

Portfolio including Thesis

Volume 1 of 2

Eleanor Wakerly

A portfolio submitted in partial fulfilment of the requirements of the University of Hertfordshire of the degree of Doctor of Clinical Psychology including a thesis entitled:

The use of ‘squiggling’: a play technique as a diagnostic aid in the assessment of secondary school-age children with Asperger syndrome

The Programme of study was carried out in the School of Psychology, University of Hertfordshire, August 2008.

Volume 1. Contents

	Page Number
Written Exercise 1	3
Written Exercise 2	27
Small-Scale Research Project	45
Literature Review	83
Thesis	117
Journal Submission	313

Written Exercise 1.

Critically review the role and importance of evidence-based practice for clinical psychologists, but with particular reference to working in adult and/or older adult settings

Eleanor Wakerly

Student No. **05108132**

January 2006

DClinPsy Year 1

Word Count (excluding references): 4927

Critically review the role and importance of evidence-based practice for clinical psychologists, but with particular reference to working in adult and/or older adult settings

For a period of over fifty years, the clinical psychologist has been consistently defined as a practitioner generating hypotheses and applying scientific strategies to inform their role as a clinician (Shapiro, 2002). There has been a marked shift in this professional position as a 'scientist-practitioner' over the past decade, broadly in response to changes in the British economic and political climate. The clinical psychologist now must work in line with a model of Evidence-Based Practice (EBP), drawing on research evidence, provided in the form of procedures and protocol, to inform their role as a clinician (Roth and Fonagy, 1996).

There are many intentions behind this metamorphosis, and many more implications for the core philosophy and development of the clinical psychology profession. As national workforce and planning agencies are encouraging more and more clinical psychologists to be involved in the development and delivery of mental health services (Cheshire and Pilgrim, 2004), I have a professional responsibility as a future implementer of EBP to review the process in terms of its role and impact on the profession.

The emergence of Evidence-Based Practice (EBP)

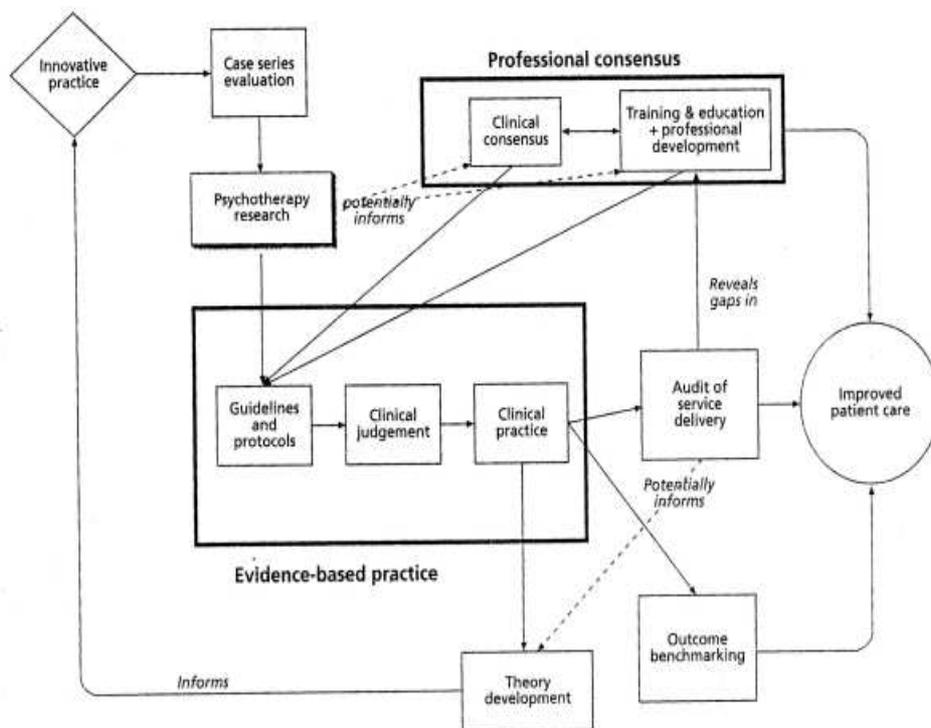
As the prevalence of mental health problems within the British adult population mount, this is negatively contributing to unemployment figures, resulting in an identified instability with the country's economy (Layard, 2004). Furthermore, there is a short supply of clinical psychologists to meet that demand¹ (Division of Clinical Psychology, 2004). In an effort to rebalance the system, the quality of the provision of mental health services has been highlighted as a key concern on the government's

¹ DCP 2004 quoted just 4850 WTE clinical psychologists in the NHS. In order to deliver the Adult Mental Health NSF there need to be approximately 7300 WTE, revealing a discrepancy of 2450 WTE.

agenda. It could be said, broadly-speaking, that the important intentions behind the integration of EBP into mental health services are to ensure the provision of safely delivered and effective mental health services at low cost, which are acceptable and accessible for people of all disabilities, ages, cultures, ethnicities and socio-economic groups (Mace and Moorey, 2001; Milne, 1999).

In 1995, the NHS Executive posited a model of EBP, later fully developed by Roth and Fonagy (1996), involving the integration of a complex recursive relationship between theory, research and practice (EBP) into a service framework, which would be broadly based on one used to aid decision-making in physical medicine. The government envisaged that the maintenance and evaluation of quality services would be strengthened by using an EBP model (Review of Strategic Policies, Department of Health, 1996).

Figure 1. Model of evidence-based practice (Roth and Fonagy, 1996)



Within the EBP model, clinical practice is informed by clinical judgement and guidelines. These protocols are created from 'systematic' psychotherapy research, evaluation of cases, 'innovative' practice and professional consensus. Clinical practice feeds into audit and outcome benchmarking, to ensure a dynamic process of review of standards, and it also informs theory development. There are a number of key systems in place, and resources available, to clarify and promote the role and importance of EBP to the clinical psychologist.

A description of the structure of the EBP framework

Clinical governance, research and development initiatives and quality assurance measures have been placed highly on the government's agenda in an effort to integrate EBP into the organisation and delivery of services for people in mental distress (Cheshire and Pilgrim, 2004). The overarching scaffolding is the National Service Framework for Mental Health (NSF, Department of Health, 1999) which outlines target models of best practice and effective care for adults of working age.

Stemming from the Mental Health NSF, the National Institute for Health and Clinical Excellence use "evidence from clinical trials and economic analyses" (Department of Health, 2001) to provide the clinical psychologist, amongst other clinicians, with national good practice guidelines for the management of a range of mental health problems in primary and secondary care services for adults (including cases of dual diagnosis). NICE uses a hierarchy of evidence arranged according to levels of complexity of research methods, taken from EBP in medicine (Sackett, Straus, Richardson, Rosenburg and Haynes, 2000). Systematic reviews, meta-analyses and Random Controlled Trials (RCTs) are seen as the most reliable and valid type of evidence. Studies with experimental designs, cohort control and case-control studies are regarded as the next best types. Other levels of evidence are obtained via consensus conferences, expert opinion, observational studies and other types of study such as interview or local clinical audit. At the lower end of the evidence hierarchy

are studies with a quasi-experimental or qualitative design, and personal communication.

Organisations that promote and support the teaching of EBP are the National Institute for Mental Health England (NIMHE) and the Centre for Evidence Based Mental Health. They aim to help the clinical psychologist transform policy into practice by ensuring that the correct systems are in place and by resolving any local challenges to the development of services.

The Journal of Evidence Based Mental Health presents updates and reviews of past studies for the clinical psychologist and the psychiatrist. There is also a guide on mental health policy, published by the Department of Health, to support the delivery of policy locally and to tailor services to meet local needs. More specific to the profession, networks within the British Psychological Society (BPS), such as the Division of Clinical Psychology (DCP), produce good practice guidelines, research journals and they have a committee who meet to discuss clinical effectiveness. The Centre for Outcomes Research and Effectiveness (CORE), the BPS, and other relevant professional associations have produced a document entitled, "Treatment Choice in Psychological Therapies and Counselling: Evidence Based Clinical Practice Guideline". Meta-analytic reviews over the past fifteen years are subject to professional consensus and consultation from user groups. In more of a local context, research and development departments oversee and assist with clinical audits and research studies. Evidently there is a structural framework, in the form of a number of organisations, networks and documented guidelines, promoting the importance of EBP.

The demands from the government and from the public mean that the clinical psychologist has to relate to the processes within the EBP framework, in terms of having a responsibility to both consume and produce evidence. There are some controversial areas particularly with regard to the consumption, dissemination and implementation of evidence (Kettlewell, 2004).

THE MARK OF THE MEDICAL MODEL

The influence of psychiatry...

For years many clinical psychologists have argued that a medical basis for understanding complex human problems is undeniably flawed, and is not helpful for the client or the therapist (Pilgrim, 1999; Johnstone, 2000; Nathan, 2004). The psychiatric profession primarily promote a biological understanding of mental health; an understanding that is “based upon unsupported hypotheses and logical errors...is bound to be flawed, and probably fruitless” (Johnstone, 2000, p85). It is curious, to say the least, how some clinicians are quite content with the appalling label of 'Personality Disorder', especially when users of mental health services tell us consistently that they do not like the term 'mental illness' (Pilgrim, 1999) and have concerns over choice and control (Read and Reynolds: as cited in Perkins, 2001).

In spite of these criticisms, the clinical psychologist is placed in a position under EBP to make use of the overarching NICE guidance, which clearly adopts the diagnostic psychiatric view. For example, guidelines are provided for “Depression”, “Bipolar Disorder”, “Obsessive-Compulsive Disorder” and other such labels of mental distress (NICE, 2001).

Furthermore, Pilgrim (1999) notes that even the journal Evidence Based Mental Health presents a psychiatric model of mental *illness*, structured with core sections on “aetiology”, “diagnosis” and “prognosis”. Outcome measures such those from CORE are indeed valid and reliable, and are recommended as part of EBP (Barkham, Margison, Leach, Lucock, Mellor-Clark, *et al.*, 2001). However, as they involve changes in psychiatric symptomatology, yet again the clinical psychologist is pushed further into the realm of the medical model.

The validity and ethics of applying a model of EBP used in physical health to one in mental health is a dubious issue, which is especially highlighted when we turn to look at some of the 'best' types of evidence that the clinical psychologist consumes and implements in practice.

The 'best' research evidence

Systematic reviews of the evidence-base, otherwise known as meta-analyses, can enable the clinical psychologist to generate meaningful questions, which can inform their case formulations and improve the accuracy of clinical interventions (Margison, Barkham, Evans, McGrath, Mellor-Clark, *et al.*, 2000). However, whilst the clinical psychologist is trained in the skills of research design and the interpretation of complex inferential statistics, making sense of the statistics and the diagnostic jargon can serve as an unnecessary barrier to understanding (Sackett, Straus, Richardson, Rosenberg and Haynes, 2000).

The clinical psychologist can also draw on the Randomised Control Trial (RCT), firstly to provide evidence of the efficacy of treatments (i.e., whether they work or not), and secondly to sift out potentially harmful treatments (Mace, Moorey and Roberts, 2001). The RCT is highly valued especially in physical health and psychiatry as the research design uses randomisation in its recruitment of participants, thus dealing with any confounding variables that can distort results (Wessely, 2001: as cited in Mace *et al.*, 2001). However, applied to mental health it is not without its drawbacks.

Firstly, the RCT ignores any wider uses of the term evidence, such as personal and social support and matter of client choice, as they are seen to confound results (Cheshire and Pilgrim, 2004). Secondly, drop-out rates can influence the interpretation of the statistics, and often participant attrition is not accounted for (Kazdin, 1994: as cited in Margison *et al.*, 2000). Thirdly, controlled trials often restrict the kind of patients recruited, and consequently do not reflect normal patterns

within the clinical population (Margison *et al.*, 2000). Shapiro, Barkham, Rees, *et al.* (1995: as cited in Margison *et al.*, 2000) comment that even with RCTs there is a trade-off between the rigour of the experimental design and the generalisability to the population. Other concerns with the RCT are that there can be psychometric problems with the outcome measures used, treatment can be inconsistently delivered between trials (and therefore be incomparable), and other treatments can contaminate results in trials of longer term therapy (Cheshire and Pilgrim, 2004).

Evidently, there are valid concerns for the clinical psychologist consuming RCT evidence and complex meta-analyses. It would be fair to estimate that there is some incongruence between these methods and the core skills of the clinical psychologist, as they do not promote formulations and interventions that are tailored to the individual (Roth, 1999; Dimcovic, 2004). In spite of this, they continue to be produced and used as part of EBP, seemingly in pursuit of the 'right' technique to improve the likelihood of a good outcome.

A heavy focus on technique affecting outcome

It has been found that across all areas of psychological therapy, modern methods of measurement support EBP for treatments to improve clinical effectiveness in routine practice (Margison *et al.*, 2000). Indeed, it is personally difficult to deny the value of reliable and valid techniques such as standardised psychometric tests, self-monitoring diaries and behavioural activation. However, these methods are playing into the psychiatric diagnostic model, and furthermore it may be that this focus on technique is overshadowing valuable research into the importance of the *process*. Strupp (1989: as cited in Nathan, 2004) comments:

“Instead of focussing on disembodied techniques, we must study and seek a better understanding of the human relationship between a particular patient and a particular therapist and the transactions occurring between them” (p.217)

The impact of the interactive process by both the therapist and the client on clinical outcomes was highlighted by Stiles and Shapiro (1989: as cited in Roth, 1999). Indeed, outcome and remission rates across all psychological therapies have been found to be strongly associated with the therapeutic alliance (Krupnick, 1996 as cited in Roth, 1999). Although clinical skills such as paraphrasing, summarising and empathy may not be regarded as strictly 'evidence-based', in terms of being supported by systematic research, it is my personal opinion that they can be key to the effectiveness and acceptability of therapy. Clinical psychology training courses highlight the importance of the *process* of assessment and therapy, particularly in ensuring allocation to the most appropriate treatment, monitoring of progress and early identification of problems.

There are signs of a shift as researchers encourage a wide theoretical examination of influences on outcomes, such as the complex re-analyses of data on trials of treatments for depression carried out recently by NIMHE (Roth, 1999). There is less interest among researchers in merely showing that therapeutic techniques work and more attention is being paid to the interaction of individual characteristics and therapies (Roth, 1999).

Evidently, the importance of process as well as technique is slowly being recognised within the EBP framework, especially as several systematic reviews of the efficacy of different psychological therapeutic techniques have shown that they are all roughly the same (Wampold, Mondin, Moody, Stich, Benson *et al.*, 1997; Shapiro, Barkham, Rees, Hardy, Reynolds *et al.*, 1994; Chambless and Ollendick, 2001). This finding has become known within the research community as the 'Dodo effect'.

The 'Dodo effect'

The few studies that have demonstrated a difference between different treatments do not exceed that which would be expected by chance (Wampold, 1997: as cited in

Bohart, 2000). This finding brings us to the question of why some therapies are recommended more than others in the EBP framework, to which we can start to look at some answers.

Gaps in research

One possible reason for why some therapies are recommended more than others in the EBP framework may be that clinical guidelines can just reflect the most thoroughly researched theoretical stances rather than the 'best' out of a range. Ten years ago, in response to an inspection of financial spending within mental health services, the Department of Health commissioned a comprehensive review of the effectiveness of psychological therapies (Roth and Fonagy, 1996). This revealed a paucity of evidence concerning many therapies, rather than a wealth of evidence for and against (Margison *et al.*, 2000). So this could account for how a clinical psychologist could be led to believe that only a few therapies are effective.

Barlow (1994: as cited in Nathan, 2004) commented that evidence-based practice in the United States, “makes the public and federal and state policy makers mistakenly believe that few...are efficacious”. This fits with my experiences in previous placements, where many referrals were often received from psychiatrists asking for 12 sessions of Cognitive-Behavioural Therapy (CBT), as though that was the only credible psychology service on offer. As more short-term therapies, such as brief CBT, are being researched and then translated into guidelines (Crits-Christoph, 1992), there are now recommendations for the government to recruit hundreds more CBT therapists (Layard, 2004). This example demonstrates the potential impact of EBP on policy makers' decisions about practice.

Given the importance of EBP on the future of services, we might expect the underlying processes of the model to be almost flawless, yet as shown by Roth and Fonagy (1996), there are gaps in the research. Furthermore, there are several biases

with the dissemination and implementation of evidence, which have implications for the clinical psychologist working under EBP.

Resistance to the empirical method

It may be that there is some resistance from advocates of some theoretical approaches to demonstrate their effectiveness using the empirical method (e.g., Personal Construct Therapy and Systemic Family Therapy), as it clashes with the underlying social constructionist or constructivist principles (Winter, 2003). This means that as these approaches are seen as not utilising scientific methods within EBP, their own research input may be getting lost, and not incorporated into practice guidelines. It is personally a frustrating issue, as there is room within the EBP model for such approaches whilst maintaining the evidence-based paradigm (Bohart, 2000), yet it seems there are various hurdles to jump until they can eventually co-habit and be welcomed into the EBP framework.

Attribution error

When the clinician is bombarded with guidelines that suggest one therapeutic approach is much better than another, it can be all too easy to wrongly attribute the success of another therapy to other factors than the therapy itself (Kettlewell, 2004). For example, factors may be considered such as the charisma of the therapist, the 'right timing' or the well-selected group of clients. If we take psychoanalytic therapy as an example: in my experience this approach has sometimes been viewed as ineffective and expensive - and indeed it is not highly recommended in national guidelines - yet studies have shown that it can be efficient and clinically effective (Mitchell and Brownescombe, 1999).

In my personal opinion, this attribution error could be exacerbated by a delay of research from modern experimental psychology being applied to guidelines to substantiate theoretical approaches. For example, there is a wealth of evidence to

support Adrian Well's cognitive theories on anxiety, yet Tim Beck's theories still dominate in many training sessions.

This emerging bias within EBP to selectively use and trust research is a daunting prospect for someone entering the clinical psychology profession; a prospect that is perhaps made even more likely as the scientific interests of the clinician continue to be challenged by the business interests of drug companies.

Influence of funding from the pharmaceutical industry

The huge financial input into health services from drug companies is a key source of bias that can shape the reliability of evidence that is disseminated via publication (Newnes, 2001). Drug company propaganda has a stranglehold over many psychiatric journals, which we know to be the key source for many national clinical guidelines (Newnes, 2001). Even the government admits to this crucial bias of the dissemination of evidence: "Most relevant trials are undertaken by those with clear pecuniary interests in the results" (Effective HealthCare, 1999: as cited in Newnes, 2001).

Researcher's therapeutic allegiances

A further bias impacting on the range of evidence published is the individual researcher's own preferences with particular therapies. Results can be interpreted in a skewed way to fit in with the experimental hypothesis, distorting comparative treatment results (Luborsky, Diguier, Seligman, Rosenthal, Krause *et al.*, 1999).

Journal standards

Newnes (2001) comments on the high standards of journals that now militate against publication of small-scale clinic-based research, the implication being that potentially useful data is lost. It is now common for clinicians to carry out clinical audits, and perhaps equally common for them to be turned down for publication (Cheshire and

Pilgrim, 2004). The journal, *Clinical Psychology* receives hundreds of articles each month bidding for publication, out of which a handful or so are chosen. I wonder what the criteria are for this selection and how fair the process is; perhaps another hurdle for the clinical psychologist in their pursuit to disseminate and/or consume a wider range of evidence.

The 'average depressive'

Although the clinical psychologist can draw on a wide body of process and outcome research via journals, unfortunately this can only often give *broad* estimated indications about the most appropriate type and manner of intervention. This is because studies are informative about the *average* expected outcomes as they focus on samples of the population rather than the individual (Garfield, 1996). A way round this is with analysis of the single case, where the clinical psychologist can contrast what they know about expected outcome with their actual clinical work (Roth 1999).

From the lab to the clinic

There is broad consensus that efficacy in research settings is likely to be greater than that found in clinical settings. This view suggests that effects are more likely to occur in the research laboratory than in the clinic. However, there are few published studies that approximate to standard clinical conditions so it makes it difficult to draw up firm conclusions. If, however, this consensus view were to be tested out and proved right, this could seriously affect our confidence in research evidence.

NICE not so nice

Several shortcomings of the national clinical guidelines have been highlighted over the years. The NICE guidelines, in particular, do not comprehensively cover the range of problems that a clinical psychologist may work with, for example there are no guidelines for people diagnosed with 'early-onset schizophrenia', nor are there any for

people with learning disabilities. There is little guidance for the clinician treating a multitude of problems, which is surprising considering that co-morbid substance abuse occurs in up to 50% of cases (Newnes, 2001).

Summary

There are several biases and flaws present within the mechanics of the evidence-based practice framework for mental health services, stemming from the potent influence of the psychiatric profession. Funded research continues to be carried out into short-term treatments, when the actual evidence points towards a need to look at differences in process rather than in therapeutic technique. Biases in the dissemination process could be maintaining the narrow view of evidence, presented to us in the form of clinical guidelines. Misinterpretation of the significance of outcomes from research studies using samples could also be covertly increasing the gap between research and practice. Glenys Parry, the Chair of the 'Treatment Choice in Psychological Therapies' guidelines development group comments: "Nowhere is the gap between research and practice wider than in this field" (Department of Health, 2001). So where, dare I ask, does this leave the clinical psychologist?

IMPLICATIONS FOR THE ROLES OF THE CLINICAL PSYCHOLOGIST

The redundant researcher

It would be fair to say that EBP does not encourage the clinical psychologist to 'indulge' in explorative research perhaps as much as they would like to, or as much as they used to. Working within the EBP framework, there can be pressure from all angles, leaving the clinical psychologist mainly as a *consumer* of research in the prominent role of therapist. After the profession has battled for years to establish its position as a 'Level 3' scientist-practitioner, perhaps there is now some element of

learned helplessness. Perhaps the clinical psychologist finds it more of a challenge to question the processes of EBP when they are enmeshed within the framework.

Tethered to EBP

In service delivery work, evidence-based guidance can help map pathways for an efficient service (Roth, 1999), although the growth of truly innovative services can be stunted or marginalised. Davison and Lazarus (1995: as cited in Nathan, 2004) comment, “Standards of practice will reduce innovation”. Webster (2002) outlines the tension between EBP and the development of family therapy services. Perhaps in a frantic effort to narrow the gap between supply and demand for the clinical psychologist in adult services, more of the same services seem to be being developed.

Selective promotion

It is clear to see how the use of a 'pre-packaged' evidence base can be helpful, especially in terms of saving time, in supervision and in consultation work with other professions or as a tutor on training courses. However, I would certainly say that EBP can influence attitudes within a learning environment for any clinician, commonly discouraging the use of less 'scientific' work, maintaining a very narrow view of what evidence is or can be. Furthermore, if an evidence-base is implemented too rigidly it can heighten tensions between various professions by highlighting discrepancies. As an example, there were great difficulties establishing the credibility of working systemically in an adult rehabilitation service, perhaps because it was not as well recognised by the multidisciplinary team.

CONCLUSION

There is little dissension from me regarding the intentions of the clinical governance movement and EBP, in terms of ensuring a safe and sound, efficient and equitable service for all stakeholders. It is, indeed, hard to argue against its key underlying

principle of wanting to do the right thing (Roth, 1999). However, there are legitimate concerns over a number of areas, broadly including how evidence is produced, how guidelines are then disseminated to practitioners, and proceeding this how evidence is implemented in practice.

With a growing consensus for a broader view of evidence, it is clear that there needs to be greater flexibility within the somewhat tight evidence-based framework to accommodate other accepted forms of evidence.

I personally wonder at how the processes of EBP have spread across the NHS, especially as it is simply *assumed* that by having procedures and protocols in place we are improving services. Across the Atlantic, treatment manuals are used by clinicians (similar to guidelines) as a way of merging science and practice, yet there are no studies showing that protocol actually improves practice (Addis, 2002).

The professional position of 'scientist practitioner' survived the challenges of eclecticism in the 1970s because, simply, it worked (Shapiro, 2002). The consumption and production of scientific strategy strengthened the legitimisation of the profession and helped it to separate from its philosophical roots. EBP has led to the massive shift in focus from strategy to *procedure* (Shapiro, 2002), which, in balance, has negatively impacted on the profession. Without closing the gap between supply and demand of clinical psychologists, it would be reasonable to say that the profession is being weakened further in its pursuit to work according to the demands of EBP. A gloomy picture perhaps, until the clinical psychologist is reminded of their agency and growing influence within the development of mental health services.

SUGGESTED FUTURE DIRECTIONS

Developing the breath and depth of evidence

Newnes (2001) fervently argues for the clinical psychologist to draw on non-scientific evidence from the world of the arts and undocumented lived experiences in training

and practice. The value of meaningful and valuable qualitative research methods is being brought forward almost in line with quantitative methods (Gilgun, 2004). Indeed, there are many advocates for an expansion of the EBP framework to include a broader view of scientific evidence, who are keen to look at the criteria and processes involved in its evaluation (Chwalisz, 2003; Hoshmand, 2003).

In line with this thinking, Roth (1999) stresses that we cannot base our practice solely on research evidence, advocating a buffering with professional consensus. However, it is questionable as to how much we can trust expert opinion when there are so many biases in the production and dissemination of evidence. Even if the view of evidence *is* at some point expanded to include process as much as technique, it will be important to remain flexible within the framework in terms of regarding evidence as more a sound and defensible interpretation of reality. Indeed, clinical guidelines should be used as such; to *guide* practice whilst remaining aware of the importance of the breadth of theoretical knowledge and the clinical skills that the clinical psychologist also brings to the clinic.

Whilst the menu of evidence from the medical model hierarchy presents at odds with the philosophy of clinical psychology (Sackett *et al.*, 2000), there is the inclusion of the opinions of users of the service (an aspect missing from the Roth and Fonagy, 1996 model). It would be interesting to look at the effects of EBP on the *acceptability* and *accessibility* of services from the perspective of the important stakeholder, the service-user. This, perhaps, more liberal view of evidence could be fed into the cycle of EBP in mental health, although care would need to be taken to avoid the tokenism of service-user involvement.

In response to such challenges to the *status quo*, Nathan (2004) and Leyin (2002) highlighted the increased risk of harm brought on by untested methods. However, if the narrow view of evidence remains, then equally there is the risk of potentially harming people by not developing individually tailored formulations and

interventions. Nieboer (2000) comments that, with the implementation of EBP, there is “a danger of creating armour that can suffocate the profession”.

The importance of using ‘N=1’ studies, or case studies, to broaden evidence (by providing ‘action research’ or *evidence* that is based on *practice*) is perhaps underestimated (Barkham and Mellor-Clark, 2003; Leyin, 2002). There are potential hazards with this method, such as breaking confidentiality with the client (Grant, 1999). Furthermore, the statistical power of a clinical case load is so low that there is a risk of inappropriately indicating that a treatment is ineffective. However, this method is embraced by medicine (Sackett *et al.*, 2000) and so there should not be too much resistance to developing this method of bridging evidence with practice.

Joining hands

As there is a large quantity of research evidence supporting cheaper short-term treatments and not so much supporting longer term treatments (Nathan, 2004), the clinical psychologist may be tempted to alienate themselves from researchers with their ‘bad’ intentions. However, if the clinical psychologist is to continue working in an EBP framework, it could be useful to constructively build on this relationship, and use alternative methods to improve the quality of individual intervention such as practice-based evidence. There may also be some benefit in the clinical psychologist educating other professions on the intentions of EBP, as well as how to access and use the evidence-bases available (Street, 2005).

Knowing limits

The limits of the relationship between evidence and practice are described by Sturdee (2001: as cited in Mace *et al.*, 2001): “scientific evidence...can only affirm our commitment to the conceptual structures and theoretical constructs provided by the paradigm within which what counts as evidence has already been defined”. In other words, research and its applicability in practice can only inform us of the degree of

confidence we can have in our theories, as we able to see how they reflect 'reality'. Hoshmand (2003) suggests that there may need to be more attention paid to the applied epistemology of research and practice. Maybe this would help the clinical psychologist work under the EBP model with one hand still on the roots of the scientist-practitioner position, integrating both focuses on scientific strategy and procedure.

Written Exercise 1. References

- Addis, M. (2002) Implicit and untested assumptions about the role of psychotherapy treatment manuals in evidence-based mental health practice. *Clinical Psychology: Science and Practice*, 9 (4), 421-424
- Barkham, M., Margison, F., Leach, C., Lucock, M., Mellor-Clark, J., Evans, C., Benson, L., Connell, J., Audin, K. & McGrath, G. (2001) Service profiling and outcomes benchmarking using the CORE-OM: toward practice-based evidence in the psychological therapies. *Journal of Consulting and Clinical Psychology*, 69 (2), 184-196
- Barkham, M. & Mellor-Clark, J. (2003) Bridging evidence-based practice and practice-based evidence: developing a rigorous and relevant knowledge for the psychological therapies. *Clinical Psychology and Psychotherapy*, 10, 319-327
- Bohart, A.C. (2000) Paradigm clash: Empirically supported treatments versus empirically supported psychotherapy practice. *Psychotherapy Research*, 10 (4), 488-493
- Chambless, D.L. & Ollendick, T.H. (2001) Empirically supported psychological interventions: controversies and evidence. *Annual Review of Psychology*, 52, 685-716
- Cheshire, K. & Pilgrim, D. (2004) *A Short Introduction to Clinical Psychology*. London: Sage
- Chwalisz, K. (2003) Evidence-based practice: a framework for twenty-first century scientist practitioner training. *Counseling Psychologist*, 31 (5), 497-528
- Crits-Christoph, P. (1992) The efficacy of brief dynamic psychotherapy: a meta analysis. *American Journal of Psychiatry*, 149, 151-158

Department of Health. (2001) *National Institute for Clinical Excellence: Clinical Guidelines*

<http://www.nice.org.uk/page.aspx?o=guidelines.completed>

Department of Health. (1999) *National Service Framework for Mental Health: Modern Standards and Service Models.*

<http://www.dh.gov.uk/assetRoot/04/07/72/09/04077209.pdf>

Department of Health (1996) *NHS Psychotherapy Services in England: Executive Review of Strategic Policies.*

Department of Health. (2001) *Treatment Choice in Psychological Therapies and Counselling: Evidence-based Clinical Practice Guideline.*

<http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/>

Dimcovic, N. (2004) More on evidence-based practice in psychotherapy research. *Clinical Psychology, 43, 9-12*

Garfield, S. (1996) Some problems associated with 'validated' forms of psychotherapy. *Clinical Psychology: Science and Practice, 3, 218-229*

Gilgun, J.F. (2004) Qualitative methods and the development of clinical assessment tools. *Qualitative Health Research, 14 (7), 1008-1019*

Grant, S. (1999) EDMR: examining the evidence, implementing the practice. *Clinical Psychology Forum, 133, 13-16*

Hoshmand, L.T. (2003) Applied epistemology and professional training in a science-based cultural enterprise. *Counseling Psychologist, 31 (5), 529-538*

Johnstone, L. (2000) *Users and Abusers of Psychiatry*. Brunner-Routledge: London.

Kettlewell, P.W. (2004) Development, dissemination and implementation of evidence-based treatments: commentary. *Clinical Psychology: Science and Practice*, 11 (2), 190-195

Layard, R. (2004) *Mental Health: Britain's Biggest Social Problem?* Sainsbury's Centre for Mental Health.

Leyin, A. (2002) Evidence-based mental health (correspondence). *Clinical Psychology*, 12, 5-6

Luborsky, L., Diguer, L., Seligman, D.A., Rosenthal, R., Krause, E.D., Johnson, S., Halperin, G., Bishop, M., Berman, J.S. & Schweizer, E. (1999) The researcher's own therapy allegiances: a "wild card" in comparisons of treatment efficacy. *Clinical Psychology: Science and Practice*, 6 (1), 95-106

Mace, C. & Moorey, S. (2001) *Evidence in psychotherapy: a delicate balance*. In: Evidence in the Psychological Therapies. Edited by Mace, C., Moorey, S & Roberts, B.(2001) Brunner-Routledge: London

Margison, F.R., Barkham, M., Evans, C., McGrath, G., Mellor-Clark, J., Audin, K. & Connell, J. (2000) Measurement and psychotherapy. *British Journal of Psychiatry*, 177, 123-130

Mitchell, S., Brownescombe, H.M. (1999) Why purchase psychoanalytic psychotherapy on the NHS? A set of guidelines. *Clinical Psychology Forum*, 134, 36-40

- Milne, D. (1999) Important differences between the 'scientist-practitioner' and the 'evidence-based practitioner'. *Clinical Psychology Forum*, 133, 5-9
- Nathan, P.E. (2004) When science takes us only so far. *Clinical Psychology: Science and Practice*, 11 (2), 216-218
- Newnes, C. (2001) On evidence. *Clinical Psychology*, 1, 6-11.
- Nieboer, R., Moss, D. & Partridge, K. (2000) A great servant but a poor master: a critical look at the rhetoric of evidence-based practice. *Clinical Psychology Forum*, 136, 17-19
- Perkins, R. (2001) What constitutes success? The relative priority of service users' and clinician's views of mental health services. *British Journal of Psychiatry*, 179, 9-10
- Pilgrim, D. (2002) Evidence-based mental health (correspondence). *Clinical Psychology*, 9, 5-6
- Roth, A. & Fonagy, P. (1996) *What works for whom? A critical review of psychotherapy research*. Guilford Press: New York.
- Roth, A. (1999) Evidence-based practice: is there a link between research and practice? *Clinical Psychology Forum*, 133, 37-40
- Sackett, D.L., Straus, S.E., Richardson, W.S., Rosenburg, W., Haynes, R.B. (2000) *Evidence-based medicine: how to practice and teach EBM*. Churchill-Livingstone: London.
- Shapiro, D. (2002) Renewing the scientist-practitioner model. *The Psychologist*, 15 (5), 232-234
- Street, E. (2005) Relating to complexity. *Clinical Psychology*, 47, 25-28

Wampold, B.E., Mondin, G.W., Moody, M., Stich, F., Benson, K. & Ahn, H. (1997) A meta-analysis of outcome studies comparing bona-fide psychotherapies: empirically “all must have prizes”. *Psychological Bulletin*, 122, 203-215

Webster, J. (2002) Family therapy training and workforce planning. *Journal of Family Therapy*, 24 (2), 134-149

Winter, D. (2003) *The evidence base for personal construct psychotherapy*. In: International Handbook of Personal Construct Psychology. Edited by F. Fransella. John Wiley & Sons: London.

Written Exercise 2.

Discuss the use of systemic and psycho-dynamic approaches for people with a learning disability. What are the potential dilemmas and challenges faced by a clinical psychologist when using these two approaches with learning disabled people, and how can they be addressed?

Eleanor Wakerly

Student No. **05108132**

July 2007

DClinPsy Year 2

Word Count (excluding references): 3860

Discuss the use of systemic and psycho-dynamic approaches for people with a learning disability. What are the potential dilemmas and challenges faced by a clinical psychologist when using these two approaches with learning disabled people, and how can they be addressed?

People with a learning disability demonstrate a significant impairment of intellectual and adaptive/social functioning, below what one would expect for their age and their culture (DSM-IV-TR: American Psychiatric Association, 2000; ICD-10: World Health Organisation, 1992). Secondary problems such as mental health difficulties are three to four times more common amongst people with a learning disability than people without (Deb, Thomas & Bright, 2001, with prevalence measured at 40% (Cooper & Bailey, 2001). This increased vulnerability is not entirely surprising perhaps, given the adverse historical background of deprivation, denial and rejection for this group of people and their families (Conboy-Hill & Waitman, 1992).

Mental health difficulties are sometimes falsely assumed to be part of the learning disability as though that necessarily indicates a limited capacity to process experiences and adjust psychologically (Mason, 2007). There can be either this diagnostic overshadowing bias or an inaccurate assumption that people with a learning disability are somehow immune to emotional distress (Fletcher & Dosen, 1993). However, many people commenting in the field of psychotherapy and learning disability agree that the mental health needs of this heterogeneous group have moved from being totally overlooked by clinicians to being recognised as relevant and important (Beail & Warden, 1996).

Acceptance and access to psychological approaches

The advocacy movement in the 1980s-90s was influential in the long and slow process of normalisation of people with a learning disability (Wolfensberger, 1972). In particular, O'Brien's five service accomplishments of choice, community presence, community participation, competence and respect augmented the social status of this

group of people (O'Brien, 1987: as cited in Taylor, Biklen & Knoll: pp. 85-108). Their right to access psychological services was highlighted further by the English government white paper "Valuing People: A New Strategy for Learning Disability for the 21st Century" (Department of Health, 2001). This document sets out the four guiding ideals for the delivery and development of services for people with a learning disability, comprising independence, rights, choice and inclusion. Indeed, one could say that the tide is turning.

However -bringing us back to reality- while there are these ideals of equal access, choice and integration with the mainstream, the equitable delivery of accessible and acceptable mental health services are still developing for people with a learning disability (Beail, 2003). The limitations of health services in meeting the social and emotional needs of people with a learning disability have only just started to be addressed (Arthur, 2003).

Development of psychology services in the face of a challenge

Psychological services for people with a learning disability developed in the 1970s when the behavioural approach was the predominant model for psychologists (Zamon, Holt & Bouras: as cited in Carr, O'Reilly, Noonan Walsh & McEvoy, 2007). This approach has been extensively researched and has continued through the years to be used by psychologists in everyday practice (e.g., Owens & Jones, 1992). The tendency for psychological services for people with a learning disability has been to focus on such individual approaches (e.g., cognitive behavioural: Taylor, Novaco, Gillmer & Thorne, 2002). However, with more attention being paid to the families of people with a learning disability, a systemic approach is receiving greater recognition as a therapy that can fit well with the collective team-working, often family-based, nature of learning disability services (Beail, 2001; Baum & Lynggaard, 2006). Other more person-centred therapeutic approaches, such as psychodynamic (Sinason, 1992; Beail, 1995) have only relatively recently been developed and used within learning disability services. The delayed implementation of such psychological approaches may relate to

a key challenge for the clinical psychologist working within a learning disability service.

The challenge is threefold; to meet the demands of the reformed NHS (i.e., providing an evidence-based and cost-effective service), to uphold and develop the ideals of normalisation (as in “Valuing People”: DH, 2001), and to challenge the relevant prejudices that still exist in wider society and even, alarmingly, with the psychology profession. There are several issues for the clinical psychologist to consider in the clinical practice of less-established psychological approaches with people with a learning disability. These issues or dilemmas relate to the challenge of bridging the gaps between the ideals of Valuing People (i.e., essentially listening more to the person) and the expectations or demands placed on the psychologist by the person with the learning disability, their family, the service and the NHS agenda. This essay explores these dilemmas that the clinical psychologist can face in using a systemic and a psycho-dynamic approach and describes how they may be dissolved.

Evidence of psychological approaches with people with a learning disability

Presently perhaps related to the dire straits of the NHS, the hottest challenge for the clinical psychologist is to demonstrate their skills as a scientist-practitioner and relate reliable and valid research evidence for the therapeutic approaches to their practice. The purpose is to ensure that the service commissioners are content that the money is being spent on interventions that work and work well. The clinical psychologist working in learning disability service encounters somewhat of a hurdle to both consuming the existing research and generating new research.

Research on the efficacious (i.e., does the therapy work) and effectiveness (i.e., why does it work) of psychological therapy for people with a learning disability is distinctly lacking, and what there is suggests that any effects are modest (Prout & Nowak-Drabik, 2003). There are very few studies that yield sufficient data for

inclusion in a meta-analysis, and the few that do are studies of behavioural group interventions (e.g., assertiveness and relaxation training) (Beail, 2003) with people with a mild learning disability in residential or clinical settings. Alford and Locke (1984) were the first to highlight that psychological therapy is unlikely to be a treatment option in treatment plans for people with a learning disability. Any form of psychological treatment is not considered to be appropriate for people with a severe learning disability (Mason, 2007) so there is not equity or choice of access across levels of ability.

The use of a systemic approach

A systemic approach “explores the network of significant relationships of which each individual is a part, considering the beliefs that give meaning to people's actions and the communication patterns between people as they interact with each other and with each other's ideas” (Kensington Consultation Centre, 2004: as cited in Baum & Lynggaard, 2006). These relationships may be as part of a family, a set of friends or a network of professionals. The approach seeks to explore alliances, hierarchies and boundaries within such systems. The psychologist or therapist takes a neutral stance, being careful to avoid aligning or colluding with any one member of the system, or adopting a position of power as expert (Fredman, 2006: as cited in Baum & Lynggaard, 2006). Over the past twenty years or so, interest has grown in the use of a systemic approach (Baum & Lynggaard, 2006).

Many practitioners adopting the systemic approach have written about the effectiveness of working systemically with adults with a learning disability (e.g., Fidell, 2000; Baum, Chapman, Scior, Sheppard & Walden, 2001; Lynggaard & Scior, 2002: as cited in Baum & Lynggaard, 2006). For example, a systemic approach can allow the psychologist to appropriately address issues relating to the life-cycle and parental responsibility. The lifespan of people with a learning disability is now close to that of the general population (Grant, 1990: as cited in Baum & Lynggaard, 2006), which suggests that more people with a learning disability may be outliving their

parents. This can mean more stress linked with the blurred boundaries within the system, especially as threats to the status quo are more likely to appear (for example, a person with a learning disability wishing to get married and have children). There is some evidence to suggest that community nurses working systemically can improve their skills in managing complex situations with families of people with a learning disability (Dixon and Matthews, 1992: as cited in Baum & Lynggaard, 2006).

There may not be the scientific rigour necessary for reliable conclusions about efficacy and effectiveness of a systemic approach (Beail, 2003), although a lack of evidence for this approach does not mean it lacks value. It cannot be denied that this uncertainty makes it difficult for the clinical psychologist to justify using a systemic approach in their practice when there is not the supporting evidence-base. However, one could make use of the existing reported examples of effectiveness by drawing on them as examples of practice-based evidence, or action research, involving inductive (applying observed data to theory) rather than deductive reasoning.

A systemic approach may be more acceptable than other psychological approaches (such as behavioural) to the family of a person with a learning disability as it can validate and highlight the role they play and aid with the coordination of care (Mitchell & Sloper, 2003). The approach acknowledges the complexity of relationships, not just within the family but also within the many systems that a person with a learning disability can be part of (Lynggaard, 2007). The individual can be offered the space to assert their views on such relationship themes as belonging and separation, or risk and protection. However, there can be some doubt from other disciplines in a learning disability service or surrounding systems regarding the use of a systemic approach.

It is recognised that the methods of the systemic approach (i.e., verbal language or recursive conversation) need to be adapted so that the person with a learning disability can be rightfully included in the process of exploring and constructing new meanings. This can be possible through slowing the pace of the therapy, using narrative, role-

play, humour, metaphors and working more visually using drawings to render the process more concrete and accessible (Lynggaard & Scior, 2002). Fidell (1996: as cited in Baum & Lynggaard, 2006) describes an adaptation to the technique of hypothetical circular questioning, whereby the family are invited to observe their relationships as though they were an observer looking in.

A further possible issue in using a systemic approach may be if the family cannot or will not be present together in one room. However, there are ways of working systemically with other systems such as residential or support staff, and even with just the individual (e.g., Hedges, 2005) that allow for exploration of relationships and underlying themes. Another area of uncertainty relates to who can practice this approach (Baum & Lynggaard, 2006). The psychologist needs to emphasise that any member of the clinical team can work systemically. A final concern relates to confidentiality and how it cannot easily be fully maintained in all cases especially when working with complex systems as in learning disability services. This is an area where the person's rights may not be met due to context of their care, so it is important for the psychologist to make a judgement as to what extent information should be discussed with the family in the best interests of the individual client (Zaman, Holt & Bouras: as cited in Carr, O'Reilly, Noonan Walsh & McEvoy, 2007).

Negotiating neutrality and protection

There can be a dilemma around working with the systemic assumptions of neutrality (i.e., listening to all perspectives or “multiverse”: Selvini-Palazzoli, Boscolo, Cecchin & Prata, 1980: as cited in Selvini-Palazzoli, Selvini & Pomerans, 1988) together with managing the exaggerated power differences that can exist within families of people with a learning disability. As it is highly common that a referral is initiated by the people *around* the individual (e.g., 'this is for his good'), rather than by the individual (Baum & Lynggaard, 2006), there are inevitably imbalances of power within the system presenting for therapy. Through attending to the process of a session, the psychologist may be made aware of these unspoken tensions between the requests of

the family and the silenced wishes of the person with the learning disability. It may be tempting for the practitioner to deny this subjugation of the person with a learning disability by the system (White & Epston, 1990: as cited in Neimeyer & Mahoney, 1995) so as to avoid alignment or collusion with any one person and maintain their position of respectful curiosity and neutrality. However, this may leave the individual to feel unprotected and unable to cope with the criticism that can emerge in family sessions.

To address this dilemma, the psychologist can aim to take a position of advocacy for the person with a learning disability, highlighting to the family the poor sense of mastery, choice and control that the individual may feel. However, this strategy requires a shift for the practitioner into a first-order change model such as structural therapy (Minuchin, 1974). This may mean using more direct communication and perhaps even sitting in a grand parental position toward the parents and a protective adult position toward the individual. This can feel like a high-risk intervention, as it is not collaborative, may not allow for curiosity (i.e., taking a non-expert “not-knowing” stance: Cecchin, 1987) and it exposes the family system to issues that may have been left unsaid for good reason from their perspective. For example, the parents of an infantilised adult with a learning disability may feel threatened by the psychologist's invite to explore any other relationship than that of over-protective parent to vulnerable child. Any other way of relating to their son or daughter may make them feel useless or believe that they will be judged as irresponsible parents. The family may then attempt to jeopardise the process (Zamon, Holt & Bouras: as cited in Carr, O'Reilly, Nonnan Walsh & McEvoy, 2007). It may be important for the psychologist to emphasise their curiosity and flexibility with hypotheses (Hedges, 2005).

Balancing inclusion and independence

In an effort to ensure the inclusion of the individual, a triangular pattern of protection can emerge between the psychologist, the parents and the individual (Pote, King & Clegg, 2004: as cited in Baum & Lynggaard, 2006). This situation must be anticipated

to ensure that a blaming attitude toward system members does not then ensue, and a dependent position is not reinforced to the individual. The clinical psychologist may not be content that the individual's dependency on the system remains, which may relate to their professional role to promote change and independence. However, a person with a learning disability may be strongly motivated to stay dependent, which may be linked in with the life-cycle self-fulfilling prophecy of having difficulty in establishing independence (Wang, Mannan, Posteon, Turnbull & Summers, 2004). The expectations of change may vary considerably within the system, which obviously could disrupt the degree of collaboration.

To address this dilemma, the psychologist must draw on their self-other reflexivity skills, inviting others to help reflect and consider the source of their expectations of change for the individual, and whether this may relate to their perceived competence as a practitioner (Connell & Wellbourn, 1991: as cited in Mason, 2007). Demonstration of competence is an increasingly important area for the psychologist as a member of the work-force (e.g., Knowledge Skills Framework, DH, 2005). The expectations on the individual can be eased by consistently referring to the circularity within the "problem-determined system" (Anderson, Goolsihian & Winderman, 1986), rather than the problem-saturated individual or 'broken person'. This may be particularly useful for the psychologist when using the systemic approach in consultation with the referrer or other practitioners (Rikberg-Smyly, 2006: as cited in Baum & Lynggaard, 2006), to ensure that they do not solely align with the individual on a mission to establish their independence. It may be important to empower families to draw on their own resources in the future (Fredman & Dalal, 1998: as cited in Baum & Lynggaard, 2006). In doing this, the psychologist may need to balance the need to respond sensitively to the family's sense of 'not-coping' and the need to emphasise their own resources and coping skills.

The use of a psycho-dynamic approach

A psycho-dynamic approach assumes that behaviour stems from 'the unconscious' which houses our basic instinctual needs (essentially sex and aggression). This theoretical perspective stems from the work of Freud (1920: as cited in Waitman & Conboy-Hill, 1992) who valued the identification and resolution of unconscious intra-personal conflicts. It is uncommon for the psychologist or therapist to adopt a neutral stance; rather the views of the individual are prioritised. In place of curious tentative hypothesising, the therapist will rely on the technique of 'free-association', from which interpretations will be made.

A recent review of psycho-dynamic therapy with people with a learning disability revealed support for such an approach, for example in reducing symptoms and problem behaviours (e.g., Frankish, 1989; Beail, 1998; Beail, 2001; Beail, 2000: as cited in Beail, 2003; Beail & Warden, 1996; Hollins: as cited in Fraser & Kerr, 2003). However, much of this evidence is based on single case reports and is perhaps biased by the researchers' own alliances to the approach (Beail, 2003). In terms of generating research, there are some issues relating to the involvement of people with a learning disability, although they are not insurmountable. Firstly, there can be problems associated with obtaining consent to participate in research, although there are clear procedures and instruments for clinicians assessing capacity (see Sturman, 2005). Secondly, co-morbidity of other mental health problems is often apparent (Cooper & Bailey, 2001) although such confounding variables can be controlled for or factored into the analysis.

Waitman and Conboy-Hill (1992) comment on the complimentary fit between a psycho-dynamic approach and the common issues presented by people with a learning disability, for example, the stigmatised identity of having a disability, the associated social isolation, loss and powerlessness. Furthermore, the person with a learning disability can be validated as an 'independent soul', as an individual away from the systems that can engulf their self-identity.

However, there is some doubt as to whether the *process* of a psycho-dynamic approach fits with the expectations of the family and of the service (Hodges, 2002). For example, the extended length and intensive nature of therapy may not be quick enough to provide the information to allow commissioning of other support services. Furthermore, there can be a reticence to allow creativity and flexibility due to lack of national health resources and the continued perceived effectiveness of other approaches (e.g., medication, behavioural modification programmes) (Waitman & Conboy-Hill, 1992).

Managing defence mechanisms

A learning disability could be regarded as a blow to the sense of self, and hence involves loss, grief and trauma, which are coped with via well-practised skills of denial and exaggeration of their difficulties (referred to as secondary handicap: Sinason, 1992). The psychologist must be careful to not collude with such defence mechanisms and must be sensitive in conversing about and inducing awareness of the person's identity (Zaman, Holy & Bouras as cited in: Carr, O'Reilly, Noonan Walsh & McEvoy, 2007). A strong engagement between the psychologist and the individual client is fundamental in ensuring that they feel safe and contained, and that they return! Bates (1992: as cited in Waitman & Conboy-Hill, 1992) recommends using humour and role-reversal to make such conversations more "light-hearted", although the psychologist must be careful to not trivialise the issue.

Minding the gap in language abilities

A common issue for psychologists using a psycho-dynamic approach with people with a learning disability is the tendency to hear contradictory responses, suggesting a difficulty in understanding the language during the sessions. The discrepancy between receptive and expressive language abilities can often be vast (with the latter appearing to be good), which means that the psychologist can be seduced into mistakenly thinking the person comprehends everything that is spoken about (Waitman &

Conboy-Hill, 1992). Unfortunately this can lead to a position of constant failure for the person with a learning disability as they do not meet the expectations of the practitioner. There are implications relating to individual consent for the therapeutic work if the person has difficulties comprehending some information, so it is crucial that the psychologists checks and supports their understanding (Hodges, 2002).

Countertransference of contempt

Discrimination of people with a learning disability is present within the psychology profession, made evident by the lack of psychologists choosing to work in this field (Mason, 2007), the poor flow of research in this area and the resultant exclusion of people with a learning disability from published guidance documents such as “Treatment Choice of Psychological Therapies and Counselling” (Department of Health, 2001) and “What Works for Whom” (Roth & Fonagy, 1996).

The unconscious contempt a psychologist may hold for a person with a learning disability is proposed to relate to a primitive desire to “kill off the handicapped member” (Symington, 1992: as cited in Sinason, 1992). This reaction can be detected in the psychologist's non-verbal behaviour and responded to defensively by the individual client, for example in the form of exaggeration of their disability. The guilt that the psychologist can feel manifests itself as a patronising and pitying attitude toward the client, which can reinforce to the client their feelings of powerlessness and sense of dependence on others (Symington, 1992: as cited in Sinason, 1992). This dilemma can be addressed by the psychologist firstly being alerted to their political ideas and prejudices through supervision, and then using them to wonder irreverently together with the client about others' reactions to disability (Cecchin, Lane & Ray, 1993).

The use of systemic and psycho-dynamic approaches: Implications

In terms of efficacy and effectiveness, the use of systemic and psycho-dynamic approaches with people with a learning disability is inconclusive due to the quality of the existing outcome research, which must be evaluated with caution and limited generalisability (Prout & Nowak-Drabik, 2003). It is difficult to argue for the effectiveness of any psychological approach other than a behavioural one in people with a learning disability, as the evidence simply does not exist (Sturmeay, 2006). However, research into the ways in which people with a learning disability assimilate problematic experiences suggests that they can develop an increased understanding of their problems through psychological therapeutic approaches (Newman & Beail, 2005). The psychologist needs to be more active in their role as 'scientist-practitioner' so that systemic and psycho-dynamic approaches can be applied to clinical work with people with a learning disability. There is a need to explore and generate outcome and process research, preferably using more rigorous scientific research methods and designs, and involving people with a learning disability (Beail 2003).

Service provision for meeting the mental health needs of people with a learning disability is known to vary widely across the UK (Mason, 1996). In order to tackle the challenge set by the Department of Health, of providing an effective service and offering a choice of psychological approaches, the clinical psychologist must take more of an active political role in ensuring that psychology services are resourced to meet the needs of those people with learning disability. It is likely that no single professional group can plan or deliver these services in isolation so multi-disciplinary and multi-agency working must continue in an effort to improve commissioner's understanding of the role of psychological approaches in learning disability services (Waitman & Conboy-Hill, 1992). A key part of the clinical psychologist's role should be to act as a guardian of psychological therapies ensuring choice, rights, inclusion and independence for the profession as well as for the people we serve.

Written Exercise 2. References

Alford, J.D., & Locke, B.L. (1984) Clinical responses to psychopathology of mentally retarded persons. *American Journal of Mental Deficiency, 89, 195-197*

American Psychiatric Association (2000) *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)* (4th ed.- Revised). Washington DC: APA

Anderson, H., & Goolsihian, H.A., & Windermant, L. (1986) Problem determined systems: Towards transformation in family therapy. *Journal of Strategic and Systemic Therapies, 5(4), 1-13*

Arthur, A. R. (2003) The emotional lives of people with learning disability. *British Journal of Learning Disabilities, 31(1), 25-30*

Baum, S., & Lynggaard, H. (2006) *Intellectual Disabilities: A Systemic Approach*. London: Karnac Books

Beail, N. (2003) What works for people with mental retardation? Critical commentary on cognitive-behavioural and psychodynamic psychotherapy research. *Mental Retardation, 41 (6), 468-472*

Beail, N. (2001) Recidivism following psychodynamic psychotherapy amongst offenders with intellectual disabilities. *British Journal of Forensic Practice, 3, 33-37*

Beail, N. (1995) Outcome of psychoanalysis, psychoanalytic and psychodynamic psychotherapy for people with intellectual disabilities: a review. *Changes, 13, 186-191*

Beail, N., & Warden, S. (1996) Evaluation of a psychodynamic psychotherapy service for people with intellectual disabilities: rationale, design and preliminary outcome data. *Journal of Applied Research in Intellectual Disabilities*, 9, 382-387

Carr, A., O'Reilly, G., Noonan Walsh, P., & McEvoy, J. (2007) *The Handbook of Intellectual Disability and Clinical Psychology Practice*. New York: Routledge

Cecchin, G., Lane, G., & Ray, W.A (1993) From strategising to non-intervention: Toward irreverence in systemic practice. *Journal of Marital and Family Therapy*, 19(2), 125-136

Cecchin, G. (1987) Hypothesizing, circularity, and neutrality revisited: An invitation to curiosity. *Family Process*, 26(4), 405-413

Conboy-Hil, S. & Waitman, A. (1992) *Psychotherapy and Mental Handicap*. London: Sage Publications

Cooper, S.A., & Bailey, N.M. (2001) Psychiatric disorders amongst adults with learning disabilities: prevalence and relationship to ability level. *Irish Journal of Psychological Medicine*, 18, 45-53

Deb, S., Thomas, M., & Bright, C. (2001) Mental disorder in adults with intellectual disability. 1: Prevalence of functional psychiatric illness among a community-based population aged between 16 and 64 years. *Journal of Intellectual Disability Research*, 45 (6), 495-505

Department of Health (2001) *Valuing People: A New Strategy for Learning Disability for the 21st Century*. London: Her Majesty's Stationery Office

Department of Health (2001) *Treatment Choice in Psychological Therapies and Counselling*. London: Her Majesty's Stationery Office

Fletcher, R., & Dosen, A. (1993) *Individual Psychotherapy for Persons with Mental Retardation*. New York: Lexington Books

Hedges, F. (2005) *An Introduction to Systemic Therapy with Individuals: A Social Constructionist Approach*. New York: Palgrave MacMillan

Hodges, S. (2002) *Counselling Adults with Learning Disabilities*. New York: Palgrave MacMillan

Fraser, W., & Kerr, M. (2003) *Seminars in the Psychiatry of Learning Disabilities*. London: Gaskell

Mason, J. (2007) The provision of psychological therapy to people with intellectual disabilities: an investigation into some of the relevant factors. *Journal of Intellectual Disability Research*, 51(3), 244-249

Mason, T. (1996) Seclusion and learning disabilities: research and deduction. *British Journal of Developmental Disabilities*, 42 (83, Pt 2), 149-159

Minuchin, S. (1974) *Families and Family Therapy*. Oxford: Harvard University Press.

Mitchell, W., & Sloper, P. (2003) Quality indicators: disabled children's and parents' prioritisations and experiences of quality criteria when using different types of support services. *British Journal of Social Work*, 33(8), 1063-1080

Neimeyer, R.A., & Mahoney, M.J (Ed). (1995) *Constructivism in Psychotherapy*. Washington, DC, US: American Psychological Association

Newman, D.W., & Beail, N. (2005) Analysis of assimilation during psychotherapy with people who have mental retardation. *American Journal on Mental Retardation*, 110 (5), 359-365

Owens, R., & Jones, R. (1992) Extending the role of functional analysis in challenging behaviour. *Behavioural Psychotherapy*, 20(1), 45-46

Prout, H.T., & Nowak-Drabik, K.M. (2003) Psychotherapy with persons who have mental retardation: an evaluation of effectiveness. *American Journal on Mental Retardation*, 108 (2), 82-93

Roth, A., & Fonagy, P (1996) *What Works for Whom? A Critical Review of Psychotherapy Research*. New York: Guilford Press

Selvini-Palazzoli, M., Selvini, M., & Pomerans, A.J.(Trans). (1988). *The Work of Mara Selvini Palazzoli*. Lanham: Jason Aronson.

Sinason, V. (1992) *Mental Handicap and the Human Condition*. London: Free Association Books

Sturman, E.D (2005) The capacity to consent to treatment and research: A review of standardised assessment tools. *Clinical Psychology Review*, 7, 954-974

Sturmey, P. (2006) Against psychotherapy with people who have mental retardation: in response to the responses. *Mental Retardation*, 44(1), 71-74

Taylor, J.L., Novaco, R.W., Gillmer, B., & Thorne, I (2002) Cognitive-behavioural treatment of anger intensity in offenders with intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities*, 15, 151-165

Taylor, S. J., Biklen, D., & Knoll, J. (Ed). (1987) *Community integration for people with severe disabilities*. New York: Teachers College Press

Wang, M., Mannan, H., Posteon, D., Turnbull, A.P., & Summers, J.A. (2004) Parents' perceptions of advocacy activities and their impact on family quality of life. *Research and Practice for Persons with Severe Learning Disabilities*, 29(2), 144-115

Wolfensberger, W. (1972) *Normalisation*. Toronto: National Trust on Mental Retardation.

World Health Organisation (1992) *International Classification of Mental and Behavioural Disorders (ICD-10): Clinical Description and Diagnostic Guidelines*. (10thed). Geneva: World Health Organisation

Small-Scale Research Project

**An Audit of General Practice Based Counselling
Services for Adults under Primary Care**

Eleanor Wakerly

Student No. **05108132**

April 2007

DClinPsy Year 2

Word Count (excluding references): 4267

ABSTRACT

This study examines the accessibility and efficiency of general-practice based counselling services for adults across two local Primary Care Trusts (PCTs). Current practice is reviewed and compared against Standard 2 of the National Service Framework for Mental Health. Data were gathered from postal questionnaires distributed to GPs. Results showed that the local PCTs are falling short of meeting Standard 2 as there is clearly not an equitable availability of counsellors between practices. A number of problematic areas were highlighted within the systems for managing referrals, and monitoring, measuring and communicating patient outcome. The methodological limitations are discussed and the next stages of the audit are proposed. The need for recruitment of more fully qualified counsellors, an increase of Continuing Professional Development and a reduction in the use of outside agencies are outlined as implications for local service development. Results of the audit are discussed within the historical and present context of counselling services. It is hoped that the suggestions will be integrated into a broader plan of service development, linked to the local PCT priority plan to achieve star rating targets on improved access and an improved overall experience of people who use the service.

CONTENTS

	Page
Introduction	48
Method	52
Results	54
Discussion	60
Clinical and Service Implications	63
References	66
Appendices (1-7)	69-82

1.0 INTRODUCTION

1.1. General practice based counselling

Standard 2 of the National Service Framework for Mental Health aims to ensure equitable availability of special mental health resources (e.g., counsellors) between general practices and for any service user who contacts the primary health care team to have their mental health needs efficiently identified and assessed (DH, 1999). Given that mental health issues are the third most common reason for consulting a GP (Hemmings, 2000), the efficient delivery of accessible, acceptable and effective tiered treatment is fundamental. Current clinical practice guidelines for psychological therapies recommend counselling for a range of mild to moderate mental health problems such as depression, stress and anxiety (DH, 2001).

Counselling could be defined as a brief psychological treatment (normally 6-12 sessions) that utilises a variety of different methods and techniques to enable a person to “explore, discover and clarify ways of living more resourcefully, with a greater sense of well-being” (DH, 2001). Presenting problems may relate to difficulty adjusting to a life event such as a divorce, illness or bereavement.

There is insufficient evidence to recommend that generic counselling should be used as the main intervention for severe and complex mental health problems such as major depression (Churchill et al 1999). However, counselling can be offered to those people presenting with diagnoses such as Obsessive-Compulsive Disorder and Post-Traumatic Stress Disorder (Bower, Byford & Sibbald, 2000).

To ensure equitable access under primary care, counselling based in general practices has undergone considerable expansion over the last decade. Back in the 1990s, Sibbald, Addington-Hall, Brenneman & Freeling (1993) estimated that a third of national practices provided a counselling service. According to a more recent national survey carried out by Mellor-Clark, Simms-Ellis & Burton (2001), approximately half

of the 9000 general practices in England employ a counsellor. The numbers tell us that counselling is becoming more accessible.

Whilst the increasing accessibility of practice-based counselling is a marker of service development, it is equally important to review other aspects such as acceptability and efficiency. Greasley & Small (2005) carried out focus groups with counsellors and service-users to look at factors influencing the acceptability and efficiency of practice-based counselling. Several areas of concern were highlighted by the counsellors, for example the unavailability of appropriate clinical space to see patients, the poor relationship with other practice staff due to the limited amount of time the counsellors spend there, increasing waiting times, lack of efficient communication channels and high levels of inappropriate referrals from GPs. These are examples of factors that may greatly affect the quality of service delivery.

1.2. Identified need

In November 2005, a number of areas of concern were raised by members of a local primary care mental health group with particular focus on the efficiency of the general practice based counselling services offered under PCT X.

Some General Practice Managers (GPMs) reported high rates of non-attendance to counselling sessions. Some General Practitioners (GPs) claimed to limit the number of counselling sessions prior to a review of the patient's progress, indicating that patients may then have to be re-referred and placed back on the counselling waiting list.

A further area of uncertainty existed over whose responsibility it was to refer on if re-assessment by the counsellor were to reveal that counselling may not be appropriate for the person at that time. There was a grey area as to whether the GP or counsellor should signpost to more suitable services such as local voluntary mental health services in the community.

Another concern raised by the group related to the communication between GPs and counsellors, for example whether the outcome of counselling sessions was formally

fed back to the GPs. The Assistant Director for Modernisation and Commissioning for PCT X informally reported to the group that roughly half of all local GPs reported no feedback at all from counsellors, which raised concern over the clinical risk both to the patients and to the health professionals involved with regards to their responsibility and accountability. An audit of the practice-based counselling services under PCT X and neighbouring PCT Y was requested to explore these areas of concern further.

1.3. Aims

In response to the concerns highlighted by the group, this audit reviews the acceptability and efficiency of general practice-based counselling across two Primary Care Trusts (X and Y) against Standard 2 of the NSF for Mental Health (DH, 1999).

The aim is to clarify which areas of the underlying system need revising or strengthening, which will then lead on to an action stage as part of the audit process. The findings will be integrated into broader service development, linked to the local PCT planning and priority plan to achieve star rating targets on improved access (reduced waiting times and patient choice) and an improved overall experience of people who use the service.

1.4 Objectives

This audit investigates the systems for referrals, monitoring, and evaluation of outcome from the perspectives of GPs across two PCTs (now merged as one PCT). The rates of attendance to counselling sessions are examined objectively.

It is important to emphasise that this study does not involve evaluation of outcome, i.e., it does *not* examine the effectiveness or efficaciousness of counselling services.

The main focus is on an evaluation of the efficiency of the systems underpinning the local counselling services based on views from a key stakeholder, the GP. This is

based on the premise that developments in the efficiency of a system may facilitate the accessibility and acceptability of a service.

1.5 Audit questions

The audit aims to answer the following questions:

- 1) What do GPs think is an acceptable waiting time for a patient?
- 2) How many patients do GPs refer to the on-site counsellors per month?
- 3) Do GPs offer patients other options to counselling?
- 4) Do GPs provide information for patients on counselling and how it may help?
- 5) Which referral criteria do GPs and the counsellors use?
- 6) Do GPs expect the counsellors to reassess the patient for suitability?
- 7) How satisfied are GPs with the feedback they receive from counsellors?
- 8) Do GPs administer any screening or monitoring or outcome measures?
- 9) Do GPs reassess patients after a set number of counselling sessions?
- 10) Where do GPs think most referrals go after the counsellors have seen them?
- 11) What opportunities do GPs have for discussion with the counsellors?
- 12) How do GPs think the counselling service could be improved?
- 13) What proportion of General Practices offers counselling?
- 14) Are there high rates of non-attendance to counselling services?

2.0 METHOD

2.1 Design

This audit involves a cross-sectional, non-experimental survey design. It was not necessary to have a control group because the execution of the audit did not entail manipulation of variables.

2.2 Data source

Quantitative and qualitative data were collected from questionnaires posted to GPs across PCT X and PCT Y (please see Appendix 1). The general practices had been identified at the respective PCT headquarters as having a counselling service. The attendance records of practice based counselling sessions under PCT X were examined and analysed. An information sheet outlining the audit and a consent form were sent out to the GPs with the questionnaires (please see Appendix 2 and 3).

2.3 Participants

The units of analysis in this audit were individual GPs from practices with a counselling service either under PCT X or PCT Y. The other main stakeholders in the service, the service users and the counsellors, will be included in this audit as the next stage (another clinical trainee psychologist has agreed to continue with this work). The reasons for this are explained later on in the report.

2.4 Procedure

Questionnaires were designed and approved. The GPs were recruited after asking the GPMs' permission for their staff to participate at a local GPM meeting.

Questionnaires, information sheets, stamped addressed envelopes and consent forms were posted to the practices and distributed to the named GPs there. All raw data was made anonymous and remained confidential to the main researcher.

2.5 Data analysis

The questionnaire data were subject to descriptive statistical analysis and basic thematic content analysis to address the main audit questions.. The quantitative data from the attendance rate records were also subject to descriptive statistical analysis (please see Appendix 4)

2.6 Registration and approval

Formal registration and approval from the audit departments in both PCT X and PCT Y was acquired. The proposal was presented at university and approved by the research tutor. Written confirmation that the audit did not require approval from the Local Research Ethics Committee (LREC) was acquired. This is for several reasons. Firstly, feedback questionnaires are an expected part of normal local clinical practice. Secondly, there was no burden imposed on GPs as they chose to take part. And lastly, there were no significant risks to others, and the potential benefits of the audit are high.

3.0 RESULTS

3.1 Response

There was a sample size of 76 GPs under PCT X and 84 GPs under PCT Y (N=160), with a response rate of 28%, resulting in an actual sample of 45 GPs. In this audit of the general practice based counselling services, 23 out of 42 GP practices (approximately 50%) across PCT X and PCT Y chose to participate.

Under PCT X, 9 of the 13 surgeries (69%) reported having an in-house counsellor. Under PCT Y, 8 of the 10 surgeries (80%) reported having an on-site counsellor.

The responses from those GPs belonging to a surgery that reported no on-site counsellor (N=18) were not included in the findings. This means that 27 of 45 responses (60%) were used in the analysis of findings. Please see Appendix 7 for raw database.

3.2 Findings from questionnaires

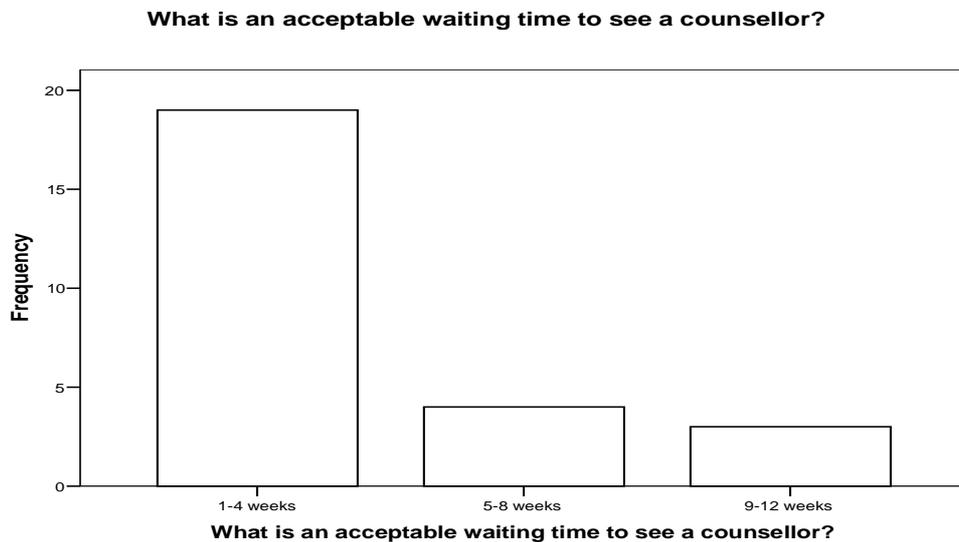
1. What do you think is an acceptable length of time for a patient to wait from GP referral to first appointment with a counsellor? A total of 26 out of the 27 participants responded to this question. 73% said 1-4 weeks. 15% said 5-8 weeks. The remaining 12% said 9-12 weeks. (please see Figure 1 over page)

2. How many patients do you refer to the in-house counsellors per month? A total of 25 out of the 27 participants responded to this question. 84% said 1-5 patients per month. The remaining 16 % said 6-10 patients per month.

3. Do you as an individual GP offer patients other options to counselling? 85% of all 27 participants responded yes. The remaining 15% responded no. Examples of alternatives to counselling are Mind, a local educational institute (counsellors in training), Life Force, and antidepressant or anxiolytic medication. Other alternatives reported were Cognitive-Behavioural Therapy, local support groups, advice on

problem-solving, a Book Prescription Scheme, Family Support, advice on diet and exercise and charity support (e.g., CRUSE, Rape Crisis and Relate).

Figure 1.



4. *Do you provide information for patients on counselling and how it may help?* 78% of all 27 participants responded yes. The remaining 22% responded no.

5. *Which referral criteria do you and the counsellors use?* A total of 26 out of the 27 participants responded to this question. 54% said they use informal referral criteria. 42% said formal and the remaining 4% said that they use both criteria.

6. *Do you expect the counsellors to offer counselling to everyone you refer or do you expect the counsellors to reassess the patient for suitability?* A total of 25 out of the 27 participants responded to this question. 76% said that expect the counsellor to reassess and the remaining 24% said that the counsellor should accept the referral on the basis of the GP's initial assessment alone.

7. *How satisfied are you with the feedback you receive from the counsellors about the patients who you have referred?* A total of 25 out of the 27 participants responded to this question. 40% said they were satisfied. 48% said they were very

satisfied. The remaining 12% said they were dissatisfied with the feedback from the counsellors. (See Figure 2 below)

Figure 2.



8. *Do you administer any screening or monitoring or outcome measures to the people you refer to counsellors?* A total of 25 out of the 27 participants responded to this question. 68% said no and the remaining 32% said yes.

9. *Do you reassess patients after a certain number of counselling sessions?* 67% of all 27 participants said no, and the remaining 33% said yes.

10. *Where do you think most referrals go after the counsellors have seen them?* A total of 26 out of the 27 participants responded to this question. 65% said the patient returns to normal GP care. 23% said they are discharged. 8% said local support services. The remaining 4% said the patient goes on to specialist secondary care mental health services. (See Figure 3 over page)

11. *What opportunities do you have for discussion with the counsellors?* A total of 26 out of the 27 participants responded to this question. 50% said no opportunities. 39%

said informal ad hoc corridor consultations. 8% said a mixture of both and the remaining 4% said regular formal meetings. (See Figure 4)

Figure 3.

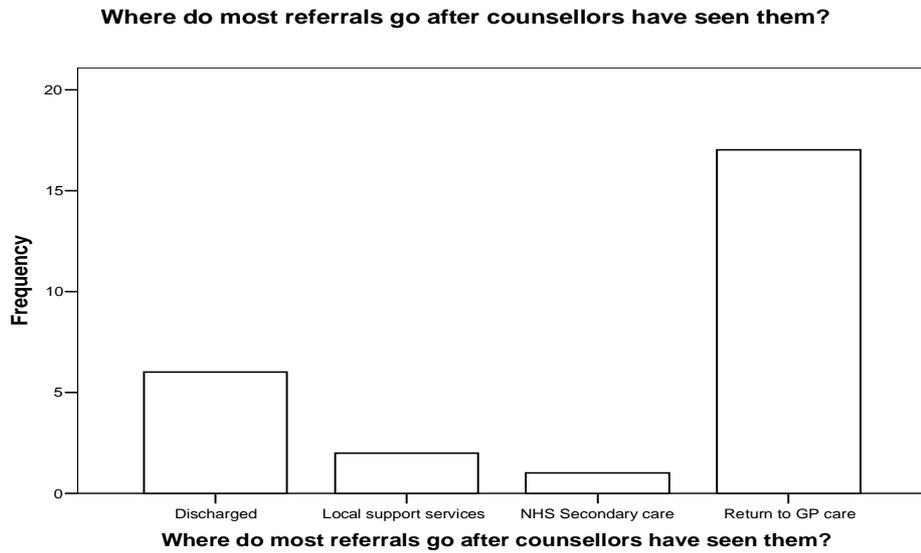
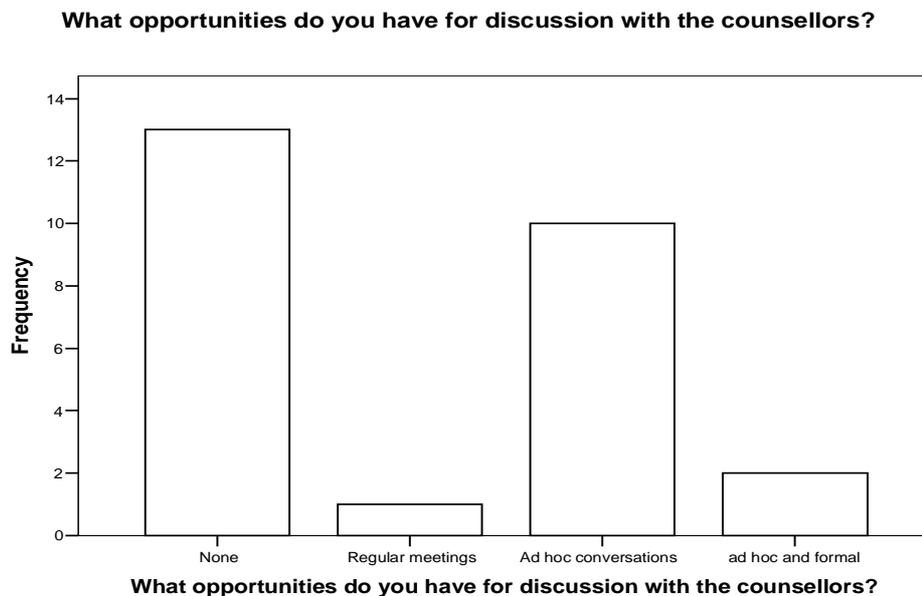


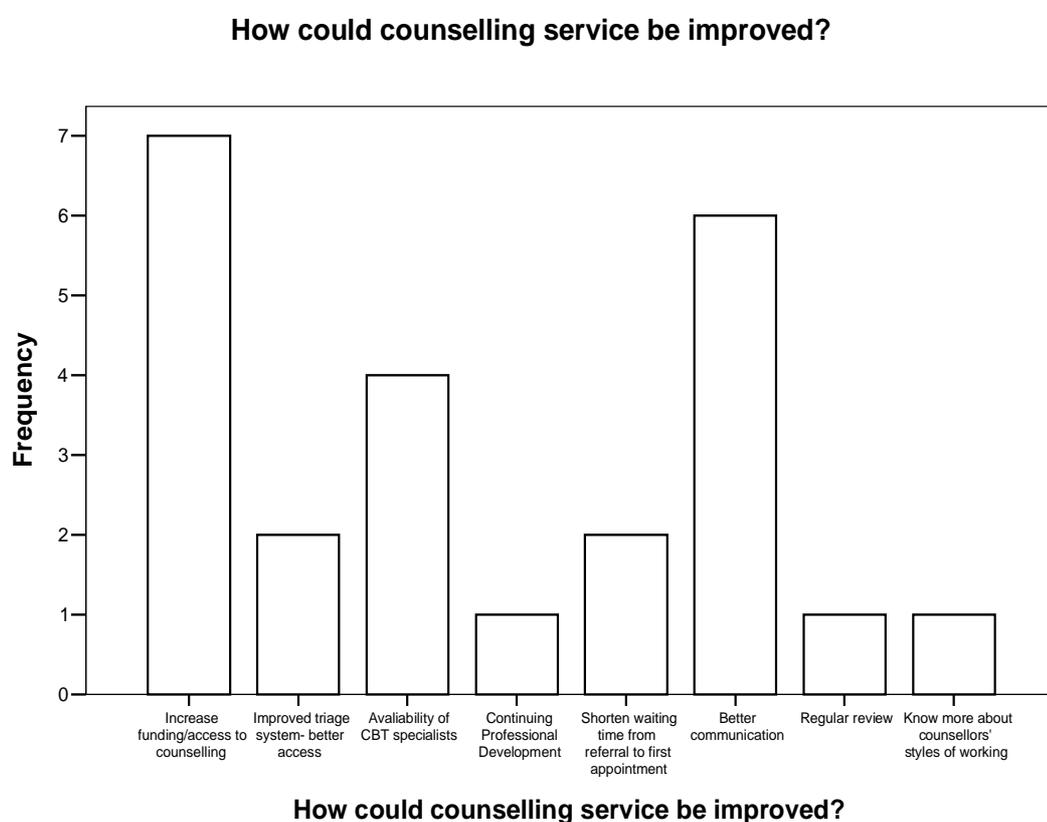
Figure 4.



12. How do you think the counselling service could be improved in meeting the needs of the patients and improving systems for you and the counsellors? A total of 24 out

of the 27 participants responded to this question. 29% said increase funding and access to counsellors. 25% said improve communication with counsellors. 17% said increase the availability of CBT specialists. 8% said improve the triage system. Another 8% said shorten the waiting time from GP referral to first counselling appointment. 4% said increase training (CPD) for both counsellors and GPs. Another 4% said have regular review of the service. The remaining 5% said share knowledge of counsellors' different approaches to clinical work. (See Figure 5 below)

Figure 5.



3.3 Attendance rates

At the time of data collection back in January 2006, under PCT X there were 3 counsellors attached to general practices in the local area. At the PCT X Headquarters, I gained access to attendance rate data for each of these counsellors. A summary of this is presented in Figure 6.

Figure 6.

Counsellor	Mean Age of Patients	Non-Attendance (DNA) Rate	Mean # appointments/ month
Anon1 (generic)	46 years	8% DNA rate (£10/ non attended session) 0% cancellation rate across 6 month sample time period (April-Sept 2005)	40 (according to same time period)
Anon2 (generic)	45 years	10% DNA rate 13% cancellation rate across 8 month sample time period (May- Dec 2005)	69 (according to same time period)
Anon3 (specialist)	unknown	0% DNA rate, 0% cancellation rate across 8 month sample time period (Feb-Sept 2005)	4 (according to same time period)

4.0 DISCUSSION

4.1. Summary

This audit revealed that just 17 out of 42 GP practices (40%) across PCT X and Y, now a merged PCT, reported having an on-site counselling service. At present the evidence suggests that the PCT is falling short of meeting Standard 2 as there is clearly not an equitable availability of special mental health resources (e.g., counsellors) between practices.

There were a number of problematic areas highlighted by the findings from the questionnaires, some of which are in line with concerns raised by the primary care mental health group.

A key point was raised with regards to communication between GPs and counsellors, and indeed it was found that half of all GP respondents reported no opportunities for discussion with the counsellors. Furthermore, slightly more GPs reported using informal rather than formal referral criteria, which, given the ambiguity, could lead to inappropriate referrals. However, most GPs reported that the counsellor reassesses for suitability following referral; this may help identify those inappropriate referrals. Most GPs do reassess the counselling patients after a certain number of counselling sessions, which may hinder the efficiency of the service if the patient has to be re-referred should they wish to have more counselling sessions.

Another area of concern relates to the administration of screening, monitoring or outcome measures (such as the General Health Questionnaire as recommended in Standard 2 of the NSF by the Department of Health, 1999). Most GPs reported administering none of these to the people they refer to the counsellors. If such measures were in use they would be important for informing the involved professionals of the patient's progress, but they may not be valid for measuring change in counselling work.

Following on with the concerns of high DNA rates, the attendance rates from a sample of 3 primary care counsellors actually indicate acceptable levels of non-attendance. Indeed, the level of attendance could be described as above expected given the high level of appointments per month.

There was a variety of suggestions for how to improve the counselling service, for example increasing funding for counsellors, improving communication between GPs and counsellors, and providing Continuing Professional Development for the current counsellors.

4.2 Methodological issues and limitations

4.2.1 Accessing data at general practices

Access to attendance data for counsellors under PCT Y was not possible linked to the different funding arrangement. The individual general practices hold this information. GPMs were not willing to disclose this information for this audit as they believed it would breach the Data Protection Act (1998). Therefore, there were no waiting times with which to compare to standards set by government and expected by GPs.

Furthermore, GPMs would not provide names of counsellors attached to the practice. They expressed reservations with regards to the involvement of service users, despite a reminder that satisfaction surveys are part of service delivery. Difficulties in gaining contact details of both these groups from either the PCT headquarters or from the GPMs unfortunately delayed the distribution, collection and analysis of this data. In practical terms, there was insufficient time to physically approach each practice and it would be beyond the remit of this small-scale research project to do so anyway.

4.2.2 Plan to recruit other stakeholders

Questionnaire packs for counsellors have been approved by the audit departments and are ready to be distributed (see Appendix 5). The purpose of this study has been carefully framed to the counsellors to avoid any misconceived threat to their jobs. Questionnaire packs for service users have been piloted and approved with the local service-user forum (see Appendix 6). It is hoped that the service users would be recruited as a cross-section sample from a database held by the counsellors. Randomisation would be used in the recruitment of service users if numbers were to become unmanageable, although it is hoped that a full cross-section (i.e., across a set time period) of participants would be invited to participate in the audit. Questionnaire packs for service users may need to be distributed by the counsellors. Data from these stakeholders would answer questions concerning both the acceptability and the efficiency of the services.

4.2.3 Feedback of results

A summary of the results has been fed back at a PCT managers' meeting, and presented personally to the PCT Assistant Director for Modernisation and Commissioning. It is possible for more specific feedback to be given with regards to which GP practices have which particular problems with the services. This should ensure that difficulties with regards to the efficiency and acceptability of the service are supported or rectified.

5.0 CLINICAL AND SERVICE IMPLICATIONS

5.1 Areas for improvement

The findings from this audit suggest a need for increased opportunities for discussion between GPs and counsellors. The GPMs would need to negotiate a context in which this could occur, perhaps as a referrals allocation meeting with other specialist staff on-site. Improved channels of communication may enable the counsellors and GPs to review patient progress and evaluate outcome together. For future review of the effectiveness of local services, it may be useful for the GPs and counsellors to negotiate some valid and reliable measures to use as accurate measures of change. A formal set of referral criteria may be useful in lowering the potential number of inappropriate referrals.

5.2 A functioning service

In addition to areas for improvement highlighted by this audit, the evidence also suggests a number of aspects of the counselling services that are functioning as they should. For example, those practices that have access to an in-house counsellor make regular referrals, and a large number of GPs offer their patients information on the counselling service. Furthermore, the vast majority of GPs were either satisfied or very satisfied with the feedback from counsellors.

It was reported that counselling patients generally return to normal GP care following completion of treatment. This indicates that, following counselling, patients are rarely in need of secondary mental health services; their needs have been met. This is as expected given the plethora of research confirming the efficacy of generic counselling under primary care. It is as efficacious in the short-term as antidepressant treatment, normal GP care and CBT for mild to moderate problems (Ward, King & Lloyd, 2000; Bowers, Byford & Sibbald, 2000; Sibbald, Ward & King, 2000. Chilvers, 2001; Friedl, King & Lloyd, 2000).

5.3 Training and supervision of counsellors

Whilst there is a functioning service, there is not an equitable availability of counsellors between local practices (hence not meeting Standard 2). In place, alternatives such as private or voluntary counsellors, or 'allied' services, are being inappropriately overused. Whilst counsellors from outside agencies appear more cost-effective for the general practices and PCTs, this may not be necessarily so. This is because there may be a higher chance of the patient returning to services as many voluntary counsellors have often not been trained and examined on a British Association for Behavioural and Counselling Psychotherapy (BABCP) accredited training course (5 years plus), nor do they often have the 450 hours of supervised experience (that is part of the training).

In order to increase cost-effectiveness and reduce clinical risk, it is crucial that the counsellors, whether they work privately or are employed by the NHS, are fully and properly qualified and receive the minimum of 90 minutes supervision per month. The provision of Continuing Professional Development, specific to primary care work, would contribute to this effort. In the meanwhile, there may be a need to increase opportunities for discussion with the counsellors and to develop written formal referral criteria in order to increase the number of appropriate referrals, and ensure a smoother more efficient service. Further training for counsellors working under primary care may lead to provision of more specialist counselling, which could relieve some of the pressure on secondary and tertiary services.

5.4 Predictions

In spite of the findings suggesting the need for development and support of practice-based counselling services in order to improve upon efficiency, there is an expectation that the PCTs will choose to act against this. This prediction is based upon the historical context surrounding counselling and where it fits with the current state of the NHS. The following information was obtained from an informal telephone interview with a practising counselling psychologist and lead for the local area.

During the mid 1990s, secondary care referral criteria (for Community Mental Health Teams) changed to allow for a focus on complex cases of suicide and psychosis. This meant that a huge amount of pressure was put upon primary care mental health services to manage those cases that suddenly did not have a service. The situation was pressurised further when Labour came to power in 1997 and demanded equity of access. Financial power was transferred from clinicians, such as GPs, to managers within the newly founded Primary Care Groups (PCGs, now Trusts). With the PCTs then pulling the purse strings and demand for services on the rise, the remaining counsellors were under great pressure to broaden their remit to provide an equitable, acceptable and effective service.

In a losing battle, counselling was soon perceived as an ineffective and inefficient service. A personal view is that this image remains today, thereby placing a national stigma on counselling services. The national health acute services have historically taken priority over mental health, so whilst the huge deficits exist, it is likely that, together with such stigma, the budget for resources such as counselling will be raided and services cut.

Having cast this dim view, there are some protective factors. A positive future for general practice-based counselling relies on the transformation of current to best practice, made possible through the dynamic processes of audit. The proceeding phase of this audit, involving the voices of service users and counsellors, may add to the power of the message that the local practice-based counselling services need financial and organisational support if they are to meet government standards. Furthermore, a new regulatory body known as the Psychological Professions Council is currently in a process of consultation for the regulation of counselling and other psychological therapies. If this proceeds, there may be a positive and significant impact on the accessibility, efficiency and acceptability of practice based counselling services. Perhaps the PCTs and general practices employing in-house counsellors will be more motivated to engage with audit, review standards and initiate changes to the problematic underlying systems.

Small Scale Research Project References

Bower, P., Byford, S., & Sibbald, B. (2000). Randomised controlled trial of non-directive counselling, cognitive-behaviour therapy and usual GP care for patients with depression. II: Cost effectiveness. *British Medical Journal*, 321, 1389-1392

Chambless, D., & Hollon, S. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology*, 66, 7-18

Chilvers, C. (2001). Antidepressant drugs and generic counselling for treatment of major depression in primary care: randomised trial with patient preference arms. *British Medical Journal*, 322, 772

Churchill, R. (1999). Should general practitioners refer patients with major depression to counsellors? A review of current published evidence. Nottingham Counselling and Antidepressants in Primary Care (CAPC) Study Group. *British Journal of General Practice*, 49(446), 738-43

Department of Health (1999). *National service framework for mental health: modern standards and service models*. London: Department of Health

Department of Health (2001). *Treatment choice in psychological therapies and counselling: evidence based clinical practice guideline*. London. Department of Health

Friedl, K., King, M.B., & Lloyd, M. (2000). The economics of employing a counsellor in general practice: analysis of data from a randomised controlled trial. *British Journal of General Practice*, 50(453), 276-83

Greasley, P., & Small, N. (2005). Evaluating a primary care counselling service: outcome and issues. *Primary Health Care Research and Development*, 6, 125-136

Hemmings, A. (2000). Counselling in primary care: a review of the practice evidence. *British Journal of Guidance and Counselling*, 28, 233-252.

Jacobson, N., & Christensen, A. (1996). Studying the effectiveness of psychotherapy: how well can clinical trials do the job? *American Psychologist*, 51, 1031-1039

Mellor-Clark, J., Simms-Ellis, R., & Burton, M. (2001). *National survey of counsellors in primary care: evidence for growing professionalisation*. London. Royal College of General Practitioners

Nettleton, B., Cooksey, E., Mordue, A., Doward, I., Ferguson, J., Johnson, J., & Jones, L. (2000). Counselling: filling a gap in general practice. *Patients Education and Counselling*, 41, 197-207

Roth, A., & Fonagy, P. (1996) What works for whom? *A critical review of psychotherapy research*. London: Guilford.

Rowland, N., Bower, P., & Mellor-Clark, J. (2001). Counselling for depression in primary care (Cochrane Review). The Cochrane Library, Issue 2, Oxford: Update Software.

Seligman, M. (1995). The effectiveness of psychotherapy: the consumer reports study. *American Psychologist*, 50, 965-974

Sibbald, B., Addington-Hall, J., Brenneman, D., & Freeling, P. (1993). Counsellors in English and Welsh general practices. *British Medical Journal*, 306, 29-33

Sibbald, B., Ward, E., & King, M. (2000). Randomised controlled trial of non-directive counselling, cognitive-behaviour therapy and usual general practitioner care

in the management of depression as well as mixed anxiety and depression in primary care. *Health Technology Assessment*, 4(19)

Ward, E., King, M., & Lloyd, M. (2000). Randomised controlled trial of non-directive counselling, cognitive-behaviour therapy and usual GP care for patients with depression. I: Clinical effectiveness. *British Medical Journal*, 321, 1383-1388

Appendix 1.

GP Satisfaction Survey of GP Counselling Service

Please circle your answers and write any comments in the spaces provided.

1. What do you think is an acceptable length of time for a patient to wait from seeing you until a counsellor sees them?

1-4 weeks 5-8 weeks 9-12 weeks 13+ weeks

2. How many patients do you refer to the in-house counsellors per month?

1-5 6-10 11-15 16-20 21+

3. Do you as an individual GP offer patients other options to counselling?

Yes No

Comments.....

4. Do you provide information for patients on counselling and how it may help?

Yes No

Comments.....

5. Which referral criteria do you and the counsellors use?

Informal Formal

Comments.....

6. Do you expect the counsellors to offer counselling to everyone you refer, or do you expect the counsellors to reassess the patient for suitability?

.....
.....
.....

7. How satisfied are you with the feedback you receive from the counsellors about the patients who you have referred? (e.g., Do you require a formal written report? Do the counsellors type into computerized notes?)

.....
.....
.....

8. Do you administer any screening or monitoring or outcome measures to the people you refer to counsellors? (e.g., CORE, BDI, HADS, etc)

Yes

No

9. Do you reassess patients after a certain number of counselling sessions?

Yes

No

Comments.....

10. Where do you think most referrals go after the counsellors have seen them?

Discharged Local support services NHS Secondary Care GP Care

11. What opportunities do you have for discussion with the counsellors? (e.g. regular meetings or corridor consultation ad hoc?)

.....
.....
.....

12. How do you think the counselling service could be improved in meeting the needs of the patients and improving systems for you and the counsellors ? (E.g., referrals system, communication, Continuing Professional Development, etc)

.....
.....
.....
.....

Thank you for completing this questionnaire. Please now post both forms back in the stamped self-addressed envelope provided.

Appendix 2.

Satisfaction Survey of GP Counselling Service

Information Sheet for GPs

What is this all about?

On behalf of (name) Primary Care Trust (PCT), I have been asked to review the counselling services provided at GP surgeries across the local and neighbouring areas. This audit will be used as an initial step to developing and improving the counseling service.

The aim of an audit is to review 'what is being done' against certain standards set by the government. In this piece of work, we are using Standard 2 from the National Service Framework for Mental Health (NSF-MH: Department of Health, 1999) to review the efficiency, accessibility and acceptability of the counselling service.

What has it got to do with me?

The name of the surgery at which you work has been taken from a database, held by the PCT, as a GP practice offering on-site counselling. As a key stakeholder in the counselling services provided across (arex X/ area Y), I am interested in hearing your views and experiences of working within the system. With your consent, your responses will be used to explore and develop areas of the service.

What can I do now?

If you would like to take part in this survey, I would be very grateful if you would do the following:

- 1) Complete and sign the enclosed consent form**
- 2) Complete the enclosed short questionnaire**
- 3) Please return both in the stamped self-addressed envelope provided**

Please note that you do *not* need to place your name on the questionnaire as you will be assigned a participant number. All of your responses will remain anonymous, confidential and secure.

Thank you

**(name)
Researcher**

Appendix 3.

Satisfaction Survey of GP Counselling Service

GP Consent Form

I agree to take part in this survey.

I have read and understood the information sheet about this survey.

I am aware that all my responses to the questionnaire will remain secure and confidential. Some of my views may be used anonymously to explore and develop areas of the counselling service.

Initials:

Date:

Please post this form with the completed questionnaire in the stamped addressed envelope.

Thank you

Appendix 4.

Attendance Rates for Counsellors (2005/6)

MONTH	YEAR	Counsellor	Appointments	DNAs	COD	Single Attend
April	2005	Anon 1	41	3	0	38
May	2005	Anon 1	35	0	0	35
June	2005	Anon 1	47	2	0	43
July	2005	Anon 1	30	3	0	28
August	2005	Anon 1	44	6	0	38
September	2005	Anon 1	40	4	0	36
October	2005	Anon 1	uk	uk	uk	uk
November	2005	Anon 1	uk	uk	uk	uk
December	2005	Anon 1	uk	uk	uk	uk
January	2006	Anon 1	awaiting	awaiting	awaiting	awaiting
February	2006	Anon 1	awaiting	awaiting	awaiting	awaiting

MONTH	YEAR	Counsellor	Appointments	DNAs	COD	Attendances
April	2005	Anon 2	34	6	4	24
May	2005	Anon 2	uk	uk	uk	uk
June	2005	Anon 2	75	6	7	62
July	2005	Anon 2	43	1	4	38
August	2005	Anon 2	69	10	10	49
September	2005	Anon 2	87	7	13	67
October	2005	Anon 2	67	2	9	56
November	2005	Anon 2	76	9	8	59
December	2005	Anon 2	98	13	16	69
January	2006	Anon 2	awaiting	awaiting	awaiting	awaiting
February	2006	Anon 2	awaiting	awaiting	awaiting	awaiting

MONTH	YEAR	Counsellor	Appointments	DNAs	COD	Attendances
February	2005	Anon 3	4	0	0	4
March	2005	Anon 3	3	0	0	3
April	2005	Anon 3	4	0	0	4
May	2005	Anon 3	3	0	0	3
June	2005	Anon 3	5	0	0	5
July	2005	Anon 3	4	0	0	4
August	2005	Anon 3	6	0	0	6
September	2005	Anon 3	4	0	0	4
October	2005	Anon 3	awaiting	awaiting	awaiting	awaiting
November	2005	Anon 3	awaiting	awaiting	awaiting	awaiting
December	2005	Anon 3	awaiting	awaiting	awaiting	awaiting
January	2006	Anon 3	awaiting	awaiting	awaiting	awaiting
February	2006	Anon 3	awaiting	awaiting	awaiting	awaiting

Appendix 5a.

Counsellor Satisfaction Survey of GP Counselling Service

Please circle your answers and write any comments in the spaces provided.

- 1) **What do you think is an acceptable length of time for a patient to wait from seeing their GP until a counsellor sees them at the surgery?**

1-4 weeks 5-8 weeks 9-12 weeks 13+ weeks

- 2) **How many referrals, on average, do you receive from local GPs per month?**

1-5 6-10 11-15 16-20 21+

- 3) **Do you reassess referrals for suitability for counselling?**

Yes No

If yes, do you signpost some of the people you see to...

Local voluntary schemes? Secondary care

Yes No Yes No

- 4) **From which GP surgeries do you receive referrals?**

.....
.....
.....

- 5) **Which referral criteria do you and the GPs use?**

Informal Formal

Comments.....

- 6) **How often do you receive inappropriate referrals from GPs?**

1 2 3 4 5 6
Highly frequently Rarely / Never

7. **Do you give feedback to the GPs about the patients you have seen?**

Yes No

If yes, in what way?

8. What are the types and levels of problems you work with at the GP surgeries?

.....
.....
.....

9. Do you administer any screening or monitoring or outcome measures to the people you see? (e.g., CORE, BDI, HADS, etc)

Yes No

Comments.....

10. Do you have opportunities for appropriate supervision?

Yes No

Comments.....

11. Is there a policy in place for cancellations and DNAs?

Yes No

12. How could the counselling service be improved in meeting the needs of the patients and improving the systems for you and the GPs? (E.g. referrals system, communication, Continuing Professional Development, etc)

.....
.....
.....
.....

Thank you for completing this questionnaire. Please now post both forms back in the stamped self-addressed envelope provided.

Appendix 5b.

Satisfaction Survey of GP Counselling Service

Information Sheet for Counsellors

What is this all about?

On behalf of the local Primary Care Trust, I have been asked to review the counselling services provided at GP surgeries across the local and neighbouring areas. This audit will be used as an initial step to developing, supporting and improving the counselling service.

The aim of an audit is to review 'what is being done' against certain standards set by the government. In this piece of work, we are using Standard 2 from the National Service Framework for Mental Health (NSF-MH: Department of Health, 1999) to review the efficiency, accessibility and acceptability of the counselling service.

What has it got to do with me?

Your name has been taken from a database, held by the PCT, of counsellors offering counselling at local GP practices. As a key stakeholder in the counselling services provided across (area X/area Y), I am interested in hearing your views and experiences of working within the system. Your views will be compared with those of the referring GPs and service users. With your consent, your responses will be used to explore and develop areas of the service.

What can I do now?

If you would like to take part in this survey, I would be very grateful if you would do the following:

- 4) Complete and sign the enclosed consent form**
- 5) Complete the enclosed short questionnaire**
- 6) Please return both in the stamped self-addressed envelope provided**

Please note that you do *not* need to place your name on the questionnaire as you will be assigned a participant number. All of your responses will remain anonymous, confidential and secure.

Thank you

**(name)
Researcher**

Appendix 5c.

Satisfaction Survey of GP Counselling Service

Counsellor Consent Form

I agree to take part in this survey.

I have read and understood the information sheet about this survey.

I am aware that all my responses to the questionnaire will remain secure and confidential. Some of my views may be used anonymously to explore and develop areas of the counselling service.

Initials:

Date:

Please post this form with the completed questionnaire in the stamped addressed envelope.

Thank you

Very inconvenient

Very convenient

8. Was the venue of the counselling sessions satisfactory?

.....
.....
.....

9. How helpful were the sessions with the counsellor?

1	2	3	4	5	6
Very unhelpful					Very helpful

10. Was the number of counselling sessions enough to meet your needs?

1	2	3	4	5	6
Too few					Too many

11. At the end of the counseling, did the counsellor suggest other services that might be helpful? (e.g., Mind support groups, or seeing a psychologist)

Yes No

12. Please tell us below how your experience as a user of counselling services under primary care might be improved.

.....
.....
.....
.....

Thank you for completing this questionnaire. Please now post both forms back in the stamped self-addressed envelope provided.

Satisfaction Survey of GP Counselling Service

Information for Service-Users

What is this all about?

We are writing to you as a first step to looking at what is being done in the counselling service available at your GP surgery, and in others nearby, to see if it can be improved.

What has it got to do with me?

Your name has been picked at random from a list of names held at your GP surgery, of people who have seen a counsellor there. We are very interested in hearing what you think of the counselling service, and we would like you to take part in this survey.

So what can I do now?

If you would like to take part in this survey, we would be very grateful if you would do the following:

- 7) Complete and sign the enclosed consent form**
- 8) Complete the enclosed short questionnaire**
- 9) Please return both in the stamped self-addressed envelope provided**

Please note that you **do not** need to write your name on the questionnaire. We will not be able to identify your responses by name. Please be assured that your GP and the counsellors will not see any of the answers you give in the questionnaire.

Thank you

(name)
Researcher

Satisfaction Survey of GP Counselling Service

Service-User Consent Form

I agree to take part in this survey.

I have read and understood the information sheet about this survey.

I am aware that all my responses to the questionnaire will remain secure and confidential. Some of my views may be used anonymously to explore and develop areas of the counselling service.

Initials:

Date:

Please post this form with the completed questionnaire in the stamped addressed envelope.

Thank you

Literature Review

**Diagnosing Asperger Syndrome:
A Critical Review of the Literature**

Eleanor Wakerly

Student No. **05108132**

October 2007

DClinPsy Year 3

Word Count (excluding references): 4928

Diagnosing Asperger Syndrome: A Review of the Literature

Introduction

Diagnostic Definitions

The key diagnostic criteria for Asperger Syndrome² or Asperger's Disorder set by the International Classification of Diseases (Version 10, ICD-10: World Health Organisation, 1993) and by the Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (American Psychiatric Association, 2000) are very similar, although ICD-10 adopts a higher severity threshold. Please see Appendix 1.

There are currently at least five different widely circulated definitions of AS, in addition to those provided in ICD-10 and DSM-IV (Ghazuiddin, Tsai, & Ghazuiddin, 1992; Leekam, Libby, Wing, Gould, & Gillberg, 2000; Klin & Volkmar: as cited in Cohen & Volkmar, 1997; Wing, 1981; Szatmari, Bryson, Boyle, Streiner, & Duku, 2003; Tsai, 1992).

Brief Historical Development

The diagnostic concept Asperger Syndrome (AS) was coined just over 25 years ago in reference to Hans Asperger a Viennese paediatrician who described what he believed to be a psychiatric disorder in children called 'autistic psychopathy' (Asperger, 1944). This report written in German was not widely known until the 1980s (Wing, 1981). Unbeknownst to Asperger, his description was similar to a condition identified a year previously by an American psychiatrist Leo Kanner as 'autistic disturbances of affective contact' (Kanner, 1934); now recognised as Childhood Autism (World Health Organisation, 1992), Austistic Disorder (AD: American Psychiatric Association, 2000), or commonly just autism. A contemporary consensual view of AS considers it a pervasive developmental condition, in which changes in the course of a

² Throughout this review, the term Asperger Syndrome will be used, abbreviated to AS

child's developing brain are manifest as a set of symptoms at pre-school age (Khouzam, El-Gabalawi, Pirwani & Priest, 2004).

Epidemiology of AS

Since the mid-1960s, over 30 epidemiological studies of the autism spectrum have been conducted (Volkmar, Lord, Bailey, Schultz & Klin, 2004). In comparison, there have been very few epidemiological studies of AS. According to Ehlers and Gillberg's (1993) UK prevalence study, between approximately 3.6 to 7.1 children in every one thousand aged between 7 and 16 years had AS at that time (i.e., under 1%). These estimates could be interpreted as inaccurate representations of the true incidence rate of AS as they are based on diagnostic criteria for AS broader than ICD-10 or DSM-IV. Delay in early language development, deviances in speech and clumsiness in movement and balance are included. However, even if more stringent ICD-10 and DSM-IV diagnostic criteria were used in a prevalence study of AS, consensus for an estimate may still be unclear. There would probably be variation in interpretation as different severity thresholds would be applied within the same qualitative domains of impairment, resulting in different prevalence rates.

AS is estimated at two to three times more common in boys than in girls (Wing, 1993). The overall ratio of males to females on the autism spectrum seems to vary with IQ, ranging from 2:1 with severe impairment to more than 4:1 in those with average IQ (i.e., high-functioning autism) (Bryson, 1996).

The Asperger Syndrome and High-Functioning Autism Debate

Across the Atlantic, the concept of Asperger Syndrome is more commonly recognised as High Functioning Autism (HFA) (American Psychiatric Association, 2001). Ozonoff and Miller (2000) refer to HFA and AS as “meaningful subtypes of pervasive developmental disorder (PDD)”.

Whilst there is no strict diagnostic criteria for HFA, it is regarded a condition at the higher end of the autism spectrum and so diagnosing clinicians tend to make reference to the criteria for either Childhood Autism or Autistic Disorder (DSM-IV, APA, 2000; ICD-10: WHO, 1993). Diagnostic criteria require the same social deficits and repetitive narrow interests as AS, although with autism it specifies a history of abnormal language development and a below average level of intellectual functioning (unless HFA) (Kanner & Eisenberg, 1956).

AS and HFA as Distinct Conditions

Based on research findings, some argue that HFA and AS represent distinct conditions, differing in a number of neuro-psychological domains. Tantam (1988) claims to have identified evidence of AS-specific impairment in movement and balance (i.e., motor abilities), although he used no standardised tests of various motor abilities so his findings may not be valid. Klin Volkmar, Sparrow, Cicchetti & Rourke (1995) found that children with AS demonstrated significantly higher levels of overall and verbal intellectual functioning, although data was collected from medical records rather than through direct psychometric testing. The original test batteries used differed and some were not standardised. These methodological issues raise doubt over the validity of their results.

Miller & Ozonoff (2000) found that children with AS had significantly better visual perceptual skills than children with HFA, although level of intellectual functioning was not controlled for in the study, sample size was small and results prior to this were to the contrary. Molloy & Vasil (2002) comment on the value of the AS as distinct concept in education in acknowledging the social disability that children with special needs face. Szatmari, Bryson, Boyle, Streiner, and Duku (2003) found that, after controlling for age and intellectual functioning, children with AS showed a lower severity of social deficits than children on the autism spectrum (e.g., HFA).

AS and HFA on Autism Spectrum

Conversely, some researchers contest that, having compared individuals in several domains, AS and HFA are the same condition on the autism spectrum (Baron-Cohen, 2005; Miller & Ozonoff, 2000), supporting the doubt cast over the external validity of the concept of AS (Klin & Volkmar, 2003; Dickerson-Mayes, Calhoun & Crites, 2001).

Howlin (2003) found that level of social impairment did not differ across groups, and several studies have found that children with AS and HFA demonstrate the same level of discrepancy between their verbal and non-verbal intellectual functioning (Szatmari, Tuff, Finlayson, Bartolucci, 1990; Ozonoff, Pennington & Rogers, 1991; Manjiviona & Prior, 1995). There is some evidence to suggest a shared difficulty in the domain of executive functioning, which involves attention in planning and reasoning (Szatmari *et al* 1990; Ozonoff *et al* 1991). Szatmari, Bartolucci and Bremner (1989) compared language impairments in children with HFA and AS and found that they shared speech abnormalities (e.g., pronoun reversal, repetitive speech) and limited imaginative play. They also found no significant group differences in motor abilities; a finding confirmed by Ghaziuddin, Butler, Tsai and Ghaziuddin (1994) and Manjiviona and Prior (1995) who used standardised measures of both fine and gross motor skills (e.g., drawing and whole body movement).

Few studies find support for AS and HFA as distinct conditions (Kasari & Rotheram-Fuller, 2005), and methodological differences across studies may account for the different findings reported here. However, the validity of AS as a discrete condition remains controversial (Schopler, Mesibov, and Kuncze, 1998). Technically, as DSM-IV and ICD-10 are now written, if criteria for respectively Autistic Disorder and Childhood Autism are met, this precludes a diagnosis of AS. However, neuropsychological evidence to date suggests that AS is a variant of autism (Frith, 2004) and there appears to be sound empirical evidence from psychological studies to support the view that AS is HFA, and vice versa. AS and HFA will be used interchangeably in this review of the literature, and be regarded under the umbrella of pervasive developmental disorders and/or the autism spectrum.

Challenges to Diagnosis

In HFA or AS where language development is not delayed and cognitive skills are in the average or superior range, the diagnosis is often not made until school age, or even later (Gillberg, Nordin & Ehlers, 1996). Indeed, the average age of diagnosis for children with AS has been shown to be 11 years (Howlin & Moore, 1997; Howlin and Asgharian, 1999). Williams, Scott, Stott, Allison, Bolton *et al* (2005) comment that AS is identified “too late” and that it should be possible to screen AS in children in primary school (i.e., aged 5-11 years) and monitor from then onwards.

More recently, Baron-Cohen estimated the average age of diagnosis as 6 years (Baron-Cohen: as cited in Hopkins, 2005). Whilst moving in the right direction, clinical recognition of AS is still later than autism conditions at the lower end of the spectrum, hypothesised to be due to the the lack of clear language or cognitive deviance in AS and roughly normal adaptive behaviour of children with AS early in life (Volkmar & Cohen, 1991). McConachie, Le Couteur & Honey (2005) explored the reasons why so few children with possible AS were identified early, and found problems inherent in the assessment tools and the variation in diagnostic criteria.

In this part of the review, I present the challenges posed to clinicians at the stage of diagnosis, or Level 2 screening (Siegel, 1998), at which a child has already been identified as at risk of AS. Level 1 screening of AS (Siegel, 1998) involves the use of parental report questionnaires such as the Child Asperger Syndrome Test (CAST: Williams, Scott, Stott, Allison, Bolton *et el*, 2005), the Australian Scale for Asperger Syndrome (Atwood, 2001), the Children’s Social Behaviour Questionnaire (Luteijn, Luteijn, Jackson, Volkmar, & Minderaa, 2000) and the Autism Spectrum Quotient (Baron-Cohen, Wheelwright, Skinner, Martin & Clubley, 2001). Other than the CAST, their properties have not yet been systematically evaluated (Baird, Charman, Cox, Baron-Cohen, Swettenham, Wheelwright & Drew, 2001).

Outdated Diagnostic Criteria

Prior to the advent of DSM-IV (APA, 2000) and ICD-10 (WHO, 1992), operationalised criteria were used to differentiate diagnosis of AS from autism (e.g., Gillberg & Gillberg, 1989; Szatmari, Bartolucci & Brenner, 1989). Since their development, advances in research have altered the diagnostic concept of AS, rendering the original criteria obsolete. For example, the Szatmari *et al.* (1989) criteria do not include a section on the restricted repetitive & stereotyped patterns of behaviour, interests and activities, nor do they include a statement about early language development or level of intellectual functioning. The six criteria developed by Gillberg *et al.* (1989) include a delay in early language development and deviances in speech and motor clumsiness, both of which are not regarded as necessary diagnostic features in the DSM-IV-TR and ICD-10.

As some sets of diagnostic criteria are outdated and are still being used by clinicians, there is a risk that children would be misdiagnosed. The broadening of criteria against the indications from the research evidence only serves to delay and complicate the diagnostic process. As diagnostic criteria have preceded validation of the concept of AS, this “puts the horse before the cart” (Howlin, 2000).

Differential Diagnosis

The symptoms of AS/HFA are sometimes mistaken as psychiatric disorders such as Childhood-Onset Schizophrenia (Gordon, Frazier & McKenna, 1994; Pearlman, 2000) or Attention Deficit Hyper-Activity Disorder (ADHD: Gillberg & Gillberg, 1989). In a study by Bhaumik, Branford, McGrother, & Thorp (1997), they found that almost two-thirds of children with HFA had wrongly been previously diagnosed with ADHD, despite important differences in their levels of social and intellectual functioning, and range of activities.

Pervasive restriction of social functioning and rigidity of interests is reported in criteria for both AS and Obsessive Compulsive Disorder (OCD: APA, 2000). The

only difference may be in the level of distress. The relationship of AS to other diagnostic concepts such as schizoid disorder, right hemisphere learning disability, and semantic pragmatic processing disorder remains to be clarified by further research (Klin, Sparrow, & Volkmar, 2000).

A clear differential diagnosis may not be easy, given the overlapping criteria and the absence of conclusive biological indicators such as genetic, immunological, neurological or metabolic differences for AS/HFA (Howlin, 2000). The process of delineating one diagnosis from another can be a painstakingly long and difficult process, but an important one particularly in identifying potentially treatable psychiatric disorders thought to have a negative impact on outcome (Bristol-Power & Spinella, 1999).

Assessment Measures

Level 2 (Siegel, 1998) involves a comprehensive assessment concerned not only with diagnosis of AS but with obtaining information on patterns of strengths and weaknesses important to intervention. The developmental (e.g., receptive and expressive speech and language, sensory-motor abilities), adaptive (daily living skills) and intellectual profile (via cognitive assessment) of the child is determined, involving numerous disciplines and specialists. Life-style and family relationships will also be examined as they can have a strong protective influence on the child's developmental status and symptoms and conversely can have an adverse impact (Filipek, Accardo, Baranek, Cook, Dawson, *et al*, 1999). Well-established schedules and interviews have been used routinely in specialist child services to identify patterns of key behavioural characteristics of AS within a lifelong developmental history.

The Autism Diagnostic Interview-Revised (ADI-R: Rutter, LeCouteur, Lord, MacDonald, Rios, & Folstein: as cited in Schopler & Mesibov, 1988) and the Diagnostic Interview for Social and Communication disorders (DISCO: Leekham, Libby, Wing, Gould & Taylor, 2002) are parental or teacher report interviews. The Autism Diagnostic Observation Schedule-Generic (ADOS-G: Lord, Risi, Lambrecht,

Cook, Leventhal, DiLavore, Pickles & Rutter, 2000) is a semi-structured observational assessment that comprises directed activities to evaluate communication, reciprocal social interaction, play, restricted interests, and other abnormal behaviours, in both children and adults on the spectrum. It takes approximately 30 to 45 minutes to administer. It also permits DSM-IV (APA, 1994) and ICD-10 (WHO, 1992) diagnoses within the autistic spectrum.

The ADI-R, ADOS and DISCO provide an overall index of ability, current standardised norms and a full range of standard scores, although not so in the higher range. They involve parental interview and naturalistic observations of the child in more than one setting (e.g., home and school), often at different time points to establish baseline function.

However, the administration of these instruments requires specific training, they are resource-intensive and hence costly. They are indirect assessment measures, which although standardised, are vulnerable to reporter-bias as teachers and parents, for example with the ADI-R, have been shown to lead to over-estimations of the child's symptomatology (Le Couteur, 2000).

The Childhood Autism Rating Scale (CARS: Schopler, Reichler, DeVellis, & Daly, 1980; Schopler, Reichler & Renner, 1988) is one of the most frequently used behaviour observation questionnaires with good internal consistency, inter-rater agreement, and test-retest stability (Perry, Condillac, Freeman, Dunn-Geier & Belair, 2005). Other validated diagnostic rating scales for the broader autism spectrum are the Social Communication Questionnaire (SCQ: Kazak, Rutter, Lord, Pickles & Bailey, 1999) and the Autism Spectrum Screening Questionnaire (ASSQ: Ehlers, Gillberg & Wing, 1999), although these scales are not specific to AS.

The AS Diagnostic Scale (ASDS: Myles, Barnhill, Hagiwara, Griswold & Simpson, 2001) is a 50-item norm referenced rating scale, published relatively recently as the first standardised and nationally normed instrument specific to AS. The ASDS has been shown to be the best discriminator between children with AS and those without,

although discriminative validity between AS and Autism has only been partially supported (Boggs, Gross & Gohm, 2006; Goldstein, 2002). It is reported to have good internal and inter-rater reliability and validity (Campbell, 2005).

The Asperger Syndrome Diagnostic Interview (ASDI: Gillberg, Gillberg, Rastam & Wentz, 2001) is reported to have excellent inter-rater reliability and test-retest stability and good validity (Campbell, 2005), although there is no evidence, to date, that the ASDI can make a distinction between AS and HFA. The Autism Spectrum Quotient (AQ: Baron-Cohen, Hoekstra¹, Knickmeyer¹ & Wheelwright, 2006) can rapidly quantify where a child is situated on the spectrum from autism to 'normality'. Again, both the ASDS and the ASDI are indirect assessment measures that are subject to reporter bias (Le Couteur, 2000). Other more AS-specific instruments are the Gilliam Asperger Disorder Scale (GADS: Gilliam, 2001) and the Asperger Disorder Index (KADI: Krug & Arik, 2003), both of which are reported to have validity and temporal stability (Campbell, 2005).

Howlin (2000) concludes in her review of AS assessment tools that few instruments are able to demonstrate reliability, validity, sensitivity (proportion of cases correctly identified) and specificity (proportion of non-cases correctly identified).

In sum, outdated diagnostic criteria, conceptual uncertainty, co-morbidities and resource-intensive assessment procedures not specific to AS/HFA could act as barriers at the stage of diagnosis.

Clinical Implications of Delayed Diagnosis

The process of assessment may be greatly delayed until there is clinical consensus by a multi-disciplinary team of an appropriate diagnosis. There is evidence to suggest considerable social and psychological impact on the individual and on the system (Filipek *et al*, 1999), as they continue to meet the demands of changes at home and at school without additional supports. Parents may blame themselves or their child for

their unusual, seemingly aloof and rude, behaviour resulting in familial stress and conflict. Parents can have difficulty convincing others that their child has a condition (Filipek *et al*, 1999).

A child could be easily targeted for bullying at school as they struggle to form and maintain friendships with peers (National Autistic Society, NAS, 2006). Without identification of the strengths and weaknesses associated with AS or HFA, a child may be excluded from more appropriate specialised education. Social isolation and continued unsupported needs could have a significant detrimental impact for the individual, for example placing them at risk of associated mental health problems (e.g., low self-esteem, anxiety) (NAS, 2006).

There is evidence to suggest that early identification of such a condition, with appropriate intervention, may improve outcome (Dawson & Osterling, 1994). It is therefore highly important that at the stage of assessment the diagnostic process for AS is efficient so as to ensure quicker access to appropriate services and support and an improved outcome for the individual and their family (National Autism Plan for Children: NAISA: Le Couteur, 2003). Howlin and Moore (1997) described the diagnostic experiences of almost 1,300 families with children with autism from the UK and concluded that diagnosis in itself may be a critical step but will not improve prognosis, or outcome, unless combined with practical help and support to assist parents in obtaining treatment for the child.

Access to the best available care is a standard set by the United Nations Convention of the Rights of the Child (UNICEF, 1989), Every Child Matters (DfES, 2003) and the National Service Framework for Children (DH, 2005). As access to care, via diagnosis, may be delayed, the development of additional supporting assessment tools that aim to catalyse the diagnostic process for AS is necessary and important. Whilst there is a comprehensive selection of valid and reliable assessments for the broad autism spectrum, there are few developed tools specific to AS. In order to explore AS-specific deficits further, we turn to some relevant theoretical hypotheses and empirical research.

Evidence of AS-Specific Deficits: Integration with Theory

Creativity-Deficit Hypothesis

The rigidity and inflexibility of thought and behaviour typical of autism spectrum conditions has been re-framed by many researchers as a deficit of creativity (e.g., Craig & Baron-Cohen, 1999; Craig, Baron-Cohen & Scott, 2001).

The definition of creativity has been greatly speculated over and remains somewhat of a highly complex and diffuse construct (Sternberg, 1985). Creativity has been defined as the production of ideas (Guilford, 1950; Amabile, 1983), the recognition of possibilities (Tyler, 1978), a personality attribute (MacKinnon, 1962), even a kind of problem-solving (Cattell, 1971: as cited in Mumford & Gustafson, 1988). Torrance (1974) described creativity as three dimensions: fluency, flexibility and originality. Fluency refers to the number of responses a person gives. Flexibility concerns the number of different categories responses cover. Originality concerns the statistical rarity of responses, only truly valid if based on standardised norms.

A 'creativity-deficit' hypothesis has developed within the frameworks of cognitive theories of the autism spectrum, of which continue to dominate the research arena (Kasari & Rotheram-Fuller, 2005).

Baron-Cohen's (1995) 'mindblindness' hypothesis of autism has spurred on more than 30 experimental investigations since it was first identified over two decades ago by Baron-Cohen, Leslie and Frith (1985). This theory suggests that for individuals on the autism spectrum, there are deficits in the normal process of empathising, which vary according to mental age. Empathising, or 'mentalising', is described here as the ability to attribute mental states to oneself and others, and to express appropriate emotional reactions to others' mental states (Baron-Cohen, 2004). Experimental neuropsychological evidence suggests that people on the autism spectrum intuitively lack the ability to empathise or 'mentalise' (Frith, 2004), and this is thought to underlie the

difficulties that they have in responding flexibly and fluently in social interaction (Baron-Cohen, 1988).

The 'meta-representational-deficit' hypothesis (Leslie, 1987) proposes that people on the spectrum can understand non-mental representations such as drawings of objects and photographs, but they fail to create mental representations of their own and other's feelings and beliefs (Charman & Baron-Cohen, 1992; Leekham & Perner, 1991). This notion has received some support from a study by Charman & Cohen (1993), in which children on the autism spectrum showed intellectual realism in their drawings as did age-matched controls, suggesting the use of non-mental representations. The authors infer from their findings support for an autism-specific deficit in the capacity to represent mental representations, although their conclusions are somewhat illogical.

Uta Frith's (1989) 'weak central coherence' hypothesis proposes that individuals on the spectrum have a preference for local detail rather than global information, the latter normally taking precedence in the typically developing child. This theory stems from a study by Witkin, Dyk, Faterson, Goodenough, & Karp (1962), and has received much empirical support since (e.g., Jolliffe & Baron-Cohen, 1997; Shah & Frith, 1993; Jolliffe & Baron-Cohen, 2000, 2001; Plaisted, O'Riordan, & Baron-Cohen, 1998). Children on the autism spectrum may find it difficult to integrate information and thus be creative in producing original ideas.

There are a steadily growing number of experimental studies of creativity and the autism spectrum based on these theoretical frameworks (Frith, 1972; Lewis & Boucher, 1991; Craig & Baron-Cohen, 1999; Craig, Baron-Cohen & Scott, 2001; Booth, Charlton, Hughes & Happe, 2003; Rutherford & Rogers, 2003; Keow Lim & Slaughter, 2007). As one of the most relevant studies to this review and one which discriminates between broad autism and AS deficits, we shall now examine Craig and Baron-Cohen's (1999) findings.

Craig and Baron-Cohen's (1999) experimental study compared groups of children with AS with typically developing children to explore differences in creativity and

imagination. One of the most popular standardised measures, the Torrance Test of Creative Thinking (TTCT: Torrance, 1974) was used. The AS group performed significantly lower on originality when asked to make some pictures by adding to 30 pairs of parallel lines, as they produced fewer novel changes compared to the control. In a second experiment, there were only clinically significant differences found where the child was asked to complete 10 incomplete scribbles or squiggles. Importantly, the control group was not age-matched as the average chronological and hence mental age was 5.2 years compared to the AS group which had an average mental age of 9.10 years.

In the third experiment of the study by Craig and Baron-Cohen (1999), the children were asked to tell the experimenter as many different ways as they could to make a soft toy “more fun to play with”. A significantly higher proportion of responses given by the children with AS were categorised as reality-based 'additions/alterations' (70% compared to 30% of controls). Compared to the control, significantly fewer of the responses given by the children with AS were imaginative responses (e.g., “he could fly us to the moon”). Even when compared with a group of children with Autistic Disorder (DSM-IV: APA, 2000), whose verbal mental age was much lower, there was a statistically significant difference. Children with AS produced significantly fewer original and flexible responses compared to the control.

In the fourth and final experiment, children were asked to tell the experimenter “lots of things” that some foam shapes could be. Significantly fewer children with AS animated the shapes compared to the control. (The overall tendency for them was to produce responses that were reality-based inanimate things that the foam shapes closely resembled.)

The authors conclude that their findings supported the 'executive dysfunction' hypothesis posited by Ozonoff, Rogers, Farnham & Pennington's (1994). This theory focusses on cognitive process and assumes that people with autism struggle to shift their attention, override routine responses and therefore fail to dynamically and creatively socially interact (Craig & Baron-Cohen, 1999). This hypothesis echoes the

work carried out by Nunez and de Saudez (1991) who explored the relationship between different cognitive styles on creativity. They found supporting evidence of previous studies (e.g., Del Gaudio, 1976, Noppe, 1985) that individuals who had a fixed cognitive style showed rigid, analytical behaviour and reduced creativity. Those with a continuously shifting cognitive style, or showing divergent thought, demonstrated more creativity.

The 'executive dysfunction' has received some support from a study by Booth, Charlton, Hughes and Happe (2003), who found that a group of boys on the autism spectrum demonstrated more detail-focused drawings and severe planning impairments compared to age and IQ-matched controls. However, the 'executive dysfunction' hypothesis has been criticised for neglecting to account for the content of repetitive and inflexible interests and behaviours (Baron-Cohen, 2004) and there is conflicting evidence that people with AS have no consistent demonstrable executive dysfunction (Baron-Cohen, Wheelwright, Stone, & Rutherford, 1999).

Imaginative Creativity-Deficit Hypothesis

Based on their findings, Craig and Baron-Cohen (1999) proposed an 'imaginative creativity deficit' hypothesis of autism spectrum conditions. This idea had been supported by many previous experimental studies of imaginative deficits in the spontaneous pretend play of children on the autism spectrum (e.g., Wing & Gould, 1979; Baron-Cohen, 1987; Jarrold, Boucher & Smith, 1993; Scott and Baron-Cohen, 1996).

Several theories posited by Baron-Cohen, including 'mindblindness' (Baron-Cohen, 1995), 'empathising-systemising' (Baron-Cohen, 2002) and 'hyper-systemising' (Baron-Cohen, 2006) stimulate the 'imaginative creativity-deficit' hypothesis by generating further testable hypotheses for investigation (e.g., Scott, Baron-Cohen and Leslie, 1999). Craig, Baron-Cohen & Scott (2001) found that compared to typically developing children, those with AS were impaired on drawing tasks requiring imagination when they were asked to make spontaneous transformations (e.g., turn a

cloud into something else). This was not found in children with Childhood Autism when compared with a control group of children matched on intellectual functioning (with mild learning disabilities) so this impairment was specific to AS.

There is also experimental evidence for imaginative impairments in the narratives or stories told by children with autism spectrum conditions (Loveland, McEvoy, Tunali & Kelly, 1990; Happe, 1994; Capps, Kehres & Sigman, 1998; Baron-Cohen & Scott, 2000; Losh & Capps, 2003; Capps, Losh, & Thurber, 2000; Tager-Flusberg, 1995; Tager-Flusberg & Sullivan, 1995). Children with AS/HFA have exhibited particular difficulty sharing their narratives of personal experience, specifically elaborating and integrating their stories (Losh & Capps, 2003).

Drawing and Storytelling as a Diagnostic Aid

Drawings have been utilised in several of the aforementioned studies as a medium from which measures of creativity can be taken. The use of drawings in the diagnostic process at the stage of assessment have been used for their clinical richness to effectively gauge developmental, emotional and cognitive status in children (Oster & Crone, 2004; DiLeo, 1973).

There are numerous general drawing procedures (e.g., Harris, 1963: as cited in Oster & Scrone, 2004; Machover, 1952; Verinis, Lichtenberg & Henrich, 1974; Buck, 1948; Burns, 1987; Kinget, 1952; Silver, 1996: as cited in Silver, 2002; Gantt & Tabone, 1998). Wadeson (2002) argues that informal drawing tests have little validity although he acknowledges their value in gathering information and generating hypotheses. Gantt (2004) highlights their disadvantages, namely that they lack standardised administration, use conflicting scoring systems and show poor test-retest and inter-rater reliability.

Several normed scoring systems have been developed to refine these art-based assessments and re-focus on the form of the drawings rather than content (Gantt,

2004). As examples, there is the Children's Diagnostic Drawing Series (Neale, 1994), the Diagnostic Drawing Series (Cohen, Hammer & Singer, 1988) and the Formal Elements Art Therapy Scale (FEATS: Gantt, 2001). They have been used to compare groups (e.g., Munley, 2002).

Some assessment measures have involved a series of drawings to monitor clinical state and to assess capacity for integration of information and imagination (e.g., Kramer & Schehr, 1983; Cohen et al, 1988; Silver, 2002; Landgarten, 1993). For example, Silver's (2002) Drawing from Imagination Test explores the person's ability to select, combine and represent stimulus drawings as a story. Such drawing scales have not so far been used to compare groups of people with AS and age-matched controls.

Another informal drawing procedure is the squiggle technique (Winnicott, 1971), in which 'players' take turns in spontaneously transforming the other person's 'squiggle' or scribble, into a series of drawings, naming them and creating a narrative out of a selection. The squiggle technique has been adapted for use in clinical therapeutic practice, particularly in the domain of psychoanalytic therapy (e.g., Ziegler, 1976; Ellen, 1978; Wakimoto, Kawamura, Kaku and Kawata, 1984), particularly in art therapy interventions with children (e.g., Gunter, 2000; Eisdell, 2005; Branik, 2005; Steinhardt, 2006). The idea that reciprocal story-telling of the squiggle drawings can enhance the therapeutic technique has been developed by Gardner (1972) and Kritzberg (1972, 1975). Despite high interest in 'squiggling' by clinicians and researchers as a therapeutic technique, there is little evidence supporting its effectiveness (Steinhardt, 2006) and its use in the diagnostic process at the stage of assessment requires further research.

The squiggle technique may help to clarify the hypothesis that the social and behavioural symptoms of autism spectrum conditions are due to an underlying 'imaginative creativity-deficit'. Based on findings by Craig, Baron-Cohen & Scott (2001) that children with AS show specific and significant impairment in making spontaneous transformations to drawings, the squiggle technique may measure this

difficulty in imaginative creativity, and as such act an aid in the diagnostic process. Furthermore, given that particular aspects of narrative ability are impaired in children with AS (Losh & Capps, 2003), the analysis of storytelling within the squiggle technique may also tap into this deficit.

References for Literature Review

Atwood, T. (2001) *Asperger's Syndrome*. London: Jessica Kingsley.

Amabile, T. M. (1983) The social psychology of creativity. A componential conceptualisation. *Journal of Personality and Social Psychology*, 45, 357-376

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of mental disorders* (4th edition) (DSM-IV). Washington DC: American Psychiatric Association

Asperger, H. (1944) Die autistischen Psychopathen im Kindesalter. *Archiv fur Psychiatre und Nervenkrankheiten*, 117, 76-136

Baron-Cohen, S. (1995) *Mindblindness: an essay on autism and theory of mind*. Boston: MIT Press/Bradford Books

Baron-Cohen, S. (1987) Autism and symbolic play. *British Journal of Developmental Psychology*, 5, 139-148

Baron-Cohen, S. (1988) Social and pragmatic deficits in autism: cognitive or affective? *Journal of Autism and Developmental Disorders*, 18, 379-402

Baron-Cohen, S. (2002) The extreme male brain theory of autism. *Trends in Cognitive Sciences*, 6, 248-254

Baron-Cohen, S. (2004) Autism: research into causes and interventions. *Paediatric Rehabilitation*, 7, 73-78

Baron-Cohen, S. (2006) The hyper-systemising assortative mating theory of autism. *Progress in Neuro-psychopharmacology & Biological Psychiatry*, 30, 865-872

Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985) Does the autistic child have a 'theory of mind'? *Cognition*, 21, 37-46

Baron-Cohen, S., Wheelwright, S., Stone, V., & Rutherford, M. (1999) A mathematician, a physicist, and a computer scientist with Asperger Syndrome: performance on folk psychology and folk physics test. *Neurocase*, 5, 475-483

Baron-Cohen, S., Hoekstra, R.A., Knickmeyer, R., & Wheelwright, S. (2006) The Autism-Spectrum Quotient (AQ)—Adolescent Version. *Journal of Autism and Developmental Disorders*, 36, 3, 343-350

Baron-Cohen, S., & Wheelwright, S. (1999) 'Obsessions' in children with autism or Asperger Syndrome: a content analysis in terms of core domains of cognition. *British Journal of Psychiatry*, 175, 484-490

Baron-Cohen S, Wheelwright S, Skinner R, Martin J, Clubley. (2001) The Autism Spectrum Quotient (AQ): Evidence from Asperger syndrome/high functioning autism, males females, scientists and mathematicians. *Journal of Autism and Developmental Disorders*, 31, 1, 5-17

Bhaumik, S., Branford, D., McGrother, C., & Thorp, C. (1997) Autistic traits in adults with learning disabilities. *British Journal of Psychiatry*, 170, 502-506

Booth, R., Charlton, R., Hughes, C., & Happe, F. (2003) Disentangling weak central coherence and executive dysfunction: planning drawing in autism and ADHD. *Philosophical Transactions: Biological Sciences*, 358, 387-392

Branik, E. (2005) Winnicott's squiggle game. Its role for assessment, creation of the relationship and treatment recommendations in child and adolescent psychiatry and psychotherapy. *Psychology and Psychotherapy: Theory, Research and Practice*, 21(1), 68-77

Bristol-Power, M.M., & Spinella, G. (1999) Research on screening and diagnosis in autism: a work in progress. *Journal of Autism and Developmental Disorders*, 29, 6, 435-437

Bryson, S. E (1996). Brief report—Epidemiology of autism. *Journal of Autism and Developmental Disorders*, 26, 165-167

Buck, J.N. (1948) The HTP Test. *Journal of Clinical Psychology*, 4, 151-159

Burns, R.C. (1987) *Kinetic House Tree Person Drawings: An Interpretive Manual*. New York, US, Brunner/Mazel

Campbell, J.M. (2005) Diagnostic assessment of Asperger's Disorder: A review of five third-party rating scales. *Journal of Autism and Developmental Disorders*, 35, 1, 25-35

Capps, L., Kehres, J., & Sigman, M. (1998) Conversational abilities among children with autism and developmental delay. *Autism*, 2, 325-344

Capps, L., Losh, M., & Thurber, C. (2000) The frog ate the bug and made his mouth sad": Narrative competence in children with autism. *Journal of Abnormal Child Psychology*, 28(2), 193-204

Charman, T., & Baron-Cohen, S. (1992) Understanding drawings and beliefs: a further test of the meta-representation theory of autism: a research note. *Journal of Child Psychology & Psychiatry*, 33, 6, 1105-1112

Cohen, B.M., Hammer, J.S., & Singer, S. (1988) The Diagnostic Drawing Series: a systematic approach to art therapy evaluation and research. *The Arts in Psychotherapy*, 15, 1, 11-21

Cohen & F.R. Volkmar (1997) *Handbook of autism and pervasive developmental disorders*. New York, NY: John Wiley & Sons, Inc.

Craig, J., & Baron-Cohen, S. (1999) Creativity and imagination in autism and Asperger Syndrome. *Journal of Autism and Developmental Disorders*, 29, 4, 319-326

Craig, J., Baron-Cohen, S. & Scott, F. (2001). Drawing ability in autism: a window into the imagination. *Israel Journal of Psychiatry*, 34, 242-253

Dawson, J., & Osterling, G. (1994) Early recognition of children with autism: A study of first birthday home videotapes. *Journal of Autism and Developmental Disorders*, 24(3), 247-257

Del Gaudio, A. (1976) Psychological differentiation and mobility as related to creativity. *Perceptual and Motor Skills*, 43, 831-841

Department for Education and Skills (DfES) (2003) *Every Child Matters*. London: The Stationery Office

Department of Health (DH) (2005) *National Service Framework for Children, Young People and Maternity Services. Autism Spectrum Disorders*. London: DH Publications

Dickerson-Mayes, S., Calhoun, S., & Crites, D.L (2001) Does DSM-IV Aspergers Disorder exist? *Journal of Abnormal Child Psychology*, 29, 3, 263-271

DiLeo, J., (1973) *Children's Drawings as Diagnostic Aids*. New York, US, Brunner/Mazel

Ehlers, S. & Gillberg, C. (1993) The epidemiology of Asperger Syndrome. A total population study. *Journal of Child Psychology and Psychiatry*, 34, 1327-1350

- Eisdell, N. (2005) A conversational model of art therapy. *Psychology and Psychotherapy: Theory, Research and Practice*, 78 (1), 1-19
- Ellen, S. (1978) Drawing games: in art therapy with children. *American Journal of Art Therapy*, 17(3), 85-84
- Filipek, P. A., Accardo, P.J., Baranek, G.T., Cook, E.H., Dawson, G., Gordon, B., Gravel, J.S., Johnson, C.P., Kallen, R.J., Levy, S.E., Minshew, N.J., Prizant, B.M., Rapin, I., Rogers, S.J., Stone, W.L., Teplin, S., Tuchman, R.F., & Volkmar, F.R. (1999) The screening and diagnosis of autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 29, 6, 439-483
- Frith, U. (1989) *Autism: explaining the enigma*. Oxford: Basil Blackwell
- Frith, U. (2004) Confusions and controversies about Asperger Syndrome. *Journal of Child Psychology and Psychiatry*, 45, 4, 672-686
- Gantt, L.M. (2001) The Formal Art Therapy Scale: a measurement system for global variables in art. *Art Therapy*, 18, 1, 50-55
- Gantt, L., & Tabone, C. (1998) *The Formal Elements Art Therapy Scale: The rating Manual*. Morgantwon, WV, US, Gargoyle Press
- Gardner, R.A. (1972). Mutual storytelling: A technique in child psychotherapy. *International Journal of Child and Adolescent Psychiatry*, 38(9), 253-262
- Ghaziuddin, M., Butler, E., Tsai, L., & Ghaziuddin, N. (1994) Is clumsiness a marker for Asperger Syndrome? *Journal of Intellectual Disability Research*, 38, 519-527
- Ghaziuddin, M., Tsai, L.Y., & Ghaziuddin, N. (1992) Brief report: A comparison of the diagnostic criteria for Asperger syndrome. *Journal of Autism and Developmental Disorders*, 22, 643-649

Gillberg, C. (1998) Asperger Syndrome and High Functioning Autism. *British Journal of Psychiatry*, 172, 200-209

Gillberg, I.C., & Gillberg, C. (1989) Asperger Syndrome- some epidemiological considerations: a research note. *Journal of Child Psychology and Psychiatry*, 30, 631-638

Gillberg, C., Gillberg, C., Rastam, M., & Wentz, E. (2001) The Asperger Syndrome Diagnostic Interview: a preliminary study of a new structured clinical interview. *Autism*, 5, 1, 57-66

Gillberg C, Nordin V, Ehlers S. (1996) Early detection of autism. Diagnostic instruments for clinicians. *European Child and Adolescent Psychiatry*, 5, 67-74

Goldstein, S. (2002) Review of the Asperger Syndrome Diagnostic Scale. *Journal of Autism and Developmental Disorders*, 32, 6, 611-614

Gordon, C.T., Frazier, J.A., & McKenna, K., & Giedd, J. (1994) Childhood-onset schizophrenia. *Schizophrenia Bulletin*, 20,4, 697-712

Guilford, J.P. (1950) Creativity. *American Psychologist*, 5, 444-454

Guilford, J.P. (1967) *The Nature of Human Intelligence*. New York, US: McGraw Hill

Gunter, M. (2000) Art therapy as an intervention to stabilize the defences of children undergoing bone marrow transplantation. *Arts in Psychotherapy*, 27(1), 3-14

Happe, F. (1994) An advanced test of theory of mind. Understanding of story characters' thoughts and feelings by able autistic, mentally handicapped, and normal children and adults. *Journal of Autism and Developmental Disorders*, 29, 129-154

Hopkins, B. (2005) *Cambridge Encyclopaedia of Childhood Development*. Cambridge University Press: Cambridge.

Howlin, P., & Asgharian, A. (1999) 'The Diagnosis of Autism and Asperger Syndrome: Findings from a Survey of 770 Families', *Developmental Medicine and Child Neurology* 41 (12): 834-9

Howlin, P., & Moore, A. (1997) Diagnosis of autism. A survey of over 1200 patients in the UK. *Autism*, 1, 135-162

Howlin, P. (2000) Assessment instruments for Asperger Syndrome. *Child Psychology and Psychiatry Review*, 5, 120-129

Howlin, P. (2003) Outcome in high-functioning adults with autism with and without early language delays: Implications for the differentiation between autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 33, 3-13

Jarrold, C., Boucher, J., & Smith, P. (1993) Symbolic play in autism: a review. *Journal of Autism and Developmental Disorders*, 23, 281-307

Jolliffe, T., & Baron-Cohen, S. (1997) Are people with autism or Asperger's Syndrome faster than normal on the Embedded Figures Task? *Journal of Child Psychology and Psychiatry*, 38, 527-534

Jolliffe, T., & Baron-Cohen, S. (2000) Linguistic processing in high-functioning adults with autism or Asperger syndrome: Can global coherence be achieved? A further test of central coherence theory. *Psychological Medicine*, 30, 1169- 1187

Jolliffe, T., & Baron-Cohen, S. (2001) A test of central coherence theory: can adults with high-functioning autism or Asperger syndrome integrate objects in context? *Visual Cognition*, 8, 67-101

Kanner, L (1943) Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250

Kanner, L., & Eisenberg, L. (1956) Early infantile autism. 1943-1955. *American Journal of Orthopsychiatry*, 26, 55-65

Kazak, B.S., Rutter, M., Lord, C., Pickles, A., & Bailey, A. (1999) Autism screening questionnaire: diagnostic validity. *British Journal of Psychiatry*, 175, 444-451

Kasari, C., & Rotheram-Fuller, E. (2005) Current trends in psychological research on children with high-functioning Autism and Asperger Disorder. *Current Opinions in Psychiatry*, 18, 5, 467-468

Keow Lim, H., & Slaughter, V. (2007) Human figure drawings by children with Asperger Syndrome. *Journal of Autism and Developmental Disorders*,

Khouzam, H.R., El-Gabalawi, F., Pirwani, N., & Priest, F. (2004) Asperger's Disorder: a review of its diagnosis and treatment. *Comprehensive Psychiatry*, 45, 3, 184-191

Kinget, G.M. (1952) *The Drawing Completion Test: A Projective Technique for the Investigation of Personality based on the Wartegg Test Blank*. New York, US, Grune & Stratton

Klin, A., Volkmar, F.R., Sparrow, S.S., Cicchetti, D.V., & Rourke, B.P. (1995) Validity and neuropsychological characterisation of Asperger syndrome: convergence with non-verbal learning disabilities syndrome. *Journal of Child Psychology and Psychiatry*, 36, 1127-1140

Klin, A., Sparrow, S., & Volkmar, F.R. (2000) *Asperger syndrome*. New York: The Guilford Press

Klin, A., & Volkmar, F. (2003) Asperger Syndrome: diagnosis and external validity. *Child and Adolescent Psychiatric Clinics of North America*, 12, 1, 1-13

Kramer, E., & Schehr, J. (1983) An art therapy evaluation session for children. *American Journal of Art Therapy*, 23, 3-12

Kritzberg, N.I. (1972). TASKIT (tell-a-story kit), the therapeutic storytelling word game. *International Journal of Child and Adolescent Psychiatry*, 38(9) 1972, 231-244

Kritzberg, N.I. (1975). *The Structured Therapeutic Game Method of Child Analytic Psychotherapy: Dynamic Game-Play Therapy with Children*. Oxford, England: Exposition Press.

Le Couteur, A. (2003) *National Autism Plan for Children*. London: National Autistic Society.

Leekham, S., & Perner, J. (1991) Does the autistic child have a theory of representation? *Cognition*, 40, 203-218

Leekam, S., Libby, S., Wing, L., Gould, J., & Gillberg, C. (2000) *Comparison of ICD-10 and Gillberg's criteria for Asperger syndrome*. *Autism: Special Issue: Asperger syndrome*, 4, 11-28

Leekham, S.R., Libby, S.J., Wing, L., Gould, J., & Taylor, C. (2002) The Diagnostic Interview for Social and Communication Disorders: algorithms for ICD-10 childhood autism and Wing and Gould autistic spectrum disorder. *Journal of Child Psychology and Psychiatry*, 43(3), 327-342

Leslie, A.M. (1987) Pretence and representation: the origins of theory of mind. *Psychological Review*, 94, 412-426

Lewis, V., & Boucher, J. (1991) Skill, content and generative strategies in autistic children's drawings. *British Journal of Developmental Psychology*, 9, 3, 393-416

Lord, C., Risi, S., Lambrecht, L., Cook, E.H., Leventhal, B.L., DiLavore, P.C., Pickles, A., & Rutter, M. (2000) The Autism Diagnostic Observation Schedule-Generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders*, 30(3), 205-223

Losh, M. & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger's Syndrome. *Journal of Autism and Developmental Disorders*, 33 (3), 239-251

Loveland, K., McEvoy, R., Tunali, B., & Kelly, M.L. (1990) Narrative storytelling in autism and Down Syndrome. *British Journal of Developmental Psychology*, 8, 9-23

Luteijn, E., Luteijn, F, Jackson, S., Volkmar, F., & Minderaa, R. (2000) The Children's Social Behaviour Questionnaire for Milder Variants of PDD Problems: Evaluation of the Psychometric Characteristics. *Journal of Autism and Developmental Disorders* 30, 4, 317-30

Machover, K. (1952) *Personality Projection in the Drawing of the Human Figure*. Springfield, IL, US: Charles C Thomas

Manjiviona, J., & Prior, M. (1995) Comparison of Asperger syndrome and high-functioning autistic children on a test of motor impairment. *Journal of Autism and Developmental Disorders*, 25, 23-39

Matilla, M.L., Lielinien, M., Jussila, K., Linna, S.L., Boligu, R., Ebeling, H., & Moilanen, I. (2007) An epidemiological and diagnostic study of Asperger Syndrome according to four sets of diagnostic criteria. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46, 5, 636-646

Mednick, S.A., & Mednick, M.T (1967) *Examiner's Manual: Remote Associations Test*. Boston, MA, US: Houghton & Mifflin

Miller, N., & Ozonoff, S. (2000) The external validity of Asperger Disorder: lack of evidence from the domain of neuropsychology. *Journal of Abnormal Psychology, 109*, 227-238.

Molloy, H., & Vasil, L. (2002) The social construction of Asperger Syndrome: the pathologising of difference? *Disability and Society, 17, 6*, 659-669

Munley, M. (2002) Comparing the PPAT drawings of boys with ADHD and age-matched controls using the Formal Elements Art Therapy Scale. *Art Therapy, 19, 2*, 69-76

Myles, B.S., Barnhill, G.P., Hagiwara, T., Griswold, D.E., Simpson, R. (2001) A synthesis of studies on the intellectual, academic, social, emotional and sensory characteristics of children and youth with Asperger Syndrome. *Education and Training in Mental Retardation and Developmental Disabilities, 36, 3*, 304-311

National Autistic Society (2006) *B is for Bullied*. London: The National Autistic Society

Neale, E.L. (1994) The Children's Diagnostic Drawing Series. *Art Therapy, 11, 2*, 119-126

Noppe, L.D. (1985) The relationship of formal thought and cognitive styles to creativity. *Journal of Creative Behaviour, 19*, 88-96

Oster, G.D., & Crone, P.G. (2004) *Using Drawings in Assessment and Therapy*. New York, US, Brunner Routledge

Ozonoff, S., Pennington, B. F., & Rogers, S.J (1991) Executive function deficits in high-functioning autistic individuals: Relationship to theory of mind. *Journal of Child Psychology and Psychiatry*, 32(7), 1081-1105

Ozonoff, S., Rogers, S., Farnham, J., & Pennington, B. (1994) Can standard measures identify subclinical markers of autism? *Journal of Autism and Developmental Disorders*

Pearlman, L. (2000) Adults with Asperger Disorder diagnosed as schizophrenic. *Professional Psychology: Research and Practice*, 31, 2, 221-225

Perry, A., Condillac, R.A., Freeman, N.L., Dunn-Geier, J., & Belair, J. (2005) Multi-site study of the childhood autism rating scale (CARS) in five clinical groups of young children. *Journal of Autism and Developmental Disorders*, 35, 5, 625-634

Plaisted, K., O'Riordan, M., & Baron-Cohen, S. (1998) Enhanced discrimination of novel, highly similar stimuli by adults with autism during a perceptual learning task. *Journal of Child Psychology and Psychiatry*, 39, 765-775

Plaisted, K., O'Riordan, M., & Baron-Cohen, S. (1998) Enhanced visual search for a conjunctive target in autism: A research note. *Journal of Child Psychology and Psychiatry*, 39, 777-783

Rutherford, M.D., & Rogers, S.J. (2003) Cognitive underpinnings of pretend play in autism. *Journal of Autism and Developmental Disorders*, 33, 3, 289-302

Shah, A., & Frith, U. (1993) Why do autistic individuals show superior performance on the block design test? *Journal of Child Psychology and Psychiatry*, 34, 1351-1364

Schopler, E., Mesibov, G. B., & Kuncze, L. (1998) *Asperger syndrome or high-functioning autism?* New York: Plenum Press

Schopler, E., & Mesibov, G.B. (Eds). (1988) *Diagnosis and Assessment in Autism*. New York, NY, US: Plenum Press.

Schopler, E, Reichler, R.J., De Villis, R.F., & Daly, K. (1980) Toward objective classification of childhood autism: Childhood Autism Rating Scale (CARS). *Journal of Autism and Developmental Disorders*, 10(1) , 91-103

Schopler, E. C., Reichler, R., & Renner, B. (1988) *The Childhood Autism Rating Scale (CARS)*. Los Angeles, CA: Western Psychological Services

Scott, F., Baron-Cohen, S., Brayne, C., Allison, C., Williams, J., Bolton, P., Wheelwright, S., & Hoekstral, R. (****) Screening for Asperger Syndrome in primary and secondary schools

Scott, F., & Baron-Cohen, S. (1996) Imagining real and unreal things: evidence of a dissociation in autism. *Journal of Cognitive Neuroscience*, 8, 400-411

Scott, F., & Baron-Cohen, S., & Leslie, A. (1999) If pigs could fly: an examination of imagination and counterfactual realism in autism. *British Journal of Developmental Psychology*, 17, 3, 349-362

Siegel, B. (1998) *Early screening and diagnosis in autism spectrum disorders: The Pervasive Developmental Disorders Screening Test (PDDST)*. Paper presented at the NIH State of the Science in Autism. Screening and Diagnosis Working Conference, Bethesda, MD, June 15-17.

Silver, R. (2002) *Three Art Assessments*. New York, US, Brunner/Routledge

Spotts, J.V., & Mackler, B. (1967) Relationships of field-dependent and field-independent cognitive styles to creative test performance. *Perceptual and Motor Skills*, 24, 239-268

Steinhardt, L. (2006) The eight frame coloured squiggle technique. *Art Therapy*, 23(3), 112-118

Szatmari, P., Bartolucci, G., & Brenner, R. (1989) Asperger Syndrome and autism: comparisons on early history and outcome. *Developmental Medicine and Child Neurology*, 31, 709-720

Szatmari, P., Bryson, S.E., Boyle, M.H., Streiner, D.L., & Duku, E. (2003) Predictors of outcome among high functioning children with autism and Asperger syndrome. *Journal of Child Psychology and Psychiatry*, 44, 520-528

Szatmari, P. Tuff, L., Finlayson, A., & Bartolucci, G. (1990) Asperger's Syndrome and autism: neurocognitive aspects. *Journal of the American Academy of Child Psychiatry*, 29, 1, 130-136

Tager-Flusberg, H. (1995) Once upon a rabbit: stories narrated by autistic children. *British Journal of Developmental Psychology*, 13, 45-59

Tager -Flusberg, H., & Sullivan, K. (1995) Attributing mental states to story characters: A comparison of narratives produced by autistic and mentally retarded individuals. *Applied Psycholinguistics*, 16(3), 241-256

Tantam, D. (1988) Annotation: Asperger's syndrome. *Journal of Child Psychology and Psychiatry*, 29, 245-255

Torrance, E.P. (1962) *Guiding Creative Talent*. Englewood Cliffs, NJ, US, Prentice Hall

Torrance, E.P. (1974) *Torrance Tests of Creative Thinking: Norms-Technical Manual*. Bensenville, IL, US, Scholastic Testing Service

Tsai, L.Y. (1992) *Diagnostic issues in high-functioning autism*. New York: Plenum Press

United Nations Children Fund (UNICEF) (1989) *Convention of the Rights of the Child*. London: UNICEF

Verinis, J.S., Lichtenberg, E.F., & Henrich, L. (1974) The Draw a Person in the Rain Technique: its relationship to diagnostic category and other personality indicators. *Journal of Clinical Psychology, 30, 407-414*

Volkmar, F.R., Lord, C., Bailey, A., Schultz, R.T., & Klin, A. (2004) Autism and pervasive developmental disorders. *Journal of Child Psychology and Psychiatry, 45, 1, 135-170*

Wadson, H. (2002) The anti-assessment devil's advocate. *Art Therapy, 19, 4, 168-170*

Wakimoto, K., Kawamura, H , Kaku, R., & Kawata, M. (1984) An approach to pre-adolescent patients using the "squiggle game." *Japanese Journal of Adolescent and Child Psychiatry, 25(4) , 231-240*

Williams, J., Scott, F., Stott, C., Allison, C., Bolton, P., Baron-Cohen, S., & Brayne, C. (2005) The CAST: Childhood Asperger Syndrome test. *Autism, 9, 1, 45-68*

Wing, L. (1981) Language, social and cognitive impairments in autism and severe mental retardation. *Journal of Autism and Developmental Disorders, 11, 31-44*

Wing, L. (1993) the definition and prevalence of autism: a review. *European Child and Adolescent Psychiatry, 2, 61-74*

Wing, L., & Gould, J. (1979) Severe impairments of social interaction and associated abnormalities in children: epidemiology and classification. *Journal of Autism and Developmental Disorders*, 9, 11-29

Winnicott, D.W. (1971) *Therapeutic Consultations in Child Psychiatry*. New York, US, Basic Books

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. G., & Karp, S. A. (1962) *Personality through perception*. New York: Harper & Row

Witkin, H.A. (1965) Psychological differentiation and forms of pathology. *Journal of Abnormal Psychology*, 70, 317-336

World Health Organisation (1992) *The ICD-10 Classification of Mental and Behavioural Disorders. Clinical Descriptions and Guidelines*. Geneva: WHO

Ziegler, R. G. (1976). Winnicott's squiggle game: Its diagnostic and therapeutic usefulness. *Art Psychotherapy*, 3, 177-185

**The use of ‘squiggling’: a play technique as a
diagnostic aid in the assessment of secondary school-
age children with Asperger syndrome**

Eleanor Wakerly

A thesis submitted in partial fulfilment of the requirements of the
University of Hertfordshire for the degree of
Doctor of Clinical Psychology

The programme of research was carried out in the School of Psychology
University of Hertfordshire, August 2008

Contents

	Page Number
List of Figures	121
Acknowledgements	122
Abstract	123
Introduction	124
1. Asperger Syndrome	125
2. Creative Thinking and Asperger syndrome	136
3. Measuring Creative Thinking	146
4. Aims and Hypotheses	153
Method	156
1. Design	156
2. Participants	157
3. Recruitment of Participants	159
4. Measures	161
5. Settings and Materials	166
6. Testing Procedure	166
7. Ethical Issues	169
Results	172
1. Validity Study of Squiggling	172
2. Group Comparisons of Creative Thinking Abilities	176
3. Meta-Representational Ability and Abstract Imagination	184
Discussion	185
1. Background and Rationale	185
2. Summary of Results	186
3. Implications for Theory	188
4. Implications for Clinical Practice	189
5. Limitations	190
6. Strengths	194
7. Further Research	198

8. Conclusion	200
References	203
Appendices	238-312

App1. For Asperger syndrome from the International Classification of Diseases, Version 10, World Health Organisation, 1992

App2. For Asperger's Disorder from the Diagnostic Statistical Manual of Mental Disorders, Version 4 Revised, American Psychiatric Association, 2000.

App3. Squiggling scoring criteria

App4. Personal information sheet

App5. CAST

App6. Box plot Performance IQ

App7. Box plot Visual Motor Integration

App8. Letter to parents/guardians of children with Asperger syndrome

App9. Letter to children with Asperger syndrome over 16 years

App10. Letter to parents/guardians of typically-developing children

App11. Letter to typically-developing children over 16 years

App12. Letter to school head-teachers

App13. Letter to diagnosing clinician

App14. Information sheet for parents/guardians of children with Asperger syndrome under 16 years

App15. Information sheet for children with Asperger syndrome under 16 yrs

App16. Information sheet for children with Asperger syndrome over 16 years

App17. Information sheet for parents/guardians of typically-developing children under 16 years

App18. Information sheet for typically-developing children under 16 years

App19. Information sheet for typically-developing children over 16 years

App20. Parent/guardian consent form

App21. Participant consent form

App22. Strange Stories Test (Abbreviated Version)

App23. Standardised squiggles

App24. University of Hertfordshire Ethics Committee Approval

App25. University of Hertfordshire Ethics Committee Approval Modification

App26. Local Research Ethics Committee Approval

App27. Research and Development NHS Approval

List of Figures

- Figure 1.** Triad of Impairments (Wing, 1981)
- Figure 2.** Meta-Representation in Play (Leslie, 1987)
- Figure 3.** Scatter-plot of TTCT Abstractedness and Squigglng Imagination
- Figure 4.** Box plot of group comparisons on TTCT Abstractedness
- Figure 5.** Box plot of group comparisons on TTCT Elaboration
- Figure 6.** Box plot of group comparisons on squigglng Flexibility
- Figure 7.** Box plot of group comparisons on TTCT Overall Creative Ability
- Figure 8.** Scatter-plot of TTCT Abstractedness and TTCT Elaboration
- Figure 9.** Scatter-plot of TTCT Elaboration and TTCT Resistance to Premature Foreclosure
- Figure 10.** Box-plot of comparisons between age bands in overall creative thinking ability (TTCT Average Standard Score)
-
- Table 1.** Group Summary of Age, Non-Verbal IQ and Visual-Motor Integration
- Table 2.** Group Comparisons in Age, Non-Verbal IQ and Visual-Motor Integration
- Table 3.** Inter-Rater Reliability of Squigglng
- Table 4.** Means and Standard Deviations for Squigglng
- Table 5.** Matrix of Pearson's r Correlations between Squigglng Subscales and Total Squigglng Scale
- Table 6.** Bivariate Analysis between Squigglng and Torrance Tests of Creative Thinking (Torrance *et al.*, 2008)
- Table 7.** Group Comparisons on TTCT Creative Thinking Abilities
- Table 8.** Group Comparisons on Squigglng Creative Thinking Abilities

Acknowledgements

I would like to thank all of the boys and girls who took part in this research study; Jaye Cowell, Research Assistant and Margaret Malt for their time and effort in helping with recruitment of participants; and James Bentall, Leader for the North Mymms Scouts who helped me enormously in the latter stages of the study. And lastly, I would like to thank my supervisors, Dr Joost Drost, Dr Stephen Davies and my principal supervisor Dr Nicholas Wood, for their time, advice and committed support throughout this research project.

Abstract

Winnicott's (1968, 1993) play technique *squiggling* was piloted as a measure of creative thinking abilities and a potential diagnostic aid in the assessment of Asperger syndrome. The internal consistency and inter-rater reliability of *squiggling* was found to be acceptable. Mixed results were found between the six subscales in terms of concurrent validity with the Torrance Tests of Creative Thinking (TTCT: Torrance, Bal & Safer, 2008). Squiggling subscales Elaboration and Imagination showed signs of psychometric strength. However, Fluency and Originality require revision. Concurrent validity of the subscales Flexibility and Integration were not established.

A matched-participants design enabled testing of hypothesised differences in creative thinking abilities with children with Asperger syndrome using the TTCT (Torrance et al., 2008): Abstractedness, Fluency, Originality, Integration, Elaboration, Resistance to Premature Foreclosure and Flexibility. Children with Asperger syndrome demonstrated a significantly higher level of elaboration and abstract imagination in their drawings relative to a comparison group of typically-developing children matched on age, visual motor integration ability and non-verbal IQ. Findings indicate partial support for the Weak Central Coherence Theory (Shah and Frith, 1983) and Leslie's (1987) Meta-Representational Deficit hypothesis. Children with Asperger syndrome demonstrated understanding and expression of abstract concepts as graphical representations, thereby supporting their use in clinical assessments and interventions. No support was found for the Executive Dysfunction Theory (Pennington & Ozonoff, 1996) or for the Hyper-Systemising Theory (Baron-Cohen, 2006).

Some limitations include the heterogeneity of the clinical group, and the possible confounding effects of verbal intellectual abilities, extrinsic rewards and performance anxiety. Major strengths of the study include a successful matching procedure and the finding of group differences with large effect sizes on particular creative thinking abilities.

Introduction

The background and rationale are introduced for proposing the play technique *squiggling* as a diagnostic aid in the assessment of secondary school-age children with Asperger syndrome. Presented here are research evidence and theory informing hypothesised differences in the creative thinking abilities of children with Asperger syndrome compared to typically-developing children.

The introduction is segmented into four sections. In the first section, definitions of Asperger syndrome (AS) as a diagnostic concept are provided in relation to the autism spectrum. Delayed diagnosis is presented as a significant clinical problem for the child, their family, and for the health and education systems involved. A lack of assessment tools specific to AS is highlighted as a key challenge for the clinician. This gap is accounted to wide variability of the definition of AS, which is in turn related to high rates of co-morbidity and diagnostic overlap with other autism spectrum conditions. The need for a diagnostic aid is highlighted as it may catalyse or clarify the assessment process of children showing signs of AS. In the latter part of this section, the imagination aspect of Wing's (1981) triad of impairment is identified as an area for debate in children with AS. The question is raised as to impairment in a further six creative thinking abilities (CTAs).

The second section introduces theoretical perspectives relevant to creative thinking abilities and the cognitive styles of children with autism spectrum conditions. We present a critical analysis of research evidence in relation to the Meta-Representational Deficit (MRD) hypothesis (Leslie, 1987), Executive Dysfunction theory (Ozonoff, Pennington & Rogers, 1991), Weak Central Coherence theory (Frith, 1989) and Hyper-Systemising theory (Baron-Cohen, 2006).

In the third section, the methods by which creative thinking abilities may be measured with children at assessment are considered and evaluated. The combined activities of drawing and storytelling are proposed to provide an enjoyable, naturalistic and reliable means of gathering and documenting information on creative thinking abilities for the

clinician at assessment. As such, a drawing and storytelling game called *squiggling* is proposed as a potentially efficient, informative and cost-effective diagnostic aid at the stage of assessment. The prospective value of *squiggling* is highlighted as a means of catalysing and/or clarifying the process of diagnosis in the context of a range of challenges along the diagnostic pathway. The final section of the introduction presents the immediate aims and hypotheses for the thesis.

1. Asperger syndrome

1.1 Asperger syndrome and the autism spectrum

The autism spectrum spans a wide range of abilities in social interaction, communication, flexibility of behaviour, language and intellectual development (Frith, 2004). Significant differences in these abilities comparative to the norm emerge during psychological, neurological and social development. Various conditions along the autism spectrum are delineated and defined by the International Classification of Diseases (Version 10: ICD-10, World Health Organisation, 1992) and the Diagnostic Statistical Manual of Mental Disorders (Version 4 Revised: DSM-IV-TR: American Psychiatric Association, 2000).

Kanner (1943) utilised the term *autism* to describe what is now recognised as Childhood Autism (CA) (International Classification of Diseases, 10th Edition: ICD-10, WHO, 1992) or Autistic Disorder (AD) (DSM-IV-TR: APA, 2000). CA/AD is characterised by a pervasive pattern of significant impairment in communication, social interaction and flexibility of behaviour, often, although not necessarily, in conjunction with significant global cognitive delay or learning disability (i.e., IQ below 70 and adaptive functioning well below average) (Hobson, 1993). Such children can be described as “socially aloof” (Wing & Gould, 1979).

The phrase, *autistic psychopathy* was employed in the field of paediatric medicine by Hans Asperger to describe a similar but more subtle pattern of social detachment displayed by children he was studying for his doctoral thesis at the University of

Vienna (Asperger, 1944).: a clinical presentation now recognised as Asperger syndrome (AS). It is Asperger syndrome³ (AS) that provides the primary focus for the present thesis.

Based on the ICD-10 criteria for Asperger syndrome (AS: F84.5., WHO, 1992), this condition involves:

- 1) Qualitative impairment of social interaction
- 2) Restricted and repetitive patterns of behaviour, interests and activities

The ability to appropriately socially interact and behave flexibly can affect the development and maintenance of meaningful relationships with others. In contrast to CA/AD, there must be no clinically significant general delay in language development, cognitive development or development of adaptive behaviour. See Appendix 1 for the ICD-10 criteria for Asperger syndrome (F84.5., WHO, 1992) and Appendix 2 for the DSM-IV-TR for Asperger Disorder (APA, 2000).

Both sets of diagnostic criteria are referred to by clinicians in the United Kingdom. Whilst they are very similar, the former (ICD-10) adopts a higher threshold (i.e., there must be more qualitative evidence to meet each criteria). Clinicians can choose from four sets of diagnostic criteria for AS (DSM-IV-TR: APA, 2000; ICD-10, WHO, 1992; Gillberg & Gillberg, 1989; Szatmari, Bremner & Nagy, 1989). These criteria stem from the description of a syndrome, or set of symptoms provided by Asperger (1944). A passive and unusual way of relating with other people is described, which he presumed to have some underlying common cause (Frith, 2004):

- 1) ***impairment in non-verbal communication*** (e.g., understanding facial expressions or hand gestures);
- 2) ***idiosyncrasies in verbal communication*** (creating *neologisms* or new words, understanding figural use of language literally); and
- 3) ***pursuit of extremely preoccupying and specific interests***

³ For consistency, the ICD-10 diagnostic term “Asperger syndrome” will be used throughout the thesis.

1.2. Asperger syndrome as a diagnostic concept

Despite the several sets of diagnostic criteria, AS remains a fuzzy concept. Here two key reasons for this are outlined: blurred boundaries with other autism spectrum conditions and high rates of co-morbidities.

1.2.1. AS and other autism spectrum conditions

AS shares its core common features with other conditions on the autism spectrum, including Childhood Autism (CA), Atypical Autism (AA) and High-Functioning Autism (HFA) (ICD-10: WHO, 1992).

There are no comparative brain scans or specific biological markers in brain physiology to distinguish AS from CA (Lotspeich, Kwon, Schumann, Fryer, Goodlin-Jones, *et al*, 2004; Schumann, Hamstra, Goodlin-Jones, Lotspeich, Kwon, *et al*, 2004) so there is heavy reliance on neuropsychological evidence and qualitative differences between children with AS and CA. For example, high verbal intelligence and earlier language development have been identified as more common in people with AS than in CA (Saulnier & Klin, 2007). The child with AS tends to be socially motivated but odd in their interactions, compared to those children with CA who are often described as rather unmotivated and passive (Ghaziuddin, 2008). Differentiation between AS and CA is relatively clear for the clinician, although there may be uncertainty for the clinician in distinguishing between AS and Atypical Autism (ICD-10: WHO, 1992).

AS and AA are *qualitatively* very similar (ICD-10: WHO, 1992), with evidence for the latter group showing less intense and repetitive behaviour (Walker, Thompson, Zwaigenbaum, Goldberg, Bryson, *et al.*, 2004), lower intellectual abilities and sometimes a specific developmental difficulty with receptive language (ICD-10, WHO, 1992). Further blurriness of the AS definition arises when compared with High-Functioning Autism (HFA: ICD-10: WHO, 1992) (Mesibov, Kuncé & Schopler, 1998; Howlin, 2000; Howlin, 2003).

Going back almost three decades, Wing and Gould (1979) described a *higher-functioning* variant of Childhood Autism (CA), in terms of intellectual and language abilities, and as such, the diagnostic term High-Functioning Autism (HFA) emerged. The distinction between AS and HFA has remained a turbulent area of debate over the past 20 years.

There is evidence to indicate that HFA and AS are distinct and separate conditions (Klin, Volkmar, Sparrow, Cicchetti & Rourke, 1995; Miller & Ozonoff, 2000). For example, there is preliminary evidence to suggest differences in people with HFA and AS in emotion perception (Mazefsky & Oswald, 2007), speaking style (Ghaziuddin & Gerstein, 1996) and organization of thinking (Ghaziuddin, Leininger, & Tsai, 1995). However, the conclusions of these studies are limited as they cannot generalise their findings due to small sample sizes (Belmonte, Mazziotta, Minshew, Evans, Courchesne *et al.*, 2008).

There is, conversely, neuropsychological research evidence that highlights the similarities between HFA and AS, and supports that they are one and the same condition (Ozonoff, South & Miller, 2000; Szatmari, Tuff, Finlayson, Bartolucci, 1990; Ozonoff, Pennington & Rogers, 1991; Manjiviona & Prior, 1995). However, a systematic review of the literature revealed an equal amount of evidence for and against (Howlin, 2000). Since this review however, a raft of further neuropsychological research has emerged that supports the position that AS *is* equivalent to HFA, and vice versa (Shriberg, Paul, McSweeney, Klin, Cohen & Volkmar, 2001; Meyer & Minshew, 2002; Lotspeich, Kwon, Schumann, Fryer, Goodlin-Jones, *et al.*, 2004; Rinehart, Tonge, Bradshaw, Iansek, Enticott and Johnson, 2006; Akshoomoff, Farid, Courchesne & Haas, 2007).

A recent review by Volkmar, Lord, Bailey, Schultz & Klin (2004) concluded that there is a paucity of neuropsychological and experimental to support AS as a discrete condition. And while in clinical practice, HFA and AS may be widely considered interchangeable diagnostic terms (Kasari & Rotheram-Fuller, 2005), the debate remains alive within the academic and research community. For the purposes of the

present study, AS is treated as *a distinct* autism spectrum condition. The rationale for this will be outlined in the method section.

1.2.2. AS and co-morbidities

A second reason for AS remaining as a fuzzy diagnostic concept concerns the high rate of additional, or co-morbid, conditions (Tantam, 2000). There is accumulating evidence to suggest the common development of secondary mental health problems, including mood, conduct, eating and sleeping disorders, and conditions such as Attention Deficit Hyperactivity Disorder and Gilles de la Tourette disorder (DSM-IV-TR, APA, 2000), amongst individuals with AS (Green, Gilchrist, Burton and Cox, 2000; Joseph, Szatmari, Bryson, Streiner & Wilson, 2000; Gillberg & Billstedt, 2000; Paavonen, Vehkalahti, Vanhala, von Wendt, von Wendt, & Aronen, 2008; Kadsejo & Gillberg, 2000; Ringman & Jankovic, 2000; Tani, Linberg, Neiminen-von Wendt, von Wendt, *et al*, 2004).

To complicate matters further, presenting signs of AS can overlap with specific language disorders and learning difficulties. For example, typical Asperger linguistic abilities resemble those of Semantic Pragmatic Language Disorder (SPLD: ICD-10: WHO, 1992), where there is good use of syntax and vocabulary but poor uses of language in a social context such as making literal interpretations of what people say (Attwood, 2007).

In sum, psychiatric co-morbidities and overlap with other conditions on the autism spectrum ensure that AS is a fuzzy diagnostic concept. The implication for researchers is difficulty in developing and evaluating assessment tools specific to AS. A review by Pat Howlin in 2000 concluded there is a lack of tools that are designed to measure differences between children with AS and children without AS. This position was confirmed again by Pat Howlin via email in 2008.

The present thesis aims to pilot a drawing and storytelling game called *squiggling* as a potential diagnostic aid at assessment of children showing signs of AS. The rationale

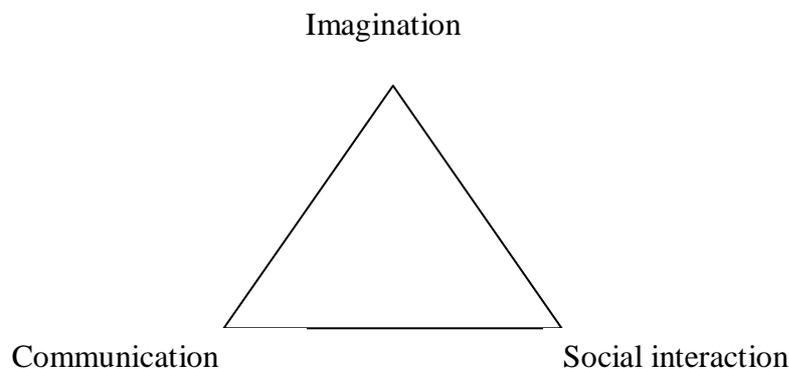
for selecting squiggling and its potential value will be described in detail in the latter section of the introduction. Prior to this, it is important to introduce the foundation to this thesis stemming from Wing's (1981) triad of impairments.

1.3. Asperger syndrome and the triad of impairment

1.3.1. Description of the triad

Since Asperger's original description, a simplified definition of autism spectrum conditions was provided by Lorna Wing (1981). AS was re-defined in terms of its high position on a continuum of impairment in three areas of development: 1) *social interaction*, 2) *communication* and 3) *imagination*; a triad partially reflected in a later diagnostic definition offered by Gillberg and Gillberg (1989), and within ICD-10 criteria for Asperger syndrome (F84.5., WHO, 1992) and the DSM-IV-TR for Asperger Disorder (APA, 2000).

Figure 1. Triad of Impairments (Wing, 1981)



Wing's (1981) triad and modern sets of diagnostic criteria are clearly based on a deficit model, highlighting the absences of skills and knowledge, i.e., *impairments*. The present thesis adopts an alternative model, focussing on areas of *difference*, which may be positive (entailing skill) or indeed negative (entailing impairment). Very often there can be areas of ability and skill, for example, the child with Asperger syndrome

usually has language and learning abilities at a level as one would expect for their age (Happé, 1999; Frith, 2004). They can also have well-developed skills or knowledge in a specific area of interest, as well as particular abilities in recognising and providing detail that many would not notice (Frith, 2004; Attwood, 2007).

It is easy to see how impairment in social interaction and communication relate with each other; simply one relies upon accurate communication skills to effectively engage in social interaction. For example, a child with AS may experience difficulty understanding the importance of and regulating eye contact when in conversation with others. The absence of this social behaviour can be interpreted by others as a sign, for example, that the child is not listening. As another example, a child with AS may struggle to make sense of figurative language (e.g., “*Catch you later*”, “*Hang on*”) as they interpret it literally, and miss the meaning of that part of the social interaction (Bogdashina, 2005).

Furthermore, difficulty in social and emotional reciprocity can contribute to their struggle to successfully interact. For example, they may not spontaneously share interests or recognise the social signs that someone is bored or is becoming irritated. This lack of self-initiated outward interest or observation of others can be interpreted by others as a sign, for example, that the child is self-absorbed or rude or both. For a child with AS, given the greater potential for unsuccessful social interactions compared to a typically developing child, the task of forming and maintaining social relationships can be enormous.

It is less clear how impairment of imagination relates to social interaction and communication. One idea for a link was proposed by Simon Baron-Cohen in his *Empathising-Deficit (EDef)* theory (Baron-Cohen, 1995). In brief, imagination is required in effective social communication (i.e., communication with other or others) because one implicitly forms representations in one’s mind of the other person’s thoughts and emotions and *empathises*.

This notion was originally posited by Woodruff and Premack (1978) as Theory of Mind (ToM) following their studies of social intellect in chimpanzees, which in turn was based on writings by Piaget on cognitive development (Piaget, 1962). For the child with AS, imagined estimated representations of the other's perspective are either *not* formed implicitly or are formed *inaccurately* (due to misinterpreted or missed non-verbal cues); they have an empathising deficit (Baron-Cohen, 1985). This empathising or ToM deficit, whatever we may call it, can affect how the child acquires language (Mitchell, 1996), and vice versa, and hence can affect communication and social interaction with others. A child's early experiences with using language in a social context are highly important in promoting the development of a theory of mind (Mitchell, 1996). For example, as young children's understanding of categories in language develops, they begin to construct theories in everyday contexts to understand connections between things (Hickling & Wellman, 2001), and thereby learn about difference in perspectives.

1.3.2. The triad in relation to diagnostic criteria

The social interaction and communication impairments of Wing's (1981) triad remain within ICD-10 criteria for Asperger syndrome (F84.5., WHO, 1992) and the DSM-IV-TR for Asperger Disorder (APA, 2000). However, impairment of imagination is *not* included. Wing (2002: as cited in Hopkins, 2002) comments in an interview for the website autism.connect.com, "It's *{imagination impairment}* really very important, although I agree it's often missed out, because the other two are so much easier to recognise". Impairment of imagination is certainly more salient within the diagnostic definition of conditions lower down on the spectrum such as Childhood Autism (CA) (ICD-10: WHO, 1992) or Autistic Disorder (AD) (DSM-IV-TR: APA, 2000). For example, a diagnosis of CA/AD focuses on impaired imagination shown by an inability to initiate and engage in spontaneous pretend play before the age of three years. This is defined as using one object to substitute for another (*functional* play) or attributing a property to an object which it does not have or referring to an absent object as if present (*symbolic* play) (Baron-Cohen, 1985). So, whilst a significant deficit in imagination is clearly part of the CA/AD diagnoses, it is currently *not*

included within the ICD-10 (WHO, 1992) diagnostic criteria for Asperger syndrome or the DSM-IV-TR for Asperger Disorder (APA, 2000).

Despite this exclusion, there is steadily growing evidence to indicate that significant imagination impairment does exist in the drawings produced by children with Asperger syndrome (e.g., Craig & Baron-Cohen, 1999; Craig & Baron-Cohen, 2000; Craig, Baron-Cohen & Scott, 2001). This research is clearly valued as many diagnostic parental report checklists such as the Australian Scale for Asperger Syndrome (ASAS: Garnett and Attwood, 2007) and the Childhood Asperger Syndrome Test (Williams, Scott, Stott, Allison, Baron-Cohen, *et al.*, 2004) ask questions on imaginative ability. Furthermore, the National Autistic Society (NAS, 2003) quotes lack of imagination in their description of AS on a leaflet for the public.

Imagination can be viewed as a skill required for creative thinking (Eysenck, 1970). The present study proposes differences in imagination and *other* creative thinking abilities (CTAs) between children with Asperger syndrome and typically-developing children. For example, impairment of *originality* may be seen as evident in the typical patterns of intense, restricted and repetitive behaviour characteristic of children across the autism spectrum (Honey, Leekam, Turner & McConachie, 2007). They can be quite resolute on engaging with an interest at the expense of all else; relishing in the “sameness” (Frith, 1989). Such intense pre-occupation and rigidity can be re-framed once again as evidence of poor *generativity* or *fluency*, meaning an impaired ability to generate ideas (Honey *et al.*, 2007). Generation of ideas is one of many important creative thinking abilities (Guilford, 1950; Amabile, 1983) used every day for effectively solving problems (Mumford & Gustafson, 1988). While repetition and rigidity of behaviour and interests may be re-framed as evidence of impaired *originality* and *fluency*, the accompanying focussed style of thinking may lead to substantial *skill* in an area of specific interest (e.g., learning and recalling the details on a topic).

The ability to think creatively is “a highly complex and diffuse construct” (p27. Mumford & Gustafson, 1988) as various cognitive abilities are implicated (e.g.,

reasoning, memory, attention) (Kaufman & Baer, 2006). Imagination, originality, fluency and four *other* creative thinking abilities are proposed as areas of significant difference between children with Asperger syndrome and typically-developing children.

For the purposes of the present study, seven creative thinking abilities have been selected based on definitions of creativity postulated by several researchers:

- 1) ***Imagination*** refers to the abstractedness and depth of ideas, based on definitions of creativity originally provided by Hargreaves, 1927, and later developed by Spearman (1931) and Eysenck (1970).
- 2) ***Fluency*** refers to the volume of ideas generated, based on definitions of creativity provided by Guilford (1950), Amabile (1983) and Torrance (1968).
- 3) ***Originality*** refers to the unusualness and novelty of ideas, based on definitions of creativity provided by Torrance (1968) and Boden (1994).
- 4) ***Integration*** refers to the combination of ideas, based on definitions of creativity provided by Mednick (1962) and Rothenberg (1990).
- 5) ***Elaboration*** refers to the detail of ideas, based on a definition of creativity provided by Torrance (1968).
- 6) ***Resistance to premature foreclosure*** refers to the ability to resist giving the initial or easiest response based on a definition of creativity provided by Torrance (1968).
- 7) ***Flexibility*** refers to the ability to generate a range of different ideas or concepts, based on definitions of creativity provided by Runco (2002) and Lubart (1994).

Potential areas of differences in these seven creative thinking abilities are proposed to be measured by the *squiggling* game (Winnicott, 1968, 1993) and an established measure of creative thinking (Torrance Tests of Creative Thinking, TTCT: Torrance, Bal & Safter, 2008). *Squiggling* has been developed and utilised as an interactional play technique to aid engagement in therapy, involving the activities of drawing and storytelling (e.g., Winnicott, 1993; Farhi, 2001; Claman, 2002). See Appendix three for details of the scoring criteria for the creative thinking abilities demonstrated in *squiggling*. Next, the rationale is presented for examining creative thinking ability in children with AS.

2. Creative Thinking and Asperger syndrome

The second section of the introduction explains the rationale for the proposal of significant differences in the seven CTA between children with AS and typically-developing children. Hypotheses are generated based on relevant experimental and observational research and four key theoretical perspectives on cognitive styles in children with autism spectrum conditions.

- 1) Meta-Representational Deficit (MRD) Hypothesis (Leslie, 1987);
- 2) Hyper-Systemising (HS) Theory (Baron-Cohen, 2006);
- 3) Weak Central Coherence (WCC) Theory (Shah & Frith, 1983);
- 4) Executive Dysfunction (ED) Theory (Pennigton & Ozonoff, 1996).

In order to substantiate the utility of these outlined theoretical perspectives in the generation of hypotheses for the present study, an evaluation of experimental research into creative thinking abilities of children with AS is also presented. Note that some studies mentioned here recruited a sample of children with autism spectrum conditions, which includes Asperger syndrome amongst High Functioning Autism (HFA) and Atypical Autism (AA) and some recruited only children with Childhood Autism (CA) (ICD-10: WHO, 1992). Findings from these studies are reported as the core symptoms of these conditions are shared with Asperger syndrome, and hence are considered relevant. The different sample populations are highlighted.

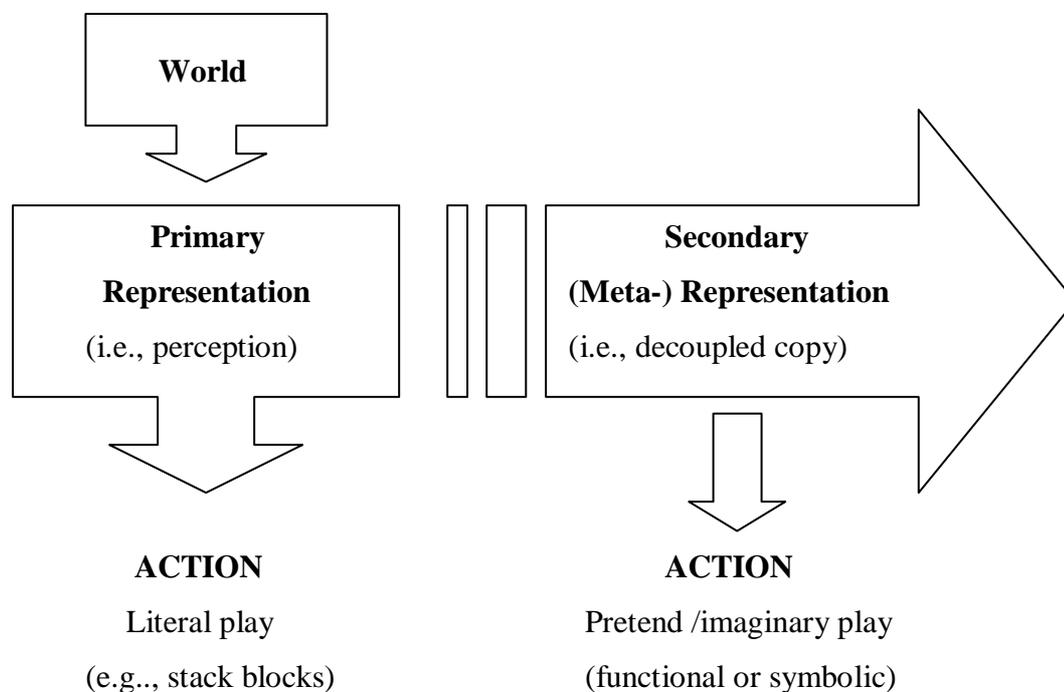
2.1. Meta-Representational Deficit (MRD) hypothesis

Alan Leslie (1987) presented the MRD hypothesis as an explanation for the underlying mechanism of an under-developed ability to empathise and pretend in children with autism spectrum conditions. Evidence indicates that such children consistently lack the capacity to empathise with emotions and beliefs of others, as they often do not accurately infer the mental states of others (Baron-Cohen, 1985). Leslie (1987) posited that the reason for children with an autism spectrum condition having

this empathising deficit is that they lack a capacity for *meta-representation*; a term originally defined by Pylyshyn (1978) as representing primary representations.

This notion is recognised as the Meta-Representational Deficit (MRD) hypothesis (Leslie, 1987). See Figure 2. There is robust neuropsychological evidence in support of the MRD hypothesis in children with CA (Baron-Cohen, Leslie & Frith, 1986; Baron-Cohen, 1989; Baron-Cohen, 1990). Despite this empirical support, the hypothesis remains as such as it is not as yet sufficiently established to be labelled a theory.

Figure 2. Meta-Representation in Play (Leslie, 1987)



Leslie (1987) proposed that children along the autism spectrum are delayed in their capacity to process, understand and represent specifically *mental* representations. A primary mental representation is a depiction of something that is held in one's mind, which will be of varying degrees of concreteness and abstractedness (e.g., an object such as a cup; a hairy monster). The formation and understanding of secondary mental representations, however abstract, requires one to decouple reality from non-reality, and thereby use one's imagination (Leslie, 1987). A meta-representational *deficit*

would therefore negatively affect one's ability to imagine, which is argued to be required for pretend play.

Over the past few decades, several research studies have consistently demonstrated that children with CA are only able to engage in pretend play *with direction* from others (e.g., Hermelin & O'Connor, 1963; Frith, 1972; Wing, Gould, Yeates, & Brierly, 1977; Gould, 1986; Baron-Cohen, 1987; Lewis & Boucher, 1988; Jarrold, Boucher & Smith, 1996; Lewis & Boucher, 1995; Scott & Baron-Cohen, 1996; Rutherford & Rogers, 2003; Blanc, Adrien, Roux & Barthelemy, 2005). One cannot easily infer from the ability of children with CA how children with AS would perform under such experimental conditions. The severity of autistic symptomatology does *not* necessarily predict engagement in symbolic pretend play (Stanley & Konstantareas, 2007), i.e., the less severe qualitative impairment in children with AS does not necessarily mean they can engage in pretend play better than children with CA. Based on the MRD hypothesis, preference for literal play (e.g., stacking blocks) over pretend play can be viewed as evidence for impairment of the capacity to spontaneously represent secondary representations (i.e., meta-represent), and hence to play with *imagination*.

There is a relatively recent study demonstrating reduced *imagination* on a play activity with foam shapes, in children with Asperger syndrome (AS) compared to typically-developing children (Craig & Baron-Cohen, 1999). Children with AS were found to generate concrete and reality-based ideas rather than abstract ideas in their play. Indeed, a preference for reality-based *functional* play over abstract *symbolic* play is often presented by children on the autism spectrum (Jarrold, 2003; Honey *et al.*, 2006). An example of *functional* pretend play is a child using a cup and pretending to drink from it. During *symbolic* pretend play a child might enact their mental representation of a 'hairy monster'. The MRD hypothesis can be used here to provide a theoretical explanation for this impaired ability to generate *abstract imaginative* (i.e., non reality-based, secondary representations) ideas. The children with AS in the study by Craig and Baron-Cohen (1999) may have an impaired *abstract meta-*

representational ability. Interestingly, the study indicates more severe imagination impairment in children with AS compared to children with CA.

Additional evidence for imagination impairment in children with AS, and support for Leslie's (1987) MRD hypothesis, can be found in a study of storytelling (Craig & Baron-Cohen, 2000). In a similar way to pretend play, the ability to meta-represent may be necessary in storytelling as well as in play. For example, in forming and conveying a fictional or non-reality based story one needs to manipulate, elaborate and combine primary representations, and in this process decouple and create secondary representations.

Leslie (1987) originally defined the MRD hypothesis as specific to *mental* meta-representations, i.e., it does not extend to graphical *non-mental* representations, for example in drawings. Charman and Baron-Cohen (1992, 1993) confirmed Leslie's position when they found that children with CA demonstrated the ability to draw with intellectual realism (i.e., based on what they think or remember they see), which suggests that they *can* represent non-mental representations. Such a task would require a primary mental representation of a concept to be created and produced as a secondary representation *external* to one's mind. The specificity of the MRD hypothesis has been and continues to be challenged by empirical evidence indicating impairment of imagination in *non-mental* meta-representations in children with CA (e.g., Lewis & Boucher, 1991; Booth, Charlton, Hughes & Happe, 2003) and AS (Craig, Baron-Cohen & Scott, 2001).

A relatively recent study by Craig, Baron-Cohen and Scott (2001) found that children with AS struggled to spontaneously demonstrate abstract imagination on a drawing task compared to controls. In relation to the MRD hypothesis, one could assume that meta-representational ability is required in drawing. During this activity, primary mental representations are transformed and transferred to non-mental graphical representations on paper. In doing this, one must be aware at some level that the drawing is a representation, i.e., a drawing of an apple is not really an apple you can actually eat or touch. A problem with this meta-representational ability may occur

with more abstract content. One could speculate that the original primary mental representations of abstract or unreal concepts, objects or subjects (e.g., hunger, heaven, sweets tree, witch) are not so well formed as more concrete and real primary mental representations (e.g., train, book, face) in children with autism spectrum conditions.

The present study investigates whether children with Asperger syndrome demonstrate an impairment of abstract imagination compared to typically-developing children through the administration of a drawing and storytelling task (*squiggling*). In this way, the specificity of the MRD hypothesis is also tested.

2.2. Weak Central Coherence (WCC) Theory

Shah and Frith (1983) proposed that children with autism spectrum conditions have a preference for processing *local* over global contextual visual information (Frith 1989; Frith & Happe, 1994). This preference for processing information in a piecemeal way suggests that children with AS would attend to the fine detail and elaborate on information, although they would struggle to combine information into a whole or *gestalt* (Frith, 2004). In terms of creative thinking abilities, the Weak Central Coherence (WCC) theory would suggest skill in *elaboration* and impairment of *integration*.

A very large volume of support from experimental psychological studies has been found for WCC theory in children with CA (e.g., Shah & Frith, 1983, 1993; Mottron & Belleville, 1993; Frith & Snowling, 1983; Happe, 1997; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962; Booth, Charlton, Hughes & Happe, 2003; Morgan, Maybery, & Durkin, 2003), children with HFA (Bolte, Holtmann, Poustka, Scheurich & Schmidt, 2007), and in children with AS (Jolliffe & Baron-Cohen, 1997, 1999; Baron-Cohen & Hammer, 1997).

Weak central coherence is indicated by a faster and more accurate performance on the Embedded Figures Task (EFT) (Shah & Frith, 1983; Jolliffe & Baron-Cohen, 1997;

Baron-Cohen, 1998). In the EFT, one is shown a simple shape (the target) and is asked to find it as quickly and as accurately as possible in a larger design in which it is embedded. Superior performance on such visual search tasks has been interpreted as evidence of good segmentation skills in children with CA (O'Riordan, Plaisted, Driver & Baron-Cohen, 2001), although this has not been consistently demonstrated (Kaland, Lykke Motensen & Smith, 2007).

A superior level of attention to detail is interpreted as evidence for weak central coherence. This has been found on the Block Design subtest of the Wechsler Abbreviated Scale of Intelligence (WASI: Wechsler, 1999) in children with CA (Ohta, 1987; Shah & Frith, 1993), HFA (Allen, Lincoln & Kaufman, 1991; Happé, 1994; Lincoln, Courchesne, Kilman, Elmasian & Allen, 1988) and AS (Szatmari, Tuff, Finlayson & Bartolucci, 1990). Furthermore, high levels of precision and exactness are shown in drawings by Peter Myers (Myers, Baron-Cohen & Wheelwright, 2004) and Steven Wiltshire (Sacks & Wiltshire, 1991; Wiltshire, 1987), both young adult artists with AS. Such skill can be explained by fixation at the visual realism stage of drawing development, where one draws what one sees, rather than what one *thinks* they see (Charman & Baron-Cohen, 1992). Skill in elaboration (i.e., addition of detail) is evident in some experimental studies of the drawings children with CA (Mottron, Belleville & Menard, 1999; Mottron & Belleville, 1993; Golomb & Schmeling, 1996). There is some more recent evidence to suggest the contrary in children with AS, as Keow-Lim & Slaughter (2007) found no differences in detail or elaboration in drawings produced by children with AS compared to age and non-verbal IQ matched typically developing children.

Preference for local processing of information has also been framed as impairment of *integration*, evident in difficulties combining fragments of objects and integrating sentences within a paragraph in children with AS (Jolliffe & Baron-Cohen, 2000) as well as integrating the whole in a drawing in children with CA (Fein, Lucci & Waterhouse, 1990).

At present, there is very limited supporting evidence from neuro-anatomical research (e.g., Hill & Frith, 2003) for the WCC theory (Shah & Frith, 1983). However, the raft of consistent *neuropsychological* support indicates that this theory could be useful in making some predictions as to the creative thinking abilities of *elaboration* and *integration* in children with Asperger syndrome.

2.3. Executive Dysfunction (ED) theory

Pennington & Ozonoff (1996) postulated a theory based on some previous study findings (e.g., Steel, Gorman & Flexman, 1984; Rumsey & Hamburger, 1988, 1990) that some groups of children with clinical conditions, for example with an autism spectrum condition, develop specific deficits in their executive function capabilities. In terms of creative thinking abilities, executive functioning is involved in *resisting premature foreclosure* (inhibiting impulse to act on first response and delay decision), *originality* (inhibiting highly associated or copied responses, generating unusual responses), *fluency* (inhibiting irrelevant responses, generating seemingly relevant responses), and *flexibility* (shifting and regulating attention).

There are clear links between ED and autism spectrum conditions. For example, recent neuro-imaging studies link executive functioning performance to brain abnormalities in the frontal cortex in individuals on the autism spectrum (e.g., Baddeley, 2002; Shallice, 2004). A review of the neuropsychological literature on cognitive functioning in children with autism spectrum conditions reveals consistent significant deficits in such executive functions (Sanders, Johnson, Garavan, Gill & Gallagher, 2008). However, it must be highlighted that many research studies in support of the ED theory are based on children with Childhood Autism (CA) or broadly on children with autism spectrum conditions. Research specific to executive functioning in children with Asperger (AS) syndrome could be considered less extensive.

Children with CA and AS have performed poorly on tests of shifting set (i.e., attention) (Rinehart, Bradshaw, Moss, Brereton & Tonge, 2006), indicative of

impaired cognitive *flexibility*. Early evidence for impairment of *flexibility* and *originality* in children with CA was demonstrated by Frith (1972), who found that they produced less varied patterns with rubber stamps compared to a control group. A couple of decades later, Lewis and Boucher (1991) came to a similar conclusion. They compared the strategies for generating ideas for drawings by children with CA and children with a global learning disability. The group of children with CA showed reduced *flexibility* in their responses, generating ideas within a limited number of categories. The limited change introduced by the group of CA children indicated that they were constrained by their poor representational flexibility (Karmiloff-Smith, 1990). Evidence for impairment of *resisting premature foreclosure* and *originality* relates to poor performance of children with CA on tasks requiring skill in inhibiting responses (Russell, Mauthner, Sharpe, & Tidswell, 1991).

This wealth of research evidence in support of the ED theory in children with CA raises the question of whether an impairment of flexibility may also be prevalent in children with AS. Turning to the literature on the factors affecting development of creative thinking in children, for example outlined by Kaufman & Baer (2006), it seems that many of the cognitive differences typical of children with AS are relevant. For example, a systematic and inflexible reasoning style, typical of children with AS, can *inhibit* the fluency and flexibility of ideas (Runco, 2002; Guignard & Lubart, 2006). The ability to pay attention to a wide range of information that may become relevant at another time can facilitate creative thinking (Ansburg & Hill, 2003). However, children with AS tend to have highly focused attention (Bogdashina, 2005). They often struggle to shift their attention from one task or one idea to another (Rinehart, Bradshaw, Moss, Brereton & Tonge, 2006), a difficulty which is known to impair creative thinking (Martindale, 1981; Niaz & Saud de Nunez, 1991). For children with AS, dysfunction in shifting attention would therefore negatively affect their ability to generate a number of ideas across a range of categories, and therefore demonstrate impairment of *flexibility* and *fluency*. The relevancy of the cognitive styles of children with AS to mediating factors in creative thinking suggests that there are likely to be significant differences with a typically-developing population.

It is important to consider the possibility of positive difference in executive functions, *i.e.*, skill in children with AS. Asperger (1944) believed that the children fitting his syndrome did demonstrate original thought (Howlin, 2000), so perhaps if he were alive today he would not align himself with the ED theory. Temple Grandin, a successful author diagnosed with AS continues to agree with Asperger in this matter (Grandin, 2008). The evolutionary psychiatrist Michael Fitzgerald argues that individuals with AS are considerably more creative than those elsewhere on the autism spectrum (Fitzgerald, 2004).

Indeed one may argue that the methods employed by children with AS or any other autism spectrum condition to solve problems and interpret the world are particularly sensory, focussed, fragmented and literal, and therefore may in themselves be considered original (Bogdashina, 2005). Hermelin (2001) and Waterhouse (2000) write about individuals with AS and a superior isolated area of specific intelligence usually associated with mathematics, engineering and physics; people known as *Asperger savants*. It is perfectly valid to argue that such specific skill and knowledge is valuable in adding an original perspective to the world (Williams & Waterhouse, 1999). Furthermore, young authors with AS, such as Luke Jackson and Daniel Tammet, demonstrate a high level of originality, in that they provide an unusual and novel personal perspective (Jackson, 2002; Tammet, 2007).

Whilst this converse view of originality may be based on logical argument, it is nevertheless speculative and in need of scientific endeavour. Based on the ED theory, the present study investigates whether children with Asperger syndrome demonstrate impairment in 4 creative thinking abilities: *fluency, flexibility, resistance to premature foreclosure* and *originality*.

2.4. Hyper-systemising (HS) Theory

An extension of the Empathising Deficit theory was posited by Baron-Cohen in 2006, namely the *Hyper-Systemising* (HS) theory. The individual with an autism spectrum condition is understood as poorly skilled in empathising yet highly skilled in

systemising, described as meticulously identifying and using patterns of detailed information to form lawful and predictable systems (Baron-Cohen, 2006). They are described as extremely competent in collating information and identifying the detail in order to locate patterns within the information. This *hyper-systemising* pattern of thought and behaviour is proposed to be genetically linked, as there is evidence that the parents of children with AS perform particularly well in systemising on the Embedded Figures Test (EFT) (Baron-Cohen and Hammer, 1997). The superior performance on the EFT by individuals with an autism spectrum condition, mentioned in relation to the WCC theory, is taken as partial evidence of hyper-systemising. In terms of creative thinking abilities, HS theory would predict skill in *integration* (in contrast to WCC theory) and *elaboration* in the activities of drawing and storytelling.

2.5. Summary

There is wide theoretical and preliminary empirical support to predict significant differences in creative thinking abilities between children with AS and typically-developing children. Based on the MRD hypothesis (Leslie, 1987), it is predicted that children with AS will demonstrate impairment of abstract *imagination*. The WCC theory (Shah & Frith, 1983) would predict that children with AS will demonstrate skill in *elaborating* and providing detail to ideas yet they would show impairment of *integration* of ideas. Based on the ED theory (Pennington & Ozonoff, 1996), it is predicted that children with AS will demonstrate impairments of *flexibility* and *fluency*. Furthermore, ED theory suggests that children with Asperger syndrome would struggle to resist or inhibit their desire to draw a mark to close a shape and to override a copied or initial response; and hence would demonstrate impairment of *originality* and *resistance to premature foreclosure*. The HS theory (Baron-Cohen, 2006) suggests that children with AS would demonstrate skill in *integration* and *elaboration*. As significant differences in these creative thinking abilities may be apparent in children with Asperger syndrome, presented next are ideas of how creativity might be validly and reliably measured.

3. Measuring Creative Thinking

There is a plethora of empirical evidence and theoretical support to favour the prediction of significant differences of creative thinking between children with AS and typically-developing children. In this third section of the introduction, we briefly outline the development of and evaluate the psychometric strength of available assessment tools that tap into creative thinking abilities.

3.1. Tools used at assessment of autism spectrum conditions

Some creative thinking abilities may be co-incidentally measured through screening of children suspected of AS. For example, several checklists administered by clinicians include items on imagination and flexibility of play (e.g., Childhood Asperger Syndrome Test (CAST): Williams, Scott, Stott, Allison, Baron-Cohen, Bolton & Brayne, 2004; Krug Aspergers Disorder Index (KADI): Krug & Arick, 2002). At the stage of assessment however there are very few clinical tools available *specific* to children with AS (Howlin, 2000). They tend to distinguish effectively, albeit quite crudely, between autism spectrum conditions and not autism spectrum conditions (Le Couteur, Haden, Hammel & McConachie, 2008).

By the stage of assessment, typically the semi-structured Autism Diagnostic Interview-Revised (ADI-R: Lord, Rutter & Le Couteur, 1994) or the Diagnostic Interview for Social and Communication Disorders (DISCO: Wing, Leekam, Libby, Gould, & Larcombe, 2002) would be carried out with the parents or guardians of the identified child. Through means of parental report, the clinician can gauge whether the child plays with imagination and flexibility. However, parental responses may not always be reliable and this method can be very time-consuming (Le Couteur, Haden, Hammel & McConachie, 2008).

There are also play-based tools routinely used by a multi-disciplinary clinical team to determine whether a pattern of difficulties and abilities are age-appropriate or are indicative of CA or another autism spectrum condition (Le Couteur, Haden, Hammel

& McConachie, 2008). For example, the Autism Diagnostic Observation Schedule- Generic (ADOS-G: Lord, Risi, Lambrecht, Cook, Edwin, et al., 2000) is a standardised semi-structured observational play assessment of the child, (Le Couteur *et al.*, 2008). Play will be semi-structured with a limited range of toys and time in which to play with them. Altogether there are four modules of the ADOS-G; the one for more verbally fluent children involves a short unstructured break for the demonstration of spontaneous unstructured play. Some aspects of creative thinking will be assessed here such as imagination, fluency and flexibility (i.e., indicated by degree of repetitiveness) of ideas. The ADOS-G has good ecological validity, i.e., it provides a snapshot of how the child usually plays and it only lasts about 40 minutes (Le Couteur *et al.*, 2008). However, inter-rater reliability is reported to be poor for repetitive behaviour (Lord *et al.*, 2000), so one could conclude that the ADOS-G may not be a highly reliable means of assessing creative thinking abilities.

Fluency and flexibility may be identified as part of a wider neuropsychological assessment of executive functioning, for example using the Delis Kaplan Executive Functioning Scale (D-KEFS: Delis, Kaplan & Kramer, 2001; Baron, 2004) or the Contingency Naming Test (CNT: Cerrone, Mazocco & Cox, 1999). Whilst such tools are well-established and psychometrically strong, they do not provide a comprehensive measure of a range of creative thinking abilities.

3.2. Developed tests of creativity

During the 1960s and '70s, several psychometric tests of creativity were designed and developed, for example in Mednick's Remote Association Task respondents are asked to correctly converge on the single correct solution to a problem (Mednick, 1962). Other tests developed at that time aimed to measure *divergent* thinking, i.e., the ability to generate as many possible solutions for a given problem (e.g., Guilford, 1967, 1970; Wallach & Kogan, 1965 as cited in Kaufman & Baer, 2006; Halpin, Halpin & Torrance, 1974).

One such measure of divergent thinking is the Torrance Test of Creative Thinking (TTCT: Halpin *et al.*, 1966), comprising three semi-structured drawing activities. Refinement of the TTCT over the past forty years ensures it provides a highly reliable and valid measure of creative thinking abilities in children over a wide age range from age 5 to adolescents aged 20 years (Torrance, 2007). Large sets of age-related norms have been developed, the most recent published in 2007 (Torrance *et al.*, 2008). The TTCT presents as a relatively brief (duration 30 minutes) and desirable measure of creative thinking abilities, it has psychometric strength, systematic scoring procedures, valuable longitudinal validations and high predictive validity (Torrance, 2008).

In addition to Torrance (2007), the use of drawings at assessment was also developed by Rawley Silver (2002). Silver (2002) developed the Silver Drawing Test (SDT) of Cognition and Emotion, measuring the ability to draw based on predictions, to draw from observation, and to draw from imagination. The 'Drawing from Imagination Task' as part of the SDT validly measures the ability to select, combine and represent. Silver's Draw-a-Story Assessment (DAS; Silver, 2002) allows the child to project their emotional mood. The respondent has to choose two subjects from an array of stimulus drawings, to imagine something happening between them and show what is happening through their own drawings. The DAS has been used by art therapists to compare groups of adolescents for example, with and without emotional disturbances, and with and without depression. Such drawing scales have not so far been used to compare groups of people with AS and age-matched controls. Scoring is based on the ability to integrate and to generate novel ideas, and thus provides a basic measure of creative thinking abilities that is less comprehensive than the TTCT but is nevertheless psychometrically strong (Oster & Crone, 2004).

There are clear advantages to using drawings at assessment. Firstly, drawings provide “a minimally threatening, yet maximally absorbing” activity (Oster & Krone, pp. 22) at assessment; they are enjoyable. Secondly, they provide a rich source of qualitative recorded information that can be reviewed within the clinical team. Thirdly, the administration and scoring of drawing tests is not usually complex, and thereby allows fair access to a number of professionals in health, education and social care (Gantt,

2004). Furthermore, a drawing task can be formalised and psychometrically strengthened, for example through development of scoring criteria, piloting, and gathering normative data (e.g., Cohen, Hammer & Singer, 1988). Both the content and the structure of drawings have been interpreted in a validated and reliable way as part of a standardised assessment (Gulbro-Leavitt & Schimmel, 1991; Gantt & Tabone, 1998; Silver, 2002; Gantt, 2001, 2004).

Historically, drawings have been used as diagnostic aids for mental health problems (Di Leo, 1973; Burns, 1987; Silver, 2001, 2002; Cohen, 1990), as well as projective methods of assessing intellectual level (Harris, 1963) and personality attributes (e.g., Machover, 1949; Hammer, 1967). Drawings have been used as a diagnostic aid for several years by psycho-analytically oriented clinicians, allowing access to information on cognitive and emotional development (Malchiodi, 1998). Furthermore, they may be less threatening for children at assessment as they involve an indirect and developmentally appropriate shared activity rather than a potentially more threatening direct interview or conversation. As such, they may also assist with the development of rapport to facilitate further discussions.

3.3. Squiggling

The present study aims to pilot the utility of an established play technique called *squiggling* as a diagnostic aid (Winnicott, 1968, 1993). *Squiggling* entails drawing and storytelling as a measure of creative thinking abilities. If differences in some creative thinking abilities exist in drawing and storytelling tasks between children with AS and typically-developing children, and squiggling can validly tap into and document these differences, then there may be scope to develop and evaluate squiggling as a diagnostic aid in the assessment of AS. The additional information at assessment could help catalyse the process of diagnosis for the child and their family.

3.3.1. Development of squiggling

Squiggling was formally introduced by Donald Winnicott (1968) as a play technique tool to build rapport with a child, and has since been developed (e.g., Winnicott, 1993; Farhi, 2001; Claman, 2002). *Squiggling players* take turns in making a drawing out of the other person's *squiggle* or mark, and then naming them. The child and clinician draw freely and narrate what they are doing as part of an interchange of ideas. Over the past thirty or so years, *squiggling* has been adapted for use in clinical therapeutic practice, particularly in the domain of psychoanalytic therapy (e.g., Ziegler, 1976; Ellen, 1978; Wakimoto, Kawamura, Kaku and Kawata, 1984; Gunter, 2007). *Squiggling* has continued to be used effectively in psycho-analytically oriented art therapy interventions with children (e.g., Gunter, 2000; Eisdell, 2005; Branik, 2005; Steinhardt, 2006). Gunter (2000) comments that squiggling is “a seemingly simple method which has the quality of a razor's edge”, offering understanding of deeper levels of cognitive and social functioning.

Gardner (1972) suggested that inviting formation of a narrative of the *squiggling* drawings can enhance the therapeutic technique. This idea was developed by Kritzberg (1972, 1975), Brandell (1986) and Feen-Calligan (2006) who suggest that stories can reveal intra-psychic structure, conflicts and defensive adaptations, as well as wishes and fantasies. There is clearly high regard and continued interest in *squiggling* by clinicians and researchers as a therapeutic technique. However, its use as a diagnostic aid at the stage of gathering information at assessment has remained undeveloped (Branik, 2005). While there are some graphic assessments that utilise a series of drawings, as in squiggling (e.g., Diagnostic Drawing Series, DDS: Cohen, Hammer & Singer, 1988; Anderson, 1960), they do not comprehensively tap into creative thinking abilities.

Change may be on the horizon for *squiggling* as it has been utilised within a child and adolescent mental health service as an efficient means of assessing emotional, cognitive and behavioural development. This aid to assessment seems to compliment the other diagnostic play-based tools and fits well with the service delivery and

development standards outlined in the National Autism Plan for Children (National Autistic Society: 2003) and the National Framework for Children (DH, 2004).

3.3.2. *Potential value of squiggling*

Squiggling could be a potentially valuable diagnostic aid, based on two conditions:

- 1) if significant differences in creative thinking abilities are evident between children with AS and age and IQ matched typically-developing children, and
- 2) if the squiggling task can be validated, developed and evaluated to measure these differences

An accurate and timely diagnosis of AS is important as it enables access to the best available care, which corresponds with legislation and standards set by the United Nations Convention of the Rights of the Child (UNICEF, 1989), the Children's Act (2004), Every Child Matters (Department of Schools and Education, 2003) and the National Service Framework for Children and Young People (Department of Health (DH), 2005). The current government is making efforts to meet these standards, for example, in commissioning and developing specialised services for people with AS (DH, 2007). Furthermore, the National Autistic Society (NAS) has recently been awarded funding from the Department of Health (www.nas.org.uk, 2007). In spite of this prioritisation, a high number of people meeting diagnostic criteria for AS may be diagnosed incorrectly, very late or not diagnosed at all (Attwood, 2007).

Howlin & Moore (1997) found that 1000 parents of children with AS reported an average age of diagnosis at 11 years; for those with CA it was five years, revealing an average discrepancy of almost six years⁴. This delay is understandably frustrating for parents of children with AS (Howlin & Asgharian, 1999), and probably for the child who struggles to make sense of their difference within a stressful experience at school and home. A diagnosis may not be made until secondary school age when demands for social functioning and self-organisation increase and the child may have trouble

⁴ Although there were wide regional variations

adjusting to the increased complexity of external demands (Gillberg, Nordin & Ehlers, 1996). The issue of an *inaccurate* and *untimely* diagnosis of AS is highly important, as delayed diagnosis means delayed access to appropriate care and support and a reduced likelihood of improved outcome for the individual and their family (Dawson & Osterling, 1994; Bryson, Rogers, & Fombonne, 2003).

Co-morbidities and overlap with other autism spectrum conditions can blur and complicate the diagnostic picture (Tantam, 2000) and will continue to contribute to a delayed diagnosis. AS is a rare condition and is therefore difficult to identify even without such complications. Fombonne & Tidmarsh (2003) suggest a working AS prevalence rate of two per 10,000. Recent estimates of the prevalence of AS from epidemiological studies ranges from 0.3 in 10,000 (~0.003%) children to 8.4 in 10,000 (~0.084%) (Taylor, Miller, Farrington, Petropoulos, Favot-Mayaud, *et al.*, 1999; Baird, Charman, Baron-Cohen, Cox, Sweetenham, Wheelwright *et al.*, 2000; Chakrabati & Fombonne, 2001; Fombonne, 2005; Baird, Simonoff, Pickles, Chandler, Loucas, Meldrum & Charman, 2006). Limited availability of screening and assessment tools specific to AS (Howlin, 2000; Campbell, 2005) adds to the challenge. The pilot of *squiggling* may be valuable in developing a diagnostic aid that can contribute towards a more accurate and timely diagnosis.

4. Aims and Hypotheses

4.1. Aims of study

The primary aim of this research study is to gauge the psychometric strength of *squiggling* as a potential diagnostic aid in the assessment of Asperger syndrome. The main objectives are to establish reliability and concurrent validity of the *squiggling* game through comparison with an established standardised test of creative thinking with norms for children (Torrance Tests of Creative Thinking: TTCT, Torrance *et al.*, 2008). It is hypothesised that *squiggling* can reliably measure seven creative thinking abilities, including flexibility, originality, fluency, imagination, elaboration and integration via the activities of drawing and storytelling.

A secondary aim of this study is to compare the creative thinking abilities of children who meet criteria for Asperger syndrome (ICD-10: WHO, 1992) or Asperger's Disorder (DSM-IV-TR: APA, 2000) with an age and IQ-matched comparison group of typically-developing children. There are no research studies to date that have carried out a systematic comparison of a range of creative thinking abilities between groups of children with Asperger syndrome and a comparison group.

An additional aim of the study is to investigate the relationship between abstract imaginative thinking and meta-representational capacity.

4.2. Hypotheses

1. To test the specificity of the MRD hypothesis (Leslie, 1987) >> Children with AS will demonstrate **lower levels of abstract imagination** in their drawings and stories compared to typically-developing children matched on age, IQ and VMI.
2. To test the WCC (Shah & Frith, 1983) and HS (Baron-Cohen, 2006) theory >> Children with AS will demonstrate **higher levels of elaboration** in their drawings compared to typically-developing children matched on age, IQ and VMI.

3. To test the WCC (Shah & Frith, 1983) theory >> Children with AS will demonstrate **lower levels of integration** of their drawings and stories compared to typically-developing children matched on age, IQ and VMI.
4. To test the HS (Baron-Cohen, 2006) theory >> Children with AS will demonstrate **higher levels of integration** of their drawings and stories compared to typically-developing children matched on age, IQ and VMI.
5. To test the ED (Pennington & Ozonoff, 1991) theory >> Children with AS will demonstrate **lower levels of fluency** in their drawings compared to typically-developing children matched on age, IQ and VMI.
6. To test the ED (Pennington & Ozonoff, 1991) and HS (Baron-Cohen, 2006) theory >> Children with AS will demonstrate **lower levels of originality** in their drawings compared to typically-developing children matched on age, IQ and VMI.
7. To test the HS (Baron-Cohen, 2006) theory >> Children with AS will demonstrate **higher levels of originality** in their drawings compared to typically-developing children matched on age, IQ and VMI.
8. To test the ED (Pennington & Ozonoff, 1991) theory >> Children with AS will demonstrate **lower levels of resistance to closure** in their drawings compared to typically-developing children matched on age, IQ and VMI.
9. To test the ED (Pennington & Ozonoff, 1991) and HS (Baron-Cohen, 2006) theory >> Children with AS will demonstrate **lower levels of flexibility** across their drawings compared to typically-developing children matched on age, IQ and VMI.
10. Children with AS will demonstrate **higher levels of overall creative thinking ability** across their drawings compared to typically-developing children matched on age, IQ and VMI.

4.3. Introduction Summary

Impairment of abstract imagination is evident in children with Asperger syndrome on tasks requiring formation and expressions of mental meta-representations (e.g., play and storytelling) and on tasks requiring both mental and non-mental meta-representations (e.g., drawing). The ability to use one's imagination in such tasks is a creative thinking ability. Three cognitive theories of autism spectrum conditions and a theoretical hypothesis are used to predict significant differences in imagination and other creative thinking abilities between children with AS and typically-developing children matched on age, visual-motor functioning and IQ.

If significant differences in creative thinking abilities exist, it may be useful at the stage of assessment for the clinician to administer a measure of creative thinking. At assessment of children with AS, there are measures of creativity within larger play-based tools and parental interview schedules. However, they may not be reliable or sufficiently comprehensive to tap into a range of creative thinking abilities other than imagination.

The average age of diagnosis of AS is considerably behind other autism spectrum conditions. Such a delayed process can be frustrating for the child and their family, and lack of appropriate educative, social and emotional support may affect long-term outcome. *Squiggling*, a drawing and storytelling game, may highlight differences in creative thinking, and ultimately aid and catalyse the assessment process to increase the likelihood of a timely and accurate diagnosis of AS.

Method

In this section, firstly the study design is outlined and demographic information on the participants in the study is presented. Next the process of recruitment of participants is described. The measures are defined and reasons for their use in the present study are explained. The settings, materials and procedure of the study are outlined, and lastly ethical issues relevant to this research study are highlighted.

1. Study design

This research study used a non-experimental matched group comparison design to observe specific differences in the creative thinking abilities of children with Asperger syndrome, defined as meeting either the DSM-IV-TR (APA, 2000) or the ICD-10 (WHO, 1993) criteria for respectively Aspergers Disorder or Asperger syndrome, compared to typically-developing children. Non-verbal intellectual functioning, chronological age and visual-motor functioning were successfully controlled for as potential confounders. The matching procedure was carried out by ordering participants in terms of their non-verbal intellectual functioning first of all, followed by matching on chronological age. Matching on visual motor integration ability was relatively easy as the groups performed at similar levels.

This particular clinical group of children with Asperger syndrome was selected because children with other similar autism spectrum conditions may have been less verbally able and motivated to participate (e.g., children with High Functioning Autism, ICD-10: WHO, 1992). Children with AS however usually have average or above verbal abilities (with some idiosyncrasies) and are “active but odd” (Wing & Gould, 1979) in their interactions with others. Furthermore, children with AS generally have an overall level of intellectual functioning within or above the average range so recruitment of a comparison group from the general population would be easier than recruiting from a group of children with a learning disability.

2. Participants

The units of analysis in this study were two groups of children; a clinical group of 15 children with Asperger syndrome (AS: based on DSM-IV-TR, APA, 2000 or ICD-10, WHO, 1992 diagnostic criteria) and a comparison group of 15 typically-developing children. Data on 34 participants was collected altogether. However, four of these participants in the clinical group were not matched to a suitable control in the comparison group so this data was not included in the analysis. A power calculation was performed to determine the sample size required for the detection of a mean difference between the AS group and the comparison group amounting to a moderate effect size (Cohen's d around .50). Results showed that 14 matched pairs (i.e. total sample size = 28) would be sufficient to detect such an effect at an alpha level of 5% (one-tailed) with a power of 80%.

Participants were in full-time education, had English as their first language, had no history of traumatic head injury, and no severe current physical or mental health problems. There were more males ($N=14$) with AS participating in the clinical group than females ($N = 1$). The estimated ratio of male to female is four to one (Wing, 1981) so the sample does not accurately reflect a typical AS population in terms of gender. However, due to time constraints it was not possible to recruit more females for the clinical group.

There were four participants with a dual diagnosis of Attention Deficit Hyperactivity Disorder (ADHD: DSM-IV-TR, APA, 2000). There was one participant with two additional diagnoses of ADHD (DSM-IV-TR, APA, 2000) and Gilles de La Tourette syndrome (GLT: ICD-10, WHO, 1992), and one participant with Obsessive Compulsive Disorder (OCD: DSM-IV-TR, APA, 2000). It was the clinical judgement of the field supervisor that the presenting problems associated with these dual diagnoses would not affect the ability of the child to take part. As examples, the difficulties in regulating attention to task for the participants with AS and ADHD were not regarded as so severe as to make testing a difficult experience for the child. The

participant with AS and OCD experienced anxiety in specific situations, which they would not be placed in if participating in the study.

There were three participants included in the study with a specific learning difficulty, namely dyslexia, who were supported on tasks requiring reading during the study. After discussion with parents of these participants it was judged together that the severity of their specific learning difficulty would not place a significant demand on them during testing. No other specific learning or language difficulties were reported. This information was gathered from a written personal information sheet completed either by the participant or by the participant's parent (if under the age of 16 years). See Appendix four.

Based on the Childhood Asperger Syndrome Test (CAST: Williams, Scott, Stott, Allison, Baron-Cohen, *et al.*, 2004) questionnaires distributed to the parents or guardians of all participants in the comparison group, none of the children in the comparison group were identified as showing signs of AS (see Appendix 5).

Table 1 shows a summary of the chronological age (CA), performance (or non-verbal) intellectual functioning (PIQ) and visual-motor integration (VMI) for the clinical and comparison group. For both groups, the PIQ scores were distributed in accordance with the notion of normality, albeit within the higher end of the average range of intellectual functioning. The mean PIQ in the general population is estimated at 100 with a standard deviation of 15. In terms of VMI, the overall distribution of scores within both groups similarly reflected what one might expect in the general population. See Appendices 6 and 7 for box-plot displays of, respectively, the PIQ and VMI scores.

In order to ensure the children with AS were suitably matched in order to control for the confounding effects of intellectual functioning (IQ), chronological age (CA) and visual-motor integration (VMI) on creative thinking, two-tailed group comparisons were performed using a paired samples t-test. See Table 2.

Table 2. Group Comparisons in Age, Non-Verbal IQ and Visual-Motor Integration

	CHRONOLOGICAL AGE	NON-VERBAL IQ	VISUAL MOTOR INTEGRATION
Clinical Mean (SD)	14.221 (1.515)	111.267 (9.184)	10.333 (3.288)
Comparison Mean (SD)	13.234 (1.505)	111.6 (8.407)	10.867 (2.134)
t-score	-2.143	0.128	0.469
Degrees of freedom	14	14	14
p-value	0.050	0.900	0.646
Effect size	0.654	-0.038	-0.195

3. Recruitment of participants

Participants for the present study were recruited with reference to certain inclusion criteria:

- In full-time education
- Aged between 12 years 0 months and 16 years 11 months
- Within or above average range of intellectual functioning

There were also exclusion criteria, as follows:

- Ongoing severe mental health difficulties (e.g., mood or anxiety disorders)
- Significant impairment of intellectual functioning (i.e., two standard deviations below mean, IQ 70 or below)
- Significant impairment of language functioning (i.e., two standard deviations below)
- Significantly impaired visual-motor control
- History of acquired traumatic head injury resulting in loss of consciousness at time of accident or significant effects on cognitive functioning
- Current moderate to severe physical illness (e.g., fever, pain).

The clinical group of 15 children who had been formally diagnosed with Asperger syndrome were approached and recruited on the basis of this specific characteristic without random selection from the general population. They had been diagnosed by clinicians in a Child and Adolescent Mental Health Service (CAMHS). Two sets of diagnostic criteria were used within the clinics from which the children were recruited, simply due to differences in diagnostic practice (ICD-10: WHO, 1992; DSM-IV-TR: APA, 2000). However, there are no significant differences between these sets of diagnostic criteria apart from slightly varying emphases on threshold level of qualitative evidence (i.e., ICD-10 slightly more stringent). Children diagnosed with Asperger syndrome based on any other diagnostic criteria (e.g., Gillberg & Gillberg, 1989 or Szatmari, Bartolucci & Brenner, 1989) were not included in the study. Diagnosing clinicians at the CAMHS distributed information packs to those children and families expressing an interest in taking part. See Appendices 8 to 13 for introductory letters, and appendices 14 to 19 for information sheets. See Appendices 20 to 21 for consent forms.

Participants in the clinical group were also approached and recruited via a regional AS family support group. The lead support group worker distributed information packs to those attending the AS family support group.

The comparison group of typically developing children was a non-probability convenience sample, approached and recruited on the basis of availability. Most of the participants for the comparison group (N = 10) were recruited through a local community scout group. The remaining (N= 5) typically-developing were recruited through family friends and a secondary school. See Appendices 8 to 13 for the introductory letters to head-teachers, diagnosing clinicians, participants and parents/guardians.

When the signed consent forms and completed personal information sheets (and CAST questionnaire from the comparison group participants) were returned, participants were contacted either by telephone to arrange a time and date for the first testing session. Any questions about the study at that stage were answered.

4. Measures

The measures used in the present study are outlined here, and reasons for their inclusion are provided.

4.1. Childhood Asperger Syndrome Test

The Childhood Asperger Syndrome Test (CAST: Williams, Scott, Stott, Allison, Baron-Cohen, *et al.*, 2004) is an established, sensitive and specific screening parental report questionnaire, which was given to the parents or guardians of the comparison group to confirm that the children were not presenting with signs of Asperger syndrome. See Appendix 5. The CAST is not, strictly speaking, specific to Asperger syndrome, but it was developed to be sensitive to autism spectrum conditions in the mainstream school population, and so it was a suitable instrument for the purposes of this study. While numerous other AS screening tests have been written for children (e.g., the Australian Scale for Asperger Syndrome by Attwood, 2007), there is inconsistent information on validity, sensitivity and specificity of these tools (Williams, Scott, Stott, Allison, Bolton *et al.*, 2005). The CAST however demonstrates good validity, sensitivity and specificity with a population of typically-developing children (Williams *et al.*, 2004). In the present study, none of the participants was identified by the CAST as showing signs of AS.

4.2. Wechsler Abbreviated Scale of Intelligence

The Wechsler Abbreviated Scale of Intelligence (WASI: Wechsler, 1999) provided a measure of verbal and non-verbal intellectual functioning. The full four-subtest form of the WASI provided a Full Scale IQ (FSIQ), a Verbal IQ (VIQ), and a Performance IQ (PIQ). The Vocabulary and Similarities sub-tests of the WASI yield the Verbal IQ, which is a measure of expressive language and crystallised (i.e., consolidated) knowledge of words and concepts. The PIQ score comprises two different types of non-verbal measures for richer information, Matrix Reasoning and Block Design, which measure *fluid* abilities in visual-spatial reasoning and organisation.

The WASI was selected for the present study as it provides a brief (approximately 30 minutes duration) and normed estimate of general intellectual ability (Stano, 2004). A more comprehensive intelligence test such as the *Wechsler Intelligence Scale for Children, Third Edition* (WISC–III) can take two hours or longer, but this depth of assessment was not required for the purposes of this study. It also has good reliability, i.e., scores across different testing occasions are stable and consistent (Kaufman & Lichtenberger, 1999). For example, split-test correlations of each of the four subtests for the children’s sample (ages 12-16 years) reveal internal consistency reliability coefficients ranging from 0.77 to 0.89 (Wechsler, 1999). The average reliability coefficients for the VIQ, PIQ and FSIQ are even higher (e.g., 0.93 for FSIQ based on 4 subtests) (Wechsler, 1999).

Correlations between the WASI and other more comprehensive Wechsler intelligence measures are high (Bosnes, 2005), and therefore the content validity of the WASI is generally viewed as very good. The WASI also has quite good clinical sensitivity and utility with clinical populations, including individuals with traumatic head injury (Wechsler, 1999). The four-subtest form is considered a better screening tool in terms of validity than the two-subtest form (Stano, 2004).

4.3. Beery-Buktenica Developmental Test of Visual-Motor Integration

The Beery-Buktenica Developmental Test of Visual-Motor Integration, 5th Edition (BVMI: Beery, 1967; Beery & Beery, 2006) provided a measure of visual-motor integration. It was important to gain a measure of this as the drawing tasks required hand-eye co-ordination and fine motor abilities. The test consists of geometric forms that are copied into a test booklet. The BVMI was selected as it has norms for children aged 2 to 18 years, has proven reliability and validity and takes just 10 minutes to administer an abbreviated version (Beery *et al.*, 2006). As a non-verbal assessment, the BVMI is useful with children with difficulties in communication (e.g., children with AS).

4.4. Strange Stories Test

An abbreviated version of the Strange Stories Test (SST: Happe, 1994) was used to provide a measure of meta-representational ability, i.e., the ability to accurately decouple primary mental representations. See Appendix 22. Difficulty in understanding the mental states of characters within stories has been shown in several studies of children with CA_ (Loveland, McEvoy & Tunali, 1990; Tager-Flusberg & Sullivan, 1995) and children with HFA (Happe, 1994; Capps, Losh & Thurber, 2000; Losh & Capps, 2003; Slaughter, Peterson, Mackintosh, 2007). In line with Leslie's Meta-Representational Deficit hypothesis (Leslie, 1987), mental states can be understood as secondary mental representations of abstract concepts. In the present study, the SST was used to test for similar possible difficulty in children with Asperger syndrome as a meta-representational deficit may be an important mediating factor in the ability to express abstract imagination in drawings and stories.

In the SST, the participant was asked to read short stories (or is invited to have the stories read to them) and then asked a question at the end of the story about the actions or words of a character. The abbreviated version comprised four stories; two of which test for empathy (Kittens and Prisoner) and two of which act as controls (Coat and Armies) where the participant does not need to empathise. See Appendix 21. The selection of the stories is based on a recommendation by Happe (2007) following a study that identified the specific stories as most discrepant between groups of children with an autism spectrum condition and those without.

4.5. Torrance Test of Creative Thinking

The Torrance Tests of Creative Thinking (TTCT: Torrance *et al.*, 2008) is a standardised test of creativity with norms for children based on a large national sample. The TTCT was selected as it has good construct validity and reliability (Torrance, 2008), and it provides a comprehensive measure of the creative thinking abilities investigated in the present study. It has highly satisfactory levels of internal consistency, with an average of 0.87 across age groups 12 to 16 years (Torrance,

2008). A high inter-rater reliability co-efficient of 0.89 has been found for the overall creativity index for various ages (Torrance, 2008).

The first component of the TTCT (Figural) was administered to participants, involving three 10-minute picture-based exercises to assess five creative thinking abilities: fluency, originality, elaboration, abstractness of titles, and resistance to closure. These abilities are particularly prominent in creative thinking (Torrance, 2008). Fluency is based on the total number of relevant responses. Originality is based upon the unusualness of the response. Elaboration relates to the demonstration of detail in the responses. Abstractness of titles is based on the ability to add depth and richness to the responses. Resistance to premature foreclosure is the ability to delay closure, to inhibit the impulse to complete a shape.

4.6. Squiggling

In the present study, *squiggling* is proposed to tap into creative thinking abilities, including abstract imagination, originality, elaboration, fluency, flexibility and integration of ideas. See Appendix 23 for standardised squiggles (randomly selected marks). In the *squiggling* game, the participant and researcher took turns to make a drawing out of the other's squiggle, or mark on the paper. The participant told a story about the drawings at the end of the 'game'. The procedure is detailed further on in the method section.

A set of *squiggling* scoring criteria have been created for this research, based on the outlined theoretical hypotheses of Asperger syndrome. Scoring criteria were developed based on the Torrance Test of Creative Thinking (TTCT: Torrance et al., 2008) and on definitions of creativity outlined in the introduction (see Appendix 3). The participant's five drawings are scored on Imagination, Elaboration, Originality and Fluency, based on four-point rating scales (total 20 for each subscale⁵). Participants obtain a higher score on the Imagination subscale if they demonstrate more abstract ideas in their drawings and story that are highly improbable, or

⁵ The Imagination subscale totals 24 as this includes a four-point rating for the story.

impossible, as reflections of reality (e.g., unreal subjects and objects). The higher the level of detail in their drawings, the higher they score on the subscale Elaboration. If a participant generates novel or transformed ideas in their drawings, rather than an imitation or slight reconstruction of a previous drawing, they score higher on Originality. The higher the number of names generated for their drawings, the higher they score on the subscale Fluency.

A further four-point rating is given for Flexibility across the drawings. If a participant generates ideas for their drawings across a range of categories (e.g., people, animals, places, objects), they score more highly on Flexibility. Two drawings from multiple squiggles and the story are scored on Integration, which again is based on a four-point rating scale. A high score on Integration is achieved if the participant demonstrates the ability to combine squiggles into one drawing (whether it is an object, person, animal, or scene), and to connect ideas in their story through interaction and elaboration.

A total creative thinking score is obtained out of 100. The precision of the scoring criteria has been examined and an acceptable level of inter-rater reliability has been established across the subscales of squiggling. See Table 3 for findings from Pearson's *r* correlations of scores on 10 sets of squiggles for each subscale between two raters.

Table 3. Inter-Rater Reliability of Squiggling

	RATER 1. MEAN (SD)	RATER 2. MEAN (SD)	PEARSON'S R	P-VALUE (1-TAILED)
Flexibility	2.600 (0.966)	3.100 (0.737)	0.374	0.143
Imagination	18.600 (2.458)	17.500 (3.205)	0.804	0.003*
Originality	16.200 (3.119)	19.400 (0.483)	-0.034	0.463
Fluency	8.600 (3.978)	8.600 (4.115)	0.790	0.003*
Integration	9.600 (1.776)	9.200 (2.658)	0.160	0.329
Elaboration	10.300 (2.058)	10.900 (3.213)	0.644	0.022*

Based on this analysis and recommendations by Nunnally & Bernstein (1994), there is good reliability on the Imagination and Fluency subscales. An acceptable level of reliability was found for the Elaboration score. For the remaining three subscales there was poor reliability between raters' scores, with indication of disagreement between raters on the Originality scale. This was supported by a Wilcoxon signed ranks test that found no significant differences, apart from in the *originality* subscale ($Z = -2.716$, $p < 0.05$) between two raters' scores for 10 sets of squiggles. The inter-rater reliability of some of the squiggling scoring criteria can be considered acceptable.

5. Setting and Materials

For the clinical group, the children were seen in a quiet plain room at their local child and family clinic or at their home. Participants from the comparison group were seen at their home. The participant sat on the horizontal axis at a table and the researcher sat on the vertical axis. This seating arrangement allowed for the drawings to be displayed in front of the participant, and also minimised any connotations of confrontation or competition. On the table there were 10 to 15 sheets of plain A4 paper and two differently coloured pencils. The researcher had a pen and paper for writing the story down that the participant dictated.

6. Testing procedure

Participants underwent a series of standardised psychometric tests and played the *squiggling* game. Testing was at two time points; the first was approximately 90 minutes, and the second was approximately 60 minutes duration. The purpose of this was not to establish a baseline but to spread the cognitive load for the participants across two sessions in an attempt both to maximise their performances and to reduce any potential stressors of assessment demands.

At the start of the testing sessions, participants were informed of the time it would take and the activities they would be doing. They were reminded of their right to have

breaks and to withdraw from the study at any time. Participants were informed that many of the activities would get progressively more difficult. At the end of the testing session, the participant was thanked and either given a book (if in clinical group) or £10.00 cash (if in comparison group). The use of financial inducement (£10) for participants in the comparison group was approved by University of Hertfordshire Ethics Committee (see Appendix 4 for approval of modification).

The participant and their parent/guardian were asked if they would like to know more about the study. There was no deception as to the aims of the research and how the data would be used. They were informed that a summary of their results would be posted to them within two to three weeks, and that the researcher was available via email should there be any queries. It was highlighted in the feedback letters to parents/guardians that the information was supportive, non-evaluative and was not necessarily reflective of results from a more comprehensive assessment.

The order in which the tests were administered across the sessions was as follows:

Session 1.

1. Wechsler Abbreviated Scale of Intelligence (WASI)
2. Torrance Tests of Creative Thinking (TTCT)
3. Beery-Buktenica Developmental Test of Visual-Motor Integration (B-VMI)

Session 2.

1. Strange Stories Test (SST)
2. Squiggling

In doing this, levels of intellectual functioning from the WASI and visual-motor integration ability from the B-VMI were initially screened to check for suitability to continue with the second session. It was important to separate administration of the TTCT and squiggling to ensure that motivation levels to think creatively were maintained. The procedure for administering squiggling with participants is detailed below.

6.1. Squiggling procedure

Initially the participant was asked if they had heard of *squiggling* or could guess what a *squiggle* was. They were also asked if they enjoyed drawing and creative writing at school. Participants were invited to make marks on the paper together with the researcher, who ensured the participant understood that one is not thinking of anything in particular when they draw a squiggle, i.e., it is at first meaningless. The squiggles drawn by the researcher during the game were standardised (See Appendix 21).

The following was verbally explained and written down:

- Each player turns the other's squiggle into a drawing of anything they like
- Researchers are not interested in drawing ability – just looking at your ideas
- Each drawing is given at least one name
- Drawing stops when there are 10 altogether (five each)
- Then five drawings are chosen to tell a short story

The participant was invited to make the first squiggle on a sheet of paper. Creative thinking ability was modelled by the researcher, demonstrating:

- *imagination* (i.e., reality based and non-reality based impossible objects or subjects)
- *originality* (i.e., novel transformed drawings, no elements copied from previous drawings)
- *flexibility* (i.e., a range of categories across drawings, e.g., animal, person, scene, unreal object)
- *integration* (i.e., an multiple squiggles combined as a whole drawing)
- *elaboration* (i.e., detail added within drawings)
- *fluency* (i.e., several ideas generated for names of drawings)

During *squiggling*, verbal comments on the participant's drawing ability were not given, as they may have felt their drawing ability was being appraised. Some encouragement and praise of creative thinking was given when appropriate. It was quiet while the participant thought of and drew their ideas. When there were 10 drawings altogether, the participant was reminded that they were invited to choose five drawings. The researcher said, "*The drawings you choose may be all yours, or all mine or a mixture*". The participant was invited to have a few minutes to think of a short story. The researcher wrote the story down as the participants told it (verbatim), and read it through to the participant afterwards to check for accuracy.

Substantial effort was made to standardise instructions and the squiggles presented to the participants (see Appendix 23). Changes were only made with some participants when they were not clear of what to do, or when they appeared to lack motivation. For example, the researcher modelled a creative drawing response to a squiggle and provided descriptive non-evaluative feedback on the drawing (e.g. "See, I've turned the squiggle into a family of worms going on holiday, Now you make my squiggle into a drawing of anything you like").

7. Ethical issues

Outlined here are some issues pertinent to the well-being of participants during the study, which were raised and methods with which to minimise them were approved by the University of Hertfordshire Ethics Committee (see Appendices 24 and 25), the Local Research Ethics Committee (see Appendix 26) and the NHS Trust Research and Development Group (see Appendix 27).

7.1. Fatigue and anxiety

Given the time (~150 minutes total) and effort required for the participants to complete the tests and play squiggling, there was a slight risk of fatigue and performance anxiety. Several additional strategies were in place to minimise this risk.

Where practical, the sessions were arranged for a time when the participant was not tired already (i.e., at end of a busy school day), and breaks were suggested when they appeared or sounded tired (e.g., restlessness, rubbing eyes, face). The information sheet for parents, children and adolescents clearly stated the potential risks of fatigue and anxiety, and highlighted the right to withdraw from the research at any time. Informed consent was obtained from all participants in the study, in addition to parental consent where necessary (i.e. for those under the age of 16 years).

Participants were reminded verbally and non-verbally (i.e., written down) at the start of each testing session that they could stop at any time and did not have to answer any questions they do not feel comfortable answering. Participants were also reminded that some of the tests were designed for children, teenagers *and* adults so it was usual to start to find them difficult at some point. They were told that it is acceptable to say if they do not know an answer. Testing was stopped if the participant became distressed and/or wanted to stop.

The exclusion criteria ensured appropriate recruitment of children, removing those who may have suffered distress from the research procedure (e.g., if the child is experiencing significant physical or mental health problems, or presents with significant cognitive deficits from a head injury). These criteria were stated in the initial introductory letter, and confirmatory information was requested on the personal information sheet.

7.2. Confidentiality

All data, including details of participants and their test results, were stored securely and kept confidential with access restricted to the study researchers and a research assistant who signed a confidentiality agreement. This is outlined in the information sheets for participants and parents. All sensitive response data, was coded anonymously by the lead researcher. Data transferred from raw data response sheets to summary sheets (or computer files) was identified by code number only. The lead researcher retains a separate sheet which links code numbers to names for the purpose

of re-contact. There is only one copy of this sheet, retained in a secure location, at no time accessible to other persons; it is stored separately from the rest of the data, and in line with university guidance and Local Research Ethics Committee approval, will be destroyed 1 year after completion of the study.

Results

The results are split into two sections. Firstly, a validation study of squiggling is presented. Secondly, findings from the matched-pairs group comparisons on the creative thinking abilities are presented in relation to the study hypotheses.

1. Validation study of squiggling

One of the main aims and objectives of this study is to pilot and gauge the psychometric strength, *i.e.*, reliability and validity, of a drawing and storytelling task called *squiggling*. The first step towards to this was to look at the reliability, or the reproducibility, of the subscales. In order for a measure to be considered valid, *i.e.*, measuring what it is supposed to measure, a reasonable degree of reliability should be established (Barker, Pistrang & Elliott, 2002).

Inter-rater reliability was carried out to check for the consistency of scoring. Acceptable to good levels of reliability (*i.e.*, correlation co-efficients of between 0.604 - 0.804) were found for 3 of the squiggling subscales (Imagination, Fluency and Elaboration). In the present section of the results, the internal *consistency* and the external *concurrent validity* of the squiggling subscales is established. This is achieved through comparison with a developed and standardised test of creative thinking abilities designed for use with children (Torrance Tests of Creative Thinking: Torrance *et al.*, 2008).

Firstly, relationships between the six individual squiggling subscales and the squiggling total score were examined across the whole sample (N = 30). See Table 4 for a basic descriptive summary of the squiggling subscales and total score.

A statistical procedure, Cronbach's Alpha, often employed to test for the internal consistency of a scale was used. An examination of the subscales comprising squiggling indicates that Flexibility and Originality have the lowest corrected subscale-total correlations. The Cronbach's alpha for the overall scale was found to be

0.664, which can be regarded as an acceptable overall level of reliability. When these two items had been removed the overall reliability increased slightly, raising the reliability co-efficient Cronbach's alpha to 0.727.

Table 4. Means and standard deviations for Squiggling

	MEAN (SD)
Squiggling Total / 100	68.833 (7.168)
Squiggling Flexibility / 4	3.200 (0.761)
Squiggling Integration / 12	9.833 (2.119)
Squiggling Elaboration / 20	11.100 (2.746)
Squiggling Fluency / 20	8.967 (3.662)
Squiggling Originality / 20	19.000 (1.259)
Squiggling Imagination / 24	16.700 (3.075)

This result was reflected in a series of one-tailed bi-variate correlations carried using the procedure Pearson's correlation co-efficient.

Table 5. Matrix of Pearson's r Correlations between Squiggling Subscales and Total Squiggling Scale

	Squig Total	Squig Flex	Squig Integ	Squig Elab	Squig Flu	Squig Orig	Squig Imag
Squiggling Total		0.019 (0.460)	0.563 (0.000)*	0.660 (0.000)*	0.632 (0.000)*	0.038 (0.420)	0.580 (0.000)*
Squiggling Flexibility			0.043 (0.410)	-0.109 (0.284)	-0.233 (0.108)	0.216 (0.126)	0.056 (0.385)
Squiggling Integration				0.388 (0.017)*	0.141 (0.228)	-0.129 (0.248)	0.146 (0.222)
Squiggling Elaboration					0.261 (0.082)	-0.080 (0.338)	0.126 (0.253)
Squiggling Fluency						-0.247 (0.095)	0.097 (0.305)
Squiggling Originality							0.071 (0.354)

As Table 5 shows, no associations were found between Flexibility and the other squiggling scales, and between Originality and the other squiggling scales. Note that in the table, the Pearson's r correlation co-efficient is presented first with the one-tailed p -value in brackets. The alpha level is set at < 0.05 , a decision based on convention.

However, some considerably large and significant positive associations were found between the squiggling total score and the squiggling subscales Integration, Elaboration, Fluency and Imagination. A medium significant positive association was also found between the squiggling Elaboration and Integration subscales. It would be reasonable to conclude that the reliability of squiggling is overall acceptable, and would be improved with revision of the Flexibility and Originality subscales. However, due to time constraints, this was not possible.

For the next stage of gauging the psychometric strength of squiggling as a measure of creative thinking abilities, a series of one-tailed correlations were performed again using the parametric Pearson's r procedure to explore the relationships between the squiggling subscales and the corresponding subscale (in terms of face validity) on the Torrance Tests of Creative Thinking (Torrance, Ball & Safter, 2008). For an acceptable level of concurrent validity, the scales should be associated with a correlation co-efficient of roughly 0.30 or above (Nunnally & Bernstein, 1994).

Table 6 shows findings from the bi-variate analysis between the squiggling subscales and the corresponding TTCT subscales. The Pearson's r correlation co-efficient can be used to gauge effect size, or the magnitude of the association. In the last column of Table 6, the effect size is described according to standards recommended by Cohen (1992). Note that the squiggling subscales Flexibility and Integration were not matched to an already established measure so the concurrent validity of these subscales was not calculated.

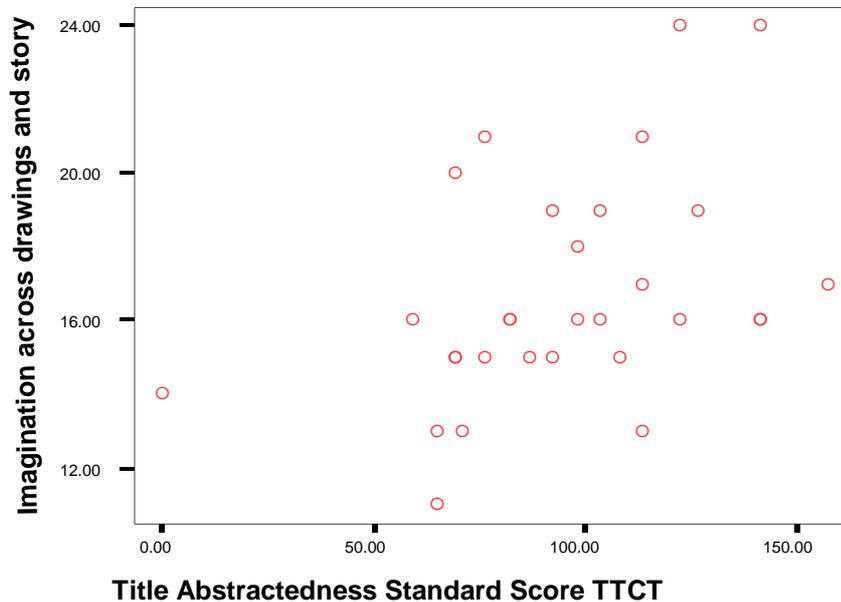
Table 6. Bivariate analysis between Squigglings and Torrance Tests of Creative Thinking (Torrance *et al.*, 2008)

	SQUIGGLING MEAN (SD)	TTCT MEAN (SD)	PEARSON'S R	P-VALUE	EFFECT SIZE
Squigglings Total – TTCT Total	68.833 (7.168)	105.167 (11.142)	0.174	0.179	Small
Squigglings Elaboration – TTCT Elaboration	11.100 (2.746)	107.933 (28.08)	0.261	0.082	Medium
Squigglings Originality – TTCT Originality	19.000 (1.259)	110.433 (19.062)	0.024	0.449	No association
Squigglings Fluency – TTCT Fluency	8.967 (3.662)	112.967 (15.399)	-0.187	0.162	Small
Squigglings Imagination – TTCT Abstractedness	16.700 (3.075)	95.100 (32.037)	0.414	0.012	Medium to Large

A medium to large significant positive association was found between the Squigglings Imagination subscale and the TTCT Abstractedness subscale. This result indicates there is good concurrent validity for the Squigglings Imagination subscale. See Figure 3 for a scatter-plot displaying this significant relationship.

As Table 6 shows, no other significant associations were found between the squigglings and TTCT subscales, nor was there a statistically significant association between the squigglings total score and the TTCT Average Standard Score. This indicates that, aside from the squigglings imagination subscale, squigglings has poor concurrent validity.

Figure 3. Scatter-plot of TTCT Abstractedness and Squiggling Imagination



2. Group comparisons of creative thinking abilities (CTA)

The second section of the results reports findings from a series of one-tailed paired-sample t-tests, carried out to test for significant differences between groups in the five creative thinking abilities outlined in the Torrance Tests of Creative Thinking (TTCT: Torrance, Ball & Safter, 2008). A series of one-tailed Wilcoxon signed-ranks test were carried out to test for significant differences between groups in the six creative thinking abilities in squiggling. See Table 7 and 8 for a summary of the findings from these group comparisons, with effect sizes for the group differences based on definitions provided by Cohen (1992).

Table 7. Group comparisons on TTCT creative thinking abilities

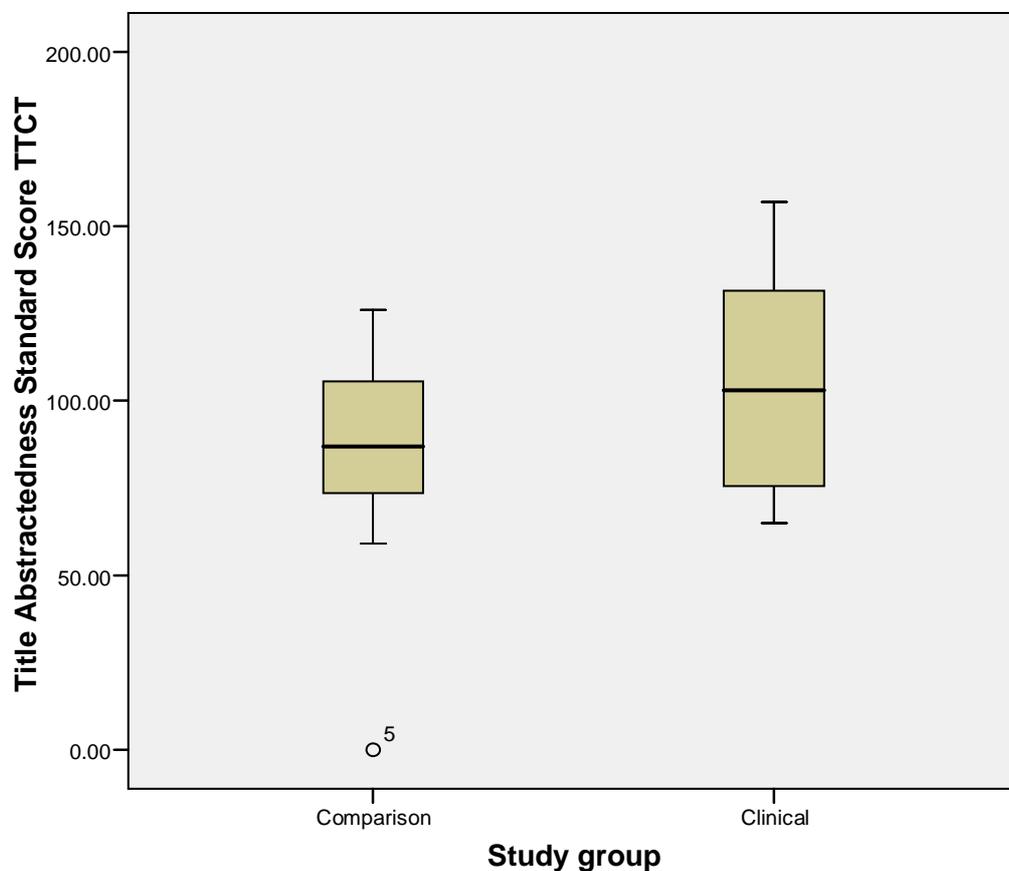
	CLINICAL MEAN (SD)	COMPARISON MEAN (SD)	T SCORE	P VALUE 1-TAILED	EFFECT SIZE
TTCT Elaboration	125.000 (24.003)	90.867 (20.808)	-3.526	0.001	1.519
TTCT Fluency	113.467 (16.199)	112.467 (15.109)	-0.175	0.432	0.064
TTCT Originality	113.600 (17.468)	107.267 (20.641)	-0.946	0.180	0.331
TTCT Abstractedness	105.400 (30.502)	84.800 (31.118)	-1.998	0.033	0.669
TTCT Resistance	96.800 (9.167)	102.333 (16.753)	1.396	0.092	-0.409
TTCT Average Scaled Score	110.800 (9.009)	99.533 (10.391)	-3.233	0.003	1.158

Table 8. Group comparisons on squiggling creative thinking abilities

	CLINICAL MEAN (SD)	COMPARISON MEAN (SD)	Z SCORE	P VALUE 1TAILED	EFFECT SIZE
Squiggling Imagination	16.467 (2.774)	16.933 (3.432)	-0.246	0.400	-0.149
Squiggling Originality	19.000 (1.195)	19.000 (1.363)	0.000	1.000	NA
Squiggling Elaboration	11.600 (3.043)	10.600 (2.414)	-1.122	0.262	0.364
Squiggling Fluency	8.667 (3.598)	9.267 (3.826)	-0.670	0.503	NA
Squiggling Flexibility	2.867 (0.743)	3.533 (0.639)	-1.996	0.046	NA
Squiggling Integration	9.400 (2.529)	10.267 (1.579)	-1.130	0.258	-0.411
Squiggling Total	67.667 (8.147)	69.667 (6.114)	-0.967	0.334	-0.278

Hypothesis 1 stated that children with AS will demonstrate lower levels of abstract imagination in their drawings and stories compared to typically-developing children matched on age, IQ and VMI. See Figure 4. Findings indicate that relative to the comparison group children with AS demonstrated a *significantly higher* level of abstract imagination in their drawings on the Torrance tests of Creative Thinking (Torrance *et al.*, 2008). The difference between groups could be considered large. In relation to the Meta-Representational Deficit hypothesis (Leslie, 1987), this finding supports the specificity of the deficit to mental meta-representations.

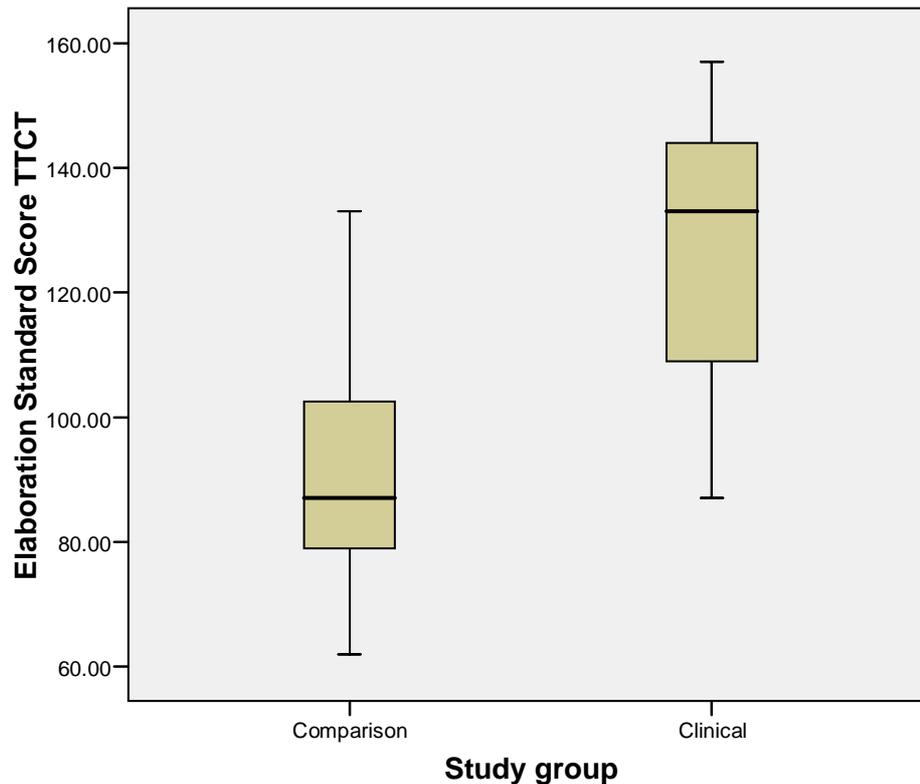
Figure 4. Box-plot showing differences between groups on TTCT Abstractedness



Hypothesis 2 stated that children with AS will demonstrate a higher level of elaboration in their drawings compared to typically-developing children matched on age, IQ and VMI. See Figure 5. Findings indicate strong support for this hypothesis as children with AS demonstrated a *significantly higher* level of elaboration in their

drawings relative to the sample of typically-developing children. Partial support for the Weak Central Coherence Theory (Frith, 1989) is indicated.

Figure 5. Box plot showing differences between groups on TTCT Elaboration



Hypothesis 3 stated that children with AS will demonstrate lower levels of integration in their drawings and stories compared to typically-developing children matched on age, IQ and VMI. No significant differences in Integration in squiggling were found between groups. However, this subscale was not established as sufficiently reliable or valid so conclusions cannot be made confidently concerning this hypothesis.

Hypothesis 4 stated that children with AS will demonstrate higher levels of integration in their drawings and stories compared to typically-developing children matched on age, IQ and VMI. As with the previous hypothesis, the measure for Integration in squiggling was not established as sufficiently reliable or valid to pursue

group comparison analysis so, based on findings from the present study, conclusions cannot be made confidently.

Hypothesis 5 stated that children with AS will demonstrate lower levels of fluency in their drawings compared to typically-developing children matched on age, IQ and VMI. This hypothesis was not supported as findings indicate that there were no significant differences between groups on fluency, defined as the ability to generate a number of different ideas. This finding does not support the Executive Dysfunction Theory (Pennington & Ozonoff, 1996).

Hypothesis 6 stated that children with AS will demonstrate lower levels of originality in their drawings compared to typically-developing children matched on age, IQ and VMI. This hypothesis was not supported as findings indicate that there were no significant differences between groups on originality, defined as the ability to generate unusual and novel ideas. Again, this finding does not support the Executive Dysfunction Theory (Pennington & Ozonoff, 1996).

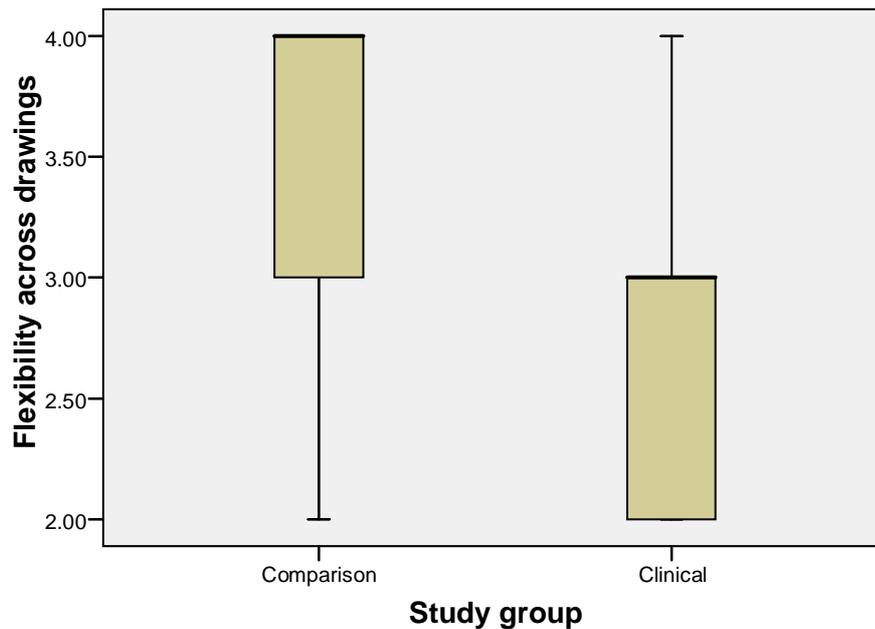
Hypothesis 7 stated that children with AS will demonstrate *higher* levels of originality in their drawings compared to typically-developing children matched on age, IQ and VMI. This hypothesis was not supported as findings indicate that there were no significant differences between groups on originality. This finding does not support the Hyper-Systemising (HS) Theory (Baron-Cohen, 2006).

Hypothesis 8 stated that children with AS will demonstrate lower levels of resistance to closure in their drawings compared to typically-developing children matched on age, IQ and VMI. This hypothesis was not supported as findings indicate that there were no significant differences between groups on resistance to closure, defined as the ability to resist giving the initial or easiest response. Once more, this finding does not support the Executive Dysfunction Theory (Pennington & Ozonoff, 1996).

Hypothesis 9 stated that children with AS will demonstrate lower levels of flexibility across their drawings compared to typically-developing children matched on age, IQ

and VMI. Findings support this hypothesis, in support of the Executive Dysfunction Theory (Ozonoff & Pennington, 1996). However, the measure for Flexibility in squiggling was not established as sufficiently reliable or valid, so conclusions cannot be made confidently concerning this hypothesis. See Figure 6.

Figure 6. Box plot showing differences between groups on Squiggling Flexibility

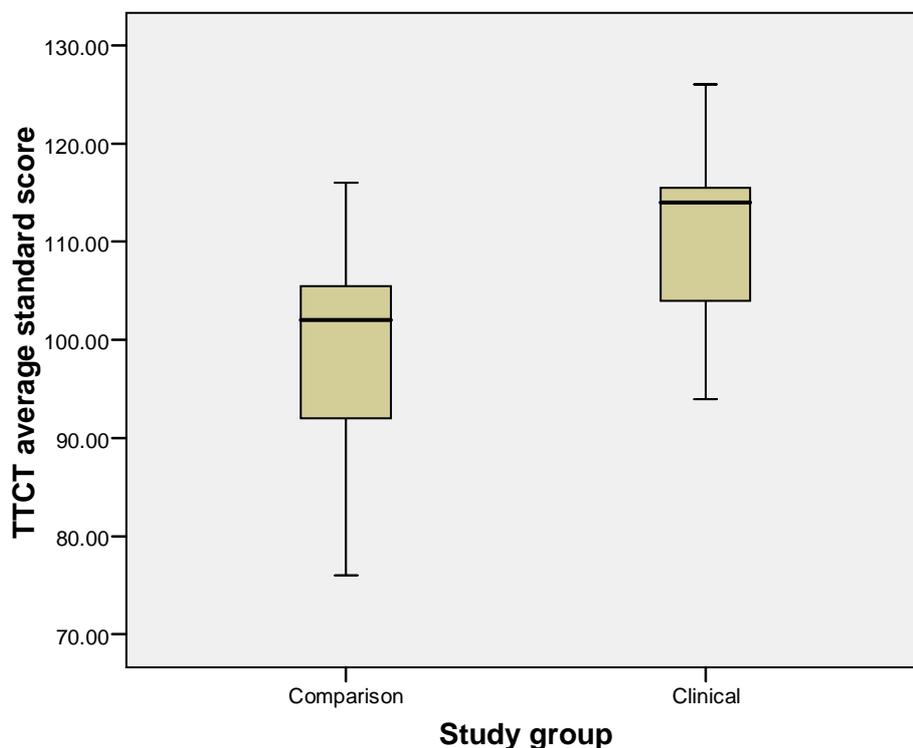


Hypothesis 10 stated that children with AS will demonstrate higher levels of overall creative thinking ability across their drawings compared to typically-developing children matched on age, IQ and VMI. See Figure 7. Findings support this hypothesis as a *large* significant difference was found between groups in terms of overall creative thinking ability, as measured by the TTCT Average Standard Score. Children with AS demonstrated a *significantly higher* level of overall creative thinking ability relative to typically-developing children on the Torrance Tests of Creative Thinking (Torrance *et al.*, 2008).

Across the sample, the TTCT subscales Elaboration ($r(30) = 0.569, p < 0.01$) and Abstractedness of Titles ($r(30) = 0.691, p < 0.01$) were found to significantly and positively correlate with the Average Standard Score from the TTCT. This finding

indicates that the ability to provide a high level of detail and to generate non-reality based ideas may be key aspects of creative thinking. Indeed, the reliability of the TTCT scale (indicated by Cronbach's alpha) would be reduced from 0.469 to 0.418 if the Elaboration subscale were to be removed and from 0.469 to 0.437 if the Abstractedness subscale were to be removed.

Figure 7. Box plot showing differences between groups on TTCT Overall Creative Ability



Some further correlations were performed to explore associations with the TTCT Elaboration and Abstractedness subscales. A significant positive association was found between the subscales Elaboration and Abstractedness ($r(30) = 0.437$, $p < 0.01$). See Figure 8 for a scatter-plot showing the close positive relationship between these sets of scores. A significant negative association was found between the subscales Elaboration and Resistance to Premature Foreclosure ($r(30) = -0.556$, $p < 0.01$). See Figure 9 for a scatter-plot showing the negative relationship between these sets of scores.

Figure 8. Scatter-plot of TTCT Abstractedness and TTCT Elaboration

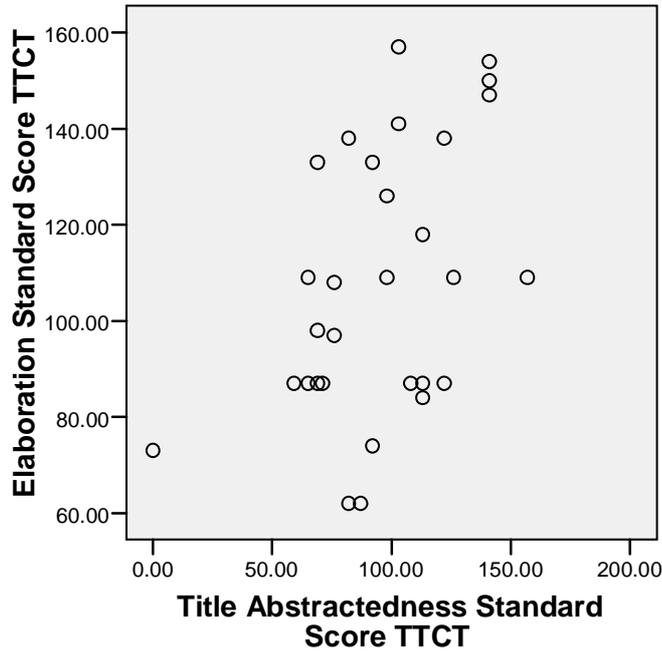
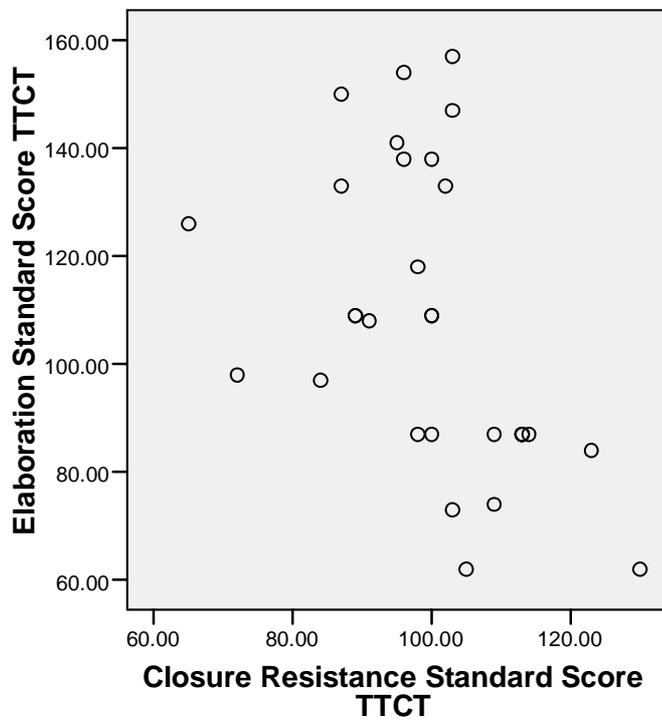


Figure 9. Scatter-plot of TTCT Elaboration and TTCT Resistance to Premature Foreclosure



3. Relationship between meta-representational ability and abstract imagination

An additional aim of the present study was to investigate the relationship between abstract imaginative thinking and meta-representational capacity. An abbreviated version of the Strange Stories Test (SST: Happe, 1994) was administered to obtain a measure of meta-representational ability, which was correlated with the squiggling Imagination subscale and the TTCT Abstractedness subscale. To score highly on these subscales, the participant would have required the abilities to form abstract mental representations and to produce as a secondary representation *external* to one's mind.

Firstly, differences on the SST between groups were examined. The mean total score (maximum four points) for the empathy-based stories from the SST was 3.067 (sd 1.223) for the comparison group and 2.6 (sd 1.639) for the clinical group. This indicates that meta-representational capacity was slightly higher in the comparison group, although a Wilcoxon signed ranks test revealed that a statistically significant difference between groups was *not* found ($Z = -1.144$, $p > 0.05$; ns).

Next, a Spearman's rho correlation was performed to explore the relationship between the squiggling subscale Imagination scores (mean 16.7, standard deviation 3.075) and the SST scores (mean 2.833, standard deviation 1.44) across the whole sample. No significant association was found between these variables ($r(30) = 0.117$, $p > 0.05$). A Spearman's rho correlation was also performed to explore the relationship between the TTCT subscale Abstractedness (mean 95.1, standard deviation 32.037) and the scores from the Strange Stories Test (SST). Again, no significant association was found between these variables ($r(30) = -0.155$, $p > 0.05$). At first glance, these findings suggest that one can conclude with some confidence that there is no relationship between meta-representational ability and abstract imagination as a creative thinking ability. This may be accounted to the different focus and nature of tasks, i.e., drawing and storytelling.

Discussion

The discussion is split into five sections. Firstly, the background and rationale for the study is briefly presented, following by a summary of the main findings from the present study. The findings outline the validity study of squigglings and the group comparisons on the following seven creative thinking abilities: fluency, elaboration, originality, flexibility, integration, resistance to premature foreclosure, and abstract imagination. Secondly, the implications of the findings for the theories outlined in the introduction are presented. In the third section, some implications for clinical practice are outlined. In the fourth section, some of the strengths and limitations of the present study are presented. Lastly, some possible areas for further research stemming from the present study are outlined, before providing some concluding comments.

1. Background and Rationale

Children showing signs of Asperger syndrome are *not* receiving an accurate and timely diagnosis, thereby failing to meet Standards One and Nine of the National Service Framework for Children and Young People (NSF: Department of Health, 2004). Asperger syndrome is an autism spectrum condition that is recognisable in early childhood, yet the average age of diagnosis is 11 years (Howlin & Moore, 1997). Parents of children with AS report a frustrating delay until they are in receipt of a formal diagnosis for their child (Howlin & Asgharian, 1999). Delayed diagnosis can mean slowed access to appropriate treatment and support and a reduced likelihood of improved outcome for the child and their family (Dawson & Osterling, 1994; Bryson, Rogers, & Fombonne, 2003).

The delay in obtaining a diagnosis of Asperger syndrome can be traced to several challenges along the referral and assessment pathway within the children's healthcare system. The clarity of Asperger syndrome as a discrete condition is complicated by a complex web of additional psychiatric and/or physical conditions, which may necessitate a process of differential diagnosis (Tantam, 2000) and a paucity of neuropsychological and experimental support clearly differentiating from other autism

spectrum conditions (Volkmar, Lord, Bailey, Schultz & Klin, 2004). This uncertainty for researchers and clinicians may have contributed to the lack of developed diagnostic tools specifically for assessing Asperger syndrome in children (Howlin, 2000). A diagnostic aid may help to catalyse the diagnostic process by highlighting key differences between children with Asperger syndrome and typically-developing children.

The reasons for investigating the creative thinking abilities of children with Asperger syndrome stem from research evidence that indicates significant differences compared with typically-developing children, and from theoretical support for these differences. Squiggling, an inexpensive drawing and storytelling game is proposed as a diagnostic aid that may provide information on a child's creative thinking abilities. In this way, at the stage of assessment squiggling may help to differentiate children with Asperger syndrome from typically-developing children. While there are some developed measures of creative thinking abilities available to clinicians, they do not appear to meet the need for a comprehensive, cost-effective and accessible diagnostic aid. So it is proposed that squiggling may have potential value as a diagnostic aid.

The first aim of the present study was to gauge the reliability and validity of *squiggling* as a measure of creative thinking ability. The second aim was to test for proposed differences in seven creative thinking abilities between children with Asperger syndrome and typically-developing children. A third aim was to examine the relationship between meta-representational ability and abstract imagination.

2. Summary of Results

As no significant relationships between the creative thinking total scores for squiggling and the Torrance Tests of Creativity (Torrance, et al., 2008) were found, poor concurrent validity of squiggling as a measure of creative thinking abilities is indicated. However, a significant positive correlation was found between the *squiggling imagination* subscale and TTCT Abstractedness subscale, and hence good criterion validity is indicated here. Otherwise, no other significant correlations were

found between *squiggling* and TTCT subscale scores. A moderate degree of reliability was found for *squiggling*, in terms of inter-rater and internal consistency, although many of the subscales lack concurrent validity. Until the *squiggling* scoring criteria are revised one cannot say that *squiggling* is a wholly valid or reliable measure of creative thinking abilities.

Children with Asperger syndrome demonstrated a significantly higher level of overall creative thinking ability compared to typically-developing children (effect size = 1.158). This finding indicates support for a model of autism spectrum conditions that highlights the presence of skills and knowledge, for example promoted by Francesca Happé (1999).

Specific creative thinking abilities were identified as significantly different between groups. Children with Asperger syndrome demonstrated a significantly higher level of *elaboration* in their drawings compared to typically-developing children (effect size = 1.519), indicating partial support for the Weak Central Coherence Theory (Frith, 1989).

A further large specific difference between groups was found. Children with Asperger syndrome also demonstrated a significantly higher level of *abstractedness* in their drawings compared to age and non-verbal IQ matched typically-developing children (effect size = 0.669). This finding indicates support for the specificity of the Meta-Representational Deficit hypothesis (Leslie, 1987) to mental secondary representations. This finding is based on the assumption that the ability to generate non-reality based ideas is tied in with the ability to decouple mental representations. However, this conclusion may be questionable as no relationship was found between meta-representational ability and abstract imagination.

No other significant differences were found between groups in the creative thinking abilities, originality, fluency and resistance to premature foreclosure as measured by the TTCT (Torrance *et al.*, 2008). These findings indicate a lack of support for the

Executive Dysfunction Theory (Pennington & Ozonoff, 1991) and also a lack of support for the Hyper-Systemising Theory (Baron-Cohen, 2006).

A significant difference was found between groups in flexibility, defined as the ability to generate a range of different ideas, in squiggling, indicating support for Executive Dysfunction Theory (Pennington & Ozonoff, 1991). No significant differences were found between children with Asperger syndrome and typically developing children in integration, defined as the ability to combine ideas, in squiggling. However, the flexibility and integration subscales were found to have psychometric weaknesses so conclusions based on these findings must be made with caution.

3. Implications for theory

The implications of the findings from the present research for the four cognitive theoretical perspectives of autism spectrum conditions presented in the introduction are outlined here.

One of the main findings was that children with Asperger syndrome demonstrated a higher level of elaboration in their drawings compared to typically-developing children, thereby providing partial support for the WCC theory (Frith, 1989). This particular result supports previous research finding that children with AS show precedence for processing detail over contextual visual information (e.g., Jolliffe & Baron-Cohen, 1997; Baron-Cohen & Hammer, 1997). Full support for the WCC theory is not indicated as there was no significant difference between groups in *integration*. However, this may need to be investigated further as poor reliability and concurrent validity was found for the *squiggling integration* subscale.

The finding that children with Asperger syndrome demonstrated a significantly higher level of *imagination* and *abstractedness* in their drawings compared to typically-developing children indicates that Leslie's (1987) Meta-Representational Deficit hypothesis is specific to mental meta-representations. In line with previous research findings (Craig & Baron-Cohen, 2000; Craig, Baron-Cohen & Scott, 2001) marginally

reduced meta-representational ability in children with AS was indicated as the clinical group scored lower on the Empathy subscale of the SST (Happe, 1994) relative to the comparison group (although the difference was not *statistically* significant).

Little support was found in the present study for the Executive Dysfunction theory (Ozonoff & Pennington, 1991) as there were no differences in resistance to premature foreclosure, originality and fluency between groups. The finding of a significant difference in squiggling *flexibility* appears to demonstrate partial support, although there is poor criterion validity for this subscale so the result is questionable.

The finding that children with AS demonstrate no differences in the flexibility, integration and originality of their drawings indicates poor support for the HS theory. For the former two subscales, however, there is poor criterion validity so, again, caution must be taken in interpretation of these particular results.

4. Implications for clinical practice

Based on the findings, some implications for the clinician in practice are presented concerning the use of graphical representations to communicate abstract concepts, and supporting children and young people with a local information processing style.

The present thesis provides support for the specificity of the MRD hypothesis; *i.e.*, that children with Asperger syndrome do possess an understanding of and ability to express abstract and imaginative graphical representations. This may be useful information for the practicing clinician in encouraging children with Asperger syndrome to participate in activities where they can express abstract ideas graphically. Involvement of visual means of communication such as drawing can enhance the understanding for a child with an autism spectrum condition (Bogdashina, 2005; Bader, 2006), for example using comic strips for eliciting thoughts and beliefs (Hitchins, 2006), and using diagrams of the body when providing psycho-education on the physical nature of anxiety. Understanding of abstract concepts may be important in effective social skills training for children with Asperger syndrome

(Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006; Scattone, 2008), for example with Social Stories (Gray, 1998; Crozier & Tincani, 2007) in promoting social competence.

The high level of elaboration in drawings by children with Asperger syndrome is supportive of the proposed preference for attention to detail. It may be useful for the clinician to be reminded of this at assessment. For example, the impact of local attentional bias should be considered when interpreting performance by children with Asperger syndrome on tasks with stimuli that provide whole pictures (*i.e.*, as there is potential for this particular information processing style invalidating the test). The clinician may judge that they need to support the child in understanding a task, for example by modelling and highlighting the global context, especially if a local bias is noticeably affecting their performance. In this way, the risk of an impaired ability to attend to the contextual visual information significantly impeding true performance is minimised. While there is evidence to suggest that modelling facilitates creative thinking (Landreneau & Halpin, 1978), it was judged was more important to minimise the risk of misunderstanding the task.

There are positive implications for the local style of visual processing, for example in supporting and encouraging young people with Asperger syndrome to enter training, apprenticeships or employment that requires attention to detail (e.g., air traffic controller, architect, cartographer, newspaper editor, graphic designer, or photographer). Parents can highlight this difference as a skill as well as a difficulty, for example during visually-based activities at home such as drawing, taking photographs, reading music and playing computer games.

5. Limitations of the study

Some limitations of the present study are presented, concerning the psychometric strength of squiggle as a measure of creative thinking abilities, and control of confounding variables. The risks of confounding effects are overall considered minimal albeit worthy of acknowledgement.

5.1. Psychometric strength of squiggling

The present study found a moderate degree of internal consistency and suitable inter-rater reliability for squiggling, although poor concurrent validity with the Torrance Test of Creative Thinking (Torrance *et al.*, 2008). Squiggling at presents lacks much psychometric strength. While the definitions of creative thinking abilities were sufficiently precise to ensure suitable inter-rater reliability, aside from Originality, the squiggling scoring criteria (see Appendix 3) could be described as a somewhat crude rating system. Based on the Spearman-Brown Prophecy Formula, the greater the number of items in a scale, the greater the internal consistency (Nunnally & Bernstein, 1994), so the four-item scales for squiggling probably contributed to the poor internal consistency for some of the subscales.

Concurrent validity could not be established for the squiggling subscales Flexibility and Integration. This was in part due to constraints on the amount of time one can ask for someone to participate. The administration of a measure of flexibility in thinking such as the Trail-Making subtest of the DKEFS (Delis *et al.*, 2001) would have enabled examination of concurrent validity of the flexibility subscale of squiggling. However, it would have added a further 20 minutes to the testing time.

5.2. Control of verbal intellectual abilities

Participants in the study were not sufficiently matched on verbal intellectual ability, which was measured by the Vocabulary and Similarities subtests of the WASI (Wechsler, 1999). Expressive language (i.e., verbal) abilities have been found to positively correlate with capacity for imaginative symbolic play in children with an autism spectrum condition (Stanley & Konstantareas, 2007). Based on this research finding, one could hypothesise that higher verbal abilities for some participants may have facilitated their ability to generate non-reality based ideas (i.e., show higher levels of imagination and abstractedness). This leaves the possibility that if participants had been matched on Verbal IQ, this may have resulted in a larger significant difference between groups in abstract imagination. However, no

significant association was found between abstract imagination and expressive language ability (based on the verbal WASI subtest Vocabulary). Indeed, there is no evidence from the present study for significant relationships between any of the creative thinking abilities and verbal intellectual abilities so any confounding effect is likely to be minimal.

5.3. Co-morbid conditions

There were six participants in the clinical group of children with Asperger syndrome with additional diagnoses of anxiety disorders and neurological conditions. The clinical group was therefore not purely children with AS, so the differences observed in creative thinking abilities between groups may be attributed in part to these additional diagnoses. For example, the less focussed attention typical of children with ADHD appears to promote creative thinking (Shaw & Brown, 1990), so participants with AS and ADHD may have had an advantage in terms of their abilities to switch attention between detailed and whole contextual information. The presence of these co-morbid conditions may therefore be a confounding factor; one that was difficult to control for given the time restraints for data collection.

5.4. Motivation

The lead researcher encountered little success recruiting for the comparison group, so the offer of a cash reward was made to typically-developing participants. Participants in the clinical group received the book, “*All Cats Have Aspergers*” (Hoopman, 2007), as a reward for taking part. This was an important decision for the researchers as there was a possibility that the, perhaps more explicit, reward of cash for participants and greater focus on an *external* incentive may have lowered participant’s motivation and performance on the creative thinking tasks. Children in the comparison group were noticeably less enthused on squiggling and the Torrance Tests of Creative Thinking (Torrance *et al.*, 2008) specifically to add or develop their ideas compared to children with Asperger syndrome (who did not receive a cash reward). Engagement with an activity for a reward, and thereby being extrinsically motivated, can be less conducive

to creative thinking than engaging with an activity out of enjoyment (e.g., Amabile, 1996; Amabile & Gitomer, 1984; Amabile, Hill, Hennessey & Tighe, 1994). However, further research demonstrates that extrinsic motivation can also be conducive to creative thinking (Eisenberger & Cameron, 1996; Amabile, 1996) so the potential confounding effect of rewards to take part was judged to be minimal albeit quite possible.

A further factor considered by the researchers with regards to motivation as a mediating factor was level of knowledge in drawing and storytelling. Creative thinking can be facilitated if there is a considerably developed domain-specific knowledge base (Runco & Chand, 1995; Sternberg, 2003; Kaufman & Baer, 2006). A limitation of the study was that data on whether participants studied and particularly enjoyed art and creative writing at school were not systematically collected. However, it was viewed that given the age of participants it was unlikely they would have developed expert strategic knowledge in drawing and storytelling. Indeed, it is estimated to take about a decade of study, work and experience to develop a strong domain-specific evidence base (Ericsson, 1996). So, it was concluded that the chance of a potential confounding effect here was again minimal.

5.5. Performance anxiety

As participants of the study were made aware, there was a possibility of mild performance anxiety. There is evidence to indicate that brief periods of anxiety can decrease performance on creativity tasks (Kaufman & Baer, 2006). Some participants showed some signs of shyness initially, which could be attributed to anxiety about their performance or about speaking with a new person in a relatively novel situation. However, in the present study this could not be regarded as a significant confounder as several measures were taken to minimise the risk of anxiety during the testing sessions so any signs were not sustained. Many of the participants in fact spontaneously expressed their enjoyment of the tasks.

5.6. Associative memory

Creative thinking can be facilitated by the organisation of associative memory (Mednick 1962). The more remote or disparate the combinations of mental representations within the memory store, the higher the level of creativity. This specific aspect of memory function may have been a confounding variable in the present study.

6. Strengths

There are a number of strengths concerning the present study, including a successful participant matching procedure, reliable and valid piloting of some subscales in the squiggling game, and good external validity (i.e., generalisability of findings).

6.1. Participant matching

Participants were sufficiently matched on chronological age, gender, non-verbal intellectual ability and visual-motor integration. There is evidence to suggest that these are, to varying degrees, mediating factors in creative thinking. This control by design ensures that the significant differences in elaboration and flexibility between matched-pairs were not influenced by differences in these variables, *i.e.*, essentially reducing the amount of error.

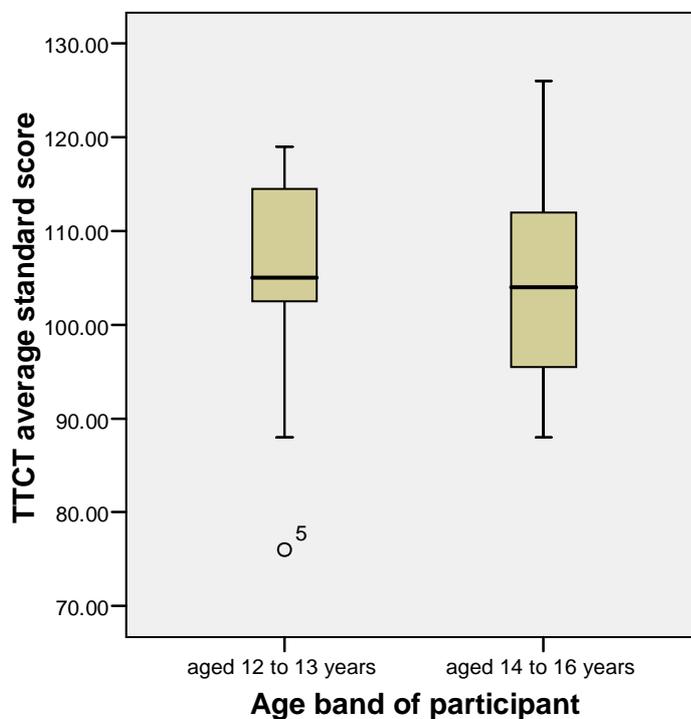
6.1.1. Chronological age

In the present study, it was highly important to account for age as research indicates that the development of creative thinking fluctuates across childhood and throughout adolescence (Kaufman & Baer, 2006).

In the early teenage years, desire to conform to conventional expectations and peer pressure can lead to a temporary decline in creative thinking (Guignard & Lubart, 2006). By middle adolescence, a new *formal operational* style of reasoning is usually

well-developed and allows for manipulation of abstract ideas and the ability to adopt several different perspectives on a problem (Piaget, 1962). Rothenberg (1990) refers to the adolescent development of *homospatial* thinking, whereby distinct thoughts are integrated into a newly created whole. Together with a striving for independent thought and autonomy, creative thinking abilities can flourish (Rothenberg, 1990). Across both groups, the converse of this pattern was evident to a degree, with the lower age bands (i.e., aged 12 to 13 years, N = 19) showing a marginally higher level of overall mean creative thinking ability (mean = 105.211, standard deviation 10.644) than the older age band (aged 14 to 16 years, N = 11) (mean = 105.091 standard deviation 12.494). See Figure 10 for a display of the slight positive skew of the distribution of scores in the lower age band. This finding may be contrary to expectations as they are based on a model of normative development of creative thinking, and the study involved non-typically developing children. It was valuable to have matched participants on chronological age prior to further analysis as variance in creative thinking ability across age groups was apparent.

Figure 10. Box-plot showing difference between age bands in overall creative thinking ability (TTCT Average Standard Score)



6.1.2. Gender

In the present study, the male to female ratio was very high, with just two female participants, so it was not possible to explore differences in creative thinking abilities according to gender. However, for a revision of the study it may be important to consider a possible confounding effect of gender. A recent study in China found that amongst a large sample of adolescents, there were no gender differences on fluency, flexibility, and originality (Jiliang & Baoguo, 2007). There is a paucity of published literature on the interaction of gender and other creative thinking abilities so the probable extent of gender having a confounding effect is difficult to determine.

6.1.3. Non-verbal intellectual abilities (PIQ)

As evidence exists for a skill in Block Design in children with AS (Szatmari, Tuff, Finlayson & Bartolucci, 1990) and such skill has the potential to facilitate creative thinking (Kaufman & Baer, 2006), it was important to match participants on non-verbal IQ. Non-verbal intellectual abilities were measured by the WASI subtests Block Design and Matrix Reasoning, tapping into visual-spatial organisation and reasoning skills. The groups performed similarly on the Block Design task in the present study (clinical group mean = 58, standard deviation = 9; comparison group mean = 58.667, standard deviation = 7.068).

6.1.4. Visual-motor integration (VMI)

The finding that overall level of VMI was age-appropriate in the clinical group was fortunate for the study design as participants could be easily matched on this variable. It was an unexpected finding, as copying visual information, as is required in the Beery-Buktenica Developmental Test of Visual-Motor Integration (BVMI: Beery & Beery, 2006), can be difficult for individuals with Asperger syndrome (Attwood, 2007). Indeed, impairment of VMI is considered a common feature of Asperger syndrome (Green, Baird, Barnett, Henderson, Huber & Henderson, 2002; Ghaziuddin & Butler, 1998; Ghaziuddin, Butler, Tsai, & Ghaziuddin, 1994; Gillberg, 1998; Green

et al., 2002; Klin, Volkmar, Cicchetti, & Rourke, 1995; Hilton, Wenthe, LaVesser, Ito, Reed & Herzverg, 2007).

6.2. External validity

The findings from the present study can be generalised to an extent to the Asperger population. While the presence of co-morbid conditions affects the confidence with which one can draw statistical conclusions from the present study, the heterogeneity of the clinical group is perhaps more representative than if there had been no co-morbidities. Children with Asperger syndrome are not a homogeneous group (Atwood, 2007). The study is also ecologically representative in terms of the procedures and settings in which the tests were administered. The children participated in their homes or in another familiar environment, and the tests were administered in an informal game-like condition albeit in a standardised way. Activities such as storytelling and drawing tend to occur with such informality.

6.3. Data collection process

A particular strength of the study is the data collection process, because perseverance across a period of six months led to a well-matched sample of 30 participants. While the sample size could not be considered large, it was sufficient to permit reasonable inferences about associations and differences between variables.

A further four participants participated fully in the present study although their data could not be included in the analysis as there were no suitable matches with participants in the comparison group. There were also two participants who started the study but chose to discontinue. So data on 36 individual participants were collected by the lead researcher, each participant requiring an estimated average eight hours for data collection. This figure includes travel time, testing, scoring and summary report writing.

Data collection was clearly time-consuming and it was also an effortful process. There were considerable barriers to recruitment of participants in the comparison group that delayed the data collection process. Initially, 15 local secondary schools were contacted inquiring about assistance with the study for recruitment of the comparison group, from which three offered to help. Information packs were delivered and disseminated an independent informed consent was obtained from all three schools wishing to participate in the study. However, only one participant was successfully recruited through these three schools. It was understood via feedback from the schools that timing of revision for examinations unfortunately coincided with the requests for participation in the study; hence the poor response rate.

7. Further research

Proposed here in the final section are some possible avenues for further research stemming from the present study. The first idea relates to a constructive replication of the present study to control for the identified confounders. The second possible area for further research concerns qualitative investigation of detail focus and meta-representational ability in the narratives produced by children with AS (following on from study by Craig, Baron-Cohen & Scott, 2001).

7.1. Constructive replication of present study

Without sounding too clichéd here, it is clear that with more time and resources the present study could be replicated with a number of improvements to the recruitment process, the measures and procedure.

For example, the comparison group could be recruited after the clinical group, rather than simultaneously, to enable a more accurate matching process. One could adopt stricter inclusion criteria, recruiting children with Asperger syndrome and no co-morbid psychiatric, physical or additional developmental conditions. In this way, the heterogeneity of the sample could be minimised further, albeit to the detriment of external validity, and conclusions may be reached more confidently.

Adaptations to the measures used in the present study could be made to increase the confidence with conclusions could be drawn. For example, the scoring criteria for squiggling could be revised and the subscales could be lengthened to increase reliability. The complete version of the Strange Stories Test (SST: Happe, 1994) could be administered to ensure more reliable measurement of meta-representational ability.

The present study was based on a Western definition of creativity and creative thinking, *i.e.*, a spotlight on individual cognitive abilities. It was wise to start with this focus, as development of creativity during early childhood years is inextricably linked with individual development of cognitive abilities (Kaufman & Baer, 2006). However, the assessment of creative thinking in the individual child must be considered within their social context (Plucker, Beghetto & Dow, 2004). Participants in the present study were all from middle class White British families, and therefore from a Western mainstream cultural background. In the West (*i.e.*, Europe and North America), creativity is generally viewed as a useful product of an individual's analytical and formal reasoning, somehow detached from the environment and context (Norenzayun, Smith, Kim & Nisbett, 2002). In a replication of the study, it may be interesting to examine the influence of different cultural belief systems on level of creative thinking ability, and thereby adopt a more holistic and contextual stance towards researching creativity between groups of children with AS and groups of typically-developing children. This may be possible through collecting data on cultural beliefs concerning creativity filtered through to systems such as the family and schools.

Development of creative thinking can be nurtured, neglected or actively discouraged by the family and school environment (Kaufman & Baer, 2006; McLaughlin, 2008). For example, at home the family lifestyle may regularly involve activities that require or encourage creative thinking (*e.g.*, painting, craft, play, debate). The marginalisation of creative thinking within the current British education system is a hot issue for debate. The pressure for teachers to deliver the academic curriculum through covering vast amounts of content ensures that there is little space for encouragement of creative

thinking (Barab & Plucker, 2002). Such a teacher-centred approach in classrooms has been shown to impede creative thinking in children (Fasko, 2001; Schuh, 2003).

7.2. Elaboration and abstract imagination in narratives

To follow on from a study by Craig, Baron-Cohen & Scott (2001), the creative thinking abilities elaboration and abstract imagination could be examined in further depth in the stories produced by children with Asperger syndrome, again within a quantitative research paradigm. Any mediating effect of verbal memory recall and verbal attention could be controlled for through the administration of appropriate psychometric tests. Such a study would base its hypotheses on Frith's (1989) Weak Central Coherence Theory and Leslie's (1987) Meta-Representational Deficit hypothesis.

8. Conclusion

Preliminary evidence was found that indicates squiggling could be developed further as a measure of creative thinking abilities. In particular, findings from the present study indicate that the squiggling subscales elaboration and imagination provide a reliable and valid measure of the ability to add detail and abstract ideas to drawings. The overall internal consistency of squiggling was found to be acceptable, although this may be improved with revision of the subscales originality and flexibility. The concurrent validity for the squiggling subscales flexibility and integration needs to be established.

Support for the Weak Central Coherence Theory (Shah & Frith, 1983) will continue to inform guidance for the clinician in practice, the child or adolescent with Asperger syndrome, their family and school. The present study supports the exclusion of the imagination impairment aspect of Wing's (1981) triad for individuals with Asperger syndrome.

In a replication of the present study, researchers may be likely to encounter similar difficulties with recruiting a purely Asperger sample due to continuing differences in diagnostic practice drawing on different definitions. Until the controversy regarding the validity of Asperger syndrome as a diagnostic definition dissipates within the clinical and research community, there will continue to be hazards to piloting, developing and evaluating diagnostic aids designed to be specific to this condition. The American Psychiatric Association announced last year that a revision of the DSM-IV-TR was aimed to be published in 2012 (Nordqvist, 2007).

A possible example of a change following the revision may relate to the diagnostic criterion within the ICD-10 (WHO, 1992) and the DSM-IV-TR (APA, 2000) of “*stereotyped and repetitive motor mannerisms*”. This criterion is potentially misleading as this characteristic is relatively rare in children with Asperger syndrome, and if it is present it typically disappears in mid-childhood (Church, Alisanski & Amanullah, 2000). A further change may be made to a diagnostic exclusion criterion of “*no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills*” (ICD-10: WHO, 1992; DSM-IV-TR: APA, 2000). This latter area is often below average in children with Asperger syndrome as they can struggle with organisation and adaptive behaviour (Smyrniotis, 2002).

A further example concerns the criterion relating to no language delay, highlighted by Attwood (2007), who suggests that the focus of diagnostic criteria should be on the current level of functioning rather than the history. If a child demonstrated a transient delay in early language development, a diagnosis of Childhood Autism (ICD-10, WHO, 1992) would take precedence over Asperger syndrome (Woodbury-Smith, Klin & Volkmar, 2005). However, a child’s language functioning might improve in early childhood to an average level, but their diagnosis would technically remain unchanged. As it stands, the criterion relating to no language delay is defined in a narrow way, by overly focussing on early developmental history.

An update of the diagnostic criteria may help to clarify the diagnostic process for clinicians and promote the development of assessment tools and diagnostic aids

specific to Asperger syndrome. Perhaps then children showing signs of Asperger syndrome start to receive an accurate and timely diagnosis, and thereby aid services to meet Standards One and Nine of the National Service Framework for Children and Young People (NSF: Department of Health, 2004). Perhaps even a shift away from a deficits based model may be evident, for example including features within the diagnostic criteria for Asperger syndrome or Asperger's Disorder that relate to *skills*.

References

- Akshoomoff, N., Farid, N., Courchesne, E. & Haas, R. (2007). Abnormalities on the neurological examination and EEG in young children with Pervasive Developmental Disorders. *Journal of Autism and Developmental Disorders*, 37, 887-893.
- Allen, M. H., Lincoln, A. J. & Kaufman, A. S. (1991). Sequential and simultaneous processing abilities of high-functioning autistic and language-impaired children. *Journal of Autism and Developmental Disorders*, 21(4), 483-502.
- Amabile, T. M. & Gitomer, J. (1984). Children's artistic creativity: Effects of choice in task materials. *Personality and Social Psychology Bulletin*, 10(2), 209-215.
- Amabile, T. M., Hill, K. G., Hennessey, B. A. & Tighe, E. M. (1994). The Work Preference Inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology*. 66(5), 950-967.
- Amabile, T. M. (1996). *Creativity in context: Update to The Social Psychology of Creativity*. Boulder: Westview Press.
- Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357-376.
- American Psychiatric Association (APA). (2000). *Diagnostic and Statistical Manual of Mental Disorders*, (4th ed. Revised). Washington DC: APA.
- Anderson, G. V. (1960). Review of Welsh Figure Preference Test (Research Edition). *Journal of Counseling Psychology*, 7(4), 310-311.
- Andreasen, N. (1978). Creativity and psychiatric illness. *Psychiatric Annals*, 8(3), 23-45.

Ansburg, P. I. & Hill, K. (2003). Creative and analytic thinkers differ in their use of attentional resources. *Personality and Individual Differences*, 34(7), 1141-1152.

Asperger, H. (1944). Die autistischen Psychopathen im Kindersalter. *Archiv fur Psychiatric Nervenkrankheiten*, 177, 76-137.

Attwood, T. (2007). *The Complete Guide to Asperger Syndrome*. London: Jessica Kingsley

Aylward, E. H., Minshew, N. J., Field, K., Sparks, B. F. & Singh, N. (2002). Effects of age on brain volume and head circumference in autism. *Neurology*, 59, 175-183.

Baddeley, A. (2002). Fractionating the central executive. In D. T. Stuss, & R. T. Knight (Eds), *Principles of frontal lobe function*. (pp. 246-260). New York: Oxford University Press.

Bader, R. (2006). Using social stories to increase emotion recognition and labeling in school-age children with autism. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 67(3-B), 1692.

Baird, G., Charman, T., Baron-Cohen, S., Cox, A., Sweetenham, J., Wheelwright, S., et al. (2000). A screening instrument for autism at 18 months of age: a six-year follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 694-702.

Baird, G., Simonoff, E., Pickles, A., Chandler, S., Loucas, T., Meldrum, D., et al. (2006). Prevalence of disorders of the autism spectrum in a population cohort of children in South Thames: the Special Needs and Autism Project (SNAP). *Lancet*, 368(9531), 210-215.

Barab, S.A. & Plucker, J.A. (2002). Smart people or smart contexts? Talent development in an age of situated approaches to learning and thinking. *Educational Psychologist*, 37, 165-182.

Baron-Cohen, S. (1987). Autism and symbolic play. *British Journal of Developmental Psychology*, 5(2), 139-148.

Baron-Cohen, S. (1989). The autistic child's theory of mind: a case of specific developmental delay. *Journal of Child Psychology and Psychiatry*, 30, 285-298.

Baron-Cohen, S. (1990). Instructed and elicited play in autism: A reply to Lewis & Boucher. *British Journal of Developmental Psychology*, 8(2), 207.

Baron-Cohen, S. (1995). *Mindblindness: an essay on autism and theory of mind*. Boston: MIT Press/Bradford Books.

Baron-Cohen, S. (1998). Superiority on the Embedded Figures Task in autism and in normal males: evidence of an "innate talent"? *Behavioural and Brain Sciences*, 21, 408-409.

Baron-Cohen, S. & Hammer, J. (1997). Parents of children with Asperger Syndrome: what is the cognitive phenotype? *Journal of Cognitive Neuroscience*, 9, 548- 554.

Baron-Cohen, S., Scahill, V. L., Izaguirre, J., Hornsey, H. & Robertson, M. M. (1999). The prevalence of Gilles de la Tourette Syndrome in children and adolescents with autism: a large scale study. *Psychological Medicine*, 29, 1151-1159.

Baron-Cohen, S., Leslie, Alan M. & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition*, 21(1), 37-46.

- Baron-Cohen, S., Leslie, A. M. & Frith, U. (1986). Mechanical, behavioural and Intentional understanding of picture stories in autistic children. *British Journal of Developmental Psychology*, 4(2), 113-125.
- Baron-Cohen, S. (2006). The hyper-systemizing, assortative mating theory of autism. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 30(5), 865-872.
- Baron, I. S. (2004). Delis-Kaplan Executive Function System. *Child Neuropsychology (Neuropsychology, Development and Cognition: Section C)*, 10(2), 147-152.
- Beery, K.E. (1967). *The Developmental Test of Visual Motor Integration*. Minneapolis, MN: NCS Pearson Inc.
- Beery, K.E., & Beery, N.A. (2006). *The Beery-Buktenica Developmental Test of Visual Motor Integration. 5th Edition*, US: NCS Pearson Inc.
- Belmonte, M. K., Mazziotta, J. C., Minshew, N. J., Evans, A. C., Courchesne, E., Dager, S. R., et al. (2008). Offering to share: how to put heads together in autism neuroimaging. *Journal of Autism and Developmental Disorders*, 38, 2-13.
- Bernabei, P., Palli, F. G., Levi, G., Mazzoncini, B. & Cannoni, E. (1999). Disturbance of imagination and symbolization in pervasive developmental disorders: Preliminary study utilizing the Rorschach Inkblot Test. *Perceptual and Motor Skills*, 89(3), 917-930.
- Blanc, R., Adrien, J. L., Roux, S. & Barthelemy, C. (2005). Dysregulation of pretend play and communication development in children with autism. *Autism*, 9(3), 229-245.
- Boden, M. (1994). *Dimensions of Creativity*. Massachusetts: MIT Press.
- Bogdashina, O. (2005). *Communication Issues in Autism and Asperger Syndrome. Do We Speak The Same Language?* London: Jessica Kingsley.

Bolte, S., Ozkara, N. & Poustka, F. (2002). Autism spectrum disorders and low body weight: is there really a systematic association? *International Journal of Eating Disorders*, 32, 349-351.

Bolte, S., Holtmann, M., Poustka, F., Scheurich, A., Schmidt, L. (2007). Gestalt perception and local-global processing in high-functioning autism. *Journal of Autism and Developmental Disorders*, 37(8), 1493-1504.

Booth, R., Charlton, R., Hughes, C. & Happe, F. (2003). Disentangling weak coherence and executive dysfunction: Planning drawing in autism and attention-deficit/hyperactivity disorder. *Philosophical Transactions: Biological Sciences*, 358, 1430.

Bosnes, O. (2005). Comparison of Wechsler Adult Intelligence Scale /Wechsler Intelligence Scale for Children-Revised, and Wechsler Abbreviated Scale of Intelligence in a Norwegian clinical sample. *Tidsskrift for Norsk Psykologforening*, 42 (7), 598-602

Boucher, J. (1977). Alternation and sequencing behaviour and response to novelty in autistic children. *Journal of Child Psychology and Psychiatry*, 18(1), 67-72.

Boucher, J. (2007). Memory and generativity in very high functioning autism: A firsthand account, and an interpretation. *Autism*, 11(3), 255-264.

Boucher, J. & Lewis, V. (1990). Guessing or creating? A reply to Baron-Cohen. *British Journal of Developmental Psychology*, 8(2), 205-206.

Brandell, J. R. (1986). Autogenic stories and projective drawings: Tools for the clinical assessment and treatment of severely disturbed and at-risk children. *Journal of Independent Social Work*, 1(2), 19-32.

Branik, E. (2005). Das Squigglespiel: Funktion des Squigglespiels nach Winnicott für die Diagnostik, Beziehungsgestaltung und Therapieindikation in der Kinder- und Jugendpsychiatrie und -psychotherapie. *Forum der Psychoanalyse: Zeitschrift für klinische Theorie & Praxis*, 21(1), 68-77.

British Psychological Society. (2006). *Position Paper: Autistic Spectrum Disorders: Guidance for Chartered Psychologists working with Children and Young People*. BPS: England.

Bryson, S. E., Rogers, S. J., Fombonne, E. (2003). Autism spectrum disorders: Early detection, intervention, education, and psychopharmacological management. *Canadian Journal of Psychiatry*, 48(8), 506-516.

Burns, R. C. (1987). *Kinetic-house-tree-person drawings (K-H-T-P): An interpretative manual*. Philadelphia: Brunner/Mazel.

Campbell, J. M. (2005). Diagnostic Assessment of Asperger's Disorder: A Review of Five Third-Party Rating Scales. *Journal of Autism and Developmental Disorders*, 35(1), 25-35.

Canitano, R. & Vivanti, G. (2007). Tic and Tourette syndrome in autism spectrum disorders. *Autism*, 11(1), 19-28.

Capps, L., Losh, M. & Thurber, C. (2000). "The frog ate the bug and made his mouth sad": narrative competence in children with autism. *Journal of Abnormal Child Psychology*, 28(2), 193-204.

Cederlund, M., Hagberg, B., Billstedt, E., Gillberg, I.C. & Gillberg, C. (2008). Asperger syndrome and autism: a comparative longitudinal follow-up study more than 5 years after original diagnosis. *Journal of Autism and Developmental Disorders*, 38, 72-85.

- Cerrone P., Mazzocco M. & Cox C. (1999). Normative data for the contingency naming test (CNT). *Archives of Clinical Neuropsychology*, 14(8), 711-711.
- Chakrabati, S. & Fombonne, E. (2001). Pervasive developmental disorders in pre-school children. *Journal of Child Psychology and Psychiatry*, 36, 1127-40.
- Charman, T. & Baron-Cohen, S. (1993). Drawing development in autism: The intellectual to visual realism shift. *British Journal of Developmental Psychology*, 11(2), 171-185.
- Charman, T. & Baron-Cohen, S. (1992). Understanding drawings and beliefs: A further test of the metarepresentation theory of autism: A research note. *Journal of Child Psychology and Psychiatry*, 33(6), 1105-1112.
- Church, C., Alisanski, S. & Amanullah, S. (2000). The social, behavioural and academic experiences of children with Asperger disorder. *Focus on Autism and Other Developmental Disabilities*, 15, 12-20.
- Claman, L. (2002). The squiggle-drawing game. In Schaefer, C. E. & Cangelosi, D. (Eds). *Play therapy techniques* (2nd ed.). (pp. 221-233). Lanham: Jason Aronson.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159.
- Cohen, B. M., Hammer, J. S. & Singer, S. (1988). The Diagnostic Drawing Series: A systematic approach to art therapy evaluation and research. *The Arts in Psychotherapy*, 15(1), 11-21.
- Craig, J., Baron-Cohen, S. & Scott, F. (2001). Drawing ability in autism: a window into the imagination. *Israel Journal of Psychiatry and Related Sciences*, 38(3-4), 242-53.

Craig, J. & Baron-Cohen, S. (1999). Creativity and imagination in autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 29(4), 319-326.

Craig, J. & Baron-Cohen, S. (2000). Story-telling ability in children with autism or Asperger syndrome: A window into the imagination. *Israel Journal of Psychiatry and Related Sciences*, 37(1), 64-70.

Crozier, S. & Tincani, Matt. (2007). Effects of Social Stories on prosocial behavior of preschool children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(9), 1803-1814.

Dawson, G. & Osterling, J. (1994). Early recognition of children with autism: A study of first birthday home videotapes. *Journal of Autism and Developmental Disorders*, 24(3), 247-257.

Delis, D. C., Kaplan, E. & Kramer, J.H. (2001). *Delis-Kaplan Executive Function System*. London: Pearson Assessment.

Department for Children, Schools and Families (2004). *The Children Act*. London: Department for Skills and Education.

Department for Skills and Education (2004). *Every Child Matters: Change for Children*. London: Department for Skills and Education.

Department of Health (2004) *National Service Framework for Children, Young People and Maternity Services*. London: Department of Health.

Department of Health (2007). *Children's Health, our Future: A Review of Progress against the National Service Framework for Children, Young People and Maternity Services*. London: Department of Health.

Di Leo, J.H. (1973). *Children's Drawings as Diagnostic Aids*. New York: Brunner Mazel.

Dosani, S. (2005). Review of autism and creativity: is there a link between autism in men and exceptional ability? *British Journal of Psychiatry*, 186(3), 267.

Ehlers, S. & Gillberg, C. (1993). The epidemiology of Asperger syndrome – a total population study. *Journal of Child Psychology and Psychiatry*, 34, 1327-1350.

Eisdell, N. A. (2005). Conversational model of art therapy. *Psychology & Psychotherapy: Theory, Research & Practice*, 78(1), 1-19.

Eisenberger, R. & Cameron, J. (1996). Detrimental effects of reward: Reality or myth? *American Psychologist*, 51(11), 1153-1166.

Ellen, S. (1978). Drawing games: in art therapy with children. *American Journal of Art Therapy*, 17(3), 85-84.

Ericsson, K. (1996). The acquisition of expert performance: An introduction to some of the issues. In Ericsson, K. A (Ed). *The road to excellence: The acquisition of expert performance in the arts and sciences, sports, and games*. (pp. 1-50). Hillsdale: Lawrence Erlbaum Associates, Inc.

Eysenck, H. J., Easting, G. & Eysenck, S. B. (1970). Personality measurement in children: A dimensional approach. *The Journal of Special Education*, 4(3), 261-268.

Eysenck, H. J. (1983). The roots of creativity: Cognitive ability or personality trait? *Roeper Review*, 5 (4), 10-12.

Eysenck, H. (1993a). Creativity and personality: An attempt to bridge divergent traditions. *Psychological Inquiry*, 4(3), 238-246.

- Eysenck, H. (1993b). Creativity and personality: Suggestions for a theory. *Psychological Inquiry*, 4(3), 147-178.
- Farhi, N. (2001). Psychotherapy and the squiggle game: A sophisticated game of hide-and-seek. In Bertolini, M., Giannakoulas, A. & Hernandez, M. (Eds). *Squiggles and spaces revisiting the work of D. W. Winnicott, (Vol. 2)*. (pp. 65-75). Philadelphia: Whurr Publishers.
- Fasko, D. (2001). Education and creativity. *Creativity Research Journal*, 13(3-4), 317-327.
- Feen-Calligan, H. (2006). Stories as Catalysts of Change. *Art Therapy*, 23(3), 102-103.
- Fein, D., Lucci, D. & Waterhouse, L. (1990). Brief report: Fragmented drawings in autistic children. *Journal of Autism and Developmental Disorders*, 20(2), 263-269.
- Fitzgerald, M. (2004). *The Genesis of Artistic Creativity. Asperger Syndrome and the Arts*. London: Jessica Kingsley.
- Fletcher, P. C., Happe, F., Frith, U. & Baker, S. C. (1995). Other minds in the brain: A functional imaging study of "theory of mind" in story comprehension. *Cognition*, 57(2) , 109-128.
- Fombonne, E. (2002). Epidemiological trends in rates of autism. *Molecular Psychiatry*, 7(2), S4-S6.
- Fombonne, E. (2005). The changing epidemiology of autism. *Journal of Applied Research in Intellectual Disabilities*, (18)4, 281-194.
- Fombonne, E. & Tidmarsh, L. (2003). Epidemiologic data on Asperger disorder. *Child and Adolescent Psychiatric Clinics of North America*, 12(1), 15-21.

- Frith, U. (1989). *Autism: Explaining the Enigma*. Oxford: Blackwell Science.
- Frith, U. (1972). Cognitive mechanisms in autism: Experiments with colour and tone sequence production. *Journal of Autism and Childhood Schizophrenia*, 2(2), 160-173.
- Frith, U. (2004a). *Autism and Asperger Syndrome*. New York: Cambridge University Press.
- Frith, U. (2004b). Emanuel Miller lecture: confusions and controversies about Asperger syndrome. *Journal of Cognitive and Behavioural Psychotherapies*, 4(2), 103-130.
- Frith, U. & Happe, F. (1994). Autism: Beyond "theory of mind." *Cognition*, 50(1-3), 115-132.
- Frith, U. & Snowling, M. (1983). Reading for meaning and reading for sound in autistic and dyslexic children. *British Journal of Developmental Psychology*, 1(4), 329-342.
- Frith, U. (1972). Cognitive mechanisms in autism: Experiments with color and tone sequence production. *Journal of Autism & Childhood Schizophrenia*, 2(2), 160-173.
- Gantt, L., & Tabone, C. (1998). *The Formal Elements Art Therapy Scale: The Rating Manual*. Morgantown: Gargoyle Press.
- Gantt, L. M. (2001). The Formal Elements Art Therapy Scale: A measurement system for global variables in art. *Art Therapy*, 18(1), 50-55.
- Gantt, L. (2004). The Case for Formal Art Therapy Assessments. *Art Therapy*, 21(1), 18-29.

Gardner, R.A. (1972). Mutual storytelling: A technique in child psychotherapy. *International Journal of Child and Adolescent Psychiatry*, 38 (9), 253-26.

Garnett, M. S., & Attwood, A. J. (1998). The Australian Scale for Asperger's syndrome. In T. Attwood (Ed.), *Asperger's syndrome. A guide for parents and professionals* (pp. 17-19). London: Jessica Kingsley.

Gelman, S. A. & Gottfried, G. M. (2006). Creativity in Young Children's Thought. Kaufman, J. C. & Baer, J. (Eds). *Creativity and reason in cognitive development*. (pp. 221-243). New York: Cambridge University Press.

Ghaziuddin, M., Weidmer-Mikhail, E. & Ghaziuddin, N. (1998). Comorbidity of Asperger syndrome: a preliminary report. *Journal of Intellectual and Developmental Disability*, 42(4), 279-83.

Ghaziuddin, M., Butler, E. (1998). Clumsiness in autism and Asperger syndrome: A further report. *Journal of Intellectual Disability Research*, 42(1), 43-48.

Ghaziuddin, M. (2008). Defining the behavioral phenotype of Asperger syndrome. *Journal of Autism and Developmental Disorders*, 38, 138-132.

Ghaziuddin, M. & Gerstein, L. (1996). Pedantic speaking style differentiates Asperger syndrome from high-functioning autism. *Journal of Autism and Developmental Disorders*, 26(6), 585-595.

Ghaziuddin, M., Leininger, L. & Tsai, L. (1995). Thought disorder in Asperger syndrome: Comparison with high-functioning autism. *Journal of Autism and Developmental Disorders*, 25(3), 311-317.

Ghaziuddin, M., Tsai, L. Y. & Ghaziuddin, N. (1992). Brief report: A comparison of the diagnostic criteria for Asperger syndrome. *Journal of Autism and Developmental Disorders*, 22(4), 643-649.

Ghaziuddin, M., Butler, E., Tsai, L. & Ghaziuddin, N. (1994). Is clumsiness a marker for Asperger syndrome? *Journal of Intellectual Disability Research*, 38(5), 519-527.

Gillberg, C. & Billstedt, E. (2000). Autism and Asperger syndrome: co-existence with other clinical disorders. *Acta Psychiatrica Scandinavia*, 102, 321-330.

Gillberg, C. & Gillberg, I.C. (1989). Asperger syndrome- some epidemiological considerations: a research note. *Journal of Child Psychology and Psychiatry*, 30, 631-638.

Gillberg, C., Nordin, V. & Ehlers, S. (1996). Early detection of autism: diagnostic instruments for clinicians. *European Child and Adolescent Psychiatry*, 5(2), 67-74.

Gillberg, C. (1998). Asperger syndrome and high-functioning autism. *British Journal of Psychiatry*, 172, 200-209.

Glenn, E., Bihm, E. M. & Lammers, W. J. (2003). Depression, anxiety and relevant cognitions in persons with mental retardation. *Journal of Autism and Developmental Disorders*, 33, 69-76.

Golomb, C. & Schmeling, J. (1996). Drawing development in autistic and mentally retarded children. *Visual Arts Research*, 22(2), 5-18.

Gould, J. (1986). The Lowe and Costello Symbolic Play Test in socially impaired children. *Journal of Autism and Developmental Disorders*, 16(2), 199-213.

Grandin, T. (2008). *The Way I See It: A Personal Look at Autism and Asperger's*. London: Future Horizons.

Gray, C. A. (1998). Social stories and comic strip conversations with students with Asperger syndrome and high-functioning autism. In Schopler, E., Gary B. & Kunce,

L. J. (Eds). *Asperger syndrome or high-functioning autism?* (pp. 167-198). New York: Plenum Press.

Green, D., Baird, G., Barnett, A., Henderson, L., Huber, J. & Henderson, S. (2002). The severity and nature of motor impairment in Asperger syndrome: A comparison with specific developmental disorder of motor function. *Journal of Child Psychology & Psychiatry*, 43(5), 655-668.

Green, J., Gilchrist, A., Burton, D. & Cox, A. (2000). Social and psychiatric functioning in adolescents with Asperger syndrome compared with conduct disorder. *Journal of Autism and Developmental Disorders*, 30(4), 279-293.

Guignard, J. & Lubart, T. (2006). Is It Reasonable to Be Creative? In Kaufman, J. C. & Baer, J. (Eds). *Creativity and reason in cognitive development*. (pp. 269-281). New York: Cambridge University Press.

Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444-454.

Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.

Guilford, J. P., Hendricks, M. & Hoepner, R. (1968). Solving social problems creatively. *Journal of Creative Behavior*, 2(3), 155-164.

Gulbro-Leavitt, C. & Schimmel, B. (1991). Assessing depression in children and adolescents using the Diagnostic Drawing Series modified for children (DDS-C). *The Arts in Psychotherapy*, 18(4), 353-356.

Gunter, M. (2000). Art therapy as an intervention to stabilize the defenses of children undergoing bone marrow transplantation. *Arts in Psychotherapy*. 27(1), 3-14.

Gunter, M. (2007). *Playing the unconscious: Psychoanalytic interviews with children using Winnicott's squiggle technique*. London: Karnac Books.

Hammer, E. F. (1967). Use of imagery in interpretive communication. *Journal of the Long Island Consultation Center*, 5(2), 3-12.

Happe, F., Ehlers, S., Fletcher, P., Frith, U., Johansson, M., Gillberg, C., et al, (1996). 'Theory of mind' in the brain. Evidence from a PET scan study of Asperger syndrome. *International Journal for the Rapid Communication of Research in Neuroscience*, 8(1), 197-201.

Happe, F. G. E. (1994). An advanced test of theory of mind: Understanding of story characters' thoughts and feelings by able autistic, mentally handicapped, and normal children and adults. *Journal-of-Autism-and-Developmental-Disorders*, 24(2), 129-154.

Happe, F. G. E. (1997). Central coherence and theory of mind in autism: Reading homographs in context. *British Journal of Developmental Psychology*, 15(1), 1-12.

Hardan, A. Y., Girgis, R. R., Adams, J., Gilbert, A. R., Melhem, N. M., Keshavan, M. S., et al. (2008). Brief report: abnormal association between the thalamus and brain size in Asperger Disorder. *Journal of Autism and Developmental Disorders*, 38, 390-394.

Hardan, A. Y., Minshew, N. J., Mallikarjuhn, M. & Keshavan, M. S. (2001). Brain volume in autism. *Journal of Child Neurology*, 16, 421-424.

Hargreaves, H. L. (1927). *The faculty of imagination*. Oxford: Cambridge University Press.

Hermelin, B. (2001). *Bright splinters of the mind: A personal story of research with autistic savants*. London: Jessica Kingsley Publishers.

- Hickling, A. K. & Wellman, H. M. (2001). The emergence of children's causal explanations and theories: Evidence from everyday conversation. *Developmental Psychology*, 37(5), 668-683.
- Hill, E. L. & Frith, U. (2003). Understanding autism: Insights from mind and brain. Hill, E. L. & Frith, U. (Eds). *Autism: Mind and brain*. (pp. 1-19). New York: Oxford University Press.
- Hilton, C., Wenthe, L., LaVesser, P., Ito, M., Reed, C. & Herzberg, G. (2007). Relationship between motor skill impairment and severity in children with Asperger syndrome. *Research in Autism Spectrum Disorders*, 339-349
- Hobson, P. (1993). *Autism and the Development of Mind*. Hove: Lawrence-Erlbaum Associates.
- Hoepfner, R., Guilford, J. P. & Bradley, P. A. (1970). Transformation of information in learning. *Journal of Educational Psychology*, 61(4), 316-323.
- Honey, E., Leekam, S., Turner, M. & McConachie, H. (2007). Repetitive behaviour and play in typically developing children and children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(6), 1107-15.
- Hoopman, K. (2006). *All Cats Have Asperger Syndrome*. London: Jessica Kingsley.
- Hopkins, E. (2002). Lorna Wing - DISCO and the triad of impairments. *Autism Connect*. Retrieved on 22nd, June, 2008, from http://www.autismconnect.org/core_files/interviews/transcripts/lorna_wing.htm
- Howlin, P. (2003). Outcome in high-functioning adults with autism with and without early language delays: Implications for the differentiation between autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 33, 3-13.

Howlin, P. (2000). Assessment instruments for Asperger syndrome. *Child Psychology and Psychiatry Review*, 5, 120-129.

Howlin, P. & Asgharian, A. (1999). The diagnosis of autism and Asperger syndrome: Findings from a survey of 770 families. *Developmental Medicine and Child Neurology*, 41(12), 834-839.

Howlin, P. & Moore, A. (1997). Diagnosis in autism: A survey of over 1200 patients in the UK. *Autism*, 1(2), 135-162.

Humphrey, N. & Lewis, S. (2008). 'Make me normal': the views and experiences of pupils on the autistic spectrum in mainstream secondary schools. *Autism*, 12, 23.

Hutchins T. L. (2006). Prelock PA Using social stories and comic strip conversations to promote socially valid outcomes for children with autism. *Seminars in Speech and Language*, 27(1), 47-59.

Jackson, L. (2002). *Frecks, Geeks and Asperger Syndrome: A User's Guide to Adolescence*. London: Jessica Kingsley.

Jarrold, C. (2003). A review of research into pretend play in autism. *Autism*, 7(4), 379-390.

Jarrold, C., Boucher, J. & Smith, P. (1993). Symbolic play in autism: A review. *Journal of Autism and Developmental Disorders*, 23(2), 281-307.

Jarrold, C., Boucher, J. & Smith, P.K. (1996). Generativity defects in pretend play in autism. *British Journal of Developmental Psychology*, 14(3), 275-300.

Jiliang, S. & Baoguo, S. (2007). Effects of gender and types of materials on creativity. *Psychological Science (China)*, 30(2), 285-288.

- Jolliffe, T. & Baron-Cohen, S. (1997). Are people with autism and Asperger syndrome faster than normal on the Embedded Figures Test? *Journal of Child Psychology and Psychiatry*, 38(5), 527-534.
- Jolliffe, T. & Baron-Cohen, S. (1999). The Strange Stories Test: A Replication with High-Functioning Adults with Autism or Asperger Syndrome. *Journal of Autism & Developmental Disorders* 29(5), 395-406.
- Jolliffe, T. & Baron-Cohen, S. (2000). Linguistic processing in high-functioning adults with autism or Asperger's syndrome. Is global coherence impaired? *Psychological Medicine*, 30(5), 1169-1187.
- Joseph, K., Szatmari, P., Bryson, S. E., Streiner, D. & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism*, 4(2), 117-132.
- Kadsejo, B. & Gillberg, C. (2000). Tourette's disorder: epidemiology and comorbidity in primary school children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 548-555.
- Kadsejo, B., Gillberg, C. & Hagberg, B. (1999). Autism and Asperger syndrome in seven-year old children: a total population study. *Journal of Autism and Developmental Disorders*, 29, 327-331.
- Kaland, N., Lykke Motensen, E., & Smith, L. (2007). Disembedding performance in children and adolescents with Asperger syndrome or high-functioning autism. *Autism*, 11(1), 81-92.
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250.

Karmiloff-Smith, A. (1990). Constraints on representational change: evidence from children's drawings. *Cognition*, 34(1), 57-83.

Kasari, C. & Rotheram-Fuller, E. (2005). Current trends in psychological research on children with high-functioning autism and Asperger disorder. *Current Opinion in Psychiatry*, 18(5), 497-501.

Kaufman, J.C. & Baer, J. (2006). *Creativity and Reason in Cognitive Development*. Cambridge: Cambridge University Press.

Kaufman, A. S., & Lichtenberger, E. O. (1999). *Essentials of WAIS-III assessment*. New York: Wiley.

Keow Lim, H., & Slaughter, V. (2007) Human figure drawings by children with Asperger Syndrome. *Journal of Autism and Developmental Disorders*,

Klin, A., Volkmar, F., Sparrow, S., Cicchetti, D. & Rourke, B. (1999). Validity and neuropsychological characterisation of Asperger syndrome: convergence with Non Verbal Learning Disabilities syndrome. *Journal of Child Psychology and Psychiatry*, 36, 1127-1140.

Koenig, K. (2004) Review of autism spectrum disorders: a research review for practitioners. *Journal of the American Academy of Child and Adolescent Psychiatry*, 43(10), 1304-1305.

Kopp, S. & Gillberg, C. (1997). Selective mutism: a population-based study. *Journal of Child Psychology and Psychiatry*, 32, 43-46.

Kritzberg, N.I. (1972). TASKIT (tell-a-story kit), the therapeutic storytelling word game. *International Journal of Child and Adolescent Psychiatry*, 38 (9), 231-244.

Kritzberg, N.I. (1975). *The Structured Therapeutic Game Method of Child Analytic Psychotherapy: Dynamic Game-Play Therapy with Children*. Oxford: Exposition Press.

Krug, D., & Arick, J. (2002). In T. Attwood (Ed.), *Asperger's syndrome. A guide for parents and professionals* (pp. 17-19). London: Jessica Kingsley.

Landreneau, E. & Halpin, G. (1978). The influence of modeling on children's creative performance. *Journal of Educational Research*, 71(3), 137-139.

Laurent, A. C. & Rubin, E. (2004). Challenges in emotional regulation in Asperger syndrome and high-functioning autism. *Topics in Language Disorders*, 24(4), 286-297.

Le Couteur, A., Haden, G., Hammal, D. & McConachie, H. (2008). Diagnosing Autism Spectrum Disorders in pre-school children using two standardised assessment instruments: The ADI-R and the ADOS. *Journal of Autism and Developmental Disorders*, 38(2), 362-372.

Leslie, A. M. (1987). Pretence and representation: the origins of theory of mind. *Psychological Review*, 94, 412-426.

Lewis, V. & Boucher, J. (1988). Spontaneous, instructed and elicited play in relatively able autistic children. *British Journal of Developmental Psychology*, 6(4), 325-339.

Lewis, V. & Boucher, J. (1991). Skill, content and generative strategies in autistic children's drawings. *British Journal of Developmental Psychology*, 9(3), 393-416.

Lewis, V. & Boucher, J. (1995). Generativity in the play of young people with autism. *Journal of Autism and Developmental Disorders*, 25(2), 105-121.

Lincoln, A. J., Courchesne, E., Kilman, B. A., Elmasian, R., et al. (1988). A study of intellectual abilities in high-functioning people with autism. *Journal of Autism and Developmental Disorders*, 18(4), 505-524.

Lord, C., Risi, S., Lambrecht, L., Cook, E. H., Leventhal, B. L., DiLavore, P. C., et al. (2000). The Autism Diagnostic Observation Schedule--Generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders*, 30(3), 205-223.

Lord, C., Rutter, M., Le Couteur, A. (1994). Autism Diagnostic Interview - Revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders*. 24(5), 659-685.

Losh, M. & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger syndrome. *Journal of Autism and Developmental Disorders*, 33(3), 239-251.

Lotspeich, L., Kwon, H., Schumann, C. M., Fryer, S., Goodlin-Jones, B. L., Buonocore, M. H., et al. (2004). Investigation of neuroanatomical differences between autism and Asperger syndrome. *Archives of General Psychiatry*, 61(3), 291-298.

Lotspeich, L., Kwon, H., Schumann, C. M., Fryer, S. L., Goodlin-Jones, B. L., Buonocore, M. H., et al. (2004). Investigation of Neuroanatomical Differences Between Autism and Asperger Syndrome. *Archives of General Psychiatry*, 61(3), 291-298.

Loveland, K. A., McEvoy, R. E., & Tunali, B. (1990). Narrative story telling in autism and Down's syndrome. *British Journal of Developmental Psychology*, 8(1), 9-23.

Lubart, T. I. (1994). In: R. J. Sternberg (Ed.). *Thinking and Problem Solving* (pp. 289-232). San Diego: Academic Press.

Machover, K. (1949). *Personality Projection in the Drawing of the Human Figure*. Illinois: Thomas.

Malchiodi, C. A. (1998). *Understanding children's drawings*. New York: Guilford Press.

Manjiviona, J. & Prior, M. (1995). Comparison of Asperger syndrome and high-functioning autistic children on a test of motor impairment. *Journal of Autism and Developmental Disorders*, 25, 23-29.

Marcus, L. M., & Stone, W. L. (1993). Assessment of the young autistic child. In E. Schopler & G. B. Mesibov (Eds.), *Preschool issues in autism?* New York: Plenum Press.

Martindale, C. (1981). Creativity and primary process thinking. *PsycCRITIQUES*, 26(7), 568.

Mazefsky C. A. & Oswald D. P. (2007). Emotion Perception in Asperger's Syndrome and High-functioning Autism: The Importance of Diagnostic Criteria and Cue Intensity. *Journal of Autism and Developmental Disorders*, 37(6), 1086-95.

McAlonon, G. M., Daly, E., Kumari, V., Critchley, H. D., van Amelsvoort, T., Suckling, J., et al. (2002). Brain anatomy and sensori-motor gating in Asperger syndrome. *Brain*, 125, 1594-1606.

McKinnon, D. (1961). *Creativity in architects*. In *The Creative Person - A Conference Presented at the Tahoe Alumni Center*. Berkley: Institute for Personality Assessment and Research.

Mclaughlin, J. B. (2008). Relationship of sibling constellation factors and figural creativity scores in grade five boys and girls. *Dissertation Abstracts International: Section B: The Sciences and Engineering*. 68 (7-B), 4867.

Mednick, S. (1962). The associative basis of the creative process. *Psychological Review*. 69(3), 220-232.

Mesibov, G. B., Kuncze, L. & Schopler, E. (1998). *Asperger syndrome or high functioning autism? In series: Current issues in autism*. New York: Plenum Press

Meyer, J. A. & Minshew, N. J. (2002). An update on neurocognitive profiles in Asperger syndrome and high-functioning autism. *Focus on Autism and Other Developmental Disabilities*, 17(3), 152-160.

Miller, J. (1993). *The Passion of Michel Foucault*. New York: Simon and Schuster

Miller, J. N. & Ozonoff, S. (2000). The external validity of Asperger Disorder: lack of evidence from the domain of neuropsychology. *Journal of Abnormal Psychology*, 109, 227-238.

Mitchell, P. (1996). *Acquiring a Conception of Mind. A Review of Psychological Research and Theory*. East Sussex: Psychology Press.

Morgan, B., Maybery, M. & Durkin, K. (2003). Weak central coherence, poor joint attention, and low verbal ability: Independent deficits in early autism. *Developmental Psychology*, 39(4), 646-656.

Mottron, L., Belleville, S. & Menard, E. (1999). Local bias in autistic subjects as evidenced by graphic tasks: Perceptual hierarchization or working memory deficit? *Journal of Child Psychology and Psychiatry*. 40(5), 743-755.

Mottron, L. & Belleville, S. (1993). A study of perceptual analysis in a high-level autistic subject with exceptional graphic abilities. *Brain and Cognition*. 23(2), 279-309.

Mumford, M.D. & Gustafson, S.B. (1988). Creativity syndrome: integration, application and innovation. *Psychological Bulletin*, 103 (1), 27-43.

Myers, P., Baron-Cohen, S. & Wheelwright, S. (2004). *An Exact Mind: An Artist with Asperger Syndrome*. London: Jessica Kingsley.

National Autistic Society (2003). *National Initiative for Autism Guidelines: Screening and Assessment: National Autism Plan for Children (NAPC)*. London: the National Autistic Society.

Niaz, M. & Saud de Nunez, G. (1991). The relationship of mobility-fixity to creativity formal reasoning and intelligence. *Journal of Creative Behavior*. 25(3), 205-217.

Niu, W. & Sternberg, R. J. (2002). Contemporary studies on the concept of creativity. The East and the West. *Journal of Creative Behaviour*, 36 (4), 268-288.

Niu, W., Zhang, J.X. & Yang, Y. (2006). In: J.C. Kaufman & J. Baer (Eds). *Creativity and Reason in Cognitive Development* (pp. 282-293). Cambridge: Cambridge University Press.

Nordqvist, C. (2007). APA names DSM-V Task Force Members – Leading Experts to Revise Handbook for Diagnosing Mental Disorders. *Medical News Today, USA*.

Retrieved July, 25th 2007, from

<http://www.medicalnewstoday.com/articles/77663.php>

Norenzayan, A., Smith, E. E., Kim, B. J. & Nisbett, R. E. (2002). Cultural preferences for formal versus intuitive reasoning. *Cognitive Science: A Multidisciplinary Journal*. 26(5), 653-684.

Nunnally, J.C. & Bernstein, I.H. (1994) *Psychometric Theory* (3rd Edition). New York: McGraw-Hill.

O'Connor, N. & Hermelin, B. (1963). Sensory dominance in autistic children and subnormal controls. *Perceptual and Motor Skills*, 16(3), 920.

O'Riordan, M. A., Plaisted, K. C., Driver, J. & Baron-Cohen, S. (2001). Superior visual search in autism. *Journal of Experimental Psychology: Human Perception and Performance*. 27(3), 719-730.

Ohta, M. (1987). Cognitive disorders of infantile autism: A study employing the WISC, spatial relationship conceptualization, and gesture imitations. *Journal of Autism and Developmental Disorders*, 17(1), 45-62.

Orsmond, G. I., Krauss, M. & Seltzer, M. M. (2004). Peer relationships and social and recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders*, 34(3), 245-256.

Oster, G.D., & Crone, P.G. (2004). *Using Drawings in Assessment and Therapy: A Guide for Mental Health Professionals*. (2nd Ed.). New York: Brunner-Routledge.

Ozonoff, S., Pennington, B. F. & Rogers, S. J. (1991). Executive function deficits in high-functioning autistic individuals: Relationship to theory of mind. *Journal of Child Psychology and Psychiatry*, 32(7), 1081-1105.

Ozonoff, S. & Jensen, J. (1999). Brief Report: Specific Executive Function Profiles in Three Neurodevelopmental Disorders. *Journal of Autism & Developmental Disorders*. 29(2), 171-177.

Ozonoff, S., South, M. & Miller, J. N. (2000). DSM-IV-defined Asperger syndrome: Cognitive, behavioral and early history differentiation from high-functioning autism. *Autism*, 4(1), 29-46.

Paavonen, E. J., Vehkalahti, K., Vanhala, R., von Wendt, L., von Wendt, T., & Aronen, E. T. (2008). Sleep in children with Asperger syndrome. *Journal of Autism and Developmental Disorders*, 38, 41-51.

Pennington, B. F. & Ozonoff, S. (1996). Executive functions and developmental psychopathology. *Journal of Child Psychology and Psychiatry*, 37(1), 51-87.

Piaget, J. (1962). The stages of the intellectual development of the child. *Bulletin of the Menninger Clinic*, 26(3), 120-128.

Plucker, J. A. Beghetto, R.A. & Dow, G.T. (2004). Why isn't creativity more important to educational psychologist? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, 39, 83-97.

Premack, D. & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, 1(4), 515-526.

Pylyshyn, Z. W. (1978). Computational models and empirical constraints. *Behavioral and Brain Sciences*, 1(1), 93-127.

Reynhout, G. & Carter, M. (2007). Social story efficacy with a child with autism spectrum disorder and moderate intellectual disability. *Focus on Autism and Other Developmental Disabilities*, 22(3), 173-182.

Richards, R. & Kinney D. K. (1988). Creativity in manic-depressives, cyclothymes, their normal relatives and control subjects. *Journal of Abnormal Psychology*, 97, 281-288.

Richards, R. & Kinney, D. (1997). Mood swings and health. In M. A. Runco & R. Richards (Eds.), *Eminent Creativity, Everyday Creativity and Health* (pp. 137-156). Greenwich: Ables Publishing Corp.

Richards, R. (2002-2003). Creativity and the schizophrenia spectrum: more and more interesting. *Creativity Research Journal*, 13(1), 111-132.

Rinehart, N. J., Tonge, B. J., Bradshaw, J. L., Iansek, R., Enticott, P. G. & Johnson, K. A. (2006). Movement-related potentials in high-functioning autism and Asperger's disorder. *Developmental Medicine and Child Neurology*, 48(4): 272-7.

Rinehart, N. J., Bradshaw, J. L., Moss, S. A., Brereton, A. V. & Tonge, B. J. (2006). Pseudo-random number generation in children with high-functioning autism and Asperger's disorder: Further evidence for a dissociation in executive functioning? *Autism*, 10(1), 70-85.

Ringman, J. & Jankovic, J. (2000). Occurrence of tics in Asperger syndrome and autistic disorder. *Journal of Child Neurology*, 15, 394-400.

Rothenberg, A. (1990). Creativity in adolescence. *Psychiatric Clinics of North America*, 13(3), 415-434.

Rumsey, J. & Hamberger, S. (1988). Neuropsychological findings in high-functioning men with infantile autism, residual state. *Journal of Clinical and Experimental Neuropsychology*, 10, 201-221.

Runco, M. A. & Chand, I. (1995). Cognition and creativity. *Educational Psychology Review*, 7(3), 243-267.

Runco, M.A. (Ed). (2002). *Critical creative processes*. Cresskill: Hampton Press.

- Russ, S. (2000-2001). Primary process thinking and creativity: affect and cognition. *Creativity Research Journal*, 13(1), 27-35.
- Russell, J., Mauthner, N., Sharpe, S. & Tidswell, T. (1991). The "windows task" as a measure of strategic deception in preschoolers and autistic subjects. *British Journal of Developmental Psychology*. 9(2), 331-349.
- Rutherford, M. D. & Rogers, S.J. (2003). Cognitive underpinnings of pretend play in autism. *Journal of Autism and Developmental Disorders*, 33(3), 289-302.
- Sacks, O. & Wiltshire, S. (1991). *Floating Cities*. London: Michael Joseph Ltd
- Salmond, C. H., Ashburner, J., Connelly, A., Friston, K. J., Gadian, D. G. & Vargha-Khadem, F. (2005). The role of the medial temporal lobe in autistic spectrum disorders. *European Journal of Neuroscience*, 22(3), 764-772.
- Sanders, J., Johnson, K. A., Garavan, H., Gill, M. & Gallagher, L. (2008). A review of neuropsychological and neuroimaging research in autistic spectrum disorders: Attention, inhibition and cognitive flexibility. *Research in Autism Spectrum Disorders*, 2, 1-16.
- Sansosti, F. J. & Powell-Smith, K. A. (2006). Using social stories to improve the social behavior of children with Asperger syndrome. *Journal of Positive Behavior Interventions*, 8(1), 43-57.
- Sarafino, E. P. (2002) *Health Psychology: Biopsychosocial interactions*. (4th ed.). Hoboken: Wiley
- Sass, L. A. & Shuldberg, D. (2000-2001). Introduction to the special issue: Creativity and the schizophrenia spectrum. *Creativity Research Journal*, 13(1), 1-4.

Saulnier, C. A. & Klin, A. (2007). Brief report: social and communication abilities and disabilities in higher functioning individuals with autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 37, 788-793.

Scattone, D. (2008). Enhancing the conversation skills of a boy with Asperger's disorder through Social Stories and video modeling. *Journal of Autism and Developmental Disorders*, 38(2), 395-400.

Schuh, K. L. (2003). Knowledge construction in the learner-centered classroom. *Journal of Educational Psychology*. 95(2), 426-442.

Schumann, C. M., Hamstra, J., Goodlin-Jones, B. L., Lotspeich, L. J., Kwon, H., Buonocore, M.H., et al (2004). The amygdala is enlarged in children but not adolescents with autism: the hippocampus is enlarged at all ages. *Journal of Neuroscience*, 24, 6392-6401.

Scott, F. J. & Baron-Cohen, S. (1996). Imagining real and unreal things: Evidence of dissociation in autism. *Journal of Cognitive Neuroscience*, 8(4), 371-382.

Scott, F. J., Baron-Cohen, S. & Leslie, A. (1999). "If pigs could fly": a test of counterfactual reasoning and pretence in children with autism. *British Journal of Developmental Psychology*, 17(3), 349-362.

Shah, A. & Frith, U. (1983). An islet of ability in autistic children: A research note. *Journal of Child Psychology and Psychiatry*, 24(4), 613-620.

Shah, A. & Frith, U. (1993). Why do autistic individuals show superior performance on the block design task? *Journal of Child Psychology and Psychiatry*, 34(8), 1351-1364.

- Shallice, T. (1988). *From Neuropsychology to Mental Structure*. Cambridge: Cambridge University Press.
- Shallice, T. (2004). The Fractionation of Supervisory Control. In Gazzaniga, M. S. (Ed.), *The cognitive neurosciences* (3rd ed.). (pp. 943-956). Cambridge: MIT Press.
- Shriberg, L. D., Paul, R., McSweeney, J. L., Klin, A., Cohen, D. J. & Volkmar, F. R. (2001). Speech and prosody characteristics of adolescents and adults with high functioning autism and Asperger syndrome. *Journal of Speech, Language and Hearing Research*, 44(5), 1097-1115.
- Silver, R. (2001). Assessing and developing cognitive skills through art. In Rubin, J. A. (Ed.), *Approaches to art therapy: Theory and technique* (2nd ed.). (pp. 241-253). New York: Brunner-Routledge.
- Silver, R. (2002). *Three art assessments: The Silver Drawing Test of cognition and emotion; draw a story: Screening for depression; and stimulus drawings and techniques*. New York: Brunner-Routledge.
- Slaughter, V., Peterson, C. C. & Mackintosh, E. (2007). Mind what mother says: narrative input and theory of mind in typical children and those on the autism spectrum. *Child Development*, 78(3), 839-858.
- Smyrnios, S. (2002). *Adaptive Behaviour, Executive Functions and Theory of Mind in Children with Asperger Syndrome*. Melbourne: Victoria University of Technology.
- Sparrow, S., Volkmar, F. & Klin, A. (2000). *Asperger Syndrome*. New York: Guilford Press.
- Spearman, C. (1931). *Creative Mind*. Oxford: Appleton-Century.

Stanley, G. C. & Konstantareas, M. M. (2007). Symbolic play in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 37(7), 1215-1223.

Stano, J. F. (2004). Test Review: Wechsler Abbreviated Scale of Intelligence. *Rehabilitation Counseling Bulletin*, 48(1), 56-57.

Steel, J. G., Gorman, R. & Flexman, J. E. (1984). Neuropsychiatric testing in an autistic mathematical idiot-savant: Evidence for nonverbal abstract capacity. *Journal of the American Academy of Child Psychiatry*, 23(6), 704-707.

Steinhardt, L. (2006). The Eight Frame Colored Squiggle Technique. *Art Therapy*, 23(3), 112-8.

Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized*. New York: Cambridge University Press.

Szatmari, P., Batolucci, G. & Bremner, R. (1989). Asperger's syndrome and autism: Comparison of early history and outcome. *Developmental Medicine and Child Neurology*, 31(6), 709-720.

Szatmari, P., Bremner, R. & Nagy, J. (1989). Asperger's Syndrome: A review of clinical features. *The Canadian Journal of Psychiatry*, 34(6), 554-560.

Szatmari, P., Tuff, L., Finlayson, A. & Bartolucci, G. (1990). Asperger syndrome and autism: neuro-cognitive aspects. *Journal of the American Academy of Child and Adolescent Psychiatry*, 29, 130-136.

Tager-Flusberg, H. & Sullivan, K. (1995). Attributing mental states to story characters: A comparison of narratives produced by autistic and mentally retarded individuals. *Applied Psycholinguistics*, 16(3), 246-251.

- Tammet, D. (2007). *Born on a Blue Day*. London: Hodder & Stoughton.
- Tani, P., Linberg, N., Neiminen-von Wendt, T., von Wendt, L., Virkkala, J. & Applebertg, B. (2004). Sleep in young adults with Asperger syndrome. *Biological Psychiatry*, 50, 147-152.
- Tantam, D. (1988). Asperger syndrome. *Journal of Child Psychology and Psychiatry*, 29, 245-253.
- Tantam, D. (2000). Psychological disorder in adolescents and adults with Asperger syndrome. *Autism*, 4(1), 47-62.
- Taylor, B., Miller, E., Farrington, C., Petropoulos, M., Favot-Mayaud, I., Li, J., et al. (1999). Autism and measles, mumps and rubella vaccine: no epidemiological evidence for a casual association. *Lancet*, 353, 2026-2029.
- Torrance, E.P. (2008). *Torrance Tests of Creative Thinking. Norms Technical Manual*. Illinois: Scholastic Testing Service Inc.
- Torrance, E.P., Ball, O.E. & Safter, H.T. (2008). *Torrance Tests of Creative Thinking*. Illinois: Scholastic Testing Service Inc.
- Torrance, E. P. (1974). *Torrance Tests of Creative Thinking*. Illinois: Scholastic Testing Service Inc.
- United Nations Children Fund (UNICEF) (1989). *Convention of the Rights of the Child*. London: UNICEF.
- Volkmar, F. R., Lord, C., Bailey, A., Schultz, R. T. & Klin, A. (2004). Autism and pervasive developmental disorders. *Journal of Child Psychology and Psychiatry*, 45(1), 135-170.

- Wakimoto, K., Kawamura, H., Kaku, R. & Kawata, M. (1984). An approach to pre-adolescent patients using the "Squiggle Game." *Japanese Journal of Child and Adolescent Psychiatry*, 25(4), 231-240.
- Walker, D. R., Thompson, A., Zwaigenbaum, L., Goldberg, J., Bryson, S. E., Mahoney, W. J., et al. (2004). Specifying PDD-NOS: a comparison of PDD-NOS, Asperger syndrome, and autism. *Journal of the American Academy of Child and Adolescent Psychiatry*, 43(2) 172-180.
- Wechsler, D. (1999). *Wechsler Abbreviated Scale of Intelligence*. San Antonio: Psychological Corporation.
- Williams, D. & Waterhouse, S. (1999). *A positive approach to autism*. London: Jessica Kingsley.
- Williams, J., Scott, F., Stott, C., Allison, C., Bolton, P., Baron-Cohen, S., et al. (2004). The CAST (Childhood Asperger Syndrome Test). *SAGE Publications and The National Autistic Society*, 9(1) 45-68.
- Wiltshire, S. (1987). *Drawings*. London: JM Dent & Sons Ltd.
- Wing, L. & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children. Epidemiology and classification. *Journal of Child Psychology and Psychiatry*, 18, 167-178.
- Wing, L. (1981). Asperger's syndrome: A clinical account. *Psychological Medicine*, 11(1), 115-129.
- Wing, L. & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. *Journal of Autism and Developmental Disorders*, 9(1), 11-29.

Wing, L. & Gould, J. (1979). Severe impairments of social interactions and associated abnormalities in children: epidemiology and classification. *Journal of Autism and Developmental Disorders*, 9, 11-29.

Wing, L., Gould, J., Yeates, S. R. & Brierly, L. M. (1977). Symbolic play in severely mentally retarded and autistic children. *Journal of Child Psychology and Psychiatry*, 18, 167-178.

Wing, L., Leekam, S. R., Libby, S. J., Gould, J. & Larcombe, M. (2002). The Diagnostic Interview for Social and Communication Disorders: Background, inter-rater reliability and clinical use. *Journal of Child Psychology and Psychiatry*, 43(3), 307-325.

Winnicott, D. W. (1968). Playing: Its theoretical status in the clinical situation. *International Journal of Psycho-Analysis*, 49(4), 591-599.

Winnicott, D. W. (1993). The Squiggle Game. In Goldman, D. (Ed), *In one's bones: The clinical genius of Winnicott*. (pp. 101-104). Lanham: Jason Aronson.

Witkin, H. A., Dyk, R. B., Fattuson, H. F., Goodenough, D. R. & Karp, S. A. (1962). *Psychological differentiation: Studies of development*. Oxford: Wiley.

Wolff, S. (2005). Review of autism and creativity: is there a link between autism in men and exceptional ability? *Journal of Child Psychology and Psychiatry*, 46(9), 1023-1024.

Woodbury-Smith, M., Klin, A. & Volkmar, F. (2005). Asperger's Syndrome: A Comparison of Clinical Diagnoses and Those Made According to the ICD-10 and DSM-IV. *Journal of Autism and Developmental Disorders*, 35(2), 235-240.

World Health Organisation (WHO) (1992). *International Classification of Diseases, 10th Edition: ICD-10*. Geneva: WHO.

Zandt, F., Prior, M. & Kyrios, M. (2007). Repetitive behaviour in children with high functioning autism and obsessive compulsive disorder. *Journal of Autism and Developmental Disorders*, 37, 251-259.

Ziegler, R. G. (1976). Winnicott's squiggle game: Its diagnostic and therapeutic usefulness. *Art Psychotherapy*, 3(3-4), 177-185.

Appendix 1.

Diagnostic Criteria for Asperger Syndrome

International Classification of Diseases, 10th Edition: ICD-10,

World Health Organisation (WHO: 1992)

- A. A lack of any clinically significant general delay in spoken or receptive language or cognitive development. Diagnosis requires that single words should have developed by two years of age or earlier and that communicative phrases be used by three years of age or earlier. Self-help skills, adaptive behaviour and curiosity about the environment during the first three years should be at a level consistent with intellectual development. However, motor milestones may be somewhat delayed and motor clumsiness is usual (although not a necessary diagnostic feature). Isolated special skills, often related to abnormal preoccupations, are common, but are not required for diagnosis.
- B. Qualitative abnormalities in reciprocal social interaction (criteria as for autism).
- C. An unusually intense circumscribed interest or restrictive, repetitive, and stereotyped patterns of behaviour, interests and activities (criteria as for autism; however, it would be less usual for these to include either motor mannerisms or preoccupations with part-objects or non-functional elements of play materials).
- D. The disorder is not attributable to other varieties of pervasive developmental disorder; schizotypal disorder (F21); simple schizophrenia (F20.6); reactive and disinhibited attachment disorder of childhood (F94.1 and .2); obsessional personality disorder (F60.5); obsessive-compulsive disorder (F42).

Appendix 2.

Diagnostic Criteria for 299.80 Asperger's Disorder

Diagnostic and Statistical Manual of Mental Disorders: DSM IV-TR

American Psychiatric Association (2000)

(I) **Qualitative impairment in social interaction**, as manifested by **at least two** of following:

- (A) marked impairments in the use of multiple nonverbal behaviours
- (B) failure to develop peer relationships appropriate to developmental level
- (C) a lack of spontaneous seeking to share enjoyment, interest or achievements with other people
- (D) lack of social or emotional reciprocity

(II) **Restricted repetitive & stereotyped patterns of behaviour, interests and activities**, as manifested by **at least one** of following:

- (A) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
- (B) apparently inflexible adherence to specific, non-functional routines or rituals
- (C) stereotyped and repetitive motor mannerisms
- (D) persistent preoccupation with parts of objects

(III) The disturbance causes clinically significant impairments in social, occupational, or other important areas of functioning.

(IV) There is no clinically significant general delay in language (E.G. single words used by age 2 years, communicative phrases used by age 3 years)

(V) There is no clinically significant delay in cognitive development or in the development of age-appropriate self help skills, adaptive behaviour (other than in

social interaction) and curiosity about the environment in childhood.

(VI) Criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia."

Appendix 3. Squigglings scoring criteria

OrigSqu – Originality in drawing	Score
No recognisable representation (patterns)	1
Imitation of a drawing	2
Restructured or elaborated drawing	3
Novel or transformed drawing	4

ElabSqu – Elaboration in drawing	Score
Outline of representation	1
Outline with 2-3 features	2
Outline with 4-5 features	3
Outline with 6 plus features	4

FluenSq – Fluency of names for drawing	Score
One idea for a name	1
Two ideas for a name	2
Three ideas for a name	3
Four plus ideas for a name	4

ImagSqu – Imagination in drawing	Score
Representation of real present objects (copied)	1
Representation of real absent objects	2
Representation of real subjects	3
Representation of unreal objects or subjects	4

ImagStory – Imagination in story	Score
Probable event	1
Possible event	2
Unlikely event	3
Impossible event	4

IntegSqu – Integration of squiggles in drawing	Score
No combining of squiggles – separate different drawings	1
Connections by lines or dots	2
Connection by association	3
Connection as a whole object, subject or by action	4

IntegStory – Integration of ideas in story	Score
Unrelated, listed ideas	1
Related by association	2
Related by interaction	3
Related by interaction and elaboration	4

FlexSquig – Flexibility across drawings	Score
Covering one category	1
Covering two categories	2
Covering three categories	3
Covering four plus categories	4

Appendix 4. Personal information sheet

University of Hertfordshire

Personal Information Sheet

Please fill this form in about your son and return in the stamped addressed envelope with the CAST and signed consent forms. Thank you.

This information will be stored confidentially, accessible only to the researchers of the study.

Gender: **Female** **Male** **(please circle)**

Name:

D.O.B:

Telephone:

Email:

Address:

.....
.....
.....

(please circle)

- | | | |
|---|----------|----------|
| 1. Is your son/daughter in full-time education? | Y | N |
| 2. Is English their first language? | Y | N |
| 3. Are you in contact with mental health services about your son/daughter? | Y | N |
| 4. Is your son/daughter in good physical health? | Y | N |
| 5. Has your son/daughter ever had a serious injury to their head? | Y | N |

Thank you

Please return in the stamped addressed envelope.

Appendix 5. The Childhood Asperger Syndrome Test (CAST: Williams, Scott, Stott, Allison, Baron-Cohen, et al., 2004)

The Childhood Asperger Syndrome Test (CAST)

Child's Name: Age: Sex: Male / Female

Birth Order: Twin or Single Birth:

Parent/Guardian:

Parent(s) occupation:

Age parent(s) left full-time education:

Address:

Tel.No: School:

Please read the following questions carefully, and circle the appropriate answer. All responses are confidential.

- | | | |
|--|-----|----|
| 1. Does s/he join in playing games with other children easily? | Yes | No |
| 2. Does s/he come up to you spontaneously for a chat? | Yes | No |
| 3. Was s/he speaking by 2 years old? | Yes | No |
| 4. Does s/he enjoy sports? | Yes | No |
| 5. Is it important to him/her to fit in with the peer group? | Yes | No |
| 6. Does s/he appear to notice unusual details that others miss? | Yes | No |
| 7. Does s/he tend to take things literally? | Yes | No |
| 8. When s/he was 3 years old, did s/he spend a lot of time pretending (e.g., play-acting being a superhero, or holding teddy's tea parties)? | Yes | No |
| 9. Does s/he like to do things over and over again, in the same way all the time? | Yes | No |
| 10. Does s/he find it easy to interact with other children? | Yes | No |
| 11. Can s/he keep a two-way conversation going? | Yes | No |

12. Can s/he read appropriately for his/her age?	Yes	No
13. Does s/he mostly have the same interests as his/her peers?	Yes	No
14. Does s/he have an interest which takes up so much time that s/he does little else?	Yes	No
15. Does s/he have friends, rather than just acquaintances?	Yes	No
16. Does s/he often bring you things s/he is interested in to show you?	Yes	No
17. Does s/he enjoy joking around?	Yes	No
18. Does s/he have difficulty understanding the rules for polite behaviour?	Yes	No
19. Does s/he appear to have an unusual memory for details?	Yes	No
20. Is his/her voice unusual (e.g., overly adult, flat, or very monotonous)?	Yes	No
21. Are people important to him/her?	Yes	No
22. Can s/he dress him/herself?	Yes	No
23. Is s/he good at turn-taking in conversation?	Yes	No
24. Does s/he play imaginatively with other children, and engage in role-play?	Yes	No
25. Does s/he often do or say things that are tactless or socially inappropriate?	Yes	No
26. Can s/he count to 50 without leaving out any numbers?	Yes	No
27. Does s/he make normal eye-contact?	Yes	No
28. Does s/he have any unusual and repetitive movements?	Yes	No
29. Is his/her social behaviour very one-sided and always on his/her own terms?	Yes	No
30. Does s/he sometimes say "you" or "s/he" when s/he means "I"?	Yes	No
31. Does s/he prefer imaginative activities such as		

- | | | |
|--|-----|----|
| play-acting or story-telling, rather than numbers or lists of facts? | Yes | No |
| 32. Does s/he sometimes lose the listener because of not explaining what s/he is talking about? | Yes | No |
| 33. Can s/he ride a bicycle (even if with stabilisers)? | Yes | No |
| 34. Does s/he try to impose routines on him/herself, or on others, in such a way that it causes problems? | Yes | No |
| 35. Does s/he care how s/he is perceived by the rest of the group? | Yes | No |
| 36. Does s/he often turn conversations to his/her favourite subject rather than following what the other person wants to talk about? | Yes | No |
| 37. Does s/he have odd or unusual phrases? | Yes | No |

SPECIAL NEEDS SECTION
Please complete as appropriate

- | | | |
|--|-----|----|
| 38. Have teachers/health visitors ever expressed any concerns about his/her development? | Yes | No |
|--|-----|----|

If Yes, please specify.....

39. Has s/he ever been diagnosed with any of the following?:

- | | | |
|--|-----|----|
| Language delay | Yes | No |
| Hyperactivity/Attention Deficit Disorder (ADHD) | Yes | No |
| Hearing or visual difficulties | Yes | No |
| Autism Spectrum Condition, incl. Asperger's Syndrome | Yes | No |
| A physical disability | Yes | No |
| Other (please specify) | Yes | No |

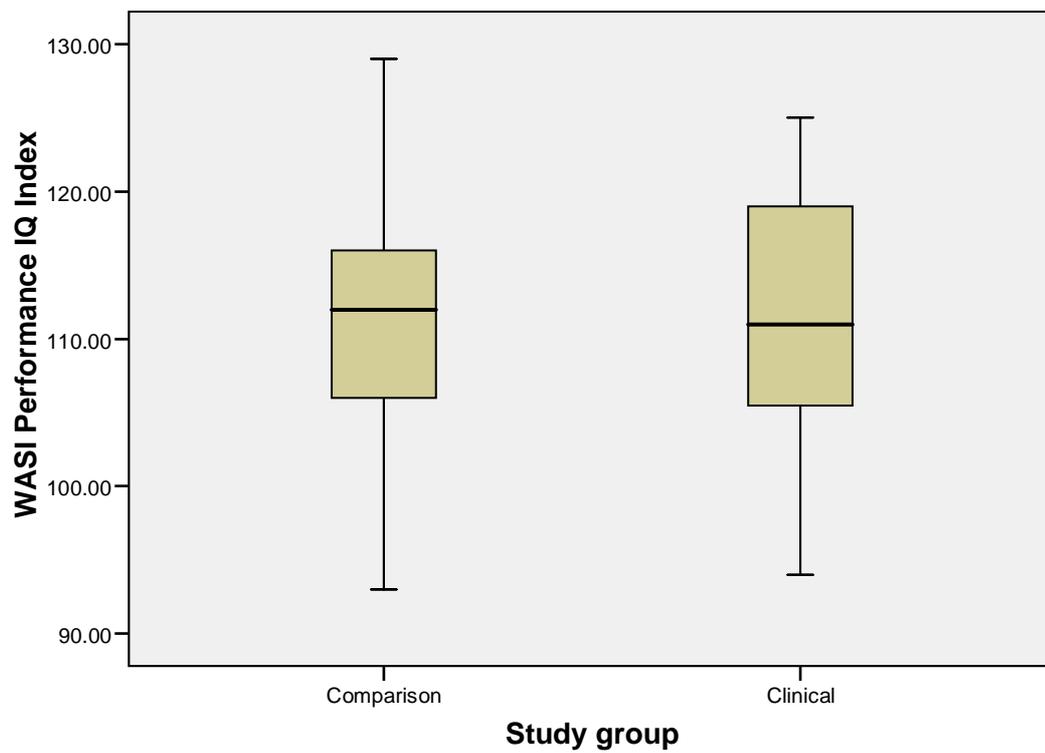
Thank you

Please return in the stamped addressed envelope.

This test is copied and distributed with permission from the Autism Research Centre, 2007.

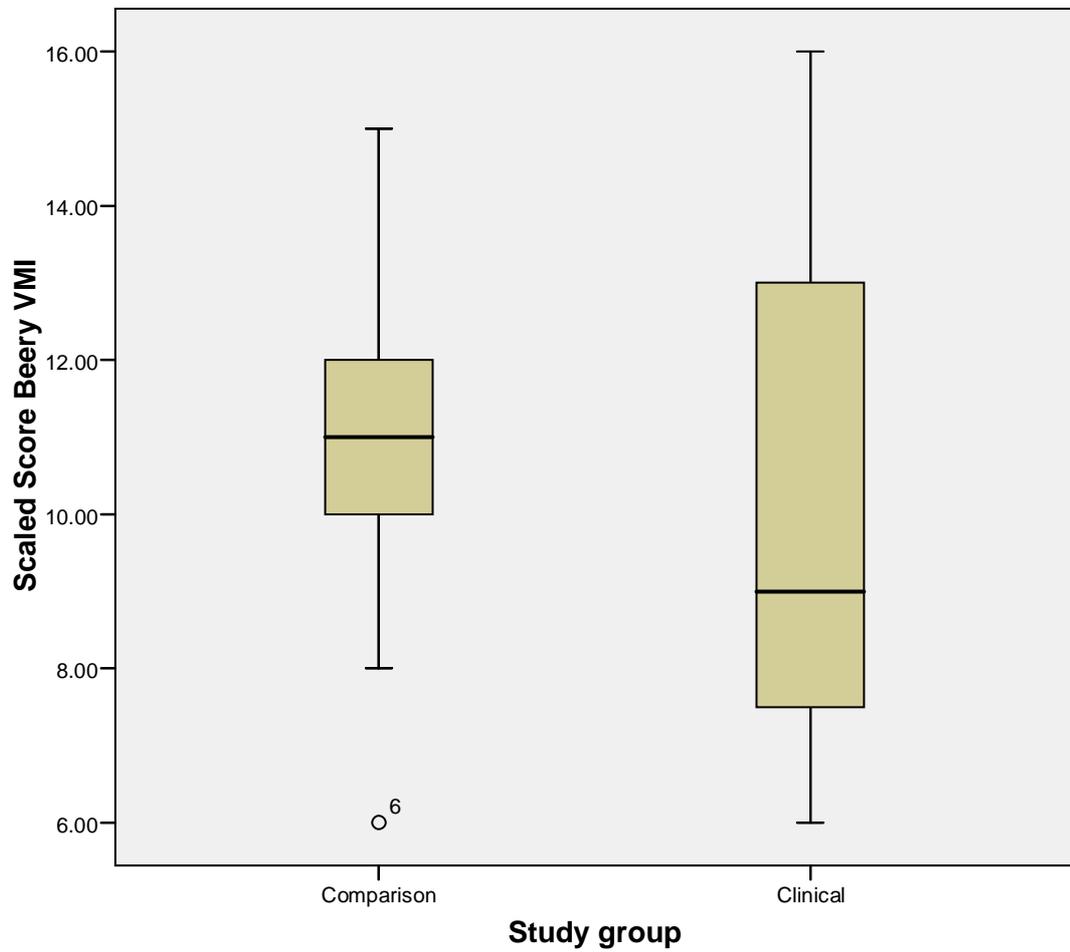
Appendix 6.

Box plot Performance IQ for each group



Appendix 7.

Box plot Visual Motor Integration (VMI) for each group



Appendix 8.

Letter to parents/guardians of children with Asperger syndrome

(University address)

(Home Address)

(Date)

Dear (Name of Parent)

Re: Participation of your son /daughter in research study “Squiggling: a diagnostic aid in the assessment of Asperger syndrome in secondary school-age children”

Thank you for your interest in the participation of your son / daughter in the above study as part of a group of young people with a diagnosis of Asperger syndrome. Before you decide whether you would like your son / daughter to take part, please read the enclosed information sheet about why the research is being carried out and what it would involve.

If you agree for your son/daughter to take part and they are interested in participating in this study, please do the following:

1. Ask your son/daughter to sign the two enclosed participant consent forms after they have read and understood their information sheet about the study. (One copy of the consent forms is for them to keep.)
2. Sign the two enclosed parental/guardian consent forms. (One copy is for you to keep.)
3. Complete the enclosed personal information sheet about your son/daughter

Please return these three documents in the enclosed stamped addressed envelope by **(date in 2 weeks from date sent)**.

Upon receipt of these documents, you will be contacted to arrange a date and time for your son/daughter to do the first set of psychological tests either at your home or at your local clinic. This will take place in a quiet and private room and will last about an hour and a half. If you would like to know more before you decide, or have any questions, please do contact me by email (email address).

Thank you.

Yours sincerely

(name)

Appendix 9.

Letter to children with Asperger syndrome over 16 years

(University address)

(Home address)

(Date)

Participation in research study “Squigglings: a diagnostic aid in the assessment of Asperger syndrome in secondary school-age children”

Thank you for your interest in taking part in the above study as part of a group of young people with a diagnosis of Asperger syndrome. Before you decide whether you would like to take part, please read the enclosed information sheet about why the research is being carried out and what it would involve.

If you would be interested in participating in this study, please do the following:

4. Complete the enclosed personal information sheet
5. Sign the two enclosed participant consent forms (One copy of the consent forms is for you to keep.)

Please return these two documents in the stamped addressed envelope within two weeks (as soon as possible please).

When I have received these documents, you will be contacted to arrange a date and time to meet with you either at your home or at your local clinic to do the first set of psychological puzzles. This will take place for about an hour and a half in a quiet and private room at a time convenient for you.

If you would like to know more before you decide or have any questions, please contact me by email at (email address)

Thank you again for your interest

Yours sincerely

(name)

Appendix 10.

Letter to parents/guardians of typically-developing children

(University address)

(Home address)

(Date)

Dear

Re: Participation of your son / daughter in research study “Squiggling: a diagnostic aid in the assessment of Asperger Syndrome in secondary school-age children”

Researcher and Trainee Clinical Psychologist from the University of Hertfordshire (name) would like to invite your son / daughter to take part in the above study. Before you decide whether you would like your son / daughter to take part, please read the enclosed information sheet about why the research is being carried out and what it would involve.

If you agree for your son / daughter to take part and they are interested in participating in this study, please do the following:

- 1) Ask your son /daughter to sign the two enclosed participant consent forms after they have read and understood their information sheet about the study. (One copy is for them to keep.)
- 2) Sign the two enclosed parental/guardian consent forms. (One copy is for you to keep.)
- 3) Complete the enclosed personal information sheet about your son / daughter.
- 4) Complete the enclosed questionnaire, the Childhood Asperger Syndrome Test (CAST)

Please return these 4 documents in the enclosed stamped addressed envelope as soon as possible. Upon receipt of these documents, you will be contacted to arrange a date and time for your son / daughter to do the first set of psychological tests at home. This will take about an hour and a half. If you would like to know more before you decide, or have any questions, please contact me by email (email address).

Thank you.

Yours sincerely

(name)

Appendix 11.

Letter to typically-developing children over 16 years

Dear (name of participant)

Re: Participation in research study “Squiggling: a diagnostic aid in the assessment of Asperger Syndrome in secondary school-age children”

Researcher and Trainee Clinical Psychologist from the University of Hertfordshire (name) would like to invite you to take part in the above psychological study. Before you decide whether you would like to take part, please read the enclosed information sheet about why the research is being carried out and what it would involve.

If you would be interested in participating in this study, please do the following:

1. Complete the enclosed personal information sheet
2. Sign the two enclosed participant consent forms (One copy is for you to keep.)
3. Ask your parent or guardian to complete the CAST questionnaire.

Please return these 3 documents in the stamped addressed envelope as soon as possible.

When I have received these documents, I will contact you to arrange a date and time to meet with you at your school or home to do the first set of psychological puzzles. This will take place for about an hour and a half.

If you would like to know more before you decide or have any questions, please contact me by email at (email address).

Thank you.

Yours sincerely

(name)

Appendix 12.

Letter to school head-teachers

(University address)

(School Address)

(Date)

Dear **(Name of Headteacher)**

Re: Involvement of pupils in a local research study

I am writing to you to tell you about a local research study exploring the potential use of a new assessment tool in the diagnosis of the neuro-developmental condition Asperger Syndrome in secondary school-age children.

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology. The study is supervised by three Chartered Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood and Dr Steve Davies. It was reviewed by the University of Hertfordshire Research Ethics Committee and by the Essex 2 Local Research Ethics Committee and given a favourable ethical opinion.

I would like to ask you to consider inviting 20 of the pupils at ***** school, aged 12-16 years, to take part in this study. Please read the following information about why the research is being carried out and what it would involve.

Why is this area important to research?

Asperger Syndrome is a brain development disorder that can have a significant effect on young peoples' lives, particularly their social and learning experiences at school. The quicker clinicians can diagnose this disorder, the better the outcome is likely to be for the young person with Asperger Syndrome and their family.

What would the pupils be invited to do?

Pupils who wish to participate would act as a comparison or 'control' group, which would be compared to a group of children with a current diagnosis of Asperger Syndrome. A random selection of your pupils would be invited to individually and privately take part in two testing sessions at the school, lasting approximately one hour each. Informed consent would be gained from all participants and from the parents of those under the age of 16 years.

Each testing session would need to occur during school time, ideally at the start of the school day when the young person is more likely to give their best performance on the tests. In the first testing session, the pupil would complete the following standardised psychological tests:

- Wechsler Abbreviated Scale of Intelligence (30 minutes)
- Beery-Buktenica Developmental Test of Visual-Motor Integration (10 minutes)
- Strange Stories Test (15 minutes)

In the second testing session, the pupil would complete the following:

- Torrance Test of Creativity (30 minutes)
- ❖ 'Squiggling' drawing and story-telling game (30 minutes)

Prior to the testing sessions, the parents of the participating children would be asked to complete an established screening questionnaire called the Childhood Asperger Syndrome Test (CAST). The CAST would be used to ensure that the children were not showing signs of Asperger Syndrome so they could be included in the study.

Parents would be assured that if their child were to be identified by the CAST as presenting with salient features characteristic of Asperger Syndrome, the researchers would contact them to ask if they would like to seek special educational support (e.g., a meeting with a Special Needs Co-ordinator) or further specialist clinical assessment.

If you would be interested in allowing your pupils to take the opportunity to take part in this research study or would like to know more before you decide, please do contact me at ([email](#) address) or by telephone on (mobile number). I would be very happy to visit the school to discuss this study face-to-face should you wish to.

I hope that it may be possible for your pupils to assist with this valuable research study.

Yours sincerely

(name)

Appendix 13.

Letter to diagnosing clinicians

(University address)

(Hospital address)

(Date)

Dear **(Name of clinician)**

Re: Approaching clients re participation in a research study

I am writing to inform you of a local research study in which I am the principal investigator. The study explores the use of a new drawing and storytelling assessment tool to aid diagnosis of Asperger syndrome in children (aged 12 to 16 years 11 months).

The reason for informing you of this study is to ask you to approach adolescents (16 to 16 years 11 months) with Asperger syndrome and to approach the parents of children under 16 with Asperger syndrome (AS) with whom you are working, or have worked with, within the service, with two purposes in mind:

1. to introduce and pass on information about the study
2. to gauge their level of interest in taking part

Please find enclosed 4 different information sheets for:

- children with AS aged under 16
- parents or guardians of children with AS aged under 16
- adolescents with AS aged over 16
- parents or guardians of adolescents with AS aged over 16

These sheets contain information about why the research is being carried out and what it involves for participants. Please would you kindly pass on the names and contact details of those who might be interested in taking part, of course with their consent. My email address is [\(email\)](#) and telephone number is (..)

Thank you.

Yours sincerely

(Supervising Psychologist)

Appendix 14.

**Information sheet for parents/guardians of children with Asperger syndrome
under 16 years**



University of Hertfordshire

**INFORMATION SHEET FOR PARENTS or GUARDIANS
(of Participants under the Age of 16 years)**

Title of project: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Introduction

Young people between the ages of 12 and 16 are being invited to take part in a research study to explore a drawing and storytelling game known as 'squiggling' as a tool in the assessment of the condition called Asperger Syndrome.

We would like to ask you to consider allowing your son or daughter to have the opportunity to take part in this study as part of a group of young people with a diagnosis of Asperger Syndrome.

Before you decide whether you would like to give consent for your son or daughter to take part, please take the time to read the following information to help you understand why the research is being carried out and what it will involve.

The Researchers

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology at the University of Hertfordshire. The study is supervised by three Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood and Dr Steve Davies.

What is the purpose of the study?

This research is looking at young peoples' styles of drawing and storytelling to see if they differ between people with Asperger Syndrome and people without that diagnosis.

As you may already know, people with Asperger Syndrome can have particular difficulties listening, talking to and making sense of other people but also they have skills like having a great eye for detail. It is hoped that the quicker Asperger Syndrome can be identified and diagnosed, the quicker young people and their families can get the right help.

What is involved?

If you decide your son or daughter can take part, they will be invited to take part in two testing sessions lasting approximately one hour each. They will be asked to complete some psychological tests and to do some drawing and tell some stories (play the 'squiggling' game).

The psychological tests measure intelligence, hand-eye coordination, creativity, the ability to integrate information and to empathise with others. The two sessions will take place in a private and quiet room at your local child and family clinic.

Who is taking part?

This study will include 40 young people aged 12-16 years of age who are in full-time education. All the young people taking part will be English-speaking, have no current mental health difficulties or current physical illness and no history of serious injury to their head.

Half the young people taking part will have a current diagnosis of Asperger Syndrome and the other half will not have this diagnosis. Your son/daughter would be in the group of young people with Asperger Syndrome.

Does my son/daughter have to take part?

No. If you do not want your son or daughter to take part, or they change their mind at any time during participation in this study, they can withdraw and do not need to give a reason.

Participation is entirely voluntary and they can withdraw at any time.

What might be the benefits of taking part?

Some people find the opportunity to know more about their psychological strengths and weaknesses interesting and useful. Participants will be asked if they would like a written summary of the results once the research has been completed. They will also be offered a book about Asperger Syndrome, as a small thank you for their time. Participants will be given this even if they withdraw from the study.

What are the potential risks of taking part?

There is a small chance that your son or daughter may feel tired or slightly anxious doing the psychological tests.

To make them feel more comfortable should they feel either tired or a bit anxious, they will be given the opportunity to take breaks during the session and they will be reminded that they can withdraw from the research any time they wish. The testing sessions would take place in a quiet, private room at a child and family clinic local to you, which may help to reduce some anxiety should there be any.

Will taking part be confidential?

Yes. If your son/daughter decides to take part, all information (i.e. consent forms, personal information sheet, psychological test results) will be kept at a secure location which will only be accessible by you and by the researchers.

The only time information from the psychological tests and the squiggling game would be shared with other professionals would be:

- if your son or daughter reveals information that they may pose a risk of harm to their self or others, *or*
- if your son/daughter's psychological test results suggest that some further professional assessment might be helpful for them. This would be discussed with you first.

The results from the psychological tests will not contain your son/daughter's name; instead a number will be used.

There is a possibility that a research assistant will be used to administer and score some of the psychological tests - if so, they will sign a confidentiality agreement.

The overall findings of the project may be published in a research paper, which may include direct quotes from the stories; however your son or daughter would not be identifiable.

Who has reviewed this study?

This study was reviewed by the University of Hertfordshire Research Ethics Committee, North Essex Research and Development and by the Essex 2 Local Research Ethics Committee and was given a favourable ethical opinion.

What do I have to do?

If after reading this information sheet you agree to your son or daughter taking part in the research, and they would like to, we ask that you please do the following:

1. Sign the parental consent forms. (There are 2 copies, you keep one copy and the researchers keep the other.)
2. Complete the personal information sheet about your son or daughter.
3. Ensure your son or daughter signs the participant consent forms. (Again, there are 2 copies, one for you to keep and one to send back for the researchers.)

Please return these in the stamped addressed envelope.

What if I have questions or concerns?

If you have any further questions about the research, please do contact the researcher via email or post, details of which are below.

Thank you for taking time to read this.

Contact details of the researcher:

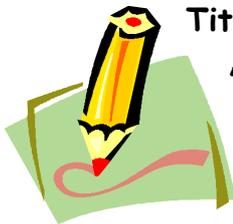
Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire, Hatfield, Herts., AL10 9AB

Appendix 15. Information sheet for children with Asperger syndrome under 16 yrs



University of Hertfordshire

INFORMATION SHEET FOR PARTICIPANTS (aged 12 years to 16 years 0 months)



Title of Study: Squiggling: a diagnostic aid in the assessment of Asperger Syndrome with secondary school-age children

What's this all about then?

Young people between 12 and 16 are being asked to take part in some research. We are looking at a game called 'squiggling', where you do some drawings and tell a story. The squiggling game might be used to help doctors and psychologists know when someone has Asperger Syndrome.

As someone with Asperger Syndrome, we would like to ask you to think about taking part in this research. Before you decide, please read this information sheet about the research.



Who is doing this research?

Eleanor Wakerly is training to be a Clinical Psychologist and she is leading this research as her main project at university. There are three more people helping her with the research. They are all Clinical Psychologists. They are called Dr Joost Drost, Dr Nicholas Wood, and Dr Steve Davies.

Why are we doing this research?

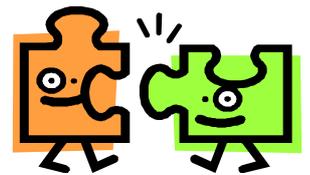
We want to look at young people's drawings and stories and look at the differences between people with Asperger Syndrome and people without Asperger Syndrome.



As you might know already, people with Asperger Syndrome can find it difficult to listen and talk to other people. They can also be very good at knowing a lot about something they are interested in. If doctors and psychologists can quickly tell if someone has Asperger Syndrome, that person and their family can get some help more quickly.

What would I do if I took part?

You would be invited to do some puzzles with words and patterns for an hour at the clinic you have been going to. Then you would come along to the clinic again to play the 'squiggling' game so you would do some drawings and tell a story. We would not look at how well you play. We would just want you to try your best.



Who is taking part in the research?

Altogether 40 young people will take part. Some people will have Asperger Syndrome like you and some *will not* have Asperger Syndrome.

Do I have to take part?

No! If you do not want to take part, or you change your mind at any time during this study, you can stop and you do not need to give a reason.

Will taking part be confidential (private)?

Yes! Only us, the researchers, and your parents or guardian will see how you do on the puzzles. The results from the puzzles will not have your name on them. There would need to be special reasons for sharing with other people how you do on the puzzles and squiggling.

These special reasons would be:

- 1) if you say that you might hurt yourself or other people *or*
- 2) if it might be helpful for you to see a psychologist again (We would talk about this with you and your parents or guardian).

Someone will help the researchers to carry out some of the puzzles with you and score them up. They will keep the results private. This research might be published and it might use some of your words but no-one would know it is you.



What might be the advantages for me?!

Some people find the chance to know more about their strengths and weaknesses interesting and useful. If you take part, you will be asked if you would like a written summary of the results once the research study has been completed.

You will be offered a book about Asperger Syndrome, as a small thank you for your time. You will be given this even if you then stop taking part.

Who has looked at this study and said it is OK to go ahead?

This study was carefully looked at by the University of Hertfordshire Research Ethics Committee, the North Essex Research and Development and the Essex 2 Local Research Ethics Committee and they said it was all OK to go ahead.

OK, I want to take part! What do I do now?

- Check with your parents or guardian that they have read their information sheet and that they agree you can take part in the research
- Sign the participant consent forms. You keep one copy. Give the other copy to your parents or guardian to send back in the stamped addressed envelope.

What if I have questions about this study?

Please ask your parents or guardian to speak to Eleanor by email or post.

Thank you for taking time to read this.

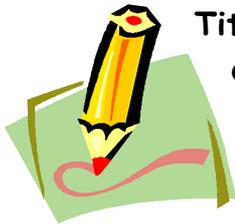
Researcher Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire
Hatfield, Herts., AL10 9AB

Appendix 16. Information sheet for children with Asperger syndrome over 16 years



University of Hertfordshire

INFORMATION SHEET FOR PARTICIPANTS (over 16)

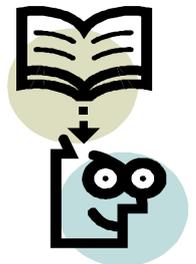


Title of Study: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

What's this all about then?

Young people between the ages of 12 and 16 are being invited to take part in a research study to explore a drawing and storytelling game known as 'squiggling'. We are looking at whether squiggling can be used to help diagnose a brain development condition called Asperger Syndrome.

As someone who has been diagnosed with Asperger Syndrome, we would like to ask you to think about taking part in this study. Before you decide whether you would like to please take the time to read the following information to help you understand why the research is being carried out and what it would involve.



Who is doing this research?

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology. The study is supervised by three Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood, and Dr Steve Davies.

What is the idea behind this study?

This research is looking at the ways in which young people's drawings and stories might be different between people with Asperger Syndrome and people without Asperger Syndrome.

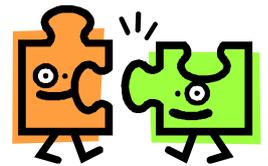
As you probably already know, people with Asperger Syndrome can have particular difficulties listening, talking to and making sense of other people. They can also have skills like having a great eye for detail.



It is hoped that the quicker Asperger Syndrome can be diagnosed, the quicker young people and their families can get the right help.

What would I do if I took part?

If you decide to take part, you will be invited to complete some psychological puzzles on your own at the clinic you have been going to. You would play the 'squiggling' game, which involves drawing and storytelling.



The researchers are not looking at how well you play. All that would be asked is that you try your best. Altogether, it will take up two hours of your time spread across two sessions. These sessions might take place during school time.



Who is taking part?

This study will include 40 young people aged 12-16 years of age who are at school for five days a week. Half the people taking part will have Asperger Syndrome and the other half *will not* have a diagnosis of Asperger Syndrome.

Do I have to take part?

No! If you do not want to take part, or you change your mind at any time during this study, you can back out and you do not need to give a reason. Taking part is entirely up to you and you can withdraw at any time.

Will taking part be confidential (or private)?

Yes! If you decide to take part, only the researchers will see the information you give us. The results from the psychological tests *will not* contain your name- instead a number will be used, and the same number will be written on your personal information sheet.

Your parents *will not* have access to the test results. As you are over the age of 16, your parents will not be able to see the results of the psychological tests unless you wanted them to.

The only time information from the psychological tests and the drawing and storytelling game would be shared with your parents, and other professionals, would be in special circumstances. These would be 1) if you reveal information that may pose a risk of harm to your self or others or 2) if your psychological test results suggest that some further professional assessment might be helpful for you. This would be discussed with you.

A research assistant might be used to carry out some of the tests and score them up. They would keep the results confidential. The findings of the project might be published in a research paper, which may include direct quotes from the stories you tell; however, no-one could identify you.



What might be the benefits for me?!

Some people find the chance to know more about their strengths and weaknesses interesting and useful. If you take part, you will be asked if you would like a written summary of the results once the research study has been completed.

You will be offered a book about Asperger Syndrome, as a small thank you for your time. You will be given this even if you then withdraw from the study.

Who has looked at this study and said it is OK to go ahead?

This study was carefully looked at by University of Hertfordshire Research Ethics Committee, North Essex Research and Development and the Essex 2 Local Research Ethics Committee and they said it was safe to go ahead.

OK, I want to take part! What do I do now? Please sign the participant consent forms and personal information sheet and send back in the stamped addressed envelope.

Any questions? Contact Eleanor, below.

Any questions? Contact Eleanor, below.

Researcher Name: Eleanor Wakerly

Email address: E.Wakerly@herts.ac.uk

Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire
Hatfield, Herts., AL10 9AB

Appendix 17.

Information sheet for parents/guardians of typically-developing children under 16 years



University of Hertfordshire

**INFORMATION SHEET FOR PARENTS or GUARDIANS
(of Participants under the Age of 16 years)**

Title of project: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school-age children

Introduction

Young people between the ages of 12 and 16 are being invited to take part in a research study to explore a drawing and storytelling game known as 'squiggling' as a tool in the assessment of the neuro-developmental condition called Asperger Syndrome.

We would like to ask you to consider allowing your son/daughter to take part in this study as part of a comparison group of young people without a diagnosis of Asperger Syndrome.

Before you decide whether you would like to give consent for your son/daughter to take part, please take the time to read the following information to help you understand why the research is being carried out and what it will involve.

The Researchers

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology at the University of Hertfordshire. The study is supervised by three Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood and Dr Steve Davies.

What is the purpose of the study?

This research is looking at young peoples' styles of drawing and storytelling to see if they differ between people with Asperger Syndrome and people without that diagnosis. People with Asperger Syndrome can have particular difficulties listening, talking to and making sense of other people but also they have skills like having a great eye for detail. It is hoped that the quicker Asperger Syndrome can be diagnosed, the quicker young people and their families can get the right help.

What is involved?

If you decide your son/daughter can take part, they will be invited to take part in two testing sessions lasting approximately one hour each. They will be asked to complete some psychological tests and to do some drawing and tell a story (play the 'squiggling' game). The story would be tape-recorded. This tape would be stored confidentially and destroyed after the study is completed.

The psychological tests will measure intelligence, hand-eye coordination, creativity, the ability to integrate information and to empathise with others. The two sessions will take place in a private and quiet room at their school during school time.

Who is taking part?

This study will include 40 young people aged 12-16 years of age who are in full-time education. Half the young people taking part will have a current diagnosis of Asperger Syndrome and the other half will not have this diagnosis (making up the comparison group which your son/daughter would be in).

All the young people taking part will be English-speaking, they will have no current mental health difficulties or current physical illness (e.g., a cold) and no history of serious injury to their head.

Does my son/daughter have to take part?

No. If you do not want your son/daughter to take part, or they change their mind at any time during participation in this study, they can withdraw and do not need to give a reason. Participation is entirely voluntary and they can withdraw at any time.

What are the benefits of taking part?

Some people find the opportunity to know more about their psychological strengths and weaknesses interesting and useful. Participants will be asked if they would like a written summary of the results once the research has been completed.

They will also be offered a book about Asperger Syndrome, as a small thank you for their time. Participants will be given this even if they withdraw from the study.

What are the potential risks of taking part?

There is a small chance that your son/daughter may feel tired or slightly anxious doing the psychological tests.

To make them feel more comfortable should they feel either tired or a bit anxious, they will be given the opportunity to take breaks during the session and they will be reminded that they can withdraw from the research any time they wish. The testing sessions would take place in a quiet, private room at their school, which may help to reduce some anxiety should there be any.

What do I have to do?

If after reading this information sheet you agree to your son/daughter taking part in the research study, we ask that you do the following:

1. Sign the two consent forms. (You will keep one copy, the researchers will keep another copy.)
2. Complete the Childhood Asperger Syndrome Test (CAST) questionnaire
3. Complete the personal information sheet about your son/daughter.

Information from the CAST may identify your child as showing signs of Asperger Syndrome, although this is unlikely as the condition is very rare. However, if that were to occur, the researchers would contact you to ask whether you would like to arrange for support from the school or to arrange for further assessment of your son/daughter's needs.

Your son/daughter will also be provided with an information sheet and asked to sign two consent forms if they wish to take part in the study. These forms would need to be completed and returned in the stamped addressed envelope.

Will taking part be confidential?

Yes. If your son/daughter decides to take part, all information (i.e. consent forms, personal information sheet, psychological test results) will be kept at a secure location, which will only be accessible by you and by the researchers.

The only time information from the psychological tests and the drawing and storytelling game would be shared with other professionals would be if your son/daughter reveals information that they may pose a risk of harm to their self or others, or if your son/daughter's psychological test results suggest that some further professional assessment might be helpful for them. This would be discussed with you first.

The results from the psychological tests will not contain your son/daughter's name; instead a number will be used. There is a possibility that a research assistant will be used to administer and score some of the psychological tests, if so they will sign a confidentiality agreement. The overall findings of the project may be published in a research paper, which may include direct quotes from the story; however your son/daughter would not be identifiable.

Who has reviewed this study?

This study was reviewed by the University of Hertfordshire Research Ethics Committee and by the Essex 2 Local Research Ethics Committee and was given a favourable ethical opinion.

What if I have questions or concerns?

If you have any further questions about the research, please do contact the researcher via email or post, details of which are below.

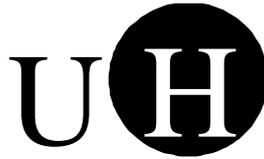
Thank you for taking time to read this.

Contact details of the researcher:

Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire, Hatfield, Herts., AL10 9AB

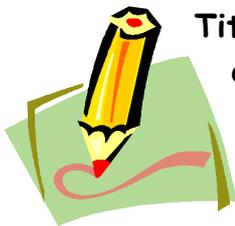
Appendix 18.

Information sheet for typically-developing children under 16 years



University of Hertfordshire

INFORMATION SHEET FOR PARTICIPANTS (12-16)



Title of Study: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school-age children

What's this all about then?

Young people between the ages of 12 and 16 are being invited to take part in a research study to explore a drawing and storytelling game known as 'squiggling'. We are looking to see whether squiggling can be used to help diagnose a brain development condition called Asperger Syndrome.

We would like to ask you to think about taking part in this study. Before you decide whether you would like to please take the time to read the following information to help you understand why the research is being carried out and what it will involve.

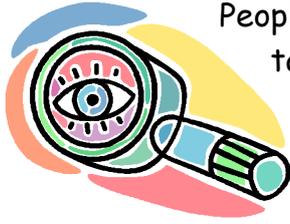


Who is doing this research?

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology. The study is supervised by three Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood, and Dr Steve Davies.

What is the idea behind this study?

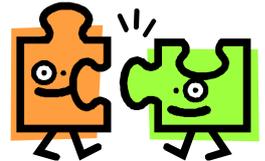
This research is looking at the ways in which young people's drawings and stories might be different between people with Asperger Syndrome and people without Asperger Syndrome.



People with Asperger Syndrome can have difficulties listening, talking to and making sense of other people. They also have skills like having a great eye for detail. It is hoped that the quicker Asperger Syndrome can be diagnosed, the quicker young people and their families can get the right help.

What would I do if I took part?

If you decide to take part, you will be invited to complete some psychological tests at your school on your own. These will involve words and patterns, and of course the 'squiggling' game! This game involves line drawing and storytelling.



The researchers are not looking at how well you play. All that would be asked is that you try your best. Altogether, it will take up two hours of your time spread across two sessions. These sessions would take place in school time.

What would my parents or guardian need to do?



Your parents or guardian will be asked to fill in a questionnaire that will tell the researchers whether you show signs of Asperger Syndrome. It is unlikely that it will, as Asperger Syndrome is very rare.

If the questionnaire reveals that you show signs of Asperger Syndrome, the researchers will arrange to speak with you and your parents. Together we would discuss if you wanted to get some extra help at school or wanted further professional assessment.



Who is taking part?

This study will include 40 young people aged 12-16 years of age who are at school for five days a week. The young people taking part from your school will not have Asperger Syndrome or show any signs of it.

Do I have to take part?

No! If you do not want to take part, or you change your mind at any time during this study, you can back out and you do not need to give a reason. Taking part is entirely up to you and you can withdraw at any time.

Will taking part be confidential (or private)?

Yes! If you decide to take part, only the researchers and your parents or guardian will be able to see the information you give us. The results from the psychological tests *will not* contain your name, instead a number will be used.

The only time information from the psychological tests and the drawing and storytelling game would be shared with other professionals would be in special circumstances.

These would be 1) if you reveal information that may pose a risk of harm to your self or others or 2) if your psychological test results suggest that some further professional assessment might be helpful for you. This would be discussed with you.

A research assistant might be used to carry out some of the tests and score them up. They will also keep the results private. The findings of the project may be published in a research paper, which may include direct quotes from the stories you tell; however, no-one could know it is you.



What's in it for me?!

Some people find the chance to know more about their strengths and weaknesses interesting and useful. If you take part, you will be asked if you would like a written summary of the results once the research study has been completed.

You will be offered a book about Asperger Syndrome, as a small thank you for your time. You will be given this even if you then withdraw from the study.

Who has looked at this study and said it is OK to go ahead?

This study was carefully looked at by University of Hertfordshire Research Ethics Committee and the Essex 2 Local Research Ethics Committee and they said it was all OK and safe to go ahead.

OK, I want to take part! What do I do now?

- Check with your parents or guardian that they have read their information sheet and that they agree you can take part in the study (They need to sign a consent form so you can take part)
- Sign the participant consent forms and give to your parents or guardian to send back in the stamped addressed envelope

What if I have questions about this research?

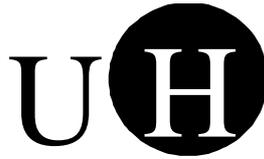
Please ask your parents or guardian to contact the researcher by email or post.

Thank you for taking time to read this.

Researcher Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire
Hatfield, Herts., AL10 9AB

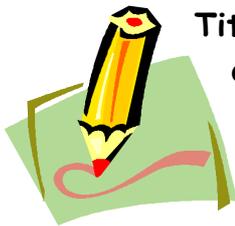
Appendix 19.

Information sheet for typically-developing children over 16 years



University of Hertfordshire

INFORMATION SHEET FOR PARTICIPANTS (over 16)



Title of Study: 'Squigglings': a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

What's this all about then?

Young people between the ages of 12 and 16 are being invited to take part in a research study to explore a drawing and storytelling game known as 'squigglings'. We are looking at whether squigglings can be used to help diagnose a brain development condition called Asperger Syndrome.

We would like to ask you to think about taking part in this study. Before you decide whether you would like to please take the time to read the following information to help you understand why the research is being carried out and what it will involve.



Who is doing this research?

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology. The study is supervised by three Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood, and Dr Steve Davies.

What is the idea behind this study?

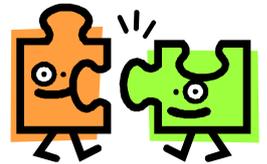


This research is looking at the ways in which young people's drawings and stories might be different between people with Asperger Syndrome and people without Asperger Syndrome. People with Asperger Syndrome can have particular difficulties listening, talking to and making sense

of other people. They also have skills like having a great eye for detail. It is hoped that the quicker Asperger Syndrome can be identified and diagnosed, the quicker young people and their families can get the right help.

What would I do if I took part?

If you decide to take part, you will be invited to complete some psychological tests at your school on your own. These will involve words and patterns, and of course the 'squiggling' game! This game involves line drawing and storytelling.



The researchers are not looking at how well you play. Altogether, it will take up two hours of your time spread across two sessions. These sessions would take place in school time.

What would my parent or guardian need to do?



Your parents or guardian will be asked to fill in a questionnaire that will tell the researchers whether you show signs of Asperger Syndrome. It is unlikely that it will, as Asperger Syndrome is very rare.

If the questionnaire reveals that you show signs of Asperger Syndrome, the researchers will arrange to speak with you and your parents. Together we would discuss if you wanted to get some extra help at school or wanted further professional assessment.



Who is taking part?

This study will include 40 young people aged 12-16 years of age who are at school for five days a week. The young people taking part from your school will not have Asperger Syndrome or be showing any signs of it.

Do I have to take part?

No! If you do not want to take part, or you change your mind at any time during this study, you can back out and you do not need to give a reason. Taking part is entirely up to you and you can withdraw at any time.

Will taking part be confidential (or private)?

Yes! If you decide to take part, only the researchers will be able to see the information you give us. The results from the psychological tests will not contain your name, instead a number will be used.

Your parents *will not* have access to the test results. As you are over the age of 16, your parents will not be able to see the results of the psychological tests unless you wanted them to.

The only time information from the psychological tests and the drawing and storytelling game would be shared with your parents, and other professionals, would be in special circumstances. These would be 1) if you reveal information that may pose a risk of harm to your self or others or 2) if your psychological test results suggest that some further professional assessment might be helpful for you. This would be discussed with you.

A research assistant might be used to carry out some of the tests and score them up. They would also keep the results confidential. The findings of the project may be published in a research paper, which may include direct quotes from the stories you tell; however, no-one could know it is you.



What's in it for me?!

Some people find the chance to know more about their strengths and weaknesses interesting and useful. If you take part, you will be asked if you would like a written summary of the results once the research study has been completed.

You will be offered a book about Asperger Syndrome, as a small thank you for your time. You will be given this even if you then withdraw from the study.

Who has looked at this study and said it is OK to go ahead?

This study was carefully looked at by University of Hertfordshire Research Ethics Committee and the Essex 2 Local Research Ethics Committee and they said it was all OK and safe to go ahead.

OK, I want to take part! What do I do now?

Please sign the participant consent forms and personal information sheet and send back in the stamped addressed envelope. Eleanor, the lead researcher will contact you to arrange a time to meet for the first testing session.

What if I have questions about this study?

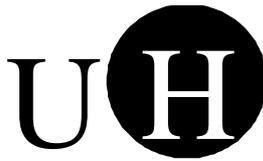
If you have any further questions about the study, please contact the researcher via email or post, details of which are below.

Thank you for taking time to read this.

Researcher Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire
Hatfield, Herts., AL10 9AB

Appendix 20.

Parent/guardian consent form



University of Hertfordshire

PARENTAL CONSENT FORM

Title of Project: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Lead Researchers: Eleanor Wakerly, Trainee Clinical Psychologist and Dr Joost Drost, Clinical Psychologist

Please initial box

- 1) I confirm that I have read and understand the information sheet dated (06.11.07) and version (3) for the above study. I have had the opportunity to consider the information and if needed ask questions that were satisfactorily answered.
2) I understand that participation is voluntary and that my son/daughter is free to withdraw at any time, without giving any reason, without healthcare or legal rights being affected.
3) I understand that relevant sections of my son/daughter's data collected during the study may be looked at by the named study researchers. I give permission for these individuals to access this data.
4) I agree for my son/daughter to take part in the above study

Name of parent of participant Date Signature

Name of researcher Date Signature

Appendix 21.

Participant consent form



University of Hertfordshire

PARTICIPANT CONSENT FORM

Title of Project: Squiggling: a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Researcher: Eleanor Wakerly, Trainee Clinical Psychologist

Please initial box

- 1) I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information and if needed ask questions that were satisfactorily answered. []
2) I understand that participation is voluntary and I am free to withdraw at any time, without giving any reason, without my healthcare or legal rights being affected. []
3) I understand that relevant sections of my data collected during the study may be looked at by the study researchers. I give permission for these individuals to access this data. []
4) I agree for my words given during the study tasks to be used anonymously in any publication leading from this research. []
5) I agree to take part in the above study []

Name of participant Date Signature

Name of researcher Date Signature



University of Hertfordshire

PARTICIPANT CONSENT FORM

Title of Project: Squiggling: a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Researcher: Eleanor Wakerly, Trainee Clinical Psychologist

Please initial box

- 1) I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information and if needed ask questions that were satisfactorily answered.
2) I understand that participation is voluntary and I am free to withdraw at any time, without giving any reason, without my healthcare or legal rights being affected.
3) I understand that relevant sections of my data collected during the study may be looked at by the study researchers. I give permission for these individuals to access this data.
4) I agree for my words given during the study tasks to be used anonymously in any publication leading from this research.
5) I agree to take part in the above study

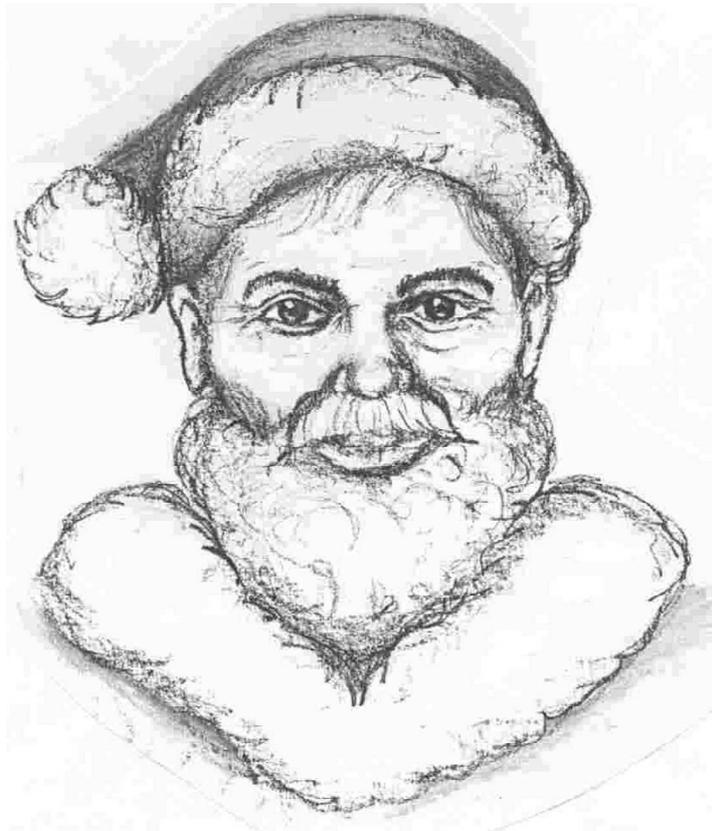
Name of participant Date Signature

Name of researcher Date Signature

**Appendix 22. Strange Stories Test (Abbreviated Version) and Scoring Criteria
(Happe, 1994)**

PRACTICE STORY

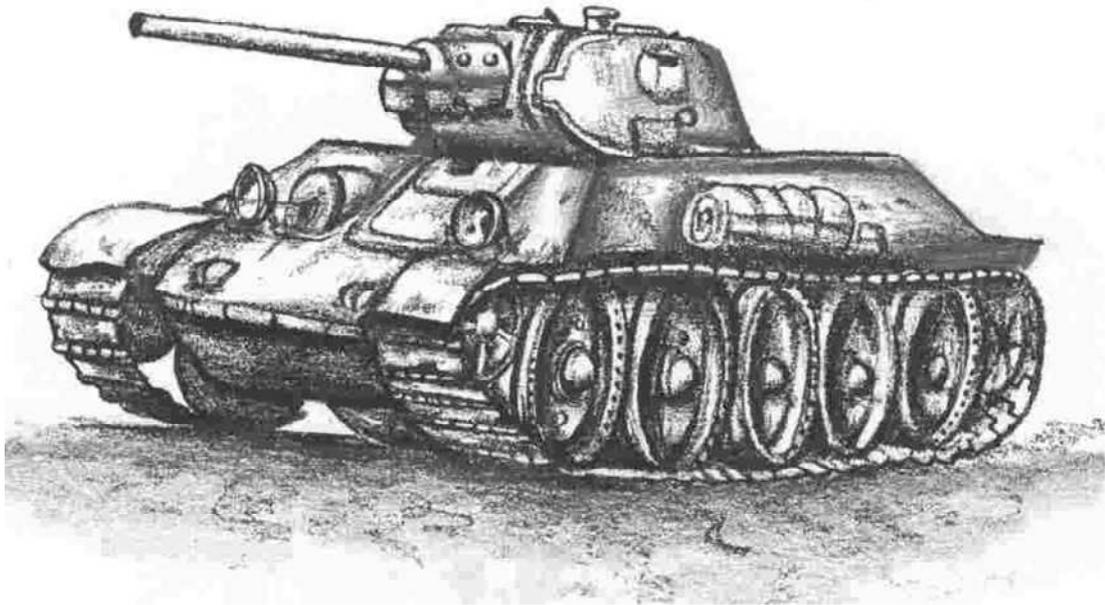
It is Christmas, and Ann's mother takes her to the toy shop. In the toy shop Mr. Jones, Ann's neighbour, is dressed up as Santa Claus, handing out sweets to all the children. Ann runs up to Mr. Jones and says, "Hello. Aren't you Mr. Jones?" Mr. Jones answers, "No, I'm Santa Claus!"



Q: Why does Mr. Jones say that?

STORY 1. (Prisoner)

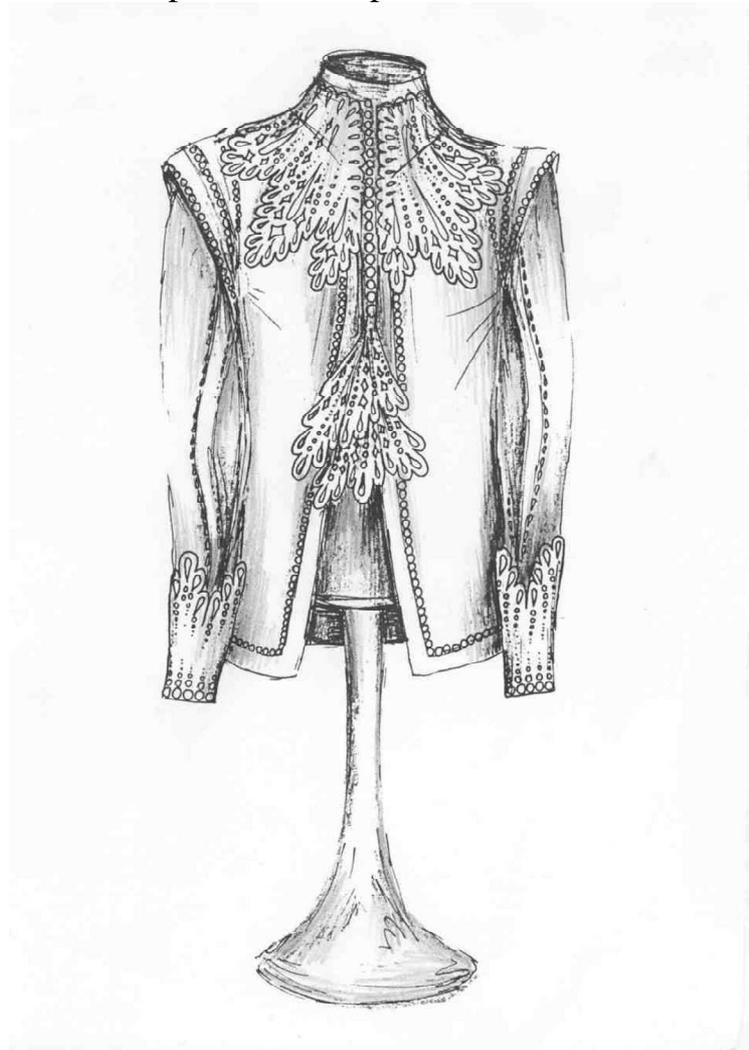
During the war, the Red army captures a member of the Blue army. They want him to tell them where his army's tanks are; they know they are either by the sea or in the mountains. They know that the prisoner will not want to tell them, he will want to save his army, and so he will certainly lie to them. The prisoner is very brave and very clever, he will not let them find his tanks. The tanks are really in the mountains. Now when the other side ask him where his tanks are, he says, "They are in the mountains".



Q: Why did the prisoner say that?

STORY 2. (Coat)

Mrs Simpson works in a museum. One day she receives a very special old coat and has to decide where to put it in the museum. The museum is very big, and has many different sections. The coat used to belong to a member of the French Royal Family and is covered in very delicate lace. However, Mrs Simpson does not put it in the French Royalty section. She does not put it in the clothing section either. Instead, she carefully takes it into a separate room. In this room all the clothes are kept in special cases and the temperature is kept constant.



Q: Why did she do this?

STORY 3. (Kittens)

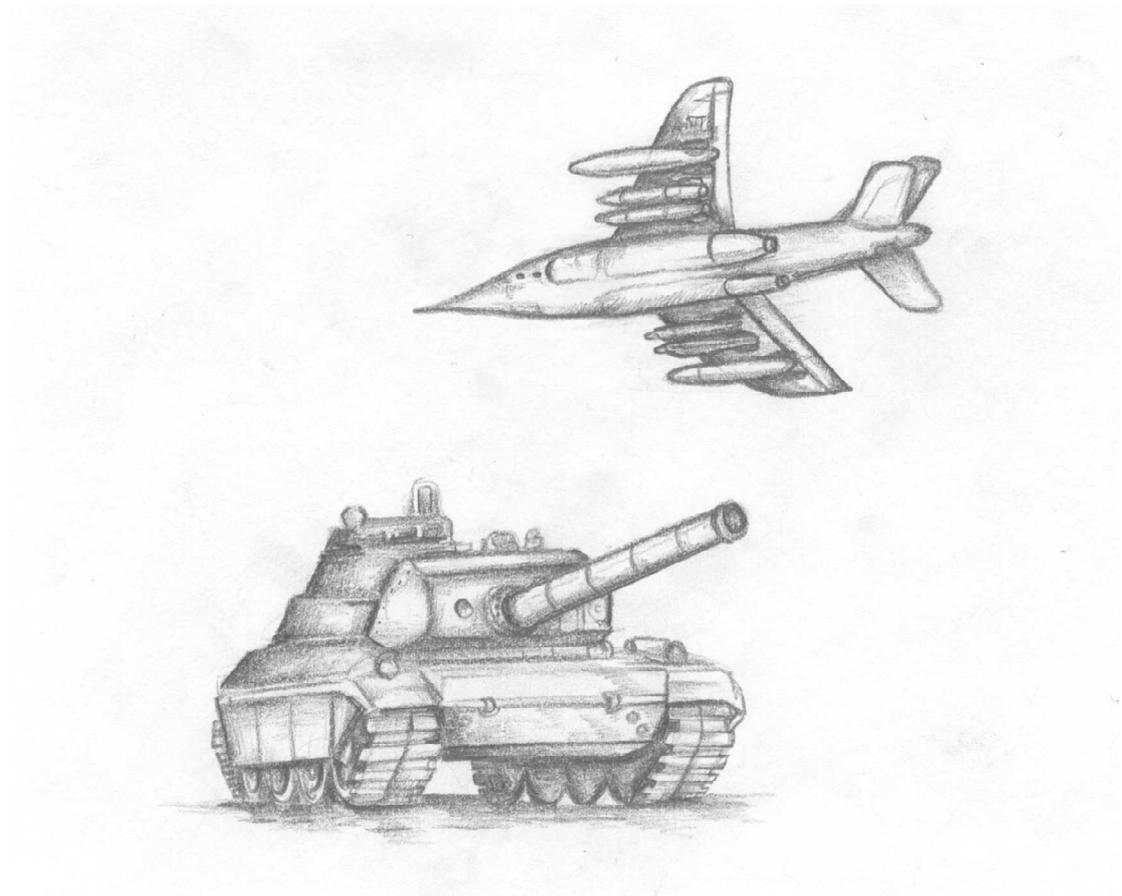
Jill wanted to buy a kitten, so she went to see Mrs. Smith, who had lots of kittens she didn't want. Now Mrs. Smith loved the kittens, and she wouldn't do anything to harm them, though she couldn't keep them all herself. When Jill visited she wasn't sure she wanted one of Mrs. Smith's kittens, since they were all males and she had wanted a female. But Mrs. Smith said, "If no one buys the kittens I'll just have to drown them!"



Q: Why did Mrs. Smith say that?

STORY 4. (Armies)

Two enemy powers have been at war for a very long time. Each army has won several battles, but now either side could win. The two sides are equally strong. However, the Blue army is stronger than the Yellow army in foot soldiers and tanks. But the Yellow army is stronger than the Blue Army in aeroplanes. On the day of the final battle, which will decide the outcome of the war, there is heavy fog over the mountains where the fighting is about to occur. Low clouds hang above the soldiers. By the end of the day the Blue army has won.



Q: Why did the Blue army win?

ToM Stories Scoring Criteria 8/01/02 Happe (1994)

Note: the following criteria were designed specifically for the FOCUS Study (8 –16 year old boys).

6 ToM and 6 Physical (control) stories were selected from the larger set of Strange Stories (Happé 1994) and adapted for children.

General: **2** = full and complete answer
 1 = incomplete or partially correct answer
 0 = incorrect answer

NB: only one score per story; giving credit for the best answer

Optional:

Score also: **MS** where mental state / psychological term used
 Refers to thoughts, feelings, desires, traits, and dispositions
 Examples: thinks, knows, wants, greedy, playing a game, pretending,
 like, happy, cross, afraid, joke, pretend, lie, to fool someone, expecting,
 upset, polite, (not) rude, etc.
 MSx if an inappropriate mental state is attributed – **or if mental state
 is attributed but the answer is incorrect.**
 MS2 if a 2nd order mental state (e.g. he thinks she wants), **MS3**, etc

ToM Story Type:

22 Double Bluff

24 Persuasion

Physical (Control) Stories:

11

19a

Physical Stories: Involve understanding of physical events to check generality of any comprehension deficit, independent of story content.

Physical State Answers: refers to non-mental events- physical appearance, action of objects, physical events and outcomes; e.g., big, looks like, is shaped like, to get rid of, to sell them, because of the X (object), to not get X (physical outcome).

Present the story and ask the child to read the story aloud. Time the duration of reading. When the child has finished reading stop the stopwatch, and place the question underneath the story.

1. Example: Why did X say that?
(no feedback to be given)

1. Memory/Comprehension Questions:

To be given to establish sufficient understanding of the story to correctly answer Why question

e.g., **What did Peter think of the new hat?** *Do not re-ask question 1*

22. Armies

“Why did the prisoner say that?”

2 = ref to fact that other army will not believe and hence look in other place, to prisoner’s realisation that that’s what they’ll do, or ref to double bluff.

“That’s very clever, he thought they would lie to them, and then they would just go to the sea” (Andrew, 11 years)

“Because they would think he was lying and if he told them where they really were they’d go to the sea” (Joe B, 11)

“Because he’s bluffing” Tell me more “Because they’ll think he’s lying so they go to the sea, and they’re not there” (Matthew, 15)

“The prisoner said that because if he says its in the sea then they know he’s lying and they’ll look in the mountains, and if he says there in the mountains, they are going to look in the sea, so he’s tricking them” (Sahdia, 10 years).

“I think he said that they will think he was lying so they will go look, they will think the tanks in the sea, by the sea, they won’t think he is telling the truth” (Rosie, 11 years).

1 = ref to outcome (e.g. to save his army’s tanks) or simple lying (to mislead them, to lie)

“Because he wanted to save his people” (Hugh, 9)

“To trick them – they go there and then they move them. So they’d go to the mountains. Could hide them under ground, or in a tree”. (Gregory, 9)

“Because he didn’t want them to know where the tanks were, and he wanted to save his army” Why would that help? “Because they’d go to the wrong place” Why? “Because he told them the wrong place” (Aimee, 10)

“Because he didn’t want them to find the tanks” Rpt question “Because.....” (Joanne, 11)

“He said that because he didn’t want to lose his honour, he was loyal, he didn’t want to tell the true destination of the tanks otherwise, just in case they found them, because he was loyal to his fellows, the others” (Andrew, 16 years).

“Because he didn’t want them to have the tanks” (Phinas, 9 years).

0 = ref to motivation that misses point of double bluff (e.g. because he was scared and wanted to tell the truth).

“The prisoner said that because the army could fight the other army and take the tanks away” (Dharine, 11 years)

“Because he wanted to lose... because he wanted to lie and he accidentally told the truth” (Darryl, 11 years)

“The prisoner said that because ...the other side, they meant the other side opposite the red... more people were fighting, he told him because they were on the same side” (Le Khang, 10 years)

“Because there was probably, there was a cave in the mountain and they were hidden in there, he probably said, thought they were on top of the mountain” (Katherine, 10 years)

“Because he wasn’t really sure if they were by the sea or the mountains, so he just guessed and said mountains” (Sanya, 11 years)

“Said they were in the mountains” Rpt question “Because, he said that because he might get in trouble” What do you mean? “They might hurt him or threaten him or something” (Daina, 9)

“They’re on the same army together – the prisoner and the next one who came along”. (Nicola, 11)

“Because he said the mountains, because they were far away” (Laura, 11)

“They are really in the mountains...but then he’s said they are in the mountains, I don’t know, they saying he’s clever, and wont let them know, but like he’s not going to let them know but then he says, the tanks are in the mountain, ... now they, then he says to the person, they are in the mountains, but then it says the tanks are really in the mountains” (Marios, 10 years).

“I don’t know, he said they were in the mountains because, but they were in the mountains (laughed) ...he didn’t tell them where in the mountains, ... he might have been, that he did not tell them which mountains and where they were” (Helen, 16 years).

“Because they could be anywhere in the mountains...very big area” (Cheryl, 16 years).

24. Kittens "Why did Mrs. Smith say that?"

2 = ref to persuasion, manipulating feelings, trying to induce pity/guilt, etc; make her buy one by making her feel sad/bad/guilty

"Because she didn't want her kittens anymore and then she wanted Jill to buy one so she was trying to be sort of cruel, really so Jill could buy one, so she said that she drown one" (Darryl, 11 years)

"It was just a joke to try and make her buy one of the kittens" (Matthew, 15)

"So Jill will buy the kitten and so Jill will feel sorry for them and won't get killed" (Andrew, 16 years).

"Mrs Smith said she would drown them because she can't look after them all, because it will cost her money, too much money buying food, vets, back-scratcher (!), all sorts of things"

Did she mean what she said?

I don't know, ... don't think she mean, she just trying to get rid of them, just trying to make the girl feel sad so she would take one" (Liam, 10 years)

1 = ref to outcome (to sell them/get rid of them) without explaining how, or simple motivation (eg to make Jane sad).

"Mrs Smith said that because she couldn't handle having all the kittens" (Dharine, 11 years)

"Because, I think she might have been an old lady and she couldn't cope with all the kittens"

(Andrew, 11 years)

"Because she wanted her (Jill) to buy them" (Hugh, 9)

"So the girl will buy the kitten" (Lisa, 16 years).

"Because she couldn't look after them all because there was too many of them and she probably wanted the kid to take them, the kittens" (Helen, 16 years).

"Because she couldn't afford to look after them all" (Kathryn, 16 years)

"Because she didn't want to hurt them...She wants the girl to buy the kittens" (Amy-May, 8)

“She said that maybe because her house was so small and she couldn’t look after them because they were little kittens and there was only one of her; maybe she didn’t have enough money to look after them”

(Sahdia, 10 years).

0 = ref to general knowledge or dilemma without realisation that statement was not true (e.g. she couldn’t keep them all. Its kinder to kill them. She’s a horrible woman, she hates cats)

“Mrs Smith said that because she didn’t want all of the kittens and she would have to drown them because she didn’t want them” (Katherine, 10 years)

“Because she had too many of the kittens and she couldn’t look after them”

“Because nobody wanted them. Jill wanted a female – so she said she’d drown them”
(Gregory, 9)

“Mrs Smith said that because she would be unable to keep the cats for very long, drowning them would be quicker than taking them to the vet and actually cheaper than keeping them herself” (Anthony, 15 years)

“Because she wanted to get rid of the kittens and then she could get rid of them, and get some more and sell them” (Thomas, 8)

“Mrs Smith said she would drown them because no-one would buy them and couldn’t keep them because there were too many of them” (Andrew, 16 years).

Physical Stories

11. Armies "Why did the Blue army win?"

2 = ref to both weather conditions and relative ground superiority or inability of other army’s planes to be useful in fog (n.b. names of armies are unimportant)

“Because the Blue army had tanks and they could stay low, but because the Yellow army had aeroplanes, when they got up into the air they could hardly see anything because it was very wet” (Darryl, 11 years)

“Blue army stronger in planes, yellow army in tanks and on foot ...The yellow were flying and it was cloudy and they couldn’t see anything. The blue were on the ground”
(Daniella, 10)

“The yellow army had to fly up in the air and most of the fog is in the air – so you can’t actually see, and because the blue army have mostly foot soldiers and tanks it might be easier to see, so they know where they’re going” (Michaela, 9)

“Because all the mist is up over the mountains. The planes can’t see where they’re going to shoot and drop the bombs so they’ll miss completely, and then the tanks will shoot them out of the sky like pigeons” (Philip, 8)

“The planes would not be able to see the targets; therefore they wouldn’t be able to provide ground support for the army; the other side have got a lot of tanks... less strong compared to the yellows” (Anthony, 15 years).

“In the story it said that Blue Army has better soldiers and the, and because Yellow one only got planes couldn’t really see well, properly...” (Liam, 10 years).

1 = ref either to weather or to relative superiority on ground versus air.

“Because the blue army were on the floor, and the yellow army in planes, and there’s fog” (Thomas, 8)

“The Blue Army won because they were stronger on foot soldiers and the Yellow Army were stronger in aeroplanes and there was low fog over the mountains” (Dharine, 11 years)

“The Blue Army won because they got more, they more stronger than the Yellow Army because they are good at foot and tanks, and the Yellow Army are only good at aeroplanes so they, the big tanks ... they can shoot from the air as well, the aeroplanes can’t shoot down, so they can’t search... the Blue Army would have won because they Blue Army were more stronger even with the planes” (Sahdia, 10 years).

0 = ref to irrelevant or incorrect information (e.g. they won because they had better planes).

“The Blue Army won because when there’s a lot of fog, the people on the ground couldn’t see, but if they go high up in the air in the aeroplanes they will probably see them, the mist will clear and they will see them and will start to fight”

So, can you tell me why the Blue Army won?

“Because they could see the people and they could know what they were doing” (Katherine, 10 years)

“Because the Blue Army were stronger in the air so they found it easier than the tanks, to get up and win it” (Andrew, 11 years)

*“Because they had more aeroplanes that would be able to go over the top” Rpt question
“Because they had more people on the ground – so if you took off in a plane you would probably crash” (Jack N, 8)*

“Because the Blue Army had aeroplanes and so they could see through the fog, but the Yellow only had tanks and foot soldiers” (Michael, 10 years).

19 a. Museum "Why did she do this?"

2 = ref to delicate condition of coat due to age, or value, and may ref to temperature control on room – reason why the coat is “safe” must be given.

1 = general ref to special status of coat, not further explained (e.g. to keep it safe)

“She doesn’t want to ruin the coat so she puts it in the safe room, where there temperature is just right” (Azin, 12 years)

“So the coat doesn’t get spoilt” (Aftab, 12 years).

0 = ref to other motivations not warranted by story (e.g. So she would always know where to find it. For her own convenience.)

“She might think that it will get mixed up with someone else’s coat, because other people might have the same or similar coats” (Thomas, 13 years).

Appendix 23.

Standardised squiggles

Appendix 24.

University of Hertfordshire Ethics Committee Approval

SCHOOL OF PSYCHOLOGY ETHICS COMMITTEE APPROVAL

Student Investigator: Eleanor Wakerly

Title of project: An exploratory study of a play technique 'squiggling' as a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Supervisor: Nicholas Wood

Registration Protocol Number: PSY/09/07/EW

The approval for the above research project was granted on 13 September 2007 by the Psychology Ethics Committee under delegated authority from the Ethics Committee of the University of Hertfordshire.

Signed:



Date: 13 September 2007

Dr. Lia Kvavilashvili

Chair

Psychology Ethics Committee

STATEMENT OF THE SUPERVISOR:

From my discussions with the above student, as far as I can ascertain, s/he has followed the ethical protocol approved for this project.

Signed (supervisor):

Date:

App25.

University of Hertfordshire Ethics Committee Approval Modification

SCHOOL OF PSYCHOLOGY ETHICS APPLICATION FORM - 3

For minor modifications to an existing protocol approval

Status: STAFF ~~PhD~~ ~~MSe~~ ~~BSe~~ (delete inapplicable categories) **DClinPsy**

Course code (if student):

Title of project: **The use of squiggling: a play technique as a diagnostic aid in the assessment of secondary school-age children with Asperger syndrome**

Name of researcher(s): **Eleanor Wakerly**

Contact Tel. no: **07979 532670**

Contact Email: **E.Wakerly@herts.ac.uk** or **elewakerly@yahoo.co.uk**

Name of supervisor

(for undergraduate and postgraduate research) **Dr Joost Drost, Dr Nicholas Wood, Dr Stephen Davies**

Start Date of Study (if the end date of the existing approval has expired): **January 2007**

End Date of Study: **August 2008**

Details of modification:

I would like to offer a small financial inducement to my comparison sample of typically developing school children in order to aid the recruitment process.

Does the modification present additional hazards to the participant/investigator?

(delete an inappropriate option category)

NO

If yes, please provide a clear but concise statement of the ethical considerations raised by the project and how you intend to deal with them.

YES

This form should be submitted (via your Supervisor for MSc/BSc students) to the Psychology Ethics Committee, psyethics@herts.ac.uk where it will be reviewed before being approved by chair's action

PLEASE ATTACH COPY OF ORIGINAL PROTOCOL APPLICATION

NameDate.....
(Researcher(s))

Name.....Date.....
(Supervisor)

APPROVAL OF PROTOCOL APPLICATION FOR MODIFICATION

We support the approval of modification of the above protocol	X
We do not support the modification of the above protocol for the following reasons:	

Signature  **Date:** 21.05.08

Chair of Ethics Committee

Ethics LK/CH/2006
Created: 19/09/06

App26.

Local Research Ethics Committee Approval

App27.

Research and Development NHS Approval

**The use of ‘squiggling’: a play technique as a
diagnostic aid in the assessment of secondary school-
age children with Asperger syndrome**

Eleanor F Wakerly
University of Hertfordshire

Running head:

Squiggling and creative thinking abilities in children with Asperger syndrome

Abstract

Drawing and storytelling game *squiggling* (Winnicott, 1993; Claman, 2002) was piloted as a diagnostic aid for Asperger syndrome in secondary school-age children. Its internal consistency and inter-rater reliability was acceptable. Mixed results were found between subscales in terms of concurrent validity.

Using a matched-participants design, children with Asperger syndrome demonstrated significantly higher levels of elaboration and abstract imagination in their drawings on the figural Torrance Tests of Creative Thinking (Torrance, Bal & Safter, 2008), indicating partial support for the Weak Central Coherence Theory (Shah and Frith, 1983) and the Meta-Representational Deficit hypothesis (Leslie, 1987).

Some limitations of the present study are outlined, including heterogeneity of the clinical sample, and possible confounding effects of verbal intellectual abilities, extrinsic rewards and performance anxiety. Major strengths include a successful matching procedure and discovery of group differences with large effect sizes on particular creative thinking abilities.

Key Words: Asperger, creativity, drawing, storytelling, diagnosis, squiggling

The use of ‘squiggling’: a play technique as a diagnostic aid in the assessment of secondary school-age children with Asperger syndrome

INTRODUCTION

Diagnosis of the autism spectrum condition Asperger syndrome is delayed. A large British survey by Howlin & Moore (1997) found that the average age of diagnosis was eleven years. Diagnosis may not be made until secondary school age when demands for social functioning and self-organisation increase and the child may have trouble adjusting to this (Gillberg, Nordin & Ehlers, 1996). An *inaccurate* and *untimely* diagnosis of Asperger syndrome has important implications, as it delays access to appropriate care and support and reduces likelihood of improved outcome for the individual and their family (Dawson & Osterling, 1994; Bryson, Rogers, & Fombonne, 2003). Furthermore, services seem to fail to meet Standards One and Nine of the National Service Framework for Children and Young People (NSF: Department of Health (DH), 2004).

A timely diagnosis of Asperger syndrome enables access to the best available care, corresponding with legislation and standards set by the United Nations Convention of the Rights of the Child (UNICEF, 1989), the Children’s Act (DH, 2004), Every Child Matters (Department of Schools and Education, 2003), and the National Autism Plan for Children (National Autistic Society: 2003).

Several factors contribute to a delayed diagnosis. The prevalence of Asperger syndrome is estimated at two per 10,000 children (Fombonne & Tidmarsh, 2003), its rarity making it difficult to identify. A high rate of co-morbidities and overlap with other autism spectrum conditions can complicate the diagnostic picture (Tantam, 2000). Furthermore, the distinction between Asperger syndrome (AS) and High-Functioning Autism (HFA) has greatly debated for 20 years, with a wealth of empirical evidence for and against AS as a discrete condition. A review by Volkmar, Lord, Bailey, Schultz & Klin (2004) concluded that there is little neuropsychological

and experimental evidence to support AS as a discrete condition. While in clinical practice, HFA and AS may be widely considered interchangeable diagnostic terms (Kasari & Rotheram-Fuller, 2005), the debate continues within the academic and research community. So, co-morbidities and diagnostic overlap with other conditions ensure that AS remains fuzzy. The implication for researchers is difficulty in developing assessment tools specific to AS. A review by Howlin (2000) concluded there is a lack of tools designed to measure differences between children with AS and children without AS.

A diagnostic aid is needed to highlight significant differences with typically-developing children, and hence facilitate assessment of Asperger syndrome. One of the main aims of the study was to pilot the utility of an established play technique called *squiggling* as a diagnostic aid (Winnicott, 1968, 1993).

Squiggling was formally introduced by Winnicott (1968) as a play technique tool to build rapport with a child, and has since been developed (e.g., Winnicott, 1993; Farhi, 2001; Claman, 2002). *Squiggling players* take turns in making a drawing out of the other person's *squiggle* or mark, and then naming them. The child and clinician draw freely and narrate what they are doing as part of an interchange of ideas. Over the past thirty years, *squiggling* has been adapted for use in clinical therapeutic practice, particularly in psychoanalytic therapy (e.g., Ziegler, 1976; Ellen, 1978; Wakimoto, Kawamura, Kaku and Kawata, 1984; Gunter, 2007). *Squiggling* continues to be used effectively in psycho-analytically oriented art therapy interventions with children (e.g., Gunter, 2000; Eisdell, 2005; Branik, 2005; Steinhardt, 2006). There is high regard and continued utility in *squiggling* by clinicians and researchers as a therapeutic technique. However, its use as a diagnostic aid at assessment has remained undeveloped (Branik, 2005). Squiggling has been utilised within a regional child and adolescent mental health service as an efficient means of assessing emotional, cognitive and behavioural development in children with developmental conditions. It is proposed that squiggling may tap into potentially significant differences in creative thinking abilities between children with AS and typically-developing children.

Creative thinking abilities can include, for example, the ability to fluently generate a number of ideas, the ability to generate unusual and abstract ideas, or the ability to combine ideas. There are many more examples as the ability to think creatively is “a highly complex and diffuse construct” (p27. Mumford & Gustafson, 1988). For the purposes of the present study, seven creative thinking abilities were selected based on definitions of creativity postulated by several researchers:

- 8) ***Imagination*** - the abstractedness and depth of ideas, based on definitions of creativity originally provided by Hargreaves, 1927, and later developed by Spearman (1931) and Eysenck (1970).
- 9) ***Fluency*** - the volume of ideas generated, based on definitions of creativity provided by Guilford (1950), Amabile (1983) and Torrance (1974).
- 10) ***Originality*** - the unusualness and novelty of ideas, based on definitions of creativity provided by Torrance (1974) and Boden (1994).
- 11) ***Integration*** - the combination of ideas, based on definitions of creativity provided by Mednick (1962) and Rothenberg (1990).
- 12) ***Elaboration*** - the detail of ideas, based on a definition of creativity provided by Torrance (1974).
- 13) ***Resistance to premature foreclosure*** - the ability to resist giving the initial or easiest response based on a definition of creativity provided by Torrance (1974).
- 14) ***Flexibility*** - the ability to generate a range of different ideas or concepts, based on definitions of creativity provided by Runco (2002) and Lubart (1994).

Differences in these abilities between children with AS and typically-developing children are evident within empirical literature and can be explained by cognitive theories of autism spectrum conditions. The study tests eight hypotheses in relation to

these creative thinking abilities and three key theoretical perspectives on cognitive styles in children with autism spectrum conditions.

- 1) Meta-Representational Deficit (MRD) Hypothesis (Leslie, 1987);
- 3) Weak Central Coherence (WCC) Theory (Shah & Frith, 1983);
- 4) Executive Dysfunction (ED) Theory (Pennington & Ozonoff, 1996).

To substantiate the utility of these outlined theoretical perspectives in the generation of hypotheses for the present study, an evaluation of experimental research into creative thinking abilities of children with AS is also presented.

Meta-representational ability and abstract imagination

Leslie (1987) posited the Meta-Representational hypothesis, proposing that children with an autism spectrum condition lack a capacity for *meta-representation*; a term originally defined by Pylyshyn (1978) as representing primary mental representations. A primary mental representation is a depiction of something held in one's mind after perceiving it, which will be of varying degrees of concreteness (e.g., an object) and abstractedness (e.g., a monster). The formation and understanding of secondary mental representations, however abstract, requires one use one's imagination to decouple reality from non-reality (Leslie, 1987). A meta-representational *deficit* would therefore negatively affect one's ability to imagine, which can be considered a cognitive ability related to creativity.

One study demonstrated reduced *imagination* on a play activity with children with Asperger syndrome (AS) compared to typically-developing children (Craig & Baron-Cohen, 1999). Children with AS were found to generate concrete and reality-based ideas rather than abstract ideas in their play. A preference for reality-based *functional* play over abstract *symbolic* play is often presented by children on the autism spectrum (Jarrod, 2003; Honey, Leekam, Turner & McConachie, 2006). The MRD hypothesis can be used here to provide a theoretical explanation for this impaired ability to generate *abstract imaginative* (i.e., non reality-based, secondary representations)

ideas. Children with AS in the study by Craig and Baron-Cohen (1999) may have an impaired *abstract* meta-representational ability. Additional evidence for imagination impairment in children with AS, and support for Leslie's (1987) MRD hypothesis, can be found in a study of storytelling (Craig & Baron-Cohen, 2000).

Leslie (1987) originally defined the MRD hypothesis as specific to *mental* meta-representations, i.e., it does not extend to graphical *non-mental* representations, for example in drawings. The specificity of the MRD hypothesis has been challenged by empirical evidence indicating impairment of imagination in *non-mental* meta-representations in children with CA (e.g., Lewis & Boucher, 1991; Booth, Charlton, Hughes & Happe, 2003) and AS (Craig, Baron-Cohen & Scott, 2001).

In relation to the MRD hypothesis, one could assume that meta-representational ability is required in drawing. During this activity, primary mental representations are transformed and transferred to non-mental graphical representations on paper. In doing this, one must be aware that the drawing is a representation, i.e., a drawing of an apple is not really an apple you can eat or touch. A problem with this meta-representational ability may occur with more abstract content. One could speculate that the original primary mental representations of abstract or unreal concepts, objects or subjects (e.g., hunger, sweets tree, witch) are not so well formed as more concrete and real primary mental representations (e.g., train, book, face) in children with autism spectrum conditions.

The present study investigates whether children with Asperger syndrome demonstrate an impairment of abstract imagination compared to typically-developing children through the administration of a drawing and storytelling task (*squiggling*). In this way, the specificity of the MRD hypothesis is also tested.

Weak central coherence and abilities in elaboration and integration

Shah and Frith (1983) proposed that children with autism spectrum conditions have a preference for processing *local* over global contextual visual information (Frith 1989;

Frith & Happe, 1994). This preference for processing information in a piecemeal way suggests that children with AS would attend to the fine detail and elaborate on information, although they would struggle to combine information into a whole (Frith, 2004a). In terms of creative thinking abilities, the Weak Central Coherence theory would suggest skill in *elaboration* and impairment of *integration*.

There is limited empirical support for weak central coherence in children with AS (Jolliffe & Baron-Cohen, 1997, 1999; Baron-Cohen & Hammer, 1997; Szatmari, Tuff, Finlayson & Bartolucci, 1990). In line with WCC theory, the present study investigates whether children with Asperger syndrome demonstrate skill in providing detail to their ideas in squiggling, and impaired ability to integrate ideas.

Executive dysfunction and creative thinking

Pennington & Ozonoff (1996) postulated the Executive Dysfunction (ED) Theory based on some previous study findings (e.g., Steel, Gorman & Flexman, 1984; Rumsey & Hamberger, 1988) that some groups of children with clinical conditions develop specific deficits in their executive function capabilities. In terms of creative thinking abilities, executive functioning is involved in *resisting premature foreclosure* (inhibiting impulse to act on first response and delay decision), *originality* (inhibiting highly associated or copied responses, generating unusual responses), *fluency* (inhibiting irrelevant responses, generating seemingly relevant responses), and *flexibility* (shifting and regulating attention). A review of the neuropsychological literature on cognitive functioning in children with autism spectrum conditions reveals consistent significant deficits in such executive functions (Sanders, Johnson, Garavan, Gill & Gallagher, 2008). However, many research studies in support of the ED theory are based on children with CA or broadly on children with autism spectrum conditions. This raises the question of whether an impairment of executive functioning may also be prevalent in children with AS. There is preliminary evidence to indicate impaired cognitive flexibility in children with AS (Rinehart, Bradshaw, Moss, Brereton & Tonge, 2006).

Literature on the factors affecting development of creative thinking in children, for example outlined by Kaufman & Baer (2006), seems to show that many of the cognitive differences typical of children with AS are relevant. For example, a systematic and inflexible reasoning style, typical of children with AS, can *inhibit* the fluency and flexibility of ideas (Runco, 2002; Guignard & Lubart, 2006). The ability to pay attention to a wide range of information that may become relevant at another time can facilitate creative thinking (Ansburg & Hill, 2003). However, children with AS tend to have highly focused attention (Bogdashina, 2005). They often struggle to shift attention from one task or idea to another (Rinehart, Bradshaw, Moss, Brereton & Tonge, 2006), a difficulty which is known to impair creative thinking (Martindale, 1981; Niaz & Saud de Nunez, 1991). For children with AS, dysfunction in shifting attention would therefore negatively affect their ability to generate a number of ideas across a range of categories, and therefore demonstrate impairment of *flexibility* and *fluency*. The relevancy of the cognitive styles of children with AS to mediating factors in creative thinking suggests that there are likely to be significant differences with a typically-developing population.

Based on the Executive Dysfunction (ED) Theory (Pennington & Ozonoff, 1996), the present study investigates whether children with Asperger syndrome demonstrate impairment in four creative thinking abilities: *fluency*, *flexibility*, *resistance to premature foreclosure* and *originality*.

Hypotheses

- 1. Children with AS will demonstrate lower levels of abstract imagination** in their drawings and stories compared to typically-developing children.
- 2. Children with AS will demonstrate higher levels of elaboration** in their drawings compared to typically-developing children.
- 3. Children with AS will demonstrate lower levels of integration** of their drawings and stories compared to typically-developing children.

4. Children with AS will demonstrate **lower levels of fluency** in their drawings compared to typically-developing children.

5. Children with AS will demonstrate **lower levels of originality** in their drawings compared to typically-developing children.

6. Children with AS will demonstrate **lower levels of resistance to closure** in their drawings compared to typically-developing children.

7. Children with AS will demonstrate **lower levels of flexibility** across their drawings compared to typically-developing children.

8. Children with AS will demonstrate **higher levels of overall creative thinking ability** across their drawings compared to typically-developing children.

METHOD

Design

This research study used a non-experimental matched group comparison design to observe specific differences in the creative thinking abilities of children with Asperger syndrome compared to typically-developing children. Asperger syndrome is defined by the International Classification of Diseases (Version 10: ICD-10, World Health Organisation, 1992) and as Asperger's Disorder by the Diagnostic Statistical Manual of Mental Disorders (Version 4 Revised: DSM-IV-TR: American Psychiatric Association, 2000). Non-verbal intellectual functioning, chronological age and visual-motor functioning were successfully controlled for as potential confounders.

Participants

A power calculation was performed to determine the sample size required for the detection of a mean difference between the AS group and the comparison group amounting to a moderate effect size (Cohen's d around 0.50). Results showed that 14 matched pairs (i.e. total sample size = 28) would be sufficient to detect such an effect at an alpha level of 5% (one-tailed) with a power of 80%. An acceptable sample size was achieved as there was a clinical group of 15 children with Asperger syndrome (AS) and a comparison group of 15 typically-developing children, matched on non-verbal intellectual ability, age and visual motor integration. To ensure sufficient matching, two-tailed group comparisons were performed using a paired samples t-test. See Table 1.

>> Insert Table 1

All participants were aged between 12 years 0 months and 16 years 11 months, in full-time education, had English as their first language, had no history of traumatic head injury, and no severe current physical or mental health problems. There were four

participants with a dual diagnosis, although the presenting problems associated with these additional conditions would not affect the ability of the child to take part.

Exclusion criteria were as follows:

- Ongoing severe mental health difficulties (e.g., mood or anxiety disorders)
- Significant impairment of intellectual and/or language functioning (i.e., two standard deviations below mean, IQ 70 or below)
- Significantly impaired visual-motor control
- History of acquired traumatic head injury resulting in loss of consciousness at time of accident or significant effects on cognitive functioning
- Current moderate to severe physical illness (e.g., fever, pain).

Participants for the clinical group were approached and recruited by clinicians in the Child and Adolescent Mental Health Service (CAMHS) where they had been diagnosed, and via a regional AS family support group. The comparison group of typically developing children was a non-probability convenience sample, approached and recruited on the basis of availability through a local community scout group, family friends of the researchers and a secondary school. See Appendices One to Six for examples of letters, information sheets, consent forms and personal information sheets that were distributed to and completed by participants.

Measures

Six measures were utilised in the present study to provide data on intellectual functioning, visual-motor integration, meta-representational ability and creative thinking ability. A screen for Asperger syndrome was also used with the parents/guardians of children in the comparison group.

The Childhood Asperger Syndrome Test (CAST: Williams, Scott, Stott, Allison, Baron-Cohen, *et al.*, 2004) is a sensitive and specific screening parental report questionnaire, which was given to the parents/guardians of typically-developing

children to confirm that they were not presenting with signs of Asperger syndrome. See Appendix Seven.

The Wechsler Abbreviated Scale of Intelligence (WASI: Wechsler, 1999) provided a measure of verbal and non-verbal intellectual functioning. The full four-subtest form of the WASI provided a Full Scale, Verbal and Performance IQ.

The Beery-Buktenica Developmental Test of Visual-Motor Integration, 5th Edition (BVTM: Beery, 1967; Beery & Beery, 2006) provided a measure of visual-motor integration. It was important to gain a measure of this as the drawing tasks required hand-eye co-ordination and fine motor abilities.

An abbreviated version of the Strange Stories Test (SST: Happe, 1994) was used to provide a measure of meta-representational ability.

The Torrance Test of Creative Thinking (TTCT: Torrance, 1974, 2008) provided a measure of 5 creative thinking abilities: fluency, originality, elaboration, abstractness of titles, and resistance to closure. The TTCT is a standardised test of creativity with norms for children based on a large national sample. The first component of the TTCT (Figural) was administered to participants, involving three 10-minute picture-based exercises.

Squiggling, a drawing and storytelling game was used to test the concurrent validity as a measure of creative thinking abilities, including abstract imagination, originality, elaboration, fluency, flexibility and integration of ideas. A set of *squiggling* scoring criteria were created based on definitions of creativity provided by several cognitive researchers. In *squiggling*, the participant and researcher took turns to make a drawing out of the other's squiggle, or mark on the paper. The participant told a story about the drawings at the end of the 'game'. The procedure is detailed further on in Appendix Eight. Scoring criteria for squiggling were developed based on the Torrance Tests of Creative Thinking (TTCT: Torrance et al., 2008) and on definitions of creativity

outlined in the introduction (see Appendix Nine). An acceptable level of inter-rater reliability has been established across the subscales of squiggling.

Based on recommendations by Nunnally & Berstein (1994), good reliability was found for the Imagination and Fluency squiggling subscales. An acceptable level of reliability was found for the Elaboration score. For the remaining three subscales there was poor reliability between raters' scores, with particular indication of disagreement between raters on the Originality scale. This was supported by a Wilcoxon signed ranks test that found a significant difference in the *originality* subscale ($Z = -2.716$, $p < 0.05$) between two raters' scores for 10 sets of squiggles. Aside from this subscale, inter-rater reliability for the squiggling scoring criteria can be considered overall acceptable.

Procedure

Participants underwent a series of standardised psychometric tests and played the *squiggling* game, either at their home or at their local child and family clinic. Testing was at two time points; the first was approximately 90 minutes, and the second approximately 60 minutes duration. The purpose of this was not to establish a baseline but to spread the cognitive load for the participants in an attempt both to maximise their performances and to reduce any potential stressors of assessment demands. The order in which the tests were administered was as follows:

Session 1.

1. Wechsler Abbreviated Scale of Intelligence (WASI)
2. Torrance Test of Creative Thinking (TTCT)
3. Beery-Buktenica Developmental Test of Visual-Motor Integration (B-VMI)

Session 2.

1. Strange Stories Test (SST)
2. Squiggling

RESULTS

Validation of squiggling

The concurrent validity of the squiggling subscales was poor, aside from the squiggling imagination subscale. A large significant positive association was found between the Squiggling Imagination subscale and the TTCT Abstractedness subscale. Cronbach's Alpha was used to examine the internal consistency of squiggling. Flexibility and Originality showed the lowest corrected subscale-total correlations. Cronbach's alpha for the overall scale was found to be 0.664 but when these two subscales were removed the overall reliability increased slightly, raising the reliability co-efficient Cronbach's alpha to 0.727. The overall reliability of squiggling is acceptable, and would be improved with revision of the Flexibility and Originality subscales.

Group comparisons of creative thinking abilities

A series of one-tailed paired-sample t-tests were carried out to test for significant differences between groups in the five creative thinking abilities outlined in the Torrance Tests of Creative Thinking (TTCT: Torrance, Ball & Safter, 2008). See Table 2 for a summary of the findings from these group comparisons, with effect sizes for the group differences based on definitions provided by Cohen (1992).

>> Insert Table 2

A series of one-tailed Wilcoxon signed-ranks test were carried out to test for significant differences between groups in the six creative thinking abilities in squiggling. See Table 3.

>> Insert Table 3

Findings indicate that relative to the comparison group children with Asperger syndrome (AS) demonstrated a *significantly higher* level of abstract imagination in their drawings on the Torrance Tests of Creative Thinking (TTCT: Torrance *et al.*, 2008). In relation to the Meta-Representational Deficit hypothesis (Leslie, 1987), this finding supports the specificity of the deficit to mental meta-representations.

Children with AS demonstrated a *significantly higher* level of elaboration in their drawings relative to the sample of typically-developing children, indicating partial support for the Weak Central Coherence Theory (Shah & Frith, 1983).

Tentative partial support was found for the Executive Dysfunction Theory (Ozonoff & Pennington, 1991) as children with AS demonstrated significantly lower levels of flexibility across their drawings compared to typically-developing children. However, the flexibility subscale in squiggling was not sufficiently reliable or valid, so conclusions cannot be made confidently concerning this hypothesis.

Children with AS demonstrated a *significantly higher* level of overall creative thinking ability relative to typically-developing children on the Torrance Tests of Creative Thinking (Torrance *et al.*, 2008).

Based on findings from the Strange Stories Test (Happe, 1994), meta-representational ability was slightly higher in the comparison group, although a Wilcoxon signed ranks test revealed no statistically significant difference ($Z = -1.144$, $p > 0.05$; ns).

DISCUSSION

The present study found a moderate degree of internal consistency and suitable inter-rater reliability for squiggling, although poor concurrent validity with the Torrance Tests of Creative Thinking (Torrance *et al.*, 2008). Squiggling at presents lacks much psychometric strength. The squiggling scoring criteria could be described as a somewhat crude rating system. Based on the Spearman-Brown Prophecy Formula, the greater the number of items in a scale, the greater the internal consistency (Nunnally & Bernstein, 1994), so the 4-item scales for squiggling probably contributed to the poor internal consistency for some of the subscales.

Only partial support for the WCC theory was indicated as there was no significant difference between groups in *integration*, or the ability to combine ideas. However, this may need to be investigated further as poor reliability and concurrent validity was found for the *squiggling integration* subscale. Increased ability to provide detail to ideas should be promoted and highlighted as a skill to individuals with Asperger syndrome.

The finding that children with Asperger syndrome demonstrated a significantly higher level of *imagination* and *abstractedness* in their drawings compared to typically-developing children indicates that Leslie's (1987) Meta-Representational Deficit hypothesis *is* specific to mental meta-representations. Children with Asperger syndrome can understand and express abstract and imaginative graphical representations. This may be useful information for the practicing clinician in encouraging children with Asperger syndrome to participate in activities where they can learn about abstract ideas graphically (e.g., using Social Stories, Gray, 1998).

Little support was found in the present study for the Executive Dysfunction Theory (Ozonoff & Pennington, 1991) as there were no differences in resistance to premature foreclosure, originality and fluency between groups. The finding of a significant difference in squiggling *flexibility* appears to demonstrate partial support for ED theory, although there is poor criterion validity for this subscale so the result is

questionable. Children with Asperger syndrome (AS) were just as able as typically developing children to delay their initial response and to generate a number of unusual ideas in their drawings and stories. Even though children with AS may typically present as rigid and repetitive in their thinking and behaviour, their ability to generate a number of unusual or novel ideas should not be underestimated.

There were some limitations to the study worthy of report here. Participants in the study were not sufficiently matched on verbal intellectual ability, which has been found to positively relate to imaginative symbolic play in children with an autism spectrum condition (Stanley & Konstantareas, 2007). However, no significant relationships were evident between any of the creative thinking abilities and verbal intellectual abilities so any confounding effect was likely to be minimal. The presence of co-morbid conditions in the study sample may have been a confounding factor, although one that was difficult to control for given the time restraints for data collection.

Strengths of the present study include a successful participant matching procedure, reliable and valid piloting of some subscales in the squiggling game, and good external validity (i.e., generalisability of findings). While the presence of co-morbid conditions affects the confidence with which one can draw statistical conclusions from the present study, the heterogeneity of the clinical group is perhaps more representative than if there had been no co-morbidities.

The present study was based on a Western definition of creativity and creative thinking, *i.e.*, a spotlight on individual cognitive abilities. It was wise to start with this focus, as development of creativity during early childhood years is inextricably linked with individual development of cognitive abilities (Kaufman & Baer, 2006). However, the assessment of creative thinking in the individual child must be considered within their social context (Plucker, Beghetto & Dow, 2004). As a further area of research, it may be interesting to examine the influence of different cultural belief systems on level of creative thinking ability, and thereby adopt a more holistic and contextual

stance towards researching creativity between groups of children with AS and groups of typically-developing children.

In a replication of the present study, researchers may be likely to encounter similar difficulties with recruiting a purely Asperger sample due to continuing differences in diagnostic practice drawing on different definitions. Until the controversy regarding the validity of Asperger syndrome as a diagnostic definition dissipates within the clinical and research community, there will continue to be hazards to piloting and developing diagnostic aids specific to this condition. The American Psychiatric Association announced last year that a revision of the DSM-IV-TR was aimed to be published in 2012 (Nordqvist, 2007). A shift away from a deficits based model may be evident, for example including features within the diagnostic criteria that relate to particular areas of ability. An update of the diagnostic criteria may help to clarify the diagnostic definition of AS, promote the development of specific diagnostic aids, and eventually reduce the delay in diagnosis of Asperger syndrome.

REFERENCES

- Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357-376.
- American Psychiatric Association (APA). (2000). *Diagnostic and Statistical Manual of Mental Disorders*, (4th ed, Revised). Washington DC: APA.
- Ansburg, P. I. & Hill, K. (2003). Creative and analytic thinkers differ in their use of attentional resources. *Personality and Individual Differences*, 34(7), 1141-1152.
- Baron-Cohen, S. & Hammer, J. (1997). Parents of children with Asperger Syndrome: what is the cognitive phenotype? *Journal of Cognitive Neuroscience*, 9, 548- 554.
- Beery, K.E., & Beery, N.A. (2006). *The Beery-Buktenica Developmental Test of Visual Motor Integration*. 5th Edition, US: NCS Pearson Inc.
- Boden, M. (1994). *Dimensions of Creativity*. Massachusetts: MIT Press.
- Bogdashina, O. (2005). *Communication Issues in Autism and Asperger Syndrome. Do We Speak The Same Language?* London: Jessica Kingsley.
- Booth, R., Charlton, R., Hughes, C. & Happe, F. (2003). Disentangling weak coherence and executive dysfunction: Planning drawing in autism and attention-deficit/hyperactivity disorder. *Philosophical Transactions: Biological Sciences*, 358, 1430.
- Branik, E. (2005). Das Squigglespiel: Funktion des Squigglespiels nach Winnicott für die Diagnostik, Beziehungsgestaltung und Therapieindikation in der Kinder- und Jugendpsychiatrie und -psychotherapie. *Forum der Psychoanalyse: Zeitschrift für klinische Theorie & Praxis*, 21(1), 68-77.

- Bryson, S. E., Rogers, S. J., Fombonne, E. (2003). Autism spectrum disorders: Early detection, intervention, education, and psychopharmacological management. *Canadian Journal of Psychiatry*, 48(8), 506-516.
- Claman, L. (2002). The squiggle-drawing game. In Schaefer, C. E. & Cangelosi, D. (Eds). *Play therapy techniques* (2nd ed.). (pp. 221-233). Lanham: Jason Aronson.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159.
- Craig, J. & Baron-Cohen, S. (1999). Creativity and imagination in autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 29(4), 319-326.
- Craig, J. & Baron-Cohen, S. (2000). Story-telling ability in children with autism or Asperger syndrome: A window into the imagination. *Israel Journal of Psychiatry and Related Sciences*, 37(1), 64-70.
- Craig, J., Baron-Cohen, S. & Scott, F. (2001). Drawing ability in autism: a window into the imagination. *Israel Journal of Psychiatry and Related Sciences*, 38(3-4), 242-53.
- Dawson, G. & Osterling, J. (1994). Early recognition of children with autism: A study of first birthday home videotapes. *Journal of Autism and Developmental Disorders*, 24(3), 247-257.
- Department for Children, Schools and Families (2004). *The Children Act*. London: Department for Skills and Education.
- Department for Skills and Education (2004). *Every Child Matters: Change for Children*. London: Department for Skills and Education.
- Department of Health (2004) *National Service Framework for Children, Young People and Maternity Services*. London: Department of Health.

- Eisdell, N. A. (2005). Conversational model of art therapy. *Psychology & Psychotherapy: Theory, Research & Practice*, 78(1), 1-19.
- Eysenck, H. J., Easting, G. & Eysenck, S. B. (1970). Personality measurement in children: A dimensional approach. *The Journal of Special Education*, 4(3), 261-268.
- Farhi, N. (2001). Psychotherapy and the squiggle game: A sophisticated game of hide-and-seek. In Bertolini, M., Giannakoulas, A. & Hernandez, M. (Eds). *Squiggles and spaces revisiting the work of D. W. Winnicott, (Vol. 2)*. (pp. 65-75). Philadelphia: Whurr Publishers.
- Fombonne, E. & Tidmarsh, L. (2003). Epidemiologic data on Asperger disorder. *Child and Adolescent Psychiatric Clinics of North America*, 12(1), 15-21.
- Frith, U. & Happe, F. (1994). Autism: Beyond "theory of mind." *Cognition*, 50(1-3), 115-132.
- Frith, U. (1989). *Autism: Explaining the Enigma*. Oxford: Blackwell Science.
- Frith, U. (2004a). *Autism and Asperger Syndrome*. New York: Cambridge University
- Gillberg, C., Nordin, V. & Ehlers, S. (1996). Early detection of autism: diagnostic instruments for clinicians. *European Child and Adolescent Psychiatry*, 5(2), 67-74.
- Gray, C. A. (1998). Social stories and comic strip conversations with students with Asperger syndrome and high-functioning autism. In Schopler, E., Gary B. & Kunce, L. J. (Eds). *Asperger syndrome or high-functioning autism?* (pp. 167-198). New York: Plenum Press.
- Guignard, J. & Lubart, T. (2006). Is It Reasonable to Be Creative? In Kaufman, J. C. & Baer, J. (Eds). *Creativity and reason in cognitive development*. (pp. 269-281). New York: Cambridge University Press.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444-454.

- Gunter, M. (2000). Art therapy as an intervention to stabilize the defenses of children undergoing bone marrow transplantation. *Arts in Psychotherapy*, 27(1), 3-14.
- Gunter, M. (2007). *Playing the unconscious: Psychoanalytic interviews with children using Winnicott's squiggle technique*. London: Karnac Books.
- Happe, F. G. E. (1994). An advanced test of theory of mind: Understanding of story characters' thoughts and feelings by able autistic, mentally handicapped, and normal children and adults. *Journal-of-Autism-and-Developmental-Disorders*, 24(2), 129-154.
- Hargreaves, H. L. (1927). *The faculty of imagination*. Oxford: Cambridge University Press.
- Honey, E., Leekam, S., Turner, M. & McConachie, H. (2007). Repetitive behaviour and play in typically developing children and children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(6), 1107-15.
- Howlin, P. & Moore, A. (1997). Diagnosis in autism: A survey of over 1200 patients in the UK. *Autism*, 1(2), 135-162.
- Howlin, P. (2000). Assessment instruments for Asperger syndrome. *Child Psychology and Psychiatry Review*, 5, 120-129.
- Jarrold, C. (2003). A review of research into pretend play in autism. *Autism*, 7(4), 379-390.
- Jolliffe, T. & Baron-Cohen, S. (1997). Are people with autism and Asperger syndrome faster than normal on the Embedded Figures Test? *Journal of Child Psychology and Psychiatry*, 38(5), 527-534.

- Jolliffe, T. & Baron-Cohen, S. (1999). The Strange Stories Test: A Replication with High-Functioning Adults with Autism or Asperger Syndrome. *Journal of Autism & Developmental Disorders* 29(5), 395-406.
- Kasari, C. & Rotheram-Fuller, E. (2005). Current trends in psychological research on children with high-functioning autism and Asperger disorder. *Current Opinion in Psychiatry*, 18(5), 497-501.
- Kaufman, J.C. & Baer, J. (2006). *Creativity and Reason in Cognitive Development*. Cambridge: Cambridge University Press.
- Leslie, A. M. (1987). Pretence and representation: the origins of theory of mind. *Psychological Review*, 94, 412-426.
- Lewis, V. & Boucher, J. (1991). Skill, content and generative strategies in autistic children's drawings. *British Journal of Developmental Psychology*, 9(3), 393-416.
- Lubart, T, I. (1994). In: R. J. Sternberg (Ed.). *Thinking and Problem Solving* (pp. 289-232). San Diego: Academic Press.
- Martindale, C. (1981). Creativity and primary process thinking. *PsycCRITIQUES*, 26(7), 568.
- Mednick, S. (1962). The associative basis of the creative process. *Psychological Review*. 69(3), 220-232.
- Mumford, M.D. & Gustafson, S.B. (1988). Creativity syndrome: integration, application and innovation. *Psychological Bulletin*, 103 (1), 27-43.
- National Autistic Society (2003). *National Initiative for Autism Guidelines: Screening and Assessment: National Autism Plan for Children (NAPC)*. London: the National Autistic Society.

Niaz, M. & Saud de Nunez, G. (1991). The relationship of mobility-fixity to creativity formal reasoning and intelligence. *Journal of Creative Behavior*, 25(3), 205-217.

Nordqvist, C. (2007). APA names DSM-V Task Force Members – Leading Experts to Revise Handbook for Diagnosing Mental Disorders. *Medical News Today, USA*.

Retrieved July, 25th 2007, from

<http://www.medicalnewstoday.com/articles/77663.php>

Nunnally, J.C. & Bernstein, I.H. (1994) *Psychometric Theory* (3rd Edition). New York: McGraw-Hill.

Pennington, B. F. & Ozonoff, S. (1996). Executive functions and developmental psychopathology. *Journal of Child Psychology and Psychiatry*, 37(1), 51-87.

Plucker, J. A. Beghetto, R.A. & Dow, G.T. (2004). Why isn't creativity more important to educational psychologist? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, 39, 83-97.

Pylyshyn, Z. W. (1978). Computational models and empirical constraints. *Behavioral and Brain Sciences*, 1(1), 93-127.

Rinehart, N. J., Bradshaw, J. L., Moss, S. A., Brereton, A. V. & Tonge, B. J. (2006). Pseudo-random number generation in children with high-functioning autism and Asperger's disorder: Further evidence for a dissociation in executive functioning? *Autism*, 10(1), 70-85.

Rothenberg, A. (1990). Creativity in adolescence. *Psychiatric Clinics of North America*, 13(3), 415-434.

Rumsey, J. & Hamberger, S. (1988). Neuropsychological findings in high-functioning men with infantile autism, residual state. *Journal of Clinical and Experimental Neuropsychology*, 10, 201-221.

- Runco, M.A. (Ed). (2002). *Critical creative processes*. Cresskill: Hampton Press.
- Runco, M.A. (Ed). (2002). *Critical creative processes*. Cresskill: Hampton Press.
- Sanders, J., Johnson, K. A., Garavan, H., Gill, M. & Gallagher, L. (2008). A review of neuropsychological and neuroimaging research in autistic spectrum disorders: Attention, inhibition and cognitive flexibility. *Research in Autism Spectrum Disorders*, 2, 1-16.
- Shah, A. & Frith, U. (1983). An islet of ability in autistic children: A research note. *Journal of Child Psychology and Psychiatry*, 24(4), 613-620.
- Spearman, C. (1931). *Creative Mind*. Oxford: Appleton-Century.
- Stanley, G. C. & Konstantareas, M. M. (2007). Symbolic play in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 37(7), 1215-1223.
- Steel, J. G., Gorman, R. & Flexman, J. E. (1984). Neuropsychiatric testing in an autistic mathematical idiot-savant: Evidence for nonverbal abstract capacity. *Journal of the American Academy of Child Psychiatry*, 23(6), 704-707.
- Steinhardt, L. (2006). The Eight Frame Colored Squiggle Technique. *Art Therapy*, 23(3), 112-8.
- Szatmari, P., Tuff, L., Finlayson, A. & Bartolucci, G. (1990). Asperger syndrome and autism: neuro-cognitive aspects. *Journal of the American Academy of Child and Adolescent Psychiatry*, 29, 130-136.
- Tantam, D. (2000). Psychological disorder in adolescents and adults with Asperger syndrome. *Autism*, 4(1), 47-62.
- Torrance, E. P. (1974). *Torrance Tests of Creative Thinking*. Illinois: Scholastic Testing Service Inc.

- Torrance, E. P. (1974). *Torrance Tests of Creative Thinking*. Illinois: Scholastic Testing Service Inc.
- Torrance, E.P. (2008). *Torrance Tests of Creative Thinking. Norms Technical Manual*. Illinois: Scholastic Testing Service Inc.
- Torrance, E.P., Ball, O.E. & Safter, H.T. (2008). *Torrance Tests of Creative Thinking*. Illinois: Scholastic Testing Service Inc.
- Torrance, E.P., Ball, O.E. & Safter, H.T. (2008). *Torrance Tests of Creative Thinking*. Illinois: Scholastic Testing Service Inc.
- United Nations Children Fund (UNICEF) (1989). *Convention of the Rights of the Child*. London: UNICEF.
- Volkmar, F. R., Lord, C., Bailey, A., Schultz, R. T. & Klin, A. (2004). Autism and pervasive developmental disorders. *Journal of Child Psychology and Psychiatry*, 45(1), 135-170.
- Wakimoto, K., Kawamura, H., Kaku, R. & Kawata, M. (1984). An approach to pre-adolescent patients using the "Squiggle Game." *Japanese Journal of Child and Adolescent Psychiatry*, 25(4), 231-240.
- Wechsler, D. (1999). *Wechsler Abbreviated Scale of Intelligence*. San Antonio: Psychological Corporation.
- Williams, J., Scott, F., Stott, C., Allison, C., Bolton, P., Baron-Cohen, S., et al. (2004). The CAST (Childhood Asperger Syndrome Test). *SAGE Publications and The National Autistic Society*, 9(1) 45-68.
- Winnicott, D. W. (1968). Playing: Its theoretical status in the clinical situation. *International Journal of Psycho-Analysis*, 49(4), 591-599.

Winnicott, D. W. (1993). The Squiggle Game. In Goldman, D. (Ed), *In one's bones: The clinical genius of Winnicott*. (pp. 101-104). Lanham: Jason Aronson.

Winnicott, D. W. (1993). The Squiggle Game. In Goldman, D. (Ed), *In one's bones: The clinical genius of Winnicott*. (pp. 101-104). Lanham: Jason Aronson.

World Health Organisation (WHO) (1992). *International Classification of Diseases, 10th Edition: ICD-10*. Geneva: WHO.

Ziegler, R. G. (1976). Winnicott's squiggle game: Its diagnostic and therapeutic usefulness. *Art Psychotherapy*, 3(3-4), 177-185.

APPENDICES

1. Letter to parents/guardians of children with Asperger syndrome
2. Letter to parents/guardian of typically-developing children
3. Information sheet to children with Asperger syndrome under 16 years
4. Information sheet to typically-developing children under 16 years
5. Consent forms
6. Personal information sheet
7. Childhood Asperger Syndrome Test
8. Squigglings procedure
9. Squigglings scoring criteria

(Home Address)

(Date)

Dear **(Name of Parent)**

Re: Participation of your son /daughter in research study “Squiggling: a diagnostic aid in the assessment of Asperger Syndrome in secondary school-age children”

Thank you for your interest in the participation of your son / daughter in the above study as part of a group of young people with a diagnosis of Asperger Syndrome.

Before you decide whether you would like your son / daughter to take part, please read the enclosed information sheet about why the research is being carried out and what it would involve.

If you agree for your son/daughter to take part and they are interested in participating in this study, please do the following:

1. Ask your son/daughter to sign the two enclosed participant consent forms after they have read and understood their information sheet about the study. (One copy of the consent forms is for them to keep.)
2. Sign the two enclosed parental/guardian consent forms. (One copy is for you to keep.)

Complete the enclosed personal information sheet about your son/daughter

Please return these three documents in the enclosed stamped addressed envelope by **(date in 2 weeks from date sent)**.

Upon receipt of these documents, you will be contacted to arrange a date and time for your son/daughter to do the first set of psychological tests at your local clinic. This will take place in a quiet and private room and will last about an hour.

If you would like to know more before you decide, or have any questions, please do contact me by email (E.Wakerly@herts.ac.uk).

Thank you.

Yours sincerely

Eleanor Wakerly
Lead Researcher and Trainee Clinical Psychologist

May 2008

Dear

Re: Participation of your son in research study “Squiggling: a diagnostic aid in the assessment of Asperger Syndrome in secondary school-age children”

Researcher and Trainee Clinical Psychologist from the University of Hertfordshire Eleanor Wakerly would like to invite your son to take part in the above study. Before you decide whether you would like your son to take part, please read the enclosed information sheet about why the research is being carried out and what it would involve.

If you agree for your son to take part and they are interested in participating in this study, please do the following:

- 1) Ask your son to sign the two enclosed participant consent forms after they have read and understood their information sheet about the study. (One copy is for them to keep.)
- 2) Sign the two enclosed parental/guardian consent forms. (One copy is for you to keep.)
- 3) Complete the enclosed personal information sheet about your son.
- 4) Complete the enclosed questionnaire, the Childhood Asperger Syndrome Test (CAST)

Please return these 4 documents in the enclosed stamped addressed envelope as soon as possible.

Upon receipt of these documents, you will be contacted to arrange a date and time for your son to do the first set of psychological tests at home. This will take about an hour and a half.

If you would like to know more before you decide, or have any questions, please contact me by email (E.Wakerly@herts.ac.uk).

Thank you.

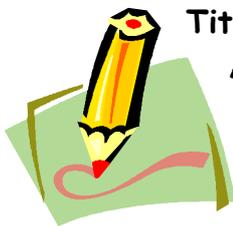
Yours sincerely

Eleanor Wakerly
Lead Researcher and Trainee Clinical Psychologist



University of Hertfordshire

INFORMATION SHEET FOR PARTICIPANTS (aged 12 years to 16 years 0 months)

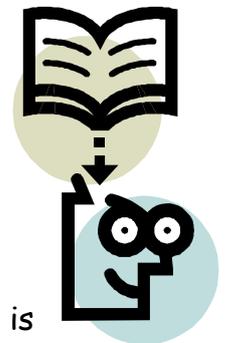


Title of Study: Squigglings: a diagnostic aid in the assessment of Asperger Syndrome with secondary school-age children

What's this all about then?

Young people between 12 and 16 are being asked to take part in some research. We are looking at a game called 'squigglings', where you do some drawings and tell a story. The squigglings game might be used to help doctors and psychologists know when someone has Asperger Syndrome.

As someone with Asperger Syndrome, we would like to ask you to think about taking part in this research. Before you decide, please read this information sheet about the research.

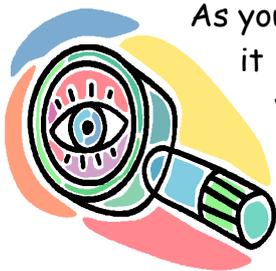


Who is doing this research?

Eleanor Wakerly is training to be a Clinical Psychologist and she is leading this research as her main project at university. There are three more people helping her with the research. They are all Clinical Psychologists. They are called Dr Joost Drost, Dr Nicholas Wood, and Dr Steve Davies.

Why are we doing this research?

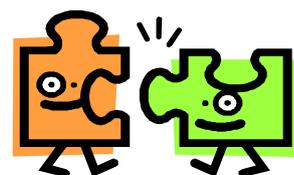
We want to look at young people's drawings and stories and look at the differences between people with Asperger Syndrome and people without Asperger Syndrome.



As you might know already, people with Asperger Syndrome can find it difficult to listen and talk to other people. They can also be very good at knowing a lot about something they are interested in. If doctors and psychologists can quickly tell if someone has Asperger Syndrome, that person and their family can get some help more quickly.

What would I do if I took part?

You would be invited to do some puzzles with words and patterns for an hour at the clinic you have been going to. Then you would come along to the clinic again to play the 'squiggling' game so you would do some drawings and tell a story. We would not look at how well you play. We would just want you to try your best.



Who is taking part in the research?

Altogether 40 young people will take part. Some people will have Asperger Syndrome like you and some *will not* have Asperger Syndrome.

Do I have to take part?

No! If you do not want to take part, or you change your mind at any time during this study, you can stop and you do not need to give a reason.

Will taking part be confidential (private)?

Yes! Only us, the researchers, and your parents or guardian will see how you do on the puzzles. The results from the puzzles will not have your name on them. There would need to be special reasons for sharing with other people how you do on the puzzles and squiggling.

These special reasons would be:

- 1) if you say that you might hurt yourself or other people *or*
- 2) if it might be helpful for you to see a psychologist again (We would talk about this with you and your parents or guardian).

Someone will help the researchers to carry out some of the puzzles with you and score them up. They will keep the results private. This research might be published and it might use some of your words but no-one would know it is you.



What might be the advantages for me?!

Some people find the chance to know more about their strengths and weaknesses interesting and useful. If you take part, you will be asked if you would like a written summary of the results once the research study has been completed.

You will be offered a book about Asperger Syndrome, as a small thank you for your time. You will be given this even if you then stop taking part.

Who has looked at this study and said it is OK to go ahead?

This study was carefully looked at by the University of Hertfordshire Research Ethics Committee, the North Essex Research and Development and the Essex 2 Local Research Ethics Committee and they said it was all OK to go ahead.

OK, I want to take part! What do I do now?

- Check with your parents or guardian that they have read their information sheet and that they agree you can take part in the research
- Sign the participant consent forms. You keep one copy. Give the other copy to your parents or guardian to send back in the stamped addressed envelope.

What if I have questions about this study?

Please ask your parents or guardian to speak to Eleanor by email or post.

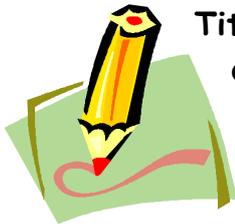
Thank you for taking time to read this.

Researcher Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire
Hatfield, Herts., AL10 9AB



University of Hertfordshire

INFORMATION SHEET FOR PARTICIPANTS (12-16)



Title of Study: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school-age children

What's this all about then?

Young people between the ages of 12 and 16 are being invited to take part in a research study to explore a drawing and storytelling game known as 'squiggling'. We are looking to see whether squiggling can be used to help diagnose a brain development condition called Asperger Syndrome.

We would like to ask you to think about taking part in this study. Before you decide whether you would like to please take the time to read the following information to help you understand why the research is being carried out and what it will involve.

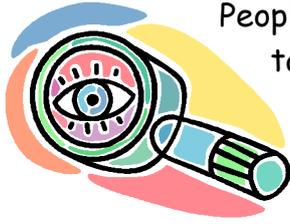


Who is doing this research?

The study is being carried out by Eleanor Wakerly, Trainee Clinical Psychologist, as part of a Doctoral qualification in Clinical Psychology. The study is supervised by three Consultant Clinical Psychologists, Dr Joost Drost, Dr Nicholas Wood, and Dr Steve Davies.

What is the idea behind this study?

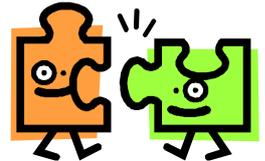
This research is looking at the ways in which young people's drawings and stories might be different between people with Asperger Syndrome and people without Asperger Syndrome.



People with Asperger Syndrome can have difficulties listening, talking to and making sense of other people. They also have skills like having a great eye for detail. It is hoped that the quicker Asperger Syndrome can be diagnosed, the quicker young people and their families can get the right help.

What would I do if I took part?

If you decide to take part, you will be invited to complete some psychological tests at your school on your own. These will involve words and patterns, and of course the 'squiggling' game! This game involves line drawing and storytelling.



The researchers are not looking at how well you play. All that would be asked is that you try your best. Altogether, it will take up two hours of your time spread across two sessions. These sessions would take place in school time.

What would my parents or guardian need to do?



Your parents or guardian will be asked to fill in a questionnaire that will tell the researchers whether you show signs of Asperger Syndrome. It is unlikely that it will, as Asperger Syndrome is very rare.

If the questionnaire reveals that you show signs of Asperger Syndrome, the researchers will arrange to speak with you and your parents. Together we would discuss if you wanted to get some extra help at school or wanted further professional assessment.



Who is taking part?

This study will include 40 young people aged 12-16 years of age who are at school for five days a week. The young people taking part from your school will not have Asperger Syndrome or show any signs of it.

Do I have to take part?

No! If you do not want to take part, or you change your mind at any time during this study, you can back out and you do not need to give a reason. Taking part is entirely up to you and you can withdraw at any time.

Will taking part be confidential (or private)?

Yes! If you decide to take part, only the researchers and your parents or guardian will be able to see the information you give us. The results from the psychological tests *will not* contain your name, instead a number will be used.

The only time information from the psychological tests and the drawing and storytelling game would be shared with other professionals would be in special circumstances.

These would be 1) if you reveal information that may pose a risk of harm to your self or others or 2) if your psychological test results suggest that some further professional assessment might be helpful for you. This would be discussed with you.

A research assistant might be used to carry out some of the tests and score them up. They will also keep the results private. The findings of the project may be published in a research paper, which may include direct quotes from the stories you tell; however, no-one could know it is you.



What's in it for me?!

Some people find the chance to know more about their strengths and weaknesses interesting and useful. If you take part, you will be asked if you would like a written summary of the results once the research study has been completed.

You will be offered a book about Asperger Syndrome, as a small thank you for your time. You will be given this even if you then withdraw from the study.

Who has looked at this study and said it is OK to go ahead?

This study was carefully looked at by University of Hertfordshire Research Ethics Committee and the Essex 2 Local Research Ethics Committee and they said it was all OK and safe to go ahead.

OK, I want to take part! What do I do now?

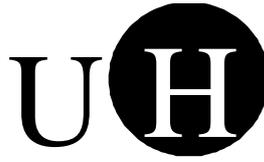
- Check with your parents or guardian that they have read their information sheet and that they agree you can take part in the study (They need to sign a consent form so you can take part)
- Sign the participant consent forms and give to your parents or guardian to send back in the stamped addressed envelope

What if I have questions about this research?

Please ask your parents or guardian to contact the researcher by email or post.

Thank you for taking time to read this.

Researcher Name: Eleanor Wakerly
Email address: E.Wakerly@herts.ac.uk
Postal address: Doctor of Clinical Psychology Training Course
University of Hertfordshire
Hatfield, Herts., AL10 9AB



University of Hertfordshire

PARENTAL CONSENT FORM

Title of Project: 'Squiggling': a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Lead Researchers: Eleanor Wakerly, Trainee Clinical Psychologist and Dr Joost Drost, Clinical Psychologist

Please initial box

- 1) I confirm that I have read and understand the information sheet dated (06.11.07) and version (3) for the above study. I have had the opportunity to consider the information and if needed ask questions that were satisfactorily answered.
2) I understand that participation is voluntary and that my son/daughter is free to withdraw at any time, without giving any reason, without healthcare or legal rights being affected.
3) I understand that relevant sections of my son/daughter's data collected during the study may be looked at by the named study researchers. I give permission for these individuals to access this data.
4) I agree for my son/daughter to take part in the above study

Name of parent of participant Date Signature

Name of researcher Date Signature



University of Hertfordshire

PARTICIPANT CONSENT FORM

Title of Project: Squiggling: a diagnostic aid in the assessment of Asperger Syndrome with secondary school -age children

Researcher: Eleanor Wakerly, Trainee Clinical Psychologist

Please initial box

- 1) I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information and if needed ask questions that were satisfactorily answered. []
2) I understand that participation is voluntary and I am free to withdraw at any time, without giving any reason, without my healthcare or legal rights being affected. []
3) I understand that relevant sections of my data collected during the study may be looked at by the study researchers. I give permission for these individuals to access this data. []
4) I agree for my words given during the study tasks to be used anonymously in any publication leading from this research. []
5) I agree to take part in the above study []

Name of participant Date Signature

Name of researcher Date Signature

The Childhood Asperger Syndrome Test (CAST)

Child's Name: Age: Sex: Male / Female

Birth Order: Twin or Single Birth:

Parent/Guardian:

Parent(s) occupation:

Age parent(s) left full-time education:

Address:

Tel.No: School:

Please read the following questions carefully, and circle the appropriate answer. All responses are confidential.

- | | | |
|--|-----|----|
| 1. Does s/he join in playing games with other children easily? | Yes | No |
| 2. Does s/he come up to you spontaneously for a chat? | Yes | No |
| 3. Was s/he speaking by 2 years old? | Yes | No |
| 4. Does s/he enjoy sports? | Yes | No |
| 5. Is it important to him/her to fit in with the peer group? | Yes | No |
| 6. Does s/he appear to notice unusual details that others miss? | Yes | No |
| 7. Does s/he tend to take things literally? | Yes | No |
| 8. When s/he was 3 years old, did s/he spend a lot of time pretending (e.g., play-acting being a superhero, or holding teddy's tea parties)? | Yes | No |
| 9. Does s/he like to do things over and over again, in the same way all the time? | Yes | No |
| 10. Does s/he find it easy to interact with other children? | Yes | No |
| 11. Can s/he keep a two-way conversation going? | Yes | No |
| 12. Can s/he read appropriately for his/her age? | Yes | No |
| 13. Does s/he mostly have the same interests as his/her peers? | Yes | No |
| 14. Does s/he have an interest which takes up so much | | |

time that s/he does little else?	Yes	No
15. Does s/he have friends, rather than just acquaintances?	Yes	No
16. Does s/he often bring you things s/he is interested in to show you?	Yes	No
17. Does s/he enjoy joking around?	Yes	No
18. Does s/he have difficulty understanding the rules for polite behaviour?	Yes	No
19. Does s/he appear to have an unusual memory for details?	Yes	No
20. Is his/her voice unusual (e.g., overly adult, flat, or very monotonous)?	Yes	No
21. Are people important to him/her?	Yes	No
22. Can s/he dress him/herself?	Yes	No
23. Is s/he good at turn-taking in conversation?	Yes	No
24. Does s/he play imaginatively with other children, and engage in role-play?	Yes	No
25. Does s/he often do or say things that are tactless or socially inappropriate?	Yes	No
26. Can s/he count to 50 without leaving out any numbers?	Yes	No
27. Does s/he make normal eye-contact?	Yes	No
28. Does s/he have any unusual and repetitive movements?	Yes	No
29. Is his/her social behaviour very one-sided and always on his/her own terms?	Yes	No
30. Does s/he sometimes say “you” or “s/he” when s/he means “I”?	Yes	No
31. Does s/he prefer imaginative activities such as play-acting or story-telling, rather than numbers or lists of facts?	Yes	No
32. Does s/he sometimes lose the listener because of not explaining what s/he is talking about?	Yes	No
33. Can s/he ride a bicycle (even if with stabilisers)?	Yes	No

- | | | |
|--|-----|----|
| 34. Does s/he try to impose routines on him/herself, or on others, in such a way that it causes problems? | Yes | No |
| 35. Does s/he care how s/he is perceived by the rest of the group? | Yes | No |
| 36. Does s/he often turn conversations to his/her favourite subject rather than following what the other person wants to talk about? | Yes | No |
| 37. Does s/he have odd or unusual phrases? | Yes | No |

SPECIAL NEEDS SECTION
Please complete as appropriate

- | | | |
|--|-----|----|
| 38. Have teachers/health visitors ever expressed any concerns about his/her development? | Yes | No |
|--|-----|----|

If Yes, please specify.....

39. Has s/he ever been diagnosed with any of the following?:

- | | | |
|--|-----|----|
| Language delay | Yes | No |
| Hyperactivity/Attention Deficit Disorder (ADHD) | Yes | No |
| Hearing or visual difficulties | Yes | No |
| Autism Spectrum Condition, incl. Asperger's Syndrome | Yes | No |
| A physical disability | Yes | No |
| Other (please specify) | Yes | No |

Thank you. Please return in the stamped addressed envelope.

This test is copied and distributed with permission from the Autism Research Centre, 2007.

Squiggling Procedure

Initially the participant was asked if they had heard of *squiggling* or could guess what a *squiggle* was. They were also asked if they enjoyed drawing and creative writing at school. Participants were invited to make marks on the paper together with the researcher, who ensured the participant understood that one is not thinking of anything in particular when they draw a squiggle, i.e., it is at first meaningless. The squiggles drawn by the researcher during the game were standardised (See Appendix 21).

The following was verbally explained and written down:

- Each player turns the other's squiggle into a drawing of anything they like
- Researchers are not interested in drawing ability – just looking at your ideas
- Each drawing is given at least one name
- Drawing stops when there are 10 altogether (5 each)
- Then 5 drawings are chosen to tell a short story

The participant was invited to make the first squiggle on a sheet of paper. Creative thinking ability was modelled by the researcher, demonstrating:

- *imagination* (i.e., reality based and non-reality based impossible objects or subjects)
- *originality* (i.e., novel transformed drawings, no elements copied from previous drawings)
- *flexibility* (i.e., a range of categories across drawings, e.g., animal, person, scene, unreal object)
- *integration* (i.e., an multiple squiggles combined as a whole drawing)
- *elaboration* (i.e., detail added within drawings)
- *fluency* (i.e., several ideas generated for names of drawings)

During *squiggling*, verbal comments on the participant's drawing ability were not given, as they may have felt their drawing ability was being appraised. Some encouragement and praise of creative thinking was given when appropriate. It was quiet while the participant thought of and drew their ideas.

When there were 10 drawings altogether, the participant was reminded that they were invited to choose 5 drawings. The researcher said, "*The drawings you choose may be all yours, or all mine or a mixture*". The participant was invited to have a few minutes to think of a short story. The researcher wrote the story down as the participants told it (verbatim), and read it through to the participant afterwards to check for accuracy.

Squigglings scoring criteria

OrigSqu – Originality in drawing	Score
No recognisable representation (patterns)	1
Imitation of a drawing	2
Restructured or elaborated drawing	3
Novel or transformed drawing	4

ElabSqu – Elaboration in drawing	Score
Outline of representation	1
Outline with 2-3 features	2
Outline with 4-5 features	3
Outline with 6 plus features	4

FluenSq – Fluency of names for drawing	Score
One idea for a name	1
Two ideas for a name	2
Three ideas for a name	3
Four plus ideas for a name	4

ImagSqu – Imagination in drawing	Score
Representation of real present objects (copied)	1
Representation of real absent objects	2
Representation of real subjects	3
Representation of unreal objects or subjects	4

ImagStory – Imagination in story	Score
Probable event	1
Possible event	2
Unlikely event	3
Impossible event	4

IntegSqu – Integration of squiggles in drawing	Score
No combining of squiggles – separate different drawings	1
Connections by lines or dots	2
Connection by association	3
Connection as a whole object, subject or by action	4

IntegStory – Integration of ideas in story	Score
Unrelated, listed ideas	1
Related by association	2
Related by interaction	3
Related by interaction and elaboration	4

FlexSquig – Flexibility across drawings	Score
Covering one category	1
Covering two categories	2
Covering three categories	3
Covering four plus categories	4

AUTHOR NOTE

The lead researcher was Eleanor Wakerly, a Trainee Clinical Psychologist with the University of Hertfordshire. The principal supervisor was Dr Nicholas Wood, Clinical Psychologist and Course Tutor for the University of Hertfordshire Clinical Psychology Doctoral programme. Supervising researchers were Dr Joost Drost, Clinical Psychologist within the North Essex Partnership NHS Trust, and Dr Stephen Davies, Clinical Psychologist and Course Tutor for the University of Hertfordshire Clinical Psychology Doctoral programme.

The lead researcher would like to thank all of the boys and girls who took part in this research study; Jaye Cowell, Research Assistant and Margaret Malt for their time and effort in helping with recruitment of participants; and James Bentall, Leader for the North Mymms Scouts who helped me enormously in the latter stages of the study. And lastly, thank you to the lead researcher's supervisors, Dr Joost Drost, Dr Stephen Davies and Dr Nicholas Wood for their time, advice and committed support throughout this research.

Correspondence concerning this article should be addressed to Eleanor Wakerly, Doctorate of Clinical Psychology, University of Hertfordshire, College Lane, Hatfield, Hertfordshire, AL10 9AB.

TABLES

Table I. Group comparisons on age, PIQ and VMI

	Chronological Age years : months	Performance IQ	Visual Motor Integration
Clinical Mean (SD)	14 : 2 (1 : 6)	111 (9)	10 (3)
Comparison Mean (SD)	13 : 2 (1 : 6)	112 (8)	11 (2)
t-score	-2.143	0.128	0.469
Degrees of freedom	14	14	14
p-value	0.050	0.900	0.646
Effect size	0.500	-0.117	-0.392

Table II. Bivariate analysis between Squiggling and Torrance Tests of Creative Thinking (Torrance *et al.*, 2008)

	Squiggling Mean (SD)	TTCT Mean (SD)	Pearson's r	p-value	Effect size
Squiggling Total Score – TTCT Total	69 (7)	105 (11)	0.174	0.179	Small
Squiggling Elaboration – TTCT Elaboration	11 (3)	108 (28)	0.261	0.082	Medium
Squiggling Originality – TTCT Originality	19 (1)	110 (19)	0.024	0.449	No association
Squiggling Fluency – TTCT Fluency	9 (4)	113 (15)	-0.187	0.162	Small
Squiggling Imagination – TTCT Abstractedness	17 (3)	95 (32)	0.414	0.012	Medium to Large

Table III. Group comparisons on squiggling creative thinking abilities

	Clinical Mean (SD)	Comparison Mean (SD)	Z score	p value 1-tailed	Effect size
Squiggling Imagination	16 (3)	17 (3)	-0.246	0.400	-0.333
Squiggling Originality	19 (1)	19 (1)	0.000	1.000	NA
Squiggling Elaboration	12 (3)	11 (2)	-1.122	0.262	0.392
Squiggling Fluency	9 (4)	9 (4)	-0.670	0.503	NA
Squiggling Flexibility	3 (1)	3 (1)	-1.996	0.046	NA
Squiggling Integration	9 (2)	10 (2)	-1.130	0.258	-0.500
Squiggling Total	68 (8)	70 (6)	-0.967	0.334	-0.283