that some therapists were considered to be discussing their own experiences excessively disrupting the clients' reflections. This could be due to many of the therapists having previous personal experiences of family addiction, although this increases the understanding which can be viewed in the strength of the relationship developed, personal disclosure of therapists needs to be addressed in the future.
Handbook	Consistency	There is a large variation across the therapists; some demonstrate excellent use of the handbook which often has been shown to improve session structure and integrating reflection. However some therapists do not appear to use the handbook effectively.
General skills	Skillset	Despite therapists displaying a need to refine 5-step specific issues of the implementation, all therapists were viewed to be strong on generic therapists' skills. All therapists appear to have very good skills in creating a trusting relationship with the client, however one therapist did mention that recording the sessions did have a negative impact on the relationship formed and the client's ability to be open. The therapists also demonstrate good skills in positive support for the client and normalising the situation.

Discussion

This study presents the initial exploration of inter-rater reliability for the 5-step accreditation (V4) measure, an observational measure assessing treatment fidelity to delivery of the 5-step method as well as a qualitative exploration of the raters' comments. The qualitative analyses complemented the quantitative findings and therefore both findings have been synthesised within the following discussion.

The qualitative analysis suggests the therapists' have the ability to execute the skills identified as being important to competency (Hogue et al, 2008; Resko et al, 2012). However, it was identified that there was an overall issue of adherence to the intended 5-step method. The analysis identified a particular issue of relevance within the items for steps 4 and 5, when considering the phrasing of step 5 items, 3 out of 4 of the items state '(if relevant)'. However, there is no instruction as to how the therapist should be rated if this is irrelevant and how the relevance should be established, by the therapist or rater. The fact that there was no standardised procedure for rating the items considered sometimes irrelevant may explain some part of the failure for the two trainer raters to reach a higher level of agreement considering they had both developed the 5-step method. The items identified therefore could be rephrased to allow for adherence to be more accurately assessed.

This was further demonstrated by the fact that when items for steps 4 and 5 were removed after the qualitative analysis identified the issue for consistent rating, the level of agreement increased, resulting in a 'moderate agreement' ($K_{lw}=.41$).

Resko et al (2012) states that items deemed to hold a low level of fidelity should

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be eliminated. One could therefore suggest that the items in step 4 and 5 need to be reassessed as these are not always necessary for effective implementation.

Another explanation for the modest kappa result of .34 for the two raters can be viewed when assessing the developed checklist. When assessing the level at which the current measure incorporates the items identified by the developed checklist it is apparent that the scale does not account for many of the items relating to session management. Due to structure being a predominant theme this can be considered problematic as many therapists demonstrated weak session management. A consequence of session management not being directly measured was raters' incorporating this issue into the score for each step with no protocol for how this should be conducted. Having items relating specifically to session management, including structure and summarising, may therefore increase raters agreement as there would be a standardised method of rating this issue.

A limitation of the study was the small number of co-rated sessions available to assess inter-rater agreement. The early stage in development of the scale also resulted in many issues to be rectified as mentioned, however, this merely reflects the initial stage of work the measure is in as opposed to a weak analysis as this process was intended for development and not validation.

The study offers much in the way of recommendations for development, a further development may be to reduce the scale to three points as this increased agreement to .43. This is of particular relevance as this scale is intended to be the means of establishing suitability for accreditation in the 5-step method, fair agreement of the two raters therefore, may not be deemed satisfactory, and

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collapsing the scale to 3 points would reduce the possible degree of variance. Specific instructions for raters should also be developed to ensure there is a standardised procedure in order to prevent rater drift and increase inter-rater reliability (Molloy & Standish, 1997; Hogue et al, 2010; Campbell et al, 2012). The primary areas of development are therefore; standardised rater instructions, refinement of identified items and alteration of the scale to three points instead of the current 5 point system. Increased training for providers is also a recommendation as within the literature this is identified as enhancing adherence to a model (Kazdin, 2003; Borrelli, 2011).

One area for future research, once the scale has incorporated the suggested developments, would be to examine the degree to which adherence, competence and generic skills predict client outcomes. This would enhance the existent research which is diverse in conclusions relating to the relationship between treatment fidelity and outcomes (Webb, DeRubeis & Barber, 2010), this would also generate further information of the active ingredients within the 5-step method. Most notably this investigation illustrates the importance of research reporting the procedure of validation of scales for treatment fidelity as the various limitations inherent in a scale are identified (Baer et al, 2007).

Reflection

The following study presents the work carried out during a placement with Professor A. Copello. The placement centred upon an intervention for family members affected by substance abuse, The 5-step method, and a measurement of fidelity which has been developed to monitor the training of therapists implementing this method. Aims and objectives for the placement were discussed and a contract between myself and my supervisor was developed (Appendix1).

The primary aim of this placement was to assist in the analysis of a measurement for therapist treatment fidelity when delivering the 5-step method. Due to previously having no experience with the area, a primary objective was to familiarise myself with the different aspects of the placement; treatment fidelity, scale measurement and the 5-step method. My supervisor initiated this process by providing exemplary materials by which I extended my research.

This developed into a further objective, to conduct a brief literature review of the area of treatment fidelity measurement. A basic literature search was conducted to retrieve appropriate sources of fidelity measures and produce an unbiased representative of measures currently applied to assess treatment fidelity. Through this process I was able to refine my literature searching skills as I was advised of the correct method for retrieving articles through databases and the appropriate elimination of irrelevant articles.

Another key aim was to conduct analysis on the measure devised to assess the 5-step method; this was to consist of both a quantitative and qualitative assessment

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of the data. Reflecting on my previous experience with qualitative analysis I intended to use this opportunity to enhance my quantitative analysis skills, with a greater emphasis on the statistical approach utilising the qualitative element to support the statistical findings and add contextual understanding. I therefore dedicated an ample amount of time to researching the statistical methods often associated with inter-rater agreement with direct reference to the articles I had retrieved through the literature search. After establishing common methods for this analysis I researched statistical techniques for the form of measurement in this investigation as it used a 5-point ordinal scale. Through this research I found that the basic form of kappa (Cohen, 1960), would not be suitable as it fails to consider ordinal categories, however, the weighted kappa (Cohen, 1968), accounts for the ordinal difference in agreement and therefore would provide a more reliable analysis of the measurement.

Through my research I was confident that I had identified the most appropriate method for analysing the current measurement, however, it soon became apparent that SPSS, the advocated statistical programme within the department would not conduct the weighted kappa. I therefore had to search for an alternative statistical programme which would compute this method, I sought advice for this as through the literature it was evident that such programmes were scarce and was eventually able to locate a sufficient device. Though this was problematic, the process did give rise to greater knowledge in the area of statistical programmes as I had previously only used SPSS. As such I have now gained insight into the various other programmes available for further statistical methods and have had first-hand experience with an alternative programme.

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Throughout the placement I feel that I have also developed in maturity to approaching my workload as I utilised organisational tools I had not previously. One method that was of great benefit and I intend to apply to future pieces of work was the use of minutes (Appendix2), particularly when conducting work that requires collaboration with others or tasks requested by a supervisor. I maintained a record of each meeting with my supervisor and this was of great assistance when I had numerous objectives as I was able to structure my time to adequately deal with each task in an efficient manner. It was also an aid when addressing my report as I found I had a detailed account of the process I followed for each stage of the placement.

Through this placement I have gained invaluable skills including literature searching, new statistical methods and how to apply for ethics as I assisted in a university ethics application for this research. This placement has been a great benefit as I have gained confidence in conducting quantitative analysis. However, I believe that the most important learning outcome was the knowledge I have acquired of treatment fidelity. This was an issue which I had previously had no experience with but will be of great benefit in the future as I intend to pursue a career in clinical psychology. Understanding the issues of fidelity to implementation will be of a great advantage for my personal development as a clinical psychologist but also as a researcher should I conduct any intervention research.

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Appendix 1

MRes Placement One Contract

Student Name: Saffron Morris

Programme: MRes Clinical

Placement Supervisor: Prof Alex Copello

Placement working title: Families and Addiction: Feasibility and preliminary evaluation of a measure of fidelity to the delivery of the 5-Step psychosocial intervention

Aim: To conduct a literature review on the development of process rating scales for psychosocial interventions. To assist with the analysis and interpretation of ratings of sessions delivered by a range of counsellors delivering the 5-step method. To assist in the completion of a University ethics application.

Planned work of the student:

Saffron to familiarise herself with relevant literature including process and intervention measurement and the 5-step method for family members affected by addiction problems

Saffron to prepare a University ethics submission

If required, complete preparation of ethics application

Prepare a literature review on the development of measures for the delivery of addictions interventions

Conduct analysis of rating scales completed by both assessors and trainees including qualitative components such as challenges and advantages of delivering the 5-step intervention

Write final report

Contributions of supervisors:

Provide initial academic references in the area related to the 5-step method and process rating scales

Provide relevant materials including DVD of the content of the 5-step method

Provide guidance on ethical application

Hold weekly meetings with student as required

Provide supervision on analysis of rating scales and writing up

Appendix 2

Placement One

Minutes of First meeting with Prof Alexandre Copello

The purpose of this meeting was to develop a contract of my duties for this research placement and the supervisors contribution.

We therefore discussed the overall project aim and how this would shape the focus of my report. My objectives were derived from this; I will familiarise myself with the method, produce a literature review and possibly prepare a university ethics application and analysis or ratings.

It was discussed that at the present moment in time it was not yet certain whether an ethics application would be needed, as such the weight of the literature review and possible data analysis are still to be defined.

However, the content of the literature review and form of analysis that would be required were both outlined. A written contract was then produced outlining the aims and objectives of the placement (see appendix 1).

Minutes of Second meeting with Prof Alexandre Copello

The purpose of this meeting was for an update on the progress of my work during the placement.

We therefore started the meeting by discussing the work I had been carrying out for a literature review. I presented a map of my search and we discussed how I had reached my finalised items and how we could elaborate on the inclusion/ exclusion criteria for these items and the possibility to refine the search further to only those concerning addiction. It was agreed that I would email the abstracts of the final articles so they could be assessed by the supervisor for relevance.

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We then addressed the issue of ethics as at the previous meeting it had not yet been finalised whether ethical approval would be needed for this placement. We are now aware that ethical approval is needed and so I shall complete a university ethics form together with the supervisor. We discussed my contribution to this ethics form, being that I shall add my personal details, read through the already completed sections and check the clarity and add any necessary information such as the use of Kappa statistics.

As a result of this I shall also familiarise myself with Kappa statistics. This is for the use of the analysis later in my placement. The possible directions of analysis were also discussed with the intention to later clarify the specific analysis to be used. A date for the next meeting was then set.

Minutes of Third meeting with Prof Alexandre Copello

This meeting primarily addressed issues concerning the final written report for this placement.

Firstly it was discussed in what way I should now focus my literature search to apply this to an introduction, organising article types into reviews and specific examples of measures was decided to be the best way. It was agreed that I would email Prof Copello a table of summaries for these two categories before our next meeting on the 19th November. We also discussed the main areas the introduction should cover, being, an over-view of the 5- step method and research on helping families affected by addiction and research regarding the measurement of fidelity to treatment.

It was decided that this shall be my focus for the next 2 weeks before addressing the method and analysis.

Minutes of Fourth meeting with Prof Alexandre Copello

The purpose of this meeting was to discuss my introduction to the report and outline areas which needed to be addressed further and my findings from the literature I had reviewed in order to establish how to proceed with the analysis.

It was decided that I will enhance a table of the literature I have developed to include specifics about the scale used in each study. This would enable for commonalities of criteria for fidelity scales to be identified and I will therefore be able to establish a table of criteria for a good scale. The form of analysis was then discussed and it was agreed that my supervisor and I will both research for the most appropriate statistical test to be used.

Minutes of Fifth meeting with Prof Alexandre Copello

The objectives of this meeting were to finalise the analysis procedures. The form of analysis was agreed upon, a weighted kappa, prior to this meeting via e-mail communication. It was then decided during this meeting how this will be achieved due to difficulties finding an appropriate programme. The qualitative analysis was also discussed in more depth, it was agreed that this shall take two forms, identifying overall issues and then assessing the data further to see where in the steps specific issues occurred.

It was decided that I shall conduct the analysis and to e-mail my supervisor with any arising issues. I will then discuss my written report once completed.

Appendix 3

5-Step Accreditation (v4)

Score: 1 = Very Poor. 2 = Poor. 3 = Acceptable. 4 = Good. 5 = Excellent. Can use .5 scores as necessary eg 3.5

Table 1: 5 Step Skills Pass Rate = overall, each section must score 70% (ie mainly a mix of 3's and 4's/5s). If an item is not relevant, give a 0 and then only calculate the Percentage using the number of items where there are scores. (The percentage is calculated by adding together the scores on the items in that section, dividing by the maximum score on those items, and multiplying by 100. EXAMPLE – in Section 1, someone scores 3, 4, 4 and 3 on the 4 items: = $14/20 = 0.7 \times 100 = 70\%$. In Section 3 (Coping), someone scores 3, 4, 4 and 0 (ie it was not relevant for this person to discuss alternatives), so the percentage is $11/15 = 0.733, \times 100 = 73.3\%$) There may be unusual circumstances where someone fails on a section but where you still feel that they should pass overall - if so, add explanatory comments.

Table 2: Counselling and Other Skills Pass Rate = 4 for each item. Again, if an item is not relevant (eg use of handbook for someone eg with literacy problems), it can be discounted.

In summary at end, state Pass / Pass with reservations (state how needs to improve) / Fail.

NB. Tape can be listened to at fast speed

NAME of Counsellor: ; NAME of Rater:

Table 1: 5-Step Skills

No	Step	Score 1-5	Pass/Fail. Comment on where and how to improve
1	Step 1: Listen, reassure and explore concerns		
Length			
1.1	Allow family member to describe situation and tell their story, listen to and ask about the FM's concerns and fears. Use Q as necessary after FM has given a general description. Summarise the situation to check if understood correctly.		
1.2	Identify relevant stresses and how the FM has been affected.		
1.3	Identify relevant stresses and how others have been affected.		
1.4	Normalise the experience of FM's giving the FM an indication that they are not alone with their experiences.		
1.5	Step 1: Total Score		

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2	Step 2: Provide relevant, specific and targeted information (BOTH about be about drugs/alcohol and/or other key issues of relevance)		
Length			
2.1	Identify/check areas where FM needs more information etc. and appropriately present targeted & relevant information to FM, and discuss this with FM (may have been started in Step 1).		
2.2	Give FM information on where they can find out more about identified issues e.g. websites, reading, organisations etc.		
2.3	Explore whether the FM has any other needs in relation to knowledge and information etc..		
2.4	Counsellor checks with FM if session has improved knowledge, understanding & awareness, and/or reduced stress and anxiety.		
2.5	Step 2: Total Score		
3	Step 3: Explore coping responses		
Length			
3.1	Ask FM about current coping responses (may include discussion of ways of coping).		
3.2	Explore advantages and disadvantages of current coping responses.		
3.3	Facilitate FM to see that there is no right or wrong way of coping (may include discussion of ways of coping).		
3.4	Explore advantages and disadvantages of alternative ways of coping (if relevant).		
3.5	Step 3: Total Score		
4	Step 4: Discuss social support		
Length			
4.1	Discussion of who/what/why is helpful and unhelpful in terms of social support (use of a network diagram may be used to guide this discussion).		
4.2	Explore how to develop/continue to develop positive social support.		
4.3	Explore potential new sources of support (could be linked to those named in the network diagram or filling in gaps in social support).		
4.4	Discussion about improving communication within the family and reaching a more unified and coherent approach.		
4.5	Step 4: Total Score		

Placement One

5	Step 5: Discuss and explore further needs (can be about drugs/alcohol and/or other key issues of relevance)		
Length			
5.1	Discuss FMs need for further help and (if relevant) how this can be actioned. Use Q as necessary after the FM has described what is helpful/unhelpful		
5.2	Discuss help needs of key other FMs and (if relevant) how this can be actioned.		
5.3	Discuss help needs of the using relative and (if relevant) how this can be actioned.		
5.4	Review of work over 5-Step sessions, goals achieved, changes made etc. Explore what FM has found helpful about the sessions. Use Q as necessary after FM has given a general description.		
5.5	Step 5: Total Score		
6	Total Score		
	Comments on where improvements are needed		

Table 2: Counselling and Other Skills

Table 2: Counselling Skills Pass Rate = 4 for every area. In addition in order to be accredited, good counselling skills must be demonstrated i.e. 4 for every area.

Score: 1 = Very Poor. 2 = Poor. 3 = Acceptable. 4 = Good. 5 = Excellent

No	Skill	Score 1-5	Pass/Fail. Comment on where and how to improve
1.1	Creation of a relationship of trust (warmth, genuineness, and empathy)		
1.2	Careful listening, the giving of minimal encouragers, the asking of appropriate questions, reflecting both the verbal and emotional content of what has been said, summarising, and sensitivity to cues whether verbal or non-verbal, direct or indirect.		
1.3	Allowing silences and the expression of emotions - anger, anxiety, depression, sadness; expression of feelings can be cathartic, alter feelings and improve self-esteem.		

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1.4	Offering positive encouragement, reassurance and support, reminding people of their strengths and expressing hope and optimism that change is possible.		
1.5	Use of 5-Step resources e.g. self-help handbook and/or exercises in the handbooks.		
1.6	Management of issues associated with risk and safety if relevant – e.g. domestic abuse and violence, safeguarding concerns and/or mental health.		

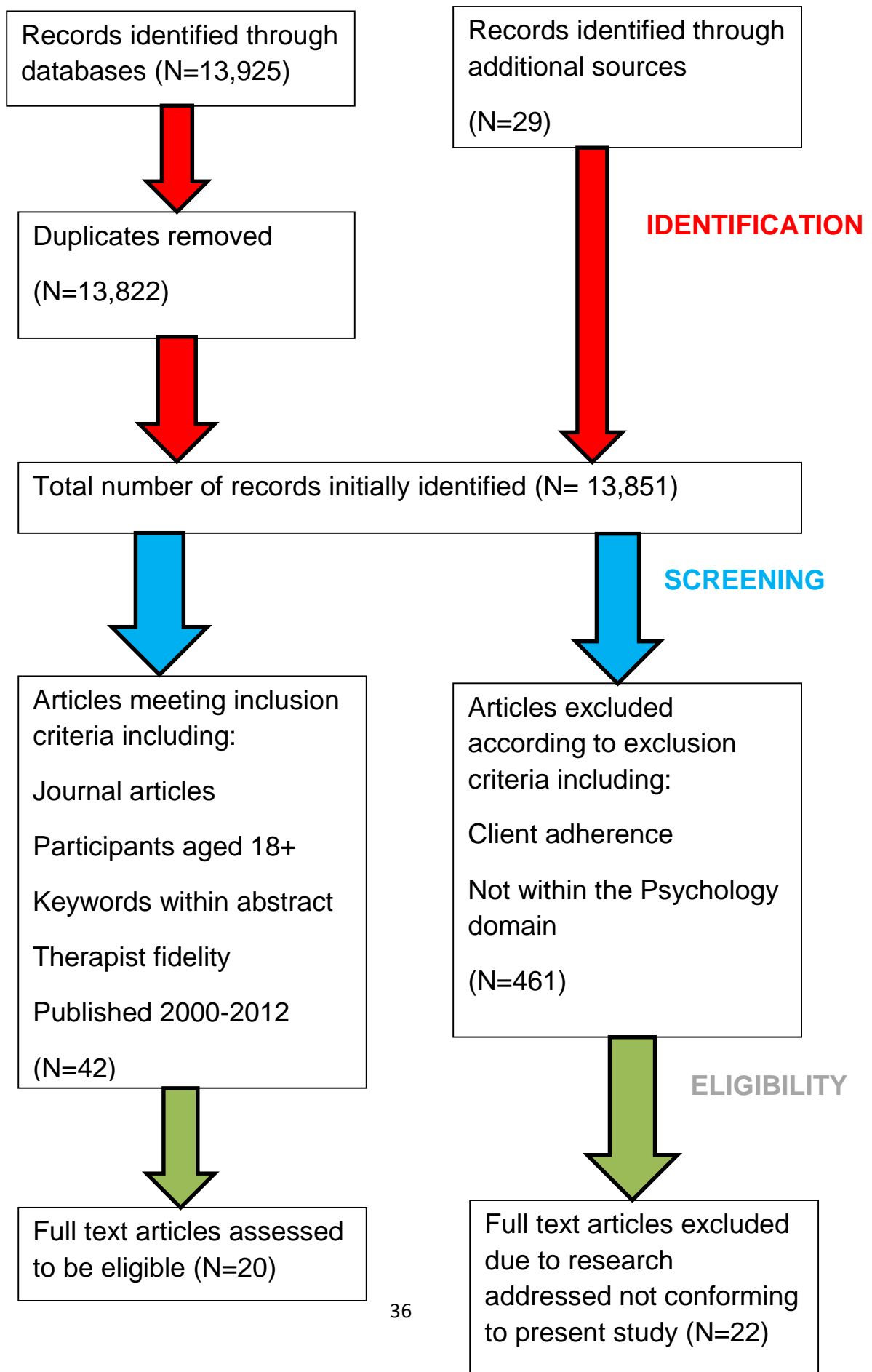
SUMMARY:

PASS:

PASS WITH RESERVATIONS (ADD COMMENTS):

FAIL:

Appendix 4



Appendix 5A

Table of articles reporting the measurement of scales

AUTHOR	Year	TITLE	INTERVENTION	MEASURES	SUMMARY	DESCRIPTION OF SCALE
Resko et al	2012	Therapist competence and treatment adherence for a brief intervention addressing alcohol violence among adolescents	motivational interviewing (MI)	Content adherence scale GROMIT SECT	The study used 3 separate observational measures for fidelity to treatment. Therapists competency and their adherence to treatment were examined. Findings support the validity of the measures used in this study to reliably measure the behaviour of therapists in MI.	<p>The content adherence scale is a 15-item scale developed from the YACS (Carroll, 2000).items address the extent to which individual components of the intervention are delivered or not delivered.</p> <p>The GROMIT is a 16-item scale to measure the competence of the therapist, their skill and responsiveness according to a 7-point likert scale.</p> <p>The SECT is a 5-item measure adapted from the Motivational Interviewing Skill Code's (Miller & Mount, 2001) consisting of both global and self-exploration items on a 7-point likert scale.</p>

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Hogue et al	2008	Assessing fidelity in individual and family therapy for adolescent substance abuse	Individual CBT Multidimensional family therapy (MDFT)	TBRS-C VTAS-R	The report examined therapists fidelity to the core therapeutic goals of the 2 interventions alongside 26 discrete techniques from the original TBRS. Assesses therapist competence alongside their adherence to treatment. The study examined the inter-rater reliability, construct validity and discriminant validity of the measure for assessing competence and treatment adherence in the 2 interventions for adolescent substance abuse.	The TBRS-C is an observational measure which uses a 7-point likert scale to measure both the treatment adherence and therapist competence for CBT and MDFT separately for each item. The VTAS-R is a modified version of the original VTAS scale (Hartley & Strupp, 1983). It is a 22-item scale to measure the therapist-client relationship and therapeutic alliance.
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Placement One

Campbell et al	2012	Assessing treatment delivery in group and individual 12-step facilitation	Group TSF Individual TSF	TSF ACES	The study reports the development of the scale and assesses its reliability for both interventions. The relationship between treatment fidelity and patient outcomes was also assessed.	The TSF ACES fidelity rating scale was based on previous adherence scales for the 12-step intervention. The scale uses a 6-point likert scale. The scale measures both adherence and competence as well as empathy, proscribed behaviours and global session performance. Competence ratings are provided for all adherence items on the measure. Proscribed behaviour items were to address the level of behaviours within each session that detracted from delivery as intended.
Schimmel-Bristow et al	2012	Can acceptance and commitment therapy be delivered with fidelity as a brief telephone intervention?	Acceptance and commitment therapy	Multidimensional 'ACT Now' therapist fidelity rating manual	The study examined therapist competence and treatment adherence in the first telephone based intervention for ACT. This was in order to establish whether ACT can be delivered effectively in terms of therapist competence and treatment adherence via the phone.	Measures the 6 core ACT processes as well as the therapists behavioural intervention processes; therapy support, contingency management, overall adherence and overall competence using a 1-5 scale.

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Martino et al	2008	Community program therapist adherence and competence in motivational enhancement therapy.	Motivational enhancement therapy (MET) Drug counselling as usual	ITRS	The report assessed the fidelity of addiction treatment programs in order to verify whether these could be discriminated from other standardised forms of counselling. The study also assessed whether therapists could deliver MI or MET with adherence and competence.	The independent tape rater scale (Ball et al, 2002) was developed from Carroll et al (2000) YACS. It is a 39 item scale using a 7-point likert scale to measure the presence or absence of intervention behaviours.
Barber et al	2004	Therapists adherence and competence and treatment discrimination in the NIDA collaborative cocaine treatment study.	CT Supportive-expressive dynamic therapy Individual drug counselling Group drug counselling	CTACS AC-IDCCD ACS-SEC	The report assesses the interjudge reliability and the internal consistency measures used in the NIDA CCTS according to the measurement of adherence and competence. The report makes an attempt to determine the possibility of discrimination between the 4 forms of treatments.	CTACS is a 21- item scale derived from the Cognitive Therapy Scale (Young & Beck, 1980). It measures adherence, appropriateness of the intervention frequency and the quality of the therapists delivery using a 6-point likert-type rating system. The AC-IDCCD is a 43-item scale using a 7-point rating scale for adherence and competence separately. The ACS-SEC is divided into three subscales; a 13-item supportive scale, a 31-item expressive scale and an 11-item cocaine abuse scale. A 7-point likert scale is used to measure adherence, quality and appropriateness separately for each item.

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Hahn et al	2002	Efficacy of training and fidelity of implementation of the life skills training program.	LST program	Series of checklists, non-specified	The report assessed the effectiveness of implementation of the LST program within middle schools and found that implementation fidelity was relatively high.	N/A non-specified.
Carroll et al	2000	A general system for evaluating therapist adherence and competence in psychotherapy research in addiction.	CBT TSF Clinical management (CM)	YACS	The article reports the development and assessment of the YACS validity for measuring competence and adherence to treatment in psychotherapy for addictions.	The YACS 40-item scale which measures adherence and competence individually for each item using a likert scale. The items measure interventions, behaviours and processes which are essential to the treatment and unique to the treatment, essential but not unique, acceptable but not essential and proscribed.
Tober et al	2008	Validation of a scale for rating the process of delivery of psycho-social treatments for alcohol dependence and misuse: The UKATT process rating scale.	MET Social behaviour and network therapy (SBNT)	UKATT process rating scale	The article reports the development of the scale and assesses the validity of the scale. It reports that it is able to reliably identify and distinguish between the two treatments it was designed to measure.	A 26-item scale divided into three subscales; session management (6 items), Specific tasks (13 items) and therapist style (7 items). Two 5-point likert scales were used to rate each item, one for adherence and one for competency.

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Carroll et al	2007	A conceptual framework for implementation fidelity	N/A	New framework	The article presents a new framework for measuring implementation fidelity. The article is not a study by which the framework is tested but a discussion of its structure and the need for a measure such as this.	The framework addresses moderators, the relationship between moderators, quality of delivery, client responsiveness, facilitation strategies and adherence.
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Appendix 5B

Table of literature reviews

AUTHOR	YEAR	TITLE	INTERVENTI ON	MEASURES	SUMMARY
Borrelli et al	2005	A new tool to assess treatment fidelity and evaluation of treatment fidelity across 10 years of health behaviour research.	N/A	25 item checklist	The review reports the development of checklist based on a framework to evaluate treatment fidelity. The review then applied this measurement to the literature to assess how all 5 components of the framework (design, training, delivery, receipt & enhancement) have been addressed over the last decade in key journals publishing health behaviour change research.
Borrelli	2011	The assessment, monitoring and enhancement of treatment fidelity in public health clinical trials.	N/A	25 item checklist	A review of treatment fidelity according to the previously stated framework, outlining this model as a means for implementing fidelity in studies. It refers to the previous review and draws conclusions on the value treatment fidelity has to scientific research.
Calsyn	2000	A checklist for critiquing treatment fidelity studies	N/A	A checklist for critiquing quality of a fidelity measure	The report reviewed the literature of fidelity measures and draws on important aspects of measuring fidelity and the implications of doing so. The report then reviews 2 papers in reference to these findings.
Resnick et al	2005	Examples of implementation and evaluation of treatment fidelity in the BCC studies: Where we are and where we need to go.	Health behaviour change interventions	Guidelines developed for treatment fidelity	A review of studies whereby the guidelines for treatment fidelity in health behaviour change were implemented.

Placement One

Mowbray et al	2012	Fidelity criteria: Development, measurement and validation.	N/A	N/A	The article reviewed the literature in order to define fidelity criteria; development, measurement and validation processes, identifying the critical steps in each process.
McHugh et al	2009	Balancing fidelity and adaptation in the dissemination of empirically-supported treatments: The promise of transdiagnostic interventions.	N/A	N/A	The article addressed the lack of evidence for fidelity assessment within the literature and supports the use of transdiagnostic interventions.
Gearing et al	2011	Major ingredients of fidelity: A review and scientific guide to improving quality of intervention research implementation.	N/A	N/A	A review of the literature identifying the core components of treatment fidelity in an attempt to provide a comprehensive tool to be used for measuring treatment fidelity
Madson & Campbell	2006	Measures of fidelity in motivational enhancement: A systematic review.	MI	N/A	A systematic review of measures that have been developed for the assessment of treatment fidelity in motivational interviewing
Breitenstein	2010	Implementation fidelity in community-based interventions.	N/A	N/A	The article reviews the literature intending to define implementation fidelity and its importance within a research context.
Baer et al	2007	Training and Fidelity Monitoring of Behavioural Interventions in Multi-Site Addictions Research: A Review	N/A	N/A	A review of the treatment fidelity within multi-site trials for substance abuse research, highlighting the limited empirical support for fidelity measures.

Appendix 6

Developed checklist

Session management

Maintaining session structure- adherence to 5-steps/ competence in appropriateness

Agenda setting- adherence to 5-steps/ competence

Explanation of session

Reviewing inter-session change

Consistency of problem focus- adherence to 5-steps/ competence

Contingency management- adherence to 5-steps/ competence

End of session summary

5-step method delivery- adherence/ competence

Proscribed behaviours- quantity of behaviours detracting from intervention

Goals- adherence to 5-steps/ competence in appropriateness

Specific tasks

Identify sources for support- adherence to 5-steps/ appropriateness

Elicit self-efficacy for change- adherence to 5-steps/ appropriateness

Eliciting optimism- adherence to 5-steps/ appropriateness

Eliciting commitment to change in coping styles- adherence to 5-steps/
appropriateness

Provided feedback- quantity/ appropriateness

Expressed interest in clients goals and values- adherence to 5-steps/
appropriateness

Therapist style

Empathy- quantity and skill level

Exploration of feelings- quantity and skill level

Reflective listening- quantity and skill level

Therapist as task orientated

Therapists as active agent for change

Interpersonal focus

Therapist skills

Responsiveness

Appendix 7

Statistics data and interpretation tables

Table 1: Rater A and Rater B weighted kappa and mean scores

	Observed Kappa	Std error	.95 confidence interval		Mean	Std deviation
			Lower	Upper		
	0.34	0.03	0.28	0.39		
Rater A					3.84	1.11
Rater B					3.15	1.09

Table 2: Rater A and therapist self-assessment weighted kappa and mean scores

	Observed Kappa	Std error	.95 confidence interval		Mean	Std deviation
			Lower	Upper		
	0.22	0.02	0.19	0.26		
Rater A					3.84	1.11
Self-assess					3.39	.94

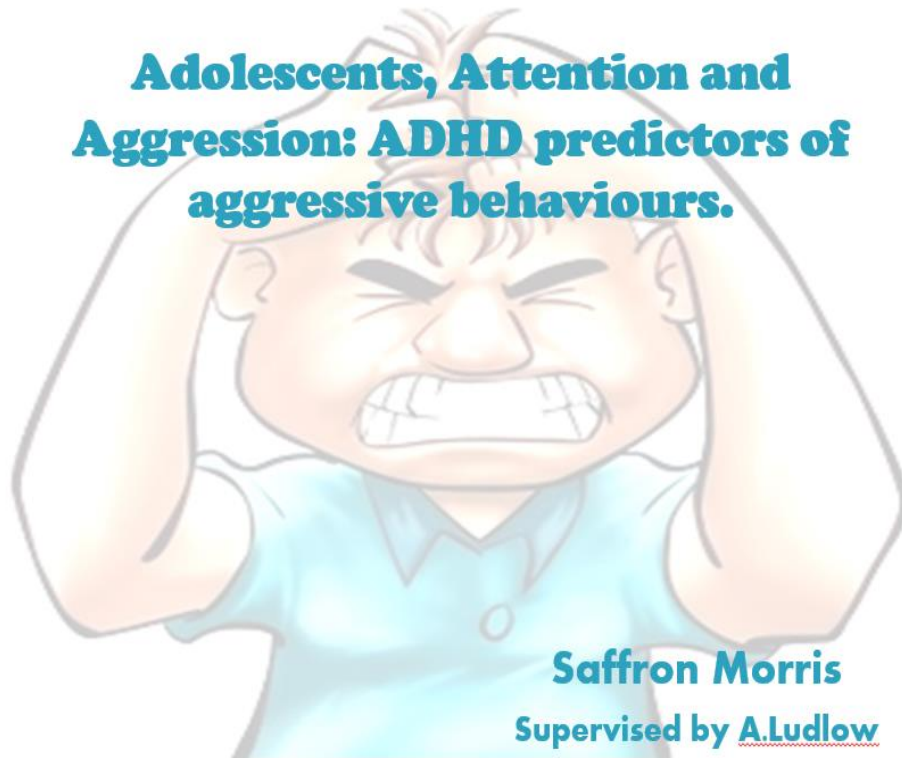
Table 3: Kappa interpretation

Kappa	Agreement
<0	Less than chance agreement
0.01-0.20	Slight agreement
0.21-0.40	Fair agreement
0.41-0.60	Moderate agreement
0.61-0.8	Substantial agreement
0.81-0.99	Almost perfect agreement

Placement Two

ADOLESCENTS, ATTENTION AND
AGGRESSION: ADHD PREDICTORS OF
AGGRESSIVE BEHAVIOURS.

**Adolescents, Attention and
Aggression: ADHD predictors of
aggressive behaviours.**



Saffron Morris

Supervised by A.Ludlow

Research and Placement Aims

Study Aim:

To test the relationship between ADHD and the specific manifestations of aggression in adolescents.

Placement Objectives:

- Review relevant literature
- Collect and analyse data
- Reflection
- Write a placement report

The aim of this project was to produce a piece of research analysing the relationship between aggression and attention deficit hyperactivity disorder (ADHD). The research held a particular interest in dissecting the four forms of aggression acknowledged in the literature Overt, Relational, Reactive and Instrumental (Coie & Dodge, 1998). The study aimed to examine ADHD in relation to the four distinct manifestations of aggression in order to create a greater insight into this acclaimed relationship. During supervision a contract was devised outlining the work I would undertake during the placement as well as the contributions to be made from the supervisor (Appendix1). It was decided that during the course of this placement I would; review the relevant literature, collect and analyse data, discuss and reflect on work progress and outcomes with my supervisor and write a placement report in the form of an annotated presentation.

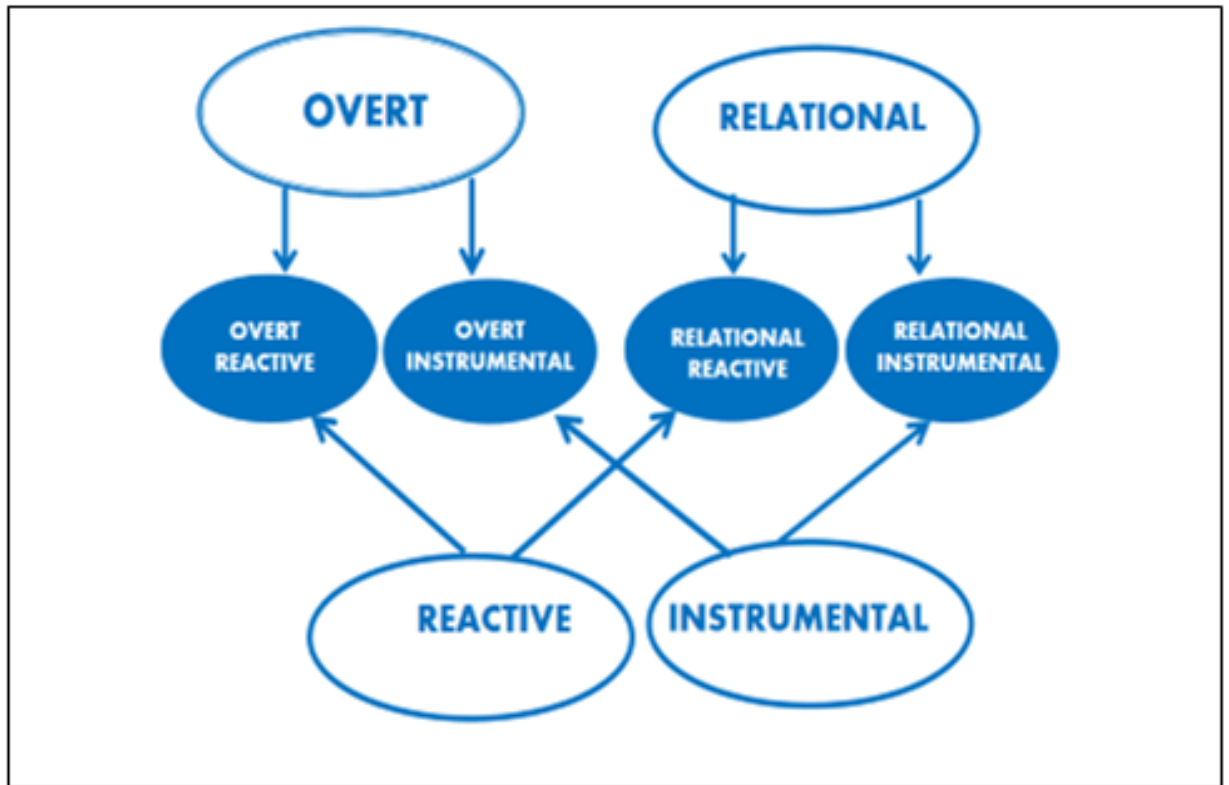
ADHD

- ADHD is a neurodevelopmental disorder defined by:
 - Inattention
 - Hyperactivity
 - Impulsivity
- Onset in childhood with a prevalence of 5% symptom remission resulting in 2.5% prevalence in adulthood.
DSM-V: American Psychological Association (2013); NICE (2008)
- Primarily pharmacological treatment.
Farone & Glatt (2009)
- Clinically complex ADHD treatment developing in research.
Patel & Barzman (2013)

Attention deficit hyperactivity disorder is a neurodevelopmental disorder beginning in childhood and characterised by three core symptoms; inattention (disorganised style resulting in intermittent effort in tasks), hyperactivity (shifting and excessive motor movement or talkativeness) and impulsivity (premature actions without forethought of consequences), that impedes functioning (DSM-V: American Psychological Association, 2013; NICE, 2008). ADHD has an estimated prevalence of 5% for children and 2.5% for adults (DSM-V: APA, 2013).

Attention deficit hyperactivity disorder has gained more recognition in recent years and as such theories relating to the aetiology of the disorder and developed therapies has evolved considerably (Levy, 2009; Swanson & Volkow, 2009; Stahl, 2010). With this increased recognition intervention has progressed,

however, there remains a focus on medication with stimulants often regarded as the 'front line approach' for ADHD (Farone & Glatt, 2009). In clinically complex cases a combined treatment approach often comprises of pharmacotherapy and a form of psychosocial intervention (Antshel & Barkley, 2008), although this could be viewed as a developing area particularly with regards to treatment for ADHD comorbid cases (Patel & Barzman, 2013).



Contemporary theorists have defined aggression as a multidimensional construct (Coie & Dodge, 1998; Frick, 1998) and research based upon this theory have allowed four distinct dimensions of aggression to be identified: overt and relational aggression are considered to be the prevailing forms of aggressive behaviour whilst reactive and instrumental have been defined as the underlying functions of aggression (little, Jones, Henrich, & Hawley, 2003).

Reactive aggression refers to acts which are impulsive and produced as a result of provocation (Bushman & Anderson, 2001), instrumental aggression, however, is directly implemented in an attempt to achieve a desired goal (Blair, 2013). Overt aggression delineates direct verbal or physical behaviours intended to cause harm

to others, relational aggression on the other hand refers to behaviours which are indirect in nature and are intended to damage another's position with the peer group or harm the other emotionally. Research has demonstrated that during adolescence boys exhibit more overt aggression than girls (Archer, 2004), whilst girls display greater levels of relational aggression (Wiseman, 2003 see Underwood, 2003).

ADHD AND AGGRESSION

- ADHD associated aggression.
Connor, Chartier, Preen & Kaplan (2010); Nice (2006)
- Higher levels of aggression displayed than peers.
Zepf (2010)
- Aggression severity is linked to the increase in ADHD symptom severity.
Connor & Ford (2012)
- DSM-IV predicts comorbid impulsive aggression.
Dowson & Blackwell, 2010
- Evidence of neurobiological contributions for elevated aggression in ADHD samples.
Zepf (2010)

One clinical group in which aggression is considered to widely manifest is individuals with ADHD (Holmes, 2010). The relationship between ADHD and aggression is evident within the literature (Constanino, Liberman, & Kincaid, 1997; Stadler, Zepf, Demisch, Schmitt, Landgraf & Poustka, 2007). Nice guidelines (2006) identify aggression as a common associated problem with ADHD and research has indicated comorbidity of aggressive behaviours and conduct problems with ADHD, children with a diagnosis displaying higher levels of aggressive behaviours than controls (Connor, Chartier, Preen & Kaplan, 2010; Zepf, 2010). Aggression has also been found to have a direct link to ADHD symptom severity (Connor & Ford, 2012) and research has pinpointed neurobiological contributions to aggression for individuals with a diagnosis of ADHD (Zepf, 2010). The DSM-IV criteria of ADHD have also been demonstrated to predict comorbid impulsive aggression (Dowson & Blackwell, 2010).

RATIONALE

Limitations of previous research:

- Research has centred around neurobiological implications.

Polier et al (2013); Zepf (2010); Zimmermann et al (2012).

- Severe diagnosis of ADHD in all male samples.

Dowson & Blackwell (2010); Zimmermann et al (2012)

- The increased treatment of ADHD, 0.05 to over 0.3% of the U.K population requires research that informs practice.

Nice(2006); Olfson et al (2008); Taylor (1986)

- Lack of knowledge of how ADHD impacts the form in which aggression manifests.

Aims:

- To investigate the relationship between ADHD subscales and aggression.

- To investigate how the subscales influence the four forms of aggression.

Over the last 30 years ADHD has gained more recognition and as such treatment of ADHD has increased from 0.05% of the population diagnosed in the U.K (Taylor, 1986) to over 0.3% receiving treatment in the late 1990's with the figures continuously increasing (Nice, 2006; Olfson et al, 2008). According to the UK Census (2011) estimated population, a 0.3% prevalence would estimate that there are approximately 186,900 people in the UK with ADHD, demonstrating the need for research which has the potential to inform practice.

Within the existent literature it could be considered that there is an emphasis upon the neurobiological implications of this relationship between aggression and ADHD (Polier et al, 2013; Zepf, 2010; Zimmermann et al, 2012), and that research specifically investigating the manifestations of aggression in relation to ADHD trait behaviours is lacking. Whilst it is acknowledged that there is a prevalence of aggression in clinically referred children, the existent research focuses upon moderate to severe diagnosis's

of ADHD and several studies have also used all male adult samples (Dowson & Blackwell, 2010; Zimmermann et al, 2012). The use of adult participants could be considered to have an effect of the findings as ADHD prevalence decreases considerably with age (5% children, 2.5% adults: DSM-V, 2013). This suggests that symptoms reduce with age and as associated aggression has been linked to increased symptom severity (Connor & Ford, 2012) this may be reflected in lower rates of aggression than would be found with a younger sample. The current study aims to investigate the relationship between ADHD and the four dimensions of aggression in adolescents.

METHOD

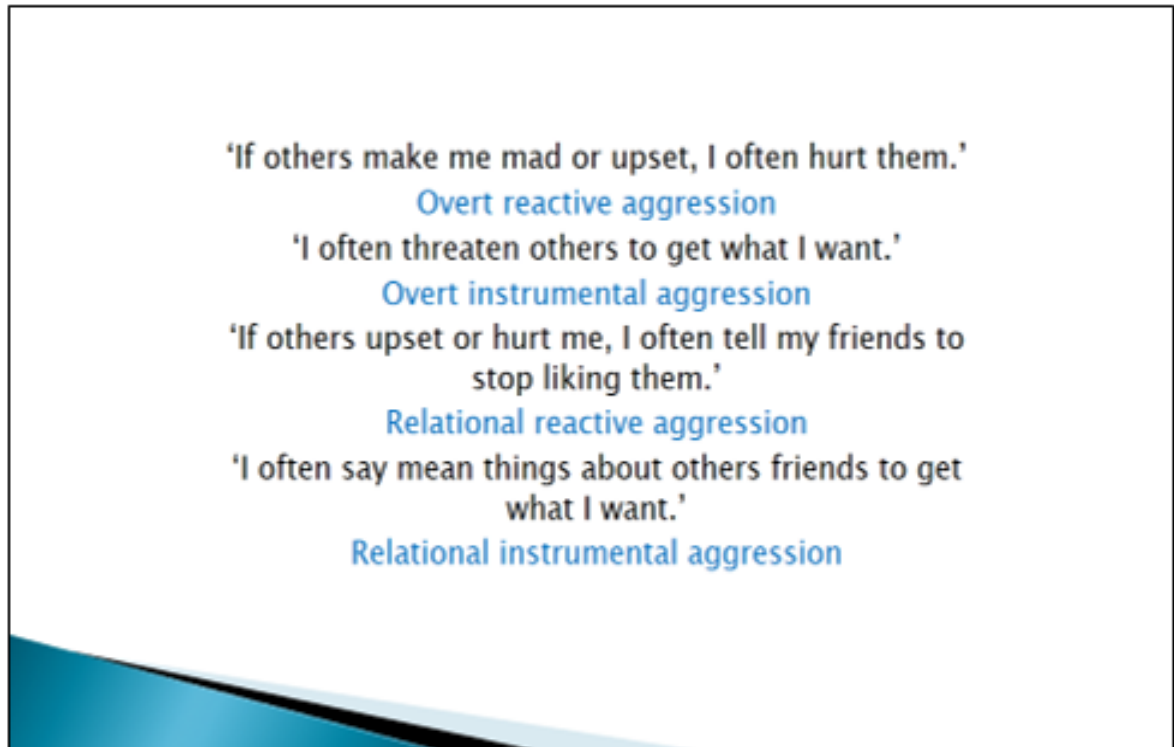
Participants: 293 (N= 155 F, 135 M, 3 undisclosed)

- Diverse ethnicities
- Range of academic abilities.

- Standardised testing procedures.
- Thorough briefing procedures.
- Consent adhering to UOB outlined ethical procedures for research with children.

For the study 293 (N= 155 female and 135 male) adolescents aged 12-16 formed the participant sample. Due to the age of the sample, information and consent to participate had been provided in advance for parents, participants who had parental consent were then briefed and provided with a consent form before completing the questionnaires. All participants were informed of the intention of the research and their right to withdraw during the debrief.

In order to acquire a participant sample representative of the general population, the researchers ensured the sample was diverse in terms of ethnicities. A range of academic abilities was also achieved by ensuring that within each year group tested the educational class groups were varied (classes were divided in terms of academic abilities for Maths and English and combined for other subjects).

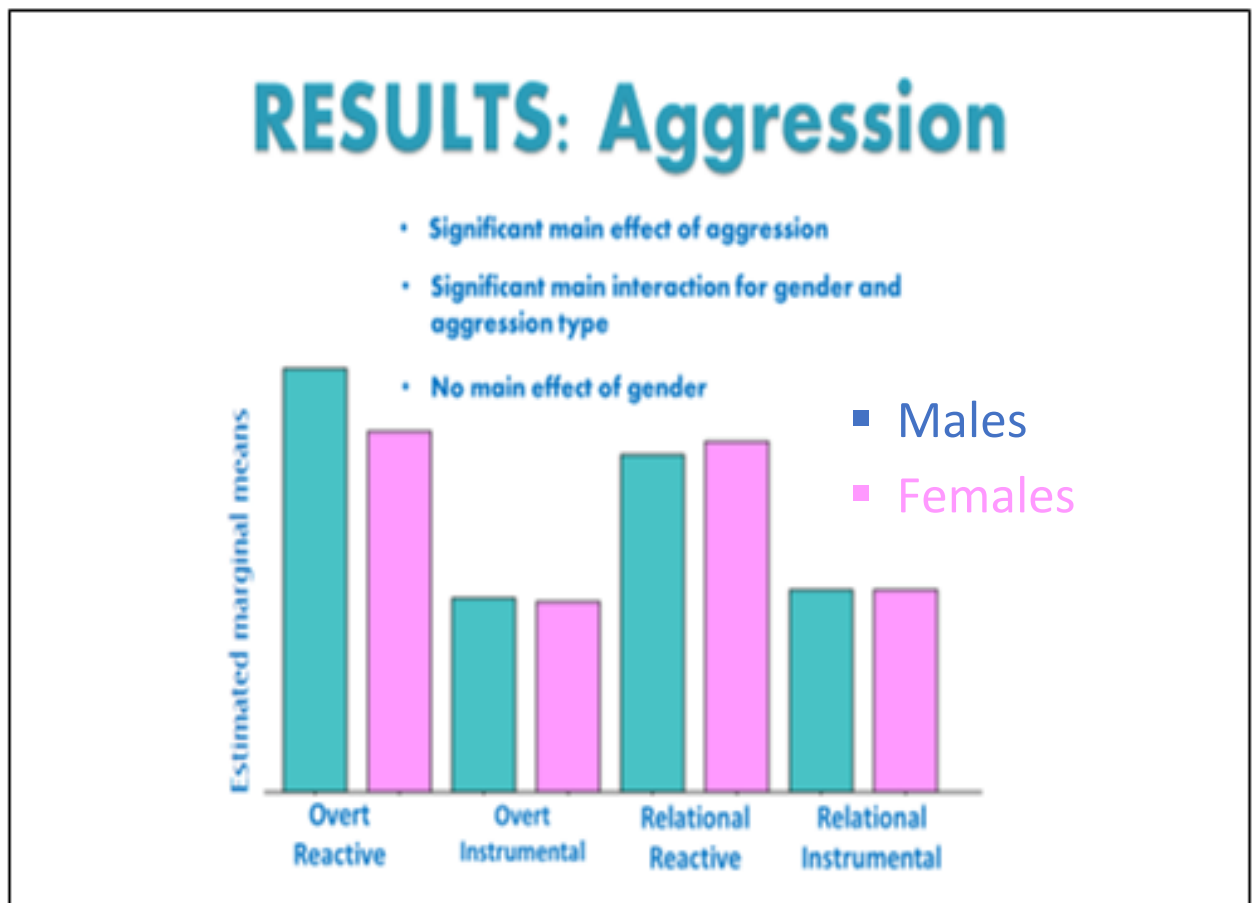


The participants completed a questionnaire assessing the four dimensions of aggression; overt reactive aggression, overt instrumental aggression, relational reactive aggression and relational instrumental aggression. The questionnaire consisted of 45 items measured on a 5 point likert scale, 15 items were related to a short vignette. There were two versions of the vignettes, randomly distributed amongst participants, to assess whether perceived friendliness had an impact on aggression:

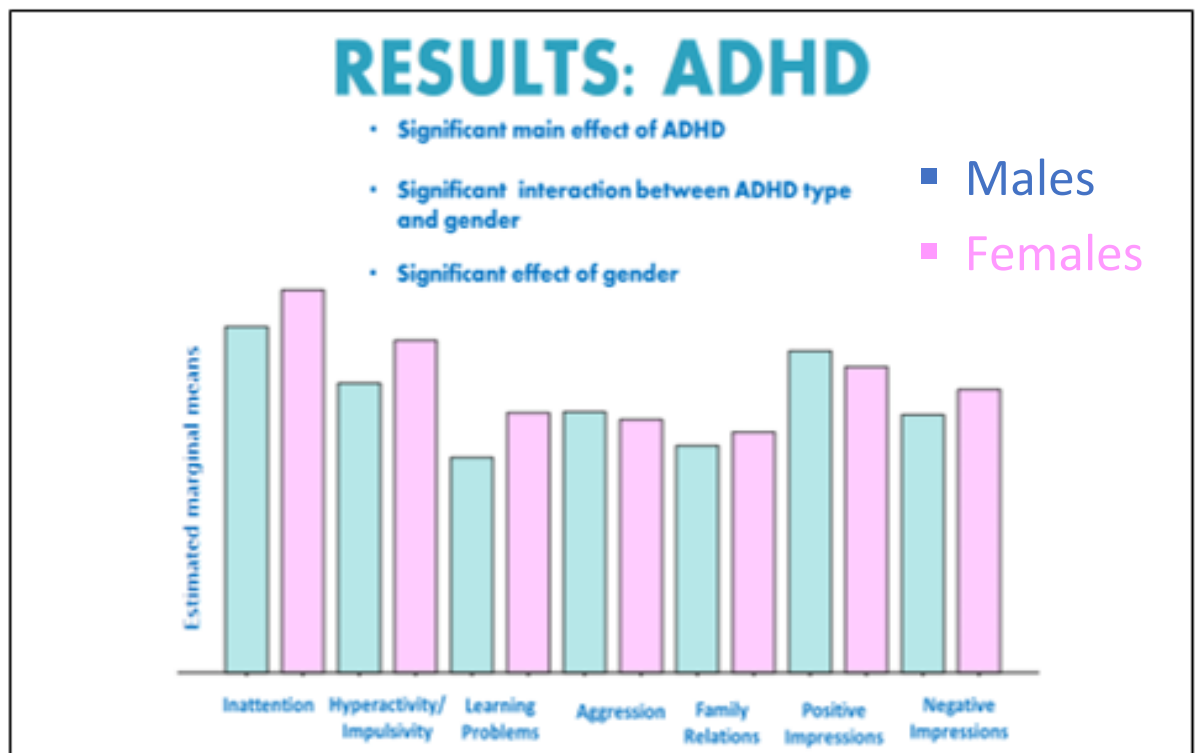
'Imagine you are at a gym class and you are passing a ball quickly between you and other students. As you turn around you are hit in the face with a ball. The person who did it is a student you never had problems with and you like. This student has always been friendly to you.'

'Imagine you are at a gym class and you are passing a ball quickly between you and other students. As you turn around you are hit in the face with a ball. The person who did it is a student you had problems with and you like. This student has always been unfriendly to you.'

In addition to the aggression questionnaire, the participants also completed the Conner3AI (Conners, 2008), a short self report screening tool to differentiate between an ADHD group and general population for children and adolescents aged 8-18. The Conner3AI measures 7 subscales of ADHD; inattention, hyperactivity/impulsivity, learning problems, aggression, family relations, positive and negative impressions. Testing sessions were standardised across the sample.



A 2 way mixed ANOVA conducted on the aggression questionnaire revealed a significant main effect of aggression ($p=.000$) and a significant main interaction between the form of aggression and gender, however, there was no main effect of gender as both males and females demonstrated similar levels of aggression with variations in the form manifested. Post hoc tests revealed that males displayed significantly higher levels of overt aggression than females ($p=.001$).



A 2 way mixed ANOVA conducted on the Conner3AI revealed a significant main effect of ADHD ($p=.000$), a significant interaction between ADHD type (based on the 7 subscales) and gender, inattention was found to be significantly higher than the other subtypes and females displayed higher levels of inattention, hyperactivity/impulsivity and learning problems. There was also a significant effect of gender on ADHD with females displaying higher levels overall ($p=.004$).

RESULTS: ADHD and Aggression

Aggression	Overt Reactive Aggression Overt Instrumental Aggression Relational Reactive Aggression Relational Instrumental Aggression
Hyperactivity/ Impulsivity	Overt Reactive Aggression
Family Relations	Overt Reactive Aggression (F) Relational Reactive Aggression (M)
Positive Impressions	Relational Instrumental Aggression (F)

To assess the relationship between ADHD and aggression a regression analysis of the 7 subscales of the ADHD measures was conducted which revealed that 4 of the subscales were significant in predicting aggression: aggression was a significant individual predictor of all 4 forms of aggression (ROA males $\beta=.42$, $p=.000$; ROA females $\beta=.43$, $p=.000$; IOA males $\beta=.53$, $p=.000$; IOA females $\beta=.55$, $p=.000$; RRA males $\beta=.35$, $p=.000$; RRA females $\beta=.45$, $p=.000$; IRA males $\beta=.42$, $p=.000$; IRA females $\beta=.55$, $p=.000$). Family relations was a significant individual predictor for overt reactive aggression for females ($\beta=.14$, $p=.05$) and relational reactive aggression for males ($\beta=.23$, $p=.009$). Hyperactivity/ impulsivity was a significant individual predictor of overt reactive aggression for both males ($\beta=.34$, $p=.002$) and females ($\beta=.31$, $p=.001$) and positive impressions was a significant individual predictor of relational instrumental aggression for females ($\beta=.16$, $p=.04$).

DISCUSSION

Findings:

- ADHD associated aggression transcends to diverse populations.
- 4 significant ADHD predictors of aggression.
- Aggression manifestation differentiates dependent on ADHD subtype and gender.

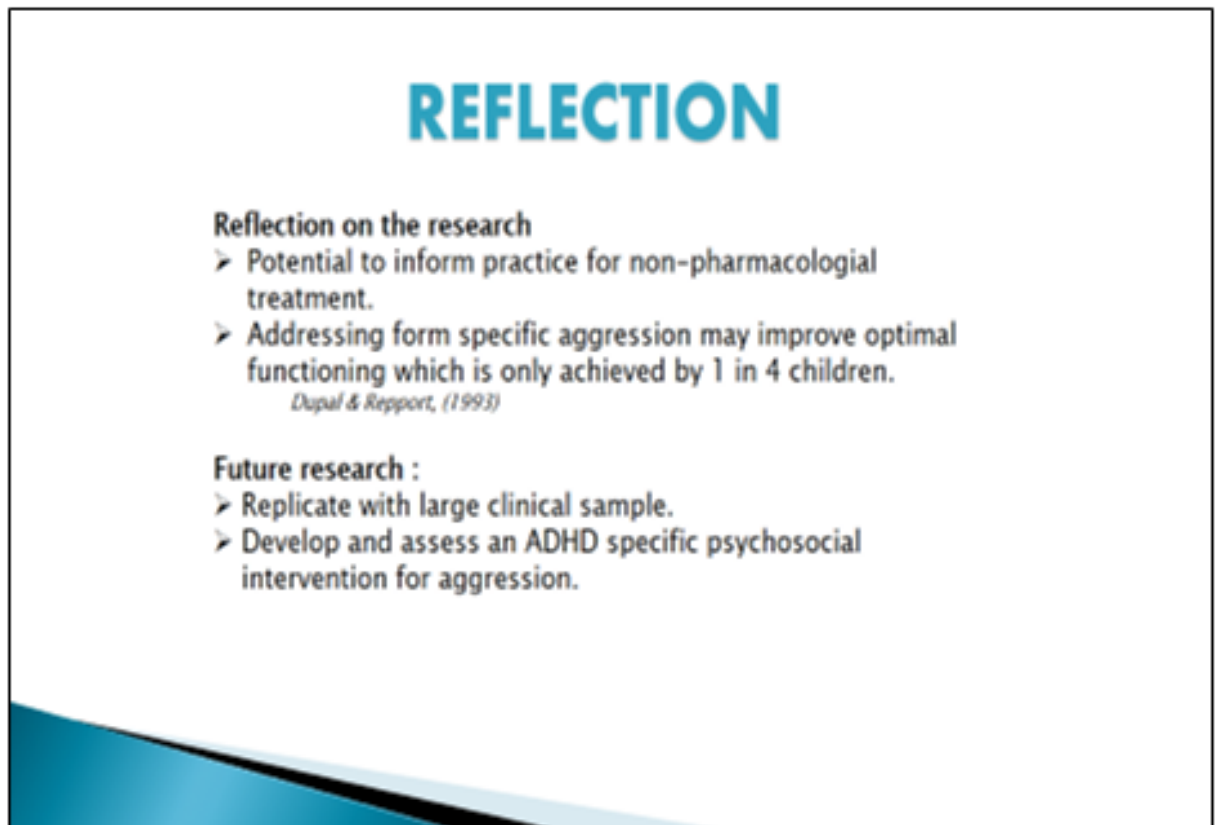
Implications:

- Aggression impedes academic achievement.
- Aggression and conduct disorder.
- Incorporation of individual variance in aggression manifestation (based on ADHD type and gender) within intervention practices.

The current research demonstrates how an individual's presentation of ADHD effects the manifestation of aggression. Following the DSM-V core symptoms, the hyperactive/ impulsive symptom domain indicated a tendency for overt reactive aggression. This finding is concurrent with previous research demonstrating that aggression is related to hyperactivity/ impulsivity (Connor & Ford, 2012) and further adds to this by outlining the specific manifestation of aggression associated with this core symptom domain.

The current research also identifies how the Conner3AI subtypes aggression, family relations and positive impressions also predict aggression and the specific manifestations associated with each subtype for males and females. Whilst family relations was a significant predictor of aggression for both males and females, the forms were opposing for the two genders; family relations indicated relational reactive aggression for males ($p=.009$) but for females it indicated overt reactive aggression ($p=.05$).

This outlines the importance of including both males and females in research as some previous research has used all male samples (Zimmermann et al, 2012). Research in this area is important as there is empirical support for the notion that aggression has a negative impact upon academic achievement and social engagement in school (Coie, Dodge, & Lynam, 2006; Loveland, Lounsbury, Welsh, & Buboltz, 2007). Aggression is also one of the 4 diagnostic criteria for conduct disorder, a comorbid disorder in 1 in 4 ADHD cases (DSM-V: APA, 2013). Developing interventions to specifically address aggression in the ADHD population may have a positive impact on the prognosis of this comorbid disorder if intervention is delivered in early childhood. The current research is beneficial to intervention practices as ADHD associated aggression is clinically complex when considering treatment as it needs to be assessed whether the aggression is a distinct symptom or a direct result of the hyperactivity/ impulsivity of ADHD. In the foremost aggression is treated as resulting from the ADHD core symptoms and as such these are primarily treated, usually with pharmacotherapy (Patel & Barzman, 2013). Therefore research gaining more insight into the specific manifestation of aggression within the ADHD population will add to the evolving aetiology and theories of ADHD (Levy, 2009; Swanson & Volkow, 2009; Stahl, 2010), and as a result contribute to developing intervention practices.



REFLECTION

Reflection on the research

- Potential to inform practice for non-pharmacological treatment.
- Addressing form specific aggression may improve optimal functioning which is only achieved by 1 in 4 children.
Dupal & Rapport, (1993)

Future research :

- Replicate with large clinical sample.
- Develop and assess an ADHD specific psychosocial intervention for aggression.

This research has the potential to inform intervention practice as there remains an empirical question whether the current front line approach of treating core ADHD symptoms is sufficient in reducing the associated aggression. Combined treatment approaches consist of pharmacotherapy and a psychosocial intervention i.e. cognitive behavioural therapy (Antshel & Barkley, 2008; Safren, Sprich, Mimiaga, Surman, Knouse, Groves & Otto, 2010) and even in non-comorbid ADHD cases only 1 in 4 children reach optimal functioning (DuPaul & Rapport, 1993). By specifically addressing the 4 forms of aggression in an ADHD intervention there could be a positive effect on the low frustration tolerance and behavioural inhibition associated with ADHD (DSM-V: APA, 2013). Thus improving daily functioning for ADHD diagnosed children and adolescents.

Future research would therefore benefit in first replicating this research with a large clinically diagnosed ADHD sample to investigate the extent to which these findings apply to a clinical diagnosis. The development and analysis of an ADHD specific intervention for aggression would also be of great benefit to the ADHD literature.

REFLECTION

On reflection the placement aims outlined in supervision were met throughout the course of this research. Participation in the research has allowed for the development of responsibility as an independent researcher and refinement of research skills.

Skills refined:

- > Data collection
- > Following a format suitable for publication
- > Following a model of supervision

Holloway (1995)

- > Clinical knowledge: [Aggression/ADHD](#)

During this placement I have gained invaluable experience including data collection allowing me to be actively involved in the research through all stages of handling the data. The experience with participants was of particular value as I gained confidence and refined my skills in delivering participant instructions in a manner suitable to this age range. Collecting data from such a large sample also provided an insight into the organisational aspects needed for a research project.

The current research adds to the existent literature and is relevant to the developing movement of this area, therefore it is the intention to develop this into a publishable piece. As such during the course of the research I constantly assessed my work in lines with the suitable journals to ensure that my approach was appropriate for publication. Throughout this process I sought supervision to reflect upon my development.

Placement Two

Upon reflection I would consider my supervision to follow the systems approach model as the reciprocal relationship with my supervisor allowed for power to be mutually bestowed to ensure my personal growth and progressive independence as a supervisee (Holloway, 1995). However, I feel that the most important skill I have gained during this placement is the knowledge of ADHD and aggression, particularly as aggression may be a trait that is evident in many of the clinical populations I may work with in the future.

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Appendix 1

MRes Second Placement Contract

Student Name: Saffron Morris

Programme: MRes Clinical Psychology

Placement supervisor: Amanda Ludlow

Placement working title: ADHD subtype predictors of aggression

Aim: To investigate the relationship between aggression and ADHD

Planned work of the student:

- Review/Search for relevant literature
- Find out process of CRB for testing in schools
- Data collection of 293 adolescents
- Analyse data
- Discuss and reflect on work progress and outcome with supervisor
- Write a placement report- presentation format

Contributions of supervisors:

- Provide references for literature review
- Hold meetings regular meetings with student
- Help with statistical analysis
- Give feedback on one draft of the placement report

Appendix 2

Minutes of First meeting with Dr Amanda Ludlow

The Purpose of this meeting was to discuss my future placement with Dr Ludlow. During this meeting we outlined the possible work I could undertake and how we would progress from this meeting.

Several study possibilities were discussed and it was agreed that Dr Ludlow would e-mail myself with further details of each study and some literature relating to the research. I would then consider which of the studies I would like to be involved with and inform Dr Ludlow of my decision by the following week.

It was also discussed how the work in the spring could be adapted for my final project but this shall be discussed at further length in a future meeting.

Minutes of Second meeting with Dr Amanda Ludlow

I had a brief meeting with Prof Ludlow to confirm which of the three studies I would like to do during my spring and summer placements. I had decided that I would like to take on the study for typical and atypical emotions in blind children during the spring. However, due to difficulties with recruitment a new direction was

suggested. It was agreed that I would be involved in a research project investigating the relationship between ADHD and aggression.

Placement objectives and a contract were then devised and it was agreed that I would spend the following week becoming familiar with the literature. My supervisor directed me with exemplary materials and I was to extend my reading from this point. A date was scheduled for the next meeting.

Minutes of Third meeting with Dr Amanda Ludlow

The purpose of this meeting was to discuss the process of data collection due to take place in the following weeks. It was agreed that I could assist in the data collection providing the CRB I already held with the university was sufficient for testing in schools. My supervisor informed me of the large scale of data to be collected in the one school day and how this had been organised with the school.

The reading I had been doing to familiarise myself with the area was also discussed and how this could form the foundation of my introduction. It was discussed that plans for the testing day would be made via email and another meeting would be arranged after data collection.

Minutes of Fourth meeting with Dr Amanda Ludlow

This meeting was arranged to discuss analysis, after data collection I had entered the data into SPSS for all 293 participants and so it was agreed that analysis could now be undertaken. The form of analysis was agreed upon and the focus points to report in the presentation.

The format of my presentation was then discussed due to this being a contrasting style to the previous placement. It was agreed that I would complete the presentation and then another meeting would be arranged to discuss any concerns to allow the time to implement any changes before the presentation. Any other issues in the meantime could be discussed via email.

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TACTILE PERCEPTION IN ADOLESCENTS WITH ASD: A
PSYCHOPHYSICS INVESTIGATION INTO TACTILE
THRESHOLDS AND THEIR RELATED SENSORY
EXPERIENCES.

Abstract

The present study arose due to an awareness that there exists limited literature available on tactile perceptions in individuals with autism spectrum disorder (ASD). Whilst the area of sensory processing in autism has gained more recognition in recent years, there remains a dearth of rigorous research on the tactile modality. Due to the inclusion of sensory abnormalities as a diagnostic criteria for autism in the DSM-V (APA, 2013), research investigating the individual sensory modalities in autism is required to gain more information concerning this core feature.

The research applied both psychometric and psychophysics testing. The Adolescent/Adult Sensory Profile (Brown & Dunn, 2002) provided information about the daily experiences of the ASD participants and how these differed from typically developing peers. Many studies in the existent literature draw conclusions from data acquired solely by a self-report measure called the sensory profile, however, the current research intended to investigate the multidimensional aspects of tactile perception. Therefore, psychophysics experiments were applied to gain a greater insight into the material properties of touch. Three distinct tactile thresholds were investigated; light touch threshold, tactile acuity and texture discrimination threshold.

The study examined the differences in tactile perception between 13 ASD participants and 13 typically developing controls matched for chronological age. Diagnosis of an ASD was confirmed using the Autism Diagnostic Observation Schedule (Lord, Rutter, Dilavor, & Risi, 1999), and using the British Picture

Vocabulary Scale (BPVS-III: Dunn & Dunn, 2009), participants were matched on verbal IQ. Analysis of the psychophysics tests revealed that the ASD group had a significantly higher light touch threshold ($p=.02$), and that a significant correlation existed between tactile acuity and fine texture discrimination threshold in the ASD group ($p=.002$). The ASD group had significantly higher scores in the low registration ($p=.001$) and tactile processing ($p=.004$) categories on the sensory profile, and a correlation of psychometric and psychophysics data found a significant correlation between hypertactile scores and coarse texture discrimination threshold ($p=.02$).

The findings from the present study demonstrate that there exist significant tactile abnormalities in individuals with ASD in terms of sensory experiences and how these impact upon the processing of a physical tactile stimulus. Tactile abnormalities infringe upon many aspects of an individual's life as daily activities become distressing for individuals who are hypertactile (Baranek, Foster & Berkson, 1997; Kern et al, 2001). Research investigating tactile perception in autism has the potential to improve the material properties of the individual's environment to aid coping and develop sensory based interventions.

Introduction

Autism is a neurodevelopmental disorder characterised by two core symptoms; social communication/ social interaction and restricted, repetitive patterns of behaviour (DSM-V: American Psychological Association [APA], 2013). A recent addition to the diagnostic criteria, to the restricted behaviour symptom domain, is the inclusion of hyper- or hyporeactivity to sensory stimuli and unusual interest in the environment's sensory features (DSM-V: APA, 2013). Sensory modulation has

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been defined as the ability to register sensory input in a graded and adaptive manner in order to regulate responses in an appropriate style to the perceived degree and intensity of the stimuli (Miller & Lane, 2000). Atypical sensory modulation in individuals with autism spectrum disorder (ASD) has historically been well documented anecdotally.

So every morning like a rock, I learned to tolerate being hugged. I told my friend's mother that being hugged hurt me and that it felt like I was being burned. She insisted that this was nonsense, but that didn't help the feeling go away.... At first my head would spin. I felt that I was going to faint. I would only hug her when routine called for it.' (Williams, 199: p. 66-67)

In recent years this phenomenon has gained academic recognition (Baranek, Foster & Berkson, 1997; Galcu, Tandir, Mukadees, Unal, 2007; Silva & Schalock, 2013). Irregular sensory modulation has been demonstrated to discriminate between ASD group and peers with no disability and has also been found to discriminate the ASD group from other developmental disorders (Rapin, 1996; Wiggins, Robins, Bakeman & Adamson, 2009). However, this previous lack of clinical acknowledgement of sensory processing abnormalities has resulted in a dearth of rigorous research evident in the literature. Sensory abnormalities have largely been investigated on a global scale with research often reporting overall sensory abnormalities in ASD. This obscures implications within the specific sensory domains. Thus there is a need for the individual sensory modalities to be investigated instead of combining scores as research using instruments akin to the Sensory Profile have previously done (Tavassoli, Miller, Schoen, Nielsen & Baron-Cohen, 2013). Much of the research concerning sensory processing has used retrospective videotape analysis (Baranek, 1999), or questionnaires, most

commonly of which being the sensory profile (SP) questionnaire (Dunn, 1999). Whilst the SP has provided evidence of aberrant sensory processing (Kern et al, 2006), with respect to the ASD participants, this is usually completed by parents/carers who cannot provide a fully accurate account for the individual. Where the questionnaire can be completed by the individual, or research reporting first-hand accounts of living with autism, this account is true for a sub-group of ASD (High-functioning) and can only provide a glimpse of the perceptual difficulties for individuals with ASD, as acquiring explanations from individuals with a severe diagnosis of an ASD would be nearly impossible (O'Neil & Jones, 1997). Objective measures of sensory processing with larger sample sizes are needed to yield statistical power to empirically assess these abnormalities and link observations to sensory processing responses and functional behaviours of ASD.

One of the sensory modalities which to date has received little recognition as a sole construct is tactile sensitivity, also known as tactile defensiveness. Tactile defensiveness, hypersensitivity or hyporesponsivity to tactile stimuli, that to the normal population are perceived as non-threatening and pose no discomfort, has been largely reported in individuals with ASD. Tactile defensiveness is characterised by atypical emotional or behavioural responses to tactile stimuli often manifesting as an avoidance response (Baranek, Foster & Berkson, 1997). Sensory processing aberrations are not only restricted to defensiveness. Sensory seeking behaviours have also been reported in individuals with ASD (Wating, Deitz & White, 2001), as individuals may also display defensiveness and apparent insensitivity by exhibiting a fixation on specific stimuli and an indifference to others (Frith, 1992). These orienting and defensiveness behavioural responses are

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measures by which tactile sensory processing abnormalities have been assessed within the literature.

Research indicates that tactile abnormalities have a high prevalence in ASD from both parent reported prevalence (100%) and therapist reported prevalence (98%) which is consistent with previous studies reporting a 95% prevalence (Silva & Schalock, 2013; Tomchek & Dunn, 2007). Akin to general sensory modulation, tactile sensitivity has been found to discriminate ASD group from both peers with no disability and from other developmental disorders (Tommerdahl, Tannan, Cascio, Baranek & Whitsel, 2007; Wiggins, Robins, Bakeman & Adamson, 2009). For example, Cascio, Lorenz and Baranek (2013) found significantly more tactile defensiveness in the ASD group than controls. Furthermore, tactile defensiveness and social impairment were positively correlated when the tactile stimulus was applied to a bodily site associated with social touch. Where tactile defensiveness has been investigated in greater depth than retrospective or questionnaire methods, the majority of psychophysical studies have only employed one testing method, predominantly investigating the thresholds and sensitivity to vibrotactile stimuli (Tommerdahl, Tannan, Cascio, Baranek & Whitsel, 2007; Guclu, Tandir, Mukadees & Unal, 2007). In a study by Blakemore et al (2006), adults with ASD displayed lower thresholds for vibrotactile stimuli at 200Hz but not 30Hz. Marco, Hinkley, Hill and Nagarajan (2011) suggest that this implies hypersensitivity in the pacinian corpuscles receptor pathway, thus a cognitive factor is considered to exist in the abnormal processing of tactile stimuli.

As tactile processing abnormalities have received little attention thus far within the literature compared to the other developmental variables in autism, compelling theories are yet to be established (Baranek, 2002; National Research Council,

2001). The current theories require further research in order to be substantiated; however within the neurological perspective there is a coherence across the literature that tactile abnormalities in ASD stem from pathological and not physiological processes (Silva & Schalock, 2013). Guclu et al (2007) suggest that tactile sensitivity is due to a sensory perceptual problem, which may stem from sensory cortical organisation abnormalities in individuals with ASD (Coskun et al, 2009). The prevalence of both hypothesia (hyposensitivity) and allodynia (hypersensitivity to tactile stimuli) in individuals with ASD may be the result of a central processing disorder, similar to that suggested for auditory abnormalities (Kwon, Kim, Choe, Ko & Park, 2007).

The importance of research investigating tactile sensitivity in ASD is evident when considering the direct implications of atypical tactile processing as sensory abnormalities contribute to social interaction and communication deficits in ASD (Cascio, 2010). Liss, Saulnier, Fein and Kinsbourne, (2006) found social and communication symptom severity for adults and children with ASD was directly correlated with dysfunctional sensory behaviours. A positive correlation was found to exist between social and communication deficit severity and hyposensitiveness and sensory seeking, whilst hyperresponsiveness correlated with social symptoms but not communication. This impact may be detrimental, particularly when considering tactile sensitivity, due to the fact that tactile contact is a vital component in the learning of social and communication skills in early development (Foss-Feig, Heacock & Cascio, 2012). Deprivation of touch has also been found to cause social- emotional delay (Montagu, 1979; Ardiel & Rankin, 2010). Schutz (2005) argues that it is the inherent social delay and not communication or behavioural deficits that distinguish autism from other

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neurodevelopmental disorders. Consequently, establishing the aetiology of tactile sensitivity in ASD may contribute to the treatment and prevention of social delay. With the recent inclusion of sensory abnormalities in the diagnostic criteria for autism (APA, 2013), sensory processing abnormalities such as tactile sensitivity are no longer a comorbid symptom. As such there is a necessity to identify tactile abnormalities in their own right and define the significance of sensory abnormalities as a core feature of autism.

The current study intended to investigate the multidimensional properties of tactile perception (Hollins, Faldowski, Rao & Young, 1993; Lederman, 1990). When evaluating the literature, it is evident that tactile abnormalities are prevalent in ASD. However, investigations into physical thresholds have been limited to predominantly vibrotactile stimulation and research investigating the relationship between sensory experiences and tactile discrimination thresholds is scarce. Therefore the objectives of the research were to (i) investigate the differences between typically developing adolescents and adolescents with ASD in tactile perception and three tactile discrimination thresholds, (ii) Investigate the correlation between psychophysics data analysing tactile discrimination thresholds and tactile hypo- hypersensitivity identified by Dunn's Sensory Profile (Brown & Dunn, 2002) and (iii) to investigate the relationship between tactile abnormalities and other diagnostic criteria in ASD by assessing the relationship between the Sensory Profile and The Autism Diagnostic Observation Schedule.

Method

Participants

Participants were recruited from two mainstream schools, one of which had an autism base. Based on the sample sizes of studies in the relevant literature, the study aimed to recruit 15 children with ASD and a control group of 15 typically developing children. Both males and females aged between 12 and 16 were recruited and children with the following were excluded: any injury or disease (in addition to ASD) that could affect touch sensation in the hands, any child with diabetes or a significant learning difficulty (IQ score <80). For the control group, 13 typically developing adolescents (N=4 female, N=9 male) aged 11.10- 16.2 years (Mean age=13.3 years; *SD*=1.7 years) participated in the investigation. Controls were matched with participants in the ASD sample on verbal IQ using The British Picture Vocabulary Scale (BPVS-III: Dunn & Dunn, 2009), and chronological age. The ASD group consisted of 13 adolescents (N=2 female, N=11 male) aged 11.6- 16.5 years (mean age=13.5 years; *SD*=1.6 years). No significant difference were found between standardised BPVS-III scores of ASD and control group ($t(24)=-.57$, $p=.57$), and chronological age ($t(24)=1.04$, $p=.31$).

The ASD group had a selection criterion of a clinical diagnosis of either an Autistic Disorder or an Asperger's Disorder (DSM-IV-TR: APA, 2000), due to the fact that not all participants had been reclassified under the new DSM-V criteria (APA, 2013). Diagnoses were confirmed using the Autism Diagnostic Observation Schedule (Lord, Rutter, Dilavor, & Risi, 1999). There were no known associated medical disorders.

Materials

The Autism Diagnostic Observation Schedule

The Autism Diagnostic Observation Schedule (ADOS) is a semi-structured assessment of communication, social interaction and imaginative play. The schedule allows for an accurate assessment of autism across ages and language skills which takes approximately 30-45 minutes to administer one module. For the current sample, module 3 was considered appropriate for all participants in the ASD group as they were aged 11-16 with verbal fluency. Verbal fluency in this context is defined as an expressive language level equivalent to that of a typically developing 4 year old (participants should be able to produce a range of grammatical forms, sentence types and connectives). Participants were observed on the manifestation or absence of behaviours intrinsic to the autism diagnostic criteria.

Psychometric Testing

All participants completed The British Picture Vocabulary Scale (BPVS-III), using this measure the autism group and controls were matched according to ability level. The BPVS-III is a brief 5-10 minute assessment of receptive vocabulary for children aged 3-16. Participants respond to a spoken word by selecting a corresponding picture, due to the task assessing receptive hearing vocabulary it is suitable to be administered to individuals with expressive language impairments. Therefore, this measure was appropriate for both controls and the ASD group allowing for an accurate match in ability.

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Participants in both the ASD and control groups completed the Adolescent/Adult Sensory Profile (AASP: Brown & Dunn, 2002), a 20-30 minute assessment of everyday sensory issues suitable for individuals with or without disabilities. The AASP is based on Dunn's Model of Sensory Processing (1997) and generates sensory profiles about an individual's general response to sensations across four quadrants: (1) low registration, (2) sensory sensitivity, (3) sensory seeking and (4) sensory avoidance. The AASP consists of 60 items, 15 per quadrant and 10 per sensory processing category; taste/smell, movement, visual, activity level, auditory and touch. Therefore, the AASP will provide data from 10 items specifically assessing the individuals tactile sensory processing in relation to the four quadrants.

Psychophysics testing

Three tasks were administered measuring sensitivity to three different tactile thresholds: (1) light touch, (2) tactile acuity and (3) fine and coarse texture discrimination. The three tasks required participants to wear a blindfold, or stimuli were hidden from the participant's view if blindfolding could not be tolerated (some participants within ASD group).

The light touch threshold was investigated using the Semmes-Weinstein monofilament test (GW Long Hansen's Disease Centre, Carville, LA), measuring diminishing cutaneous perception. The test had an administration time of approximately 5 minutes and consisted of graded pressure-sensitive nylon filaments ranging in calibre. Participants were blindfolded, or their hand was hidden in a box, before being instructed to answer 'yes' when they felt the

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monofilament on their fingertip. The participant's dominant hand was used for this test, and the point of testing on the fingertip was marked with pen to ensure consistency. To start the test a midrange monofilament (monofilament F) was used, the consecutively finer monofilament was then used after the participant had successfully identified the monofilaments presence three times. This continued until the participant could no longer reliably identify the stimulation, at which point the researcher referred back to the previous monofilament to confirm threshold. The time between any two stimulations was randomised to prevent participants identifying the monofilaments presence based on expectation.

Fine texture discrimination and coarse texture discrimination thresholds were measured using two sets of Tufset gratings (one coarse set and one fine set). The sets of gratings ranged in ridge width and height and spatial period of the ridges. The fine set of gratings had a ridge width and ridge height of 100 μ m and the groove width of the fine set of gratings ranged from 300 μ m to 700 μ m, giving a spatial period of 400 μ m to 800 μ m. Whereas the coarse set of gratings had a ridge width and ridge height of 400 μ m and the groove width ranged from 880 μ m to 1200 μ m, resulting in spatial period ranging from 1280 μ m to 1600 μ m. The task used a two-alternative forced choice paradigm as with the Zwisloki 3-1 adaptive staircase (Zwisloki & Relkin, 2001). Standard grating measurements for the fine grating thresholds were a groove width of 300 μ m and a groove width of 1200 μ m for coarse grating threshold measurement. This task required the participant to wear headphones as noise was used to mask any sound produced from the gratings. The participant also wore a blindfold or the gratings were hidden from view by placing the participant's hand through an opening in a box, inside which the gratings were presented to the participant. The experiment held no restraints

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for force or duration of exploration, gratings were felt using the index finger of the participant's dominant hand. For each trial, the experimenter presented one grating at a time to the participant stating 'the first one' and 'the second one'. The task consisted of 16 trials (8 reversals of the fine and coarse set) and the threshold was derived from the average of the last 12 trials. In each trial participants were required to identify which felt smoother (for the fine gratings set) or which felt rougher (for the coarse gratings set) from a standard grating and a test grating.

The grating orientation test with JVP domes (JVP domes, Stoelting Co., Wooddale, IL) was used to measure tactile acuity. The grating orientation test is a measure of spatial resolution for 2 point discrimination threshold. The classic set of 8 hemispherical JVP dome gratings (gratings had an equidistant bar and groove widths of: 0.35, 0.50, 0.75, 1.00, 1.20, 1.50, 2.00, 3.00 mm) was used for this test. Participants were blindfolded or the JVP domes were hidden from view by placing the participant's hand through an opening in a box, inside which the gratings were presented to the participant. The JVP domes were placed under the participant's index finger of the dominant hand, either vertical or parallel to the axis of the finger. Participants were instructed to identify whether the gratings were 'along' or 'across'. The test began with an initial grating of 2mm spatial period. Once the participant had correctly identified the orientation of the grating, three non-consecutive times, the experimenter would present the grating with the consecutively larger spatial period for the following trial. However, if the participant was unable to correctly identify the orientation the grating with the consecutively smaller spatial period would be used in the next trial. The experiment was stopped after the participant incorrectly identified the orientation of the grating 8 times.

Data Analysis

All data was entered into SPSS 20 and for the purpose of identifying differences between the two groups on the AASP and on tactile threshold tasks, independent sample t-tests were applied to the data. To investigate the relationship between tactile thresholds and the AASP and ADOS categories Spearman's rho correlation coefficient was used due to the data being non-parametric.

Results

All participants from the ASD and control groups completed the Adolescent/ Adult Sensory Profile questionnaire, the British Picture Vocabulary Scale, the monofilament test and the grating orientation test. However, for the texture discrimination tests not all participants were able to complete the coarse grating test (N=12 ASD, N=11 controls) and the fine grating test (N=6 ASD, N=12 controls).

Adolescent/ Adult Sensory profile

Overall on the sensory profile the ASD group displayed higher levels of sensory abnormalities than the population norms as outlined by Dunn (1999). Controls showed normal preferences and no sensory abnormalities across all measures. However, based on the AASP scores, using the mean +3 s.e as a cut off, 2 controls were classified as hypotactile and 1 was classified as hypertactile. Within the ASD group 4 participants were classified as hypertactile, 4 hypotactile, 4 were classified as both hyper- and hypotactile and 1 participant did not fit into either group. Significant difference between the two groups were found across several of the AASP measures.

Table 1: Significant sensory processing differences between groups

Sensory category	ASD(N=13)	Controls(N=13)	t	p
Touch	37.15±2.18	29.38±1.86	3.15	0.004**
Hypotactile	17.69±0.98	13.23±1.70	2.36	0.03*
Hypertactile	19.00±1.90	14.92 ±1.38	2.17	0.04*
Low registration	43.15±2.33	31.85±2.08	4.07	0.001***
Sensory seeking	44.92±1.86	42.23±2.46	2.08	0.05*
Sensory avoidance	41.31±2.64	33.31±2.30	2.23	0.03*
Hypototal	88.08±3.65	74.08±3.32	3.18	0.004**
Hypertotal	82.31±5.99	69.08±3.96	3.18	0.004**

*The mean ± s.e. of the scores on the sensory profile questionnaire. *significant to the value of $p < .05$, **significant to the value of $p < .01$, ***significant to the value of $p < .001$*

The table above depicts the categories in the AASP that yielded a significant difference between the ASD and control groups. These findings demonstrate that the ASD group had significantly higher scores on the low registration category ($p = .004$) and there was a significant difference between groups on sensory seeking ($p = .05$) and sensory avoidance ($p = .03$) behaviours overall on the AASP. Within the tactile processing category the ASD group displayed significantly higher

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scores for both hypertactile ($p = .04$) and hypotactile perception ($p = .03$) and touch processing ($p = .004$).

Tactile thresholds

No significant difference was found between the ASD group and controls in; grating orientation threshold ($t(24) = .17$, $p = .87$), coarse texture discrimination threshold ($t(23) = .21$, $p = .84$) and fine texture discrimination threshold ($t(16) = .53$, $p = .61$). However, in the monofilament test the ASD group displayed a significantly higher light touch threshold ($t(26) = 2.34$, $p = .028$). There was also a significantly higher variance for light touch threshold within the ASD group ($t(26) = 5.17$, $p = .03$).

A significant correlation was found between the grating orientation threshold and fine texture discrimination threshold in the ASD group ($r = .96$, $p = .002$), but not in the control group ($r = .33$, $p = .30$). There was no significant correlation between any of the other tactile thresholds.

Combined psychometrics and psychophysics results

When analysing both psychometric and psychophysics data, a significant correlation was found between hypertactile scores on the AASP and coarse texture discrimination thresholds in the ASD group ($r = .69$, $p = .016$), but not for the control group ($r = .408$, $p = .397$).

Combined AASP and ADOS results

When analysing both the Autism Diagnostic Observation Schedule and the Adolescent/ Adult Sensory Profile data, a significant correlation was found between hypotactile scores on the AASP and stereotyped behaviours on the ADOS for the ASD group ($r = .544$, $p = .036$).

Discussion

Reflecting on the research questions, it can be viewed that (i) the adolescents with ASD vary from their typically developing peers for both sensory experiences and discrimination thresholds of tactile stimulation. The findings also indicate a relationship exists between an individual's classification on the sensory profile and (ii) coarse texture discrimination thresholds to tactile stimuli and (iii) the ASD diagnostic criteria of stereotyped behaviours. The findings of this study demonstrate that not only did the individuals with ASD have generalised sensory abnormalities as has been stipulated within the literature (Rapin, 1996; Foss-Feig, Heacock & Cascio, 2012), but that they experience various tactile specific abnormalities.

The Adolescent/ Adult Sensory Profile found that the ASD group displayed both hyper- and hyporeactivity to tactile experiences, with 12 out of the 13 children being classified as hyper- or hypotactile, and 4 individuals spanning both hyper- and hypotactile classifications. This suggests that tactile abnormalities are varied for individuals with ASD, hypersensitivity has been linked to the pacinian corpuscles receptor pathway (Blakemore et al, 2006), but both hyper- and hyporesponsivity are considered to result from abnormalities in somatosensory processing (Cascio et al, 2008; Glucu, Tanidir, Mukadees & Unal, 2007).

When analysing the psychophysics experiments, the ASD group were found to have significantly higher light touch thresholds reflecting the significantly higher scores for low registration and hypotactile scores on the sensory profile for the ASD participants. It was found that there was a significant correlation between tactile acuity and fine texture discrimination, with individuals in the ASD group who

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exhibited lower scores on the grating orientation threshold test also having lower fine texture discrimination thresholds. Thus suggesting that low levels of tactile acuity may impair an individual's ability to discern fine textures, this low level of tactile acuity would therefore explain the hyporesponsivity to tactile stimulation in some individuals with ASD.

When assessing the combined data it can be viewed that hyper- and hyposensitivity carry different implications. Hypertactile scores on the AASP were linked to coarse texture discrimination threshold in the ASD group. As hypertactile levels increased the coarse texture discrimination threshold lowered, suggesting that these individuals with ASD were more sensitive to detecting the coarse stimuli. Whereas hypotactile scores correlated with stereotyped behaviours on the Autism Diagnostic Observation Schedule, individuals with higher hypotactile scores produced more stereotyped behaviours. The increase of stereotyped behaviours in individuals with ASD who are hyposensitive may arise due to a desire to increase their sensory stimulation (Leekam, Prior & Uljarevic, 2011). There is further empirical support for the relationship found between the ADOS and hypotactile scores, Wiggins, Robins, Bakeman and Adamson (2009) found that sensory abnormalities in ASD are related to the restricted and stereotyped behaviours and interests' core diagnostic features.

Research into sensory processing abnormalities in autism is important due to the implications they pose on the individual's psychological wellbeing. Studies have found that hyperresponsivity increases levels of anxiety and depression in individuals with ASD (Green & Ben-Sarson, 2010; Kinnealey et al, 2011). The implications of tactile specific abnormalities are particularly evident as tactile sensitivity can infringe upon the daily life of individuals with autistic spectrum

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disorders and their families. Tactile sensitivity has been found to impact everyday activities creating an intolerance for washing, brushing hair and certain fabrics resulting in difficulty in finding clothing (Baranek et al, 1997; Kern et al, 2001). The discomfort felt when experiencing physical contact also impacts upon the parent child relationship due to an avoidance of contact by the child and exhaustion felt by parents as a result of coping with the many daily implications of tactile sensitivity (Baranek et al, 1997; Spies & Van Rensburg, 2012). Research in this area, defining the significance of tactile abnormalities, is important to inform practice. Investigations outlining tactile abnormalities provides the basis for developing sensory based interventions.

The current research carries several practical applications by providing information on the three tactile thresholds and their relationship with hyper- and hypotactile sensitivity. This research had funding from the European Union FP7 and information gained from the study is intended to improve the quality of classroom materials and toys for children on the autistic spectrum. By combining psychophysics experiments with the AASP this research has been able to gain more details about tactile processing and the experiences of tactile stimuli for individuals with ASD, allowing for the improvement of the material properties of their environment.

Future research would benefit by replicating the current study with larger samples in order to ascertain the prevalence of tactile sensitivity in individuals with autism. The replication of the current research with an adult sample group would also enable the lifespan of the tactile abnormalities to be assessed as previous research into general sensory abnormalities suggests that they endure throughout the lifespan for individuals with ASD (Coskun et al, 2009).

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Appendix 1

MRes Third Placement Contract

Student Name: Saffron Morris

Programme: MRes Clinical Psychology

Placement supervisor: Amanda Ludlow

Placement working title: Tactile perception in Autistic Spectrum Disorders

Aim: To investigate the sensory experiences and tactile thresholds of individuals with a diagnosis of ASD compared to typically developing peers.

Planned work of the student:

- Review/Search for relevant literature
- Data collection of typically developing adolescents
- Analyse data
- Discuss and reflect on work progress and outcome with supervisor
- Write a placement report to form the main body of the thesis.

Contributions of supervisor:

- Provide references for literature review
- Hold meetings regular meetings with student
- Help with statistical analysis
- Give feedback on one draft of the placement report

Appendix 2

Minutes of First meeting with Dr Amanda Ludlow

This initial meeting was to establish a contract outlining my responsibilities for this research placement. It was discussed how my level of responsibility could increase during this second placement with my supervisor due to having familiarity with one another's process from the previous placement.

The overall project was then discussed and how the research aim would relate to my report. This allowed for placement objectives and a contract to be outlined. It was agreed that I would spend the following weeks familiarising myself with; sensory abnormalities, tactile abnormalities and psychophysics experiments. I was to conduct a brief literature review of the area of sensory abnormalities (specifically tactile), in autism. A date for the next meeting was then arranged.

Minutes of Second meeting with Dr Amanda Ludlow

The purpose of this meeting was to update my supervisor on the work I had undertaken thus far in the placement.

The work I had completed was discussed, mainly being my literature search process as I had devised a diagram mapping my search. We also discussed the information I had gained so far from the reviewed articles and arranged a date for the next meeting.

Minutes of Third meeting with Dr Amanda Ludlow

This meeting primarily addressed the psychophysics and psychometric testing of participants.

It was agreed that I could be involved in the testing to gain experience of testing participants as exposure to psychophysics and psychometric testing procedures would be good for my personal development.

Dates were arranged for the data collection and training for both the psychophysics and the BPVS was arranged prior to this. I was informed of the protocols for testing, particularly delivering participant instructions and obtaining consent prior to testing.

Minutes of Fourth meeting with Dr Amanda Ludlow

During the course of this meeting issues relating to my final report were discussed.

The focus of my introduction was the main topic of this meeting as the literature covered more global sensory abnormalities and I was concerned how to cover the relating implications without being too broad. It was agreed that I should first address general sensory abnormalities before focussing upon the specific area of tactile perception.

It was decided that I should focus on refining my introduction over the following weeks before addressing the testing.

Minutes of Fifth meeting with Dr Amanda Ludlow

The purpose of this meeting was to discuss the development of my introduction for the report. This allowed for any concerns to be raised regarding the inclusion and exclusion of any information gained from my literature review.

The process of testing was also discussed again due to testing commencing the following week. It was agreed that another meeting would be arranged following this.

Minutes of sixth meeting with Dr Amanda Ludlow

During this meeting we discussed my experiences of administering the psychophysics experiments and the BPVS during the testing day.

It was decided that I was now in a position to address the analysis and so the statistical procedures were finalised. The forms of analysis for the various experiments were agreed upon.

It was decided that I would view the analysis and begin the write up process and any further questions could be dealt with via e-mail.

Appendix 3

Literature search

