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Asperger's disorder: A musical treatment for child anxiety

Jeremy Marriott
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Asperger's Disorder: A Musical Treatment for Child Anxiety

Jeremy Marriott

A report submitted in the Partial Fulfilment of
the Requirements of the Award of Bachelor of Science (Psychology) Honours,
Faculty of Computing, Health and Science,
Edith Cowan University.
Submitted (October, 2010)



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Abstract

School-aged females with Asperger's Disorder (AD) are significantly affected by debilitating anxiety. At present, no empirically validated treatments exist to treat this anxiety. To investigate this affect and treatment gap, a mixed-methods revelatory single-case design, built on evidence-based treatment elements was designed and tested. Solo pianist, David Helfgott rated, performed and provided musical performances by Louis Moreau Gottschalk and Claude Debussy which were listened to once each morning before school by a 10-year-old female with AD. Anxiety was recorded via a self-report Daily Journal and parent-report Spence Child Anxiety Scale for 20 consecutive school days. Results indicated support for the hypothesis that music reduces anxiety for a child with AD via a noticeable reduction in mean anxiety and a statistically significant within-subjects *t*-test performed on daily Numerical Visual Analogue Anxiety Scale (NVAAS) anxiety scores. In addition, an analysis of child drawings and researcher journal entries revealed information regarding cognitive abilities and music selection preferences. The implications of these results are discussed along with future research and therapeutic directions.

*Asperger's Disorder: A Musical Treatment for Child Anxiety***Opening Vignette**

Following 12 months of hormone therapy and one-week before commencing in vitro fertilisation, Emma was conceived. Carried to term, 6-pound and 7-ounce Emma was born with severe lung and kidney complications as a result of a long and difficult pregnancy. Once Emma's health had stabilised, she was taken by her parents to the family home located in a middle class neighbourhood of rural Western Australia. Soon Emma's uniqueness became noticeable. As an avoidant infant, Emma was rigid when held and recoiled when touched. As an unhappy toddler, Emma withdrew from others at playgroup, preferred interaction with objects rather than humans and communicated mostly via tantrum. Finally, at 8 years of age and after much speculation Emma was diagnosed with Asperger's Disorder.

Currently, aged 10 years and 11 months, Emma struggles socially, comprehends speech literally and makes numerous inappropriate remarks. Graded as an average student within a mainstream school, Emma shows a special interest and talent for visual art and foreign languages. Tallest in her 5th-grade class, Emma has blonde hair, blue eyes and an infectious if somewhat monotonal laugh.

Emma's parents have been happily married for 14 years. Her mother left school after 11th-grade, worked as a Pharmacy Assistant and now sells furniture in the family business. Emma's father left school after 10th-grade, entered a printing apprenticeship and now works night shift as a timber mill technician. Emma's only sister is a happy and affectionate 6-year-old. Too frequently, Emma experiences debilitating levels of anxiety caused by school events. Often expressed in dangerous and sometimes violent behaviour,

the anxiety affects not only Emma but her entire family. So significant is the impact of Emma's anxiety, her mother exclaims: "Emma gets so anxious that our family simply cannot function".

Asperger's Disorder

Utilising a similar structure to that of the opening vignette, in 1943 child psychiatrist Leo Kanner published observations of eleven children with what he called "inborn autistic disturbances of affective contact" (Kanner, 1943, p. 250). The intention of his 1943 paper was to present a "preliminary report" with a "hopeful prognosis" (Kanner, 1943, p. 217; Kanner, 1971, p. 145). Of these children, Kanner recorded disparaging descriptions such as "seriously retarded" and "feeble-minded" (Kanner, 1943, p. 231; Kanner, 1943, p. 238). In addition, Kanner also remarked that the children showed "good cognitive potentialities" and "striking intelligence" (Kanner, 1943, p. 247). Kanner concluded this seminal paper by recommending further investigation into children with similar attributes.

Almost simultaneously, in 1944 paediatrician Hans Asperger published detailed observations of four children with attributes described as "autistic" representing the Greek word "autos" or aloneness (Asperger, 1944, pp. 37-38). Originally provided in the German language, Asperger's paper was not translated into English until Frith (1991) published *Autism and Asperger's Syndrome*. Asperger expressed the view that autism was a schizotypal or an introverted personality disorder (Asperger, 1944). Asperger concluded this paper by recommending longitudinal investigations of these attributes across the lifespan.

The similarities between attributes reported by Kanner and Asperger created

confusion within the literature and a need for a neutral term of reference (Wing, 1981). Presently, this confusion has been exacerbated by the development of two diagnostic labels for these characteristics. The 10th version of the International Classification of Diseases (ICD-10) *Clinical Descriptions and Diagnostic Guidelines* published by the World Health Organisation (WHO) defines Asperger's Syndrome (AS) as a pervasive disorder of psychological development denoted by repetitive behaviours, limited interests, occasional adult psychotic episodes and deficits of social reciprocity (WHO, 1992). Whereas, the fourth edition of the *Diagnostic and Statistical Manual-Text Revision* (DSM-IV TR) published by the American Psychological Association (APA) defined Asperger's Disorder (AD) as a lifelong pervasive developmental disorder characterised by reliance on routine, specific areas of interest and significant social deficits (APA, 2000).

Adding to this ongoing confusion is that researchers and professionals have been unable to identify significant differences in criterion between AD and High Functioning Autism (HFA) (Frith, 2008; Ozonoff, Dawson, & McPartland, 2002). Furthermore, recent literature suggesting that published reports pertaining to people with AD are directly applicable to those with HFA (Frith, 2008; Ozonoff et al., 2002). In the interests of reducing this confusion and to provide a suitable operational definition for this study, the term AD is herein used to define the characteristics of Emma as described in the opening vignette and the terms AS, AD and HFA.

Prevalence of AD

The worldwide prevalence of children aged between 7 to 16 years with AD is 3.6 to 7.1 per 1000, which has increased by 15% to 30% since the year 1990 (Ehlers & Gillberg, 1993; Ozonoff et al., 2002). This increase has been attributed to improved

diagnostic tools and increased public and professional awareness (Fine & Myers, 2004).

The prevalence of AD within Australia is not detailed in the Australian *Social Trends 2009* (Australian Bureau of Statistics, 2009). However, in the USA, AD occurs between 2.5 in every 10,000 people to 1 in every 100 people (Simone, 2009; Toth & King, 2008). In the UK, from a sample of 57,000 children aged between 9 and 10 years, 0.7% presented with AD (Firth, 2008). These prevalence rates indicate the importance of ongoing research regarding AD.

Gender and AD

The gender ratio for AD varies from three to eight males to every one female (APA, 2000; Kanner, 1971; Ozonoff et al., 2002; Tantam & Girgis, 2009; WHO, 1993). In her book *Aspergers: Empowering Females with Asperger Syndrome*, Simone (2009) describes the gender imbalance not as a result of reduced prevalence amongst females, rather under diagnosis in females. Simone reports the existence of a significant gap within scientific literature, treatment and services for females with AD and their families (Simone, 2009). Clearly, the need for investigations into different aspects of females with AD is required.

Childhood Anxiety and AD

Anxiety is defined as the concern regarding threats that occur outside the realms of rational thought (Tsai, 2006). Within the mind of a child with AD, anxiety occurs for unknown reasons but often results after changes to school timetables, unpredictable situations, teacher changes or unexpected surprises (Attwood, 2006b; Grandin, 2006). In addition, school-aged children with AD report higher levels of anxiety than age matched

peers without AD (Ghaziuddin, 2002; Reaven, 2009; Reaven et al., 2009; Russell & Sofronoff, 2005).

Kanner (1943) was the first to report the effects of anxiety on children through observations such as “dreadfully fearful” and “obsessively dreading change” (Kanner, 1943, p. 218; Kanner, 1943, p. 246; Lange & Lainhart, 2009). Current research suggests that as many as one in every two people with AD experience severe anxiety (Beidel & Turner, 2005; Ferdinand, Barrett, & Dadds, 2004; Grandin, 2006). Strengthening the opening vignette, it has been reported that the development of female primary school children with AD is significantly affected by severe anxiety (Church, Alisanski, & Amanullah, 2000; Simone, 2009).

Anxiety significantly affects everyday life for children with AD (Bellini, 2006; Grace Baron, Lipsitt, & Goodwin, 2006). Unfortunately, limited research is available which details appropriate treatment (Sofronoff, Attwood, & Hinton, 2005; Tsai, 2006). Specifically, there is an urgent need to understand the developmental affects of anxiety and respond with effective treatments (Ghaziuddin, 2002; Ginsberg & Becker, 2009; Grace Baron et al., 2006; Kuusikko, et al., 2008; Reaven et al., 2009; Sofronoff, Attwood, & Hinton, 2005; White, Oswald, Ollendick, & Scahill, 2009).

The DSM-IV TR does not sufficiently report the significance of anxiety for people with AD: “... individuals with Asperger’s Disorder may experience heightened and debilitating anxiety ...” (APA, 2000, p. 83). Of further concern, the ICD-10 does not report the effects of anxiety in either the *Clinical Descriptions and Diagnostic Guidelines* or *Diagnostic Criteria for Research* (WHO, 1992; WHO, 1993). Despite the identified lack of recognition for the affects of anxiety for children with AD, specifically designed

treatments have the potential to benefit children, families, researchers and practitioners (Morgan, 2006).

It is important, at this point, to note that children with AD can benefit from experiencing reasonable levels of anxiety in order to develop coping strategies (Grace Baron et al., 2006). For example, childhood anxiety regarding separation or the darkness are often short lived and eventually fade (Ferdinand et al., 2004). However, for many with AD, anxiety persists, remaining unreported and untreated (Grandin, 2006; Tsai, 2006).

Anxiety Outcomes for AD

Left untreated, anxiety amongst school-aged children with AD can lead to social withdrawal, anger, frustration, limited friendships, bullying, irrational decision making, memory deficits, ritualistic behaviour separation difficulties, sleep disturbances, attention problems and ongoing illness (Ferdinand et al., 2004; Grace et al., 2006; Morgan, 2006; Reaven, 2009; Tani et al., 2004; Tantam & Girgis, 2009). Often suppressed during school, children with AD often express the tension associated with anxiety as adverse behaviour at the end of the school day (Attwood, 2006b). One of the most concerning outcomes of severe anxiety for children with AD is the refusal to attend school (Ferdinand et al., 2004).

Of concern, if childhood anxiety is detected, diagnosed early and treated, it does not always subside over time (Beidel & Turner, 2005). If anxiety persists from childhood to adolescence, it can result in social isolation, poor coping skill development, depression and/or substance abuse (Ferdinand et al., 2004; Grandin, 2006; Tsai, 2006). Persisting into late adolescence and early adulthood, anxiety can result in poor academic

achievement, emotional and social difficulties and sometimes suicide (Wing, 1981; Wing, 2005). Finally, adults with AD whom are affected by anxiety often experience limited employment prospects (Wing, 2005).

The effects of this anxiety are compounded by the majority of research being focussed on adults with AD, assuming that it applies directly to children (Beidel & Turner, 2005). In addition, literature dedicated to exploring treatments for anxiety in children with AD is extremely limited (Beidel & Turner, 2005; Russell & Sofronoff, 2005).

Anxiety treatments

Currently, treatments designed to assist children with AD to reduce anxiety fall into two main categories: pharmacological and psychological.

Pharmacological

Pharmacological treatments require the consumption of medication to reduce childhood anxiety (Brandes, 2009). Dosage is determined by body weight, age, general body chemistry and level of anxiety, taking between several days to weeks to activate (Grandin, 2006; Tsai, 2006). Grandin (2006) reported that pharmacological treatments can improve productivity, eye contact, social skills and emotion recognition for those with AD. However, the developing body of a child is extremely sensitive to medication and many experience the effects at different intensities (Tsai, 2006). Therefore, it is recommended that pharmacological treatments for anxiety reduction in children with AD continue for a short period and only in extreme cases (Kearney, 2005).

Serotonin Selective Reuptake Inhibitors (SSRIs) are a well known example of

pharmacological medicine used to reduce anxiety for people with AD. Examples of SSRIs are Fluvoxamine, Citalopram, Pristiq, Prozac, Zoloft and Paxil (Grandin, 2006; Tsai, 2006). Alternatively, Tricyclic antidepressant medication such as Benzodiazepines, Diazepam, Chlordiazepoxide and Lorazepam can be consumed (Tsai, 2006).

The negative effects of pharmacological treatments often outweigh the positives for people with AD. It is often difficult to convince a child with AD to accommodate taking medication into an existing routine (Attwood, 2007). In addition, suspicions regarding correct consumption often results in the need for regular blood analysis (Tsai, 2006). An often overlooked side effect of pharmacological interventions is the impairment to vital introspective thought processes relied upon by people with AD (Brandes, 2009). SSRIs can cause sleep disturbances, nausea, skin rashes and headaches (Johnson & Lydiard, 1998). Furthermore, each medication elicits different individual effects, are only effective when active in the body and are not a permanent solution (Brandes, 2009; Frith, 2008; Kearney, 2005; Tsai, 2006). Alternative pharmacological treatments for anxiety reduction include ingesting vitamin B6, Magnesium or Dimethylglycine (Ozonoff et al., 2002); however there is limited evidence for effectiveness.

Psychological

Psychological treatments teach people with AD how to cope with anxiety (VanBergeijk & Shtayermman, 2005). Psychoeducation can assist people with AD to identify then minimise anxiety-based reactions through introspection (Kearney, 2005; Tsai, 2006). Cognitive Restructuring assists the people with AD to assess personal beliefs regarding the causes of anxiety by writing and disclosure (Tsai, 2006). Rehearsing

Coping Responses involves the re-creation of an anxiety producing situation and coping strategies during therapy (Tsai, 2006). Exposure Treatments presents people with AD to an anxiety producing situation without enabling avoidance (Kearney, 2005; Tsai, 2006). Relaxation Training requires early identification of anxiety symptoms followed by progressive muscle relaxation (Kearney, 2005; Tsai, 2006). Other psychological interventions include Psychotherapy, Family Interventions, Auditory Integration Training, Breathing Retraining, Imaginal Exposure and daily journaling (Barnhill, 2007; Kearney, 2005; Reaven, 2009; Sofronoff, Attwood, & Hinton, 2005).

The most widely used psychological treatment for people with AD to reduce anxiety is Cognitive Behaviour Therapy (CBT) (Attwood, 2004; Ferdinand et al., 2004; Reaven, 2009). CBT elicits cognitive engagement with anxiety and the use of learned coping strategies in everyday situations (Tsai, 2006). CBT is often delivered face to face, however it has been presented effectively via telephone or the internet (Kessler et al., 2009). Despite reports of CBT reducing anxiety for people with AD, comprehensive evaluations have not emerged (Tantam & Girgis, 2009). Additionally, the financial cost associated with CBT often makes it unaffordable (Müller & Henkel, 2005). Furthermore, the validity of CBT results is questionable due to the potential for experimenter bias (Müller & Henkel, 2005).

Existing pharmacological and psychological treatment for reoccurring anxiety are inappropriate for children with AD and lack empirical testing (Tantam & Girgis, 2009). Some research has begun to explore anxiety amongst children but not those with AD (Kearney, 2005). Definitively, a significant gap exists within science and professional practice regarding treatments designed to reduce anxiety for children with AD (Kearney,

2005).

Alternative Anxiety Treatments

Alternative psychological treatments for reducing anxiety are fast jogging, intense cardio respiratory exercise or watching episodes of Star Trek (Grandin, 2006). In addition, Grandin developed a human squeeze chute which relieved her anxiety by increasing and decreasing body pressure. Grandin reported relaxation after 5 seconds, anxiety relief after 30 minutes and complete anxiety reduction after 60 minutes (Grandin, 2006). Lastly, arts, martial arts, singing, playing instruments, massage, yoga, reiki and Interactive Metronome Treatment have also been suggested as potential methods of reducing anxiety for people with AD (Levy, Mandell & Schultz, 2009), with limited evidence of efficacy.

Over the past few decades, a need for non-conventional treatments for chronic disorders such as AD has emerged (Brandes, 2009). Specifically, a strong movement has developed to create a universal treatment designed to reduce anxiety for school-aged children with AD (Ferdinand et al., 2004). Generalisable treatments designed to reduce anxiety for all children with AD do not currently exist (Farrugia, & Hudson, 2006; Weber, 2008).

Evidence-Based Treatment Elements

A review of the most recent literature has identified evidence-based treatment elements deemed applicable to treatments designed to reduce anxiety for children with AD.

Knowledge of children with AD

It is essential that a treatment designed to reduce anxiety for children with AD accommodate for the attributes of the disorder. The treatment should meet the wishes and expectations of the child with AD (Barnhill, 2007). To ensure the child's wishes are maintained, consent should be obtained and time allotted to provide all relevant information to the child (Beidel & Turner, 2005). It is important to note that people with AD show preference for being alone and that complex, unexpected, verbal auditory stimuli with a volume level uncontrolled by the child will likely increase anxiety (Attwood, 2006b; Kuusikko, et al., 2008; Simone, 2009). Therefore, an uncomplicated, predictable, non verbal and independently controlled auditory stimulus is recommended (Allen, Hill, & Heaton, 2009). Children with AD often experience difficulties in describing emotions, defined as Alexithymia, making the assessment of anxiety problematic (Allen et al., 2009; Attwood, 2006b). To combat this, numerical and or pictorial rating scales are recommended (Attwood, 2006b).

Treatments for children with AD under 18 years of age should be of short duration, administered in a controlled environment and contain self-reporting mechanisms (Cardaciotto & Herbert, 2004; Ginsberg & Becker, 2009; Kestenbaum, 2008; Pelletier, 2004). Actively engaging children with AD in treatments produces greater cooperation and outcomes (Beidel & Turner, 2005; Chu et al., 2004; Grace Baron et al., 2006). Lastly, a reduction in anxiety is more likely where open communication occurs between the child with AD and the treatment provider (Tantam & Girgis, 2009).

Treatment location

Treatments designed to reduce anxiety for adults with AD have mainly occurred in clinical settings (Cardaciotto & Herbert, 2004). The family home is a preferred treatment location due to reduced travel demands of therapy and the ability to maintain vital routines for the person with AD (Ginsberg & Becker, 2009; Ozonoff et al., 2002; Woodbury-Smith & Volkmar, 2009). In addition, the family home is ideal for assessing both the individual and family impacts of anxiety reducing treatments (Grace Baron et al., 2006). Foremost, there is a need to reduce anxiety for children with AD living in rural family homes (Kearney, 2005).

Family involvement

When a child is first diagnosed with AD, family are often highly motivated to assist (Ozonoff et al., 2002). In addition, children with AD often require family members for the maintenance of regular schedules whilst accommodating for a foreign treatment (Beidel & Turner, 2005; Tsai, 2006). Family involvement in treatment of the child with AD often results in improved family interactions (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000). Furthermore, obtaining information from family members as a method of triangulation during the treatment improves the validity of results (Beidel & Turner, 2005; Kearney, 2005).

Treatments for anxiety reduction should involve the person with AD, health professionals and family members (Barnhill, 2007). Importantly, it is essential not to inconvenience families nor increase anxiety for children with AD during treatment (Tsai, 2006; Weber, 2008). Further, treatments that neglect to inform families of relevant details do not often produce meaningful outcomes due to inaccuracies in data (Kearney, 2005). It has been reported that a strong alliance between the treatment provider and the family

facilitates an increased possibility of reducing anxiety for the child with AD (Brandes, 2009; Coombs & Smith, 2003).

Research design

Measuring anxiety amongst children is complex and unpredictable (Abeles & Won Chung, 1996; Beidel & Turner, 2005; Kearney, 2005). In addition, there is a constant pressure to deliver age-appropriate, non-invasive treatments of advantage to both the child and family (Grace Baron et al., 2006). Compounding this is the possibility that the child may change behaviour to comply with a perceived outcome, known as the Hawthorne Effect (Chiesa & Hobbs, 2008). However, informing participants of the need for accurate reporting can minimise this potential confound (Chiesa & Hobbs, 2008). Research that enables anxiety self-reports from children and parents on several occasions can vastly improve the validity of results (Attwood, 2006b; Grace Baron et al., 2006).

Mixed-methods research designs can improve the detection of treatment effect (Brandes, 2009; Grace Baron et al., 2006). Daily journals are an effective way of obtaining information regarding anxiety from children with AD (Attwood, 2006b). In addition, the Spence Child Anxiety Scale -Parent Report (SCAS-P) is an inexpensive, accurate and scientifically valid method of measuring child anxiety (Kearney, 2005). Interestingly, Walker, Caine-Bish and Wait (2009) reported that analysis of children's drawings is an appropriate method of data analysis because of familiarity with the required implements. Treatments should accommodate for everyday events in the life of a child with AD and provide some form of continuance to prevent anxiety relapse (Kearney, 2005; Laage & Lainhart, 2009).

Initial single-case research followed by future replication planning reduces the risk of harm to children and families (Lange & Lainhart, 2009). Furthermore, single-case research is commonly used in psychology to explore real life phenomena such as anxiety that are difficult to replicate in clinician settings (Yin, 2003). High inference can be surmised from single-case research that collects data on repeated occasions (Stake, 1995). Moreover, it is often too time and cost consuming for a single researcher to conduct treatments for multiple cases (Yin, 2003).

Use of music

The use of sensory stimuli such as music has been suggested as a potential method of reducing anxiety for people with AD (Wing, 2005). Music progressing from stimulating to sedate, performed by a single instrument elicits relaxation as a method of anxiety reduction more effectively than sedate music alone (Allen & Blaskovich, 1994; Hanser, 1985; Rider, 1985). Previous research has either failed to report how music was selected (McKlevie & Low, 2002; Nilsson et al., 2005), relied on participants to choose music from a restricted range (Črnčec et al., 2006; El-Hassan et al., 2009; Lesiuk, 2008; Mok & Wong, 2003) or employed a panel of unspecified judges to select music (Katagiri, 2009). However, music composed by Louis Moreau Gottschalk and Claude Debussy during the Romantic Era (1825-1900) has been suggested for use in future research (Nantais & Schellenberg, 1999; Pelletier, 2004).

Music, Anxiety and Research

Music is inexpensive, non-invasive, can be heard, seen, touched and retained (Lopez, 2009; Nilsson, Unosson, & Rawal, 2005). Music has been extensively used in

therapy for the last 60 years, however only tested scientifically over the previous 20 years (Brandes, 2009; Thaut, 2004). Music has assisted people to overcome neurological movement disorders, depression, burnout, sleep disorders, hypertension and cardiac disease (Brandes, 2009; Thaut, 2004).

Numerous studies have reported the application of music to reduce anxiety (Brandes, 2009). El-Hassan, McKeown and Muller (2009), reported that music reduced anxiety for endoscopy patients. Pelletier (2004) found that music reduced anxiety for adolescents exposed to stressful situations. Nilsson et al. (2005) reported that music lowered post operative anxiety and reduced morphine usage post surgery. Lai et al. (2008) reported that music reduced anxiety during root canal treatment. Despite these results, the use of music within research has become the topic of much controversy and criticism (Nantais & Schellenberg, 1999).

Wolfgang Amadeus Mozart lived from 1756 to 1791 and has been referred to as a 'genius' because of his numerous musical compositions (Campbell, 1997, p. 6). Mozart's 488th composition entitled Sonata for Two Pianos in D Major (K488) is the centrepiece for what is known as the Mozart Effect (Campbell, 1997). The Mozart Effect was the result of a single-page research paper published by Rauscher, Shaw and Ky in 1993. Thirty-six university students were exposed to the first 10 minutes of three auditory conditions prior to completing a selection of Stanford-Binet Intelligence Scale spatial-reasoning tasks. The first condition involved listening to K488, the second listened to a relaxation tape and the third listened to silence. Mean standard age-scores for all conditions were calculated for each participant before being transformed into spatial

Intelligent Quotient (IQ) scores. Rauscher et al. (1993) concluded that listening to K488 significantly improved spatial IQ scores.

Following the Rauscher et al. (1993) study, the Mozart Effect attracted considerable media, scientific, public and corporate attention (Črnčec, Wilson, & Prior, 2006; Nantais & Schellenberg, 1999). A thriving industry emerged, proclaiming that Mozart's music positively affected human development. Compact discs (CDs), books and videos were created, laying claim to improvements in relaxation, healing, intelligence and learning for children and adults as a result of listening to Mozart's music (Campbell, 1997; Črnčec et al., 2006; McKlevie & Low, 2002). The Mozart Effect became so popular that one governor in the USA budgeted a CD or cassette player for every child (Nantais & Schellenberg, 1999).

Despite the attention surrounding the Mozart Effect, the results published by Rauscher et al. (1993) have not since been scientifically replicated (Nantais & Schellenberg, 1999). Nantais and Schellenberg (1999) assessed 84 undergraduate university students on spatial-reasoning tasks after listening to the first 10 minutes of K488, Franz Schubert's Fantasia for Piano, Four Hands, in F Minor composition (D940) or silence. Listening to music produced better spatial-reasoning task performance, however no significant difference was found between K488 and D940. Furthermore, Steele, Bass and Crook (1999) found no main effect of K488 on spatial tasks. McKlevie and Low (2002) found no significant difference between K488 and popular dance music on spatial ability tasks amongst children. Cassity, Henley and Markley (2007) reported no significant difference in performance on a computer game whilst listening to K488 and Fight Like a Brave Man by the Red Hot Chilli Peppers. These scientific failures resulted

in scientists suggesting that the Mozart Effect had been misreported, misinterpreted and exploited by the media without empirical scientific support (Cassity et al., 2007; Črnčec et al., 2006; McKlevie & Low, 2002; Nantais, & Schellenberg, 1999). Definitively, McKlevie and Low (2002, p. 256) stated 'It is time for the final curtain to fall on the Mozart Effect'.

The media popularity and scientific failings of the Mozart Effect have resulted in music becoming a treatment of last resort (Brandes, 2009). Despite this sentiment, Lange and Lainhart (2009), suggest that well designed and innovative treatments using music are essential for the betterment of science and therapy. Specifically, Lopez (2009) suggested that scientific investigation is required to examine the effects of music on children with AD. Ultimately, within a rigorous scientific design, music has the potential to become a 'gold standard' in clinical practice (Brandes, 2009, p. 100).

Music and AD

Research using music to reduce anxiety for children with AD is currently emerging (Črnčec et al., 2006; Reaven, 2009). Previously, music has been reported to reduce inappropriate social behaviour, improve attention, comprehension and self care skills amongst people with AD (Whipple, 2004). Allen et al. (2009) published a preliminary study which reported the experiences of music recorded by 12 adults with AD. The participants' reported feelings of 'calmness' and 'exhilaration' as a result of listening to music (Allen et al., 2009, p. 13). This preliminary study created a base from which the effect of music to reduce anxiety for children with AD can be tested within an

evidence based framework to explore the abilities of people with AD (Tantam & Girgis, 2009; Whipple, 2004).

AD Abilities

The DSM-IV TR and ICD-10 concur that those with AD can develop cognitive abilities without clinically significant delays (APA, 2000; WHO, 1993). Children with AD can perform equally to their peers on the Wechsler Intelligence Scale for Children (Attwood, 2007; Ghaziuddin, 2002; Tantam & Girgis, 2009). Further, Griswold, Barnhill, Myles, Hagiwara and Simpson (2002) reported that a 10-year-old child performed significantly better than aged matched peers in academic ability, problem solving and critical thinking. Volkmar, Klin, Schultz, Rubin and Bronen (2000, p. 262) use the term 'little professors' to describe children with AD who display astounding long-term memory performance. Generally, people with AD often display advanced cognition regarding visual-spatial skills, academic abilities, special interest areas (Ozonoff et al., 2002; Weber, 2008).

Reports of exceptional cognitive abilities are not uncommon amongst children with AD, especially regarding Special Interest Areas (SIAs) (Wing, 1981). School-aged children with AD can experience unlimited improvements in academic motivation, learning, communication, social skills, organisation and decision making and importantly anxiety, when engaged with a SIA (Winter-Messiers et al., 2007). Some adults with AD have even become well known for their knowledge regarding a SIA. Dr Temple Grandin is known for research, presenting and publications regarding her SIA of animal science (Frith, 2008; Ozonoff et al., 2002). Mr Kim Peek, the subject of the 1989 movie *Rain*

Man, exhibits his SIA for books by reading a book within one hour then reciting passages verbatim from memory (Frith, 2008). Mr Stephen Wiltshire displays his SIA for drawing scenery by reproducing highly accurate sketches of scenes such as St Peter's basilica after a briefly touring Rome by helicopter (Frith, 2008). Frith (2008) suggests that the cognitive abilities such as SIAs revealed by people with AD should be further explored and harnessed. Knowledge of these extraordinary cognitive abilities provides the impetus to uncover abilities of children with AD, potentially hidden by debilitating anxiety (White, et al., 2009).

It is known that human development can manifest in a myriad of different ways (Wing, 2005). Furthermore, it has been demonstrated that people with AD can exhibit exceptional abilities (Frith, 2008). Isaac Newton and Albert Einstein are prime examples of people retrospectively diagnosed with AD who have been instrumental in moving the world forward (Tantam & Girgis, 2009; Wing, 2005).

Equipped with an inquisitive approach created by Kanner in 1943 then Asperger in 1944, the question is asked: how can people with AD display such extraordinary cognitive abilities but not control debilitating anxiety. It therefore seems reasonable to assume that a treatment informed by a strong evidence-base may reduce anxiety for children with AD to uncover hidden cognitive abilities.

Music for anxiety reduction

Treatments targeted at reducing anxiety for children with AD are much needed (Morgan, 2006). Engaging in strengths such as cognitive abilities is the key to treatment for people with AD (Weber, 2008). As so eloquently stated by Ferdinand et al. (2004, p.

460): "... an ounce of prevention may be worth a pound of cure". Evidence-based research aimed at investigating a reduction in anxiety for those with AD has begun to appear (Kuusikko et al., 2008; Lange & Lainhart, 2009; Tsai, 2006). It is expected that reducing anxiety whilst exploring the resurgence of music augment the preliminary report published by Allen et al. (2009) regarding the effect of music. This study tests the hypothesis that music will reduce anxiety for a child with Asperger's Disorder.

Method

Design

A needs analysis and diagnostic review were conducted to determine the most needed area of research for people with AD. The needs analysis involved an internet search using the term *Autism Directory of Western Australia (WA)*, which yielded a directory of government and non-government AD organisations in WA via <http://www.autismawareness.com.au/directory/wa>. An analysis of the information provided by contacting the organisations within the directory revealed a need for research regarding school-aged children with AD living in rural areas. In addition, an analysis of the DSM-IV TR Diagnostic Criteria for AD was conducted to unearth significant deficiencies. The DSM-IV TR states "... individuals with Asperger's Disorder may experience heightened and debilitating anxiety ..." (APA, 2000, p. 83). As a result of the needs analysis and DSM-IV TR diagnostic criteria assessment, a need to design a treatment to reduce anxiety for school-aged children with AD living in rural areas of WA was confirmed.

The most appropriate stimulus for anxiety reduction was chosen as a result of

several factors. An audible stimulus of an uncomplicated, predictable and non-verbal nature has been suggested as most appropriate for people with AD (Allen, Hill, & Heaton, 2009). Therefore, the audible stimuli provided by music was chosen, performed by a single instrument to reduce complexity, a total of two compositions to ensure predictability and completely instrumental to eliminate verbal content. Rider (1985) provided the theoretical framework for music presentation by suggesting that music progressing from stimulating to sedate elicits more relaxation as a method of anxiety reduction than sedate music alone.

As a result of the needs analysis and stimulus requirements of people with AD, a mixed-methods revelatory single-case treatment was designed to reduce anxiety for child with AD. The intention of the treatment was to assess the effectiveness of music in reducing anxiety through an in-depth and scientifically rigorous investigation whilst limiting issues surrounding generalisation of single-case research.

To minimise the lack of generalisation associated with a single-case design, Data Source and Researcher Triangulation were included. Data Source Triangulation is the collection of data from multiple sources to build rigour (Liamputtong & Ezzy, 2005; Yin, 2003). The Daily Journal self-report, Spence Children's Anxiety Scale-Parent Report (SCAS-P) coupled with researcher journaling built such rigour. Researcher Triangulation is the use of multiple researchers within the study (Liamputtong & Ezzy, 2005). The researcher, the child's mother and external music expert David Helfgott were utilised to include this method of triangulation. The use of triangulation, combined with researcher journaling, inclusion of an external music rater, an innovative Daily Journal and diversity of data sources and measurement encouraged meaningful results.

The child with AD listened to music Monday, Tuesday, Wednesday, Thursday and Friday before school followed by completing the self-report Daily Journal after school for 20 consecutive days of a school term. In addition, the SCAS-P was completed by the child's mother based on weekly observations. Dependent variables included the Daily Journal quantitative Numerical Visual Analogue Anxiety Scale (NVAAS) scores, Daily Journal qualitative anxiety comments, Daily Journal drawings and SCAS-P quantitative anxiety scores. The collection of numerous dependent variables added rigour to the single-case treatment.

Music selected, performed and provided by external music rater David Helfgott acted as the independent variable. In order of presentation, *Souvenirs D'Andalousie* composed by Louis Moreau Gottschalk was followed by *Clair de lune* composed by Claude Debussy. Kearney (2005) reported that treatments for children with AD should accommodate for everyday life events. Therefore, the independent variable of music was tested whilst the child was exposed to naturally occurring school-based events to ascertain the most accurate assessment of treatment effect. To ensure sufficient naturalistic exposure for assessment, the participant was required to attend school for 20 consecutive days and report an equal number of anxiety ratings.

The researcher possessed considerable practical and academic knowledge regarding children and families with AD. This may have potentially biased the research development or aided the alliance built with the child and family during treatment. In addition, empirically validated treatments designed to treat anxiety for children with AD did not exist (White, et al., 2009), therefore the treatment model was not modified from existing treatment models.

Participants

The selection of participants was informed by an evidence-based approach. The child was selected for the following reasons. Kearney (2005) reported a significant need to reduce anxiety for children with AD living with families in rural areas. As detailed in the opening vignette, the child lived with her mother, father and younger sister in rural WA. Family members are often highly motivated to assist a child recently diagnosed with AD (Ozonoff et al., 2002). As described in the opening vignette, the child was first diagnosed with AD at age 8 and was aged 10 during the treatment. Therefore, it is suggested that the family may have retained this motivation to assist. Importantly, the child fulfilled the inclusion criteria by not partaking in additional treatment for anxiety prior to or during the treatment.

Treatments designed to reduce anxiety for people with AD should involve family members (Barnhill, 2007). Therefore, the child's mother was engaged to ensure that the treatment was followed within the family home. The child's mother participated via completion of the SCAS-P, presenting documentation confirming diagnosis of AD, retaining all research materials for the duration of the treatment and enabling the researcher to access the family home. To minimise potential bias regarding the mother's influence, written consent was obtained from the mother prior to the commencement of treatment.

Treatments designed to reduce anxiety for people with AD should include health professionals (Barnhill, 2007). Therefore, the child's clinical psychologist was included to identify the child and provide family contact details. Prior to the research, a professional

alliance had been previously established between the researcher and clinical psychologist. To minimise sample bias, the clinical psychologist was required to provide written consent to confirm confidentiality, no commencement of new therapy initiatives for the duration of the treatment and that the study would not be discussed with the family (See Appendix G).

Previous research has not included the use of an expert musician to rate, perform and provide music for treatment designed to reduce anxiety for children with AD. Therefore, solo concert pianist, David Helfgott rated music based on Rider's (1985) theoretical framework. As reported in *The Story of David Helfgott* (Anonymous, n.d.), Helfgott was born in Melbourne, Australia in 1947. After studying in music in Australia, Helfgott travelled to the UK to study and perform at the Royal College of Music in London where he experienced a psychologically unstable period. After returning to Australia and recovering, Helfgott's piano ability has resulted in sold out concerts within Australia, USA, Germany, Denmark, Asia, Africa, Japan, New Zealand, Austria, Vienna, Spain, Norway, Zurich, South Africa, Italy and most recently Denmark, Luzern, Israel, Jerusalem and Tel Aviv. Helfgott's life inspired the Oscar Award winning movie *Shine* released in 1996. In 2004, Helfgott was awarded an Honorary Doctorate in Music from Edith Cowan University, Perth Western Australia. Subsequently, in 2006, David Helfgott was inducted into The Australian Walk of Fame and described as a "... remarkable technical and interpretive genius ...". The inclusion of David Helfgott as the music rater added considerable triangulation and rigor to the treatment.

Treatments intended to reduce anxiety should provide continuance to prevent anxiety relapse (Lange & Lainhart, 2009). Therefore, at the completion of the treatment

and with permission granted by David Helfgott, the family were gifted the music CDs along with four additional CDs containing music chosen by the child. All participants were volunteers and aware that they may withdraw at any time without penalty.

Materials

Music

Three identical music CDs were provided for the treatment containing *Souvenirs D'Andalousie* composed by Louis Moreau Gottschalk of duration 3 minutes and 44 seconds (Jackson, 1973, p. 100-109) was followed by *Clair de lune* composed by Claude Debussy of duration 4 minutes and 42 seconds (Webster, 1974, p. 25-30). Both musical performances were composed during the Romantic Era, which added to internal validity of the treatment (Nantais & Schellenberg, 1999). Three CDs were provided to ensure treatment continuance in the case of CD malfunction. Transition time between recordings was limited to elicit maximum effect. The music was played at the optimum research volume of 63 decibels (dB) as indicated by the liquid crystal display of the Sony CD Radio Cassette player model number CFD-S350 (Lepist et al., 2006). The use of CD was selected based on the knowledge that many families have access to CD players, people with AD often use electronic devices to regulate stimulation and it would yield ease of future replication (Attwood, 2006a). Lastly, music was selected as the most age appropriate stimulus due to the absence of a learning component.

Daily journal

Children's self-reports are beneficial within research (Grace Baron et al., 2006). Therefore, a Daily Journal was designed to enable the child to self-report both

quantitative and qualitative data regarding anxiety (See Appendix A). Each of the 20 identical pages contained in the A4 sized and ring bound Daily Journal included instructions, five anxiety questions each containing a quantitative NVAAS and a space for written qualitative anxiety expression, the date and a thank you message for the child. The five daily anxiety questions were selected from *Exploring Feelings: Cognitive Behaviour Therapy to Manage Anxiety* and deemed to represent school-based anxiety (Attwood, 2004, pp. 33-34).

The NVAAS enabled the child to self-report anxiety during the treatment (Elkins, Staniunas, Hasan Rajab, Marcus & Snyder, 2004). The NVAAS for each of the five questions located in the Daily Journal was adapted from Elkins et al. (2004, p. 239) and included a 100mm horizontal line with parameters of 'a little anxious' (1) at one end and 'panic' (10) at the other. The space provided for qualitative expression located beneath each NVAAS for each question was designed to elicit unique, succinct and focussed quantitative and qualitative anxiety data.

The front and rear covers of the Daily Journal consisted of A4 sized white card covered by a clear plastic outer cover. The white card was provided both to include the child actively in the research and collect drawings for analysis. The date was entered on each page prior to the commencement of treatment to ensure accurate data recording.

Instruction sheet

The A4 sized instruction sheet contained instructions: "*Focus, relax and enjoy the music*" which were verbalised by the child's mother each morning before school (See Appendix B). The theoretical framework for this instruction was provided by the

Cognitive-Behavioural Model of Relaxation framework (Smith, 1988). The instruction sheet was laminated for durability and magnets provided to enable it to be affixed to the kitchen fridge. In addition, the instruction sheet contained the contact details of the researcher to maintain a strong alliance between family and treatment provider.

SCAS-P

In 2007, Barnhill suggested that family members should be involved in treatments to reduce anxiety for people with AD. Furthermore, gathering data from multiple sources has been recommended to increase validity of results in single-case treatments (Liamputtong & Ezzy, 2005; Yin, 2003). Therefore, the SCAS-P was selected as the measurement of choice to augment the daily journal and by providing observational data regarding the child's anxiety.

The SCAS-P utilises 38 items and one open ended question to record parent observed anxiety in children (Whiteside & Brown, 2008). Producing total weekly anxiety score plus six sub-scales, the SCAS-P has been reported to be a reliable and valid method of assessing treatment success (Nauta et al., 2004; Spence, 1999). Reliability co-efficients ranging from 0.83 to 0.92 indicate acceptable internal validity and an overall alpha coefficient reliability of 0.93 are classified as excellent (Nauta et al., 2004). Five A4 sized identical copies of the SCAS-P were bound within an A4 sized booklet.

The computer package Statistical Package for Social Sciences (SPSS) PAWS Statistics 18 for windows was used to analyse the quantitative data from the Daily Journal and SCAS-P. In addition, Microsoft Office Excel 2007 and Open Office Draw 2010 were used to generate figures and tables.

Procedure

Ethics approval was granted by the Human Research Ethics Committee of Edith Cowan University, Western Australia. All electronic and hard copy information relating to the research was stored in a locked cabinet and a password protected personal computer. To ensure reflective research practice, a researcher journal was active for the duration of planning, implementing and analysis.

Upon ethical approval, a letter was sent to David Helfgott inquiring if he would rate, perform and provide music progressing from stimulating to sedate (See Appendix C). Subsequently, Helfgott provided a CD containing *Souvenirs D'Andalousie* composed by Louis Moreau Gottschalk rated as stimulating and *Clair de lune* composed by Claude Debussy rated as sedate. The researcher produced three copies of this for the treatment.

The child's clinical psychologist was then contacted via email and asked to provide the contact details for the family. The family were contacted via telephone, verbal acceptance of participation obtained and a time scheduled for an initial home visit.

Research including active participation often results in greater cooperation and more favourable outcomes (Chu, et al., 2004; Beidel & Turner, 2005; Grace Baron et al., 2006). Therefore, as seen in Stage 1 of Figure 1, the researcher attended the family home to meet with, deliver the Daily Journal and ask the child to draw pictures of her choice on the front and rear covers. At the conclusion of Stage 1, the researcher scheduled a time and date to attend the family home and commence treatment.

During Stage 2 as seen in Figure 1, the researcher visited the family home to obtain written consent, deliver the treatment materials and explain the treatment. To

ensure that the family were aware of the treatment requirements, the information letter, child consent form and parent consent form were read aloud to the intended recipients. Upon presentation of the information letter and confirmation of child and parent consent, the researcher securely stored the signed consent forms and answered questions regarding the treatment. To confirm the child's inclusion in the study, the mother then provided documentation confirming the child's diagnosis of AD. The SCAS-P, three copies of the music CD, instruction sheet and four magnets to affix the instruction sheet to the kitchen fridge were then delivered. The mother was then asked to complete the first SCAS-P report whilst the child, accompanied by the researcher completed the first page of the Daily Journal. Completing these baseline measures whilst in the presence of the researcher improved the data validity, accuracy of reporting and reduced the likelihood of the Hawthorne Effect (Chiesa & Hobbs, 2008). At the conclusion of Stage 2, the researcher ensured that the information provided during the visit was completely comprehended. The researcher then scheduled a time and dates to collect the data and materials and assured the family that they may make contact at any stage of treatment. To complete Stage 2, the researcher met with the child's clinical psychologist and obtained signed consent (See Appendix G).

Child participation within treatment facilitates cooperation and leads to more successful outcomes (Chu, et al., 2004; Beidel & Turner, 2005; Grace Baron et al., 2006). As seen in Stage 3 seen in Figure 1, for 19 consecutive school mornings, the mother provided the child with the music CD. The mother then observed the child activating and listening to the music at 63 dB whilst consuming her breakfast. The child was enabled to consume her breakfast during the treatment in order to accommodate for everyday

routines of children with AD (Kearney, 2005). Once the music on the CD had concluded, the child completed her breakfast then returned the CD to her mother. The child's mother presented the music exclusively for during treatment to avoid desensitisation.

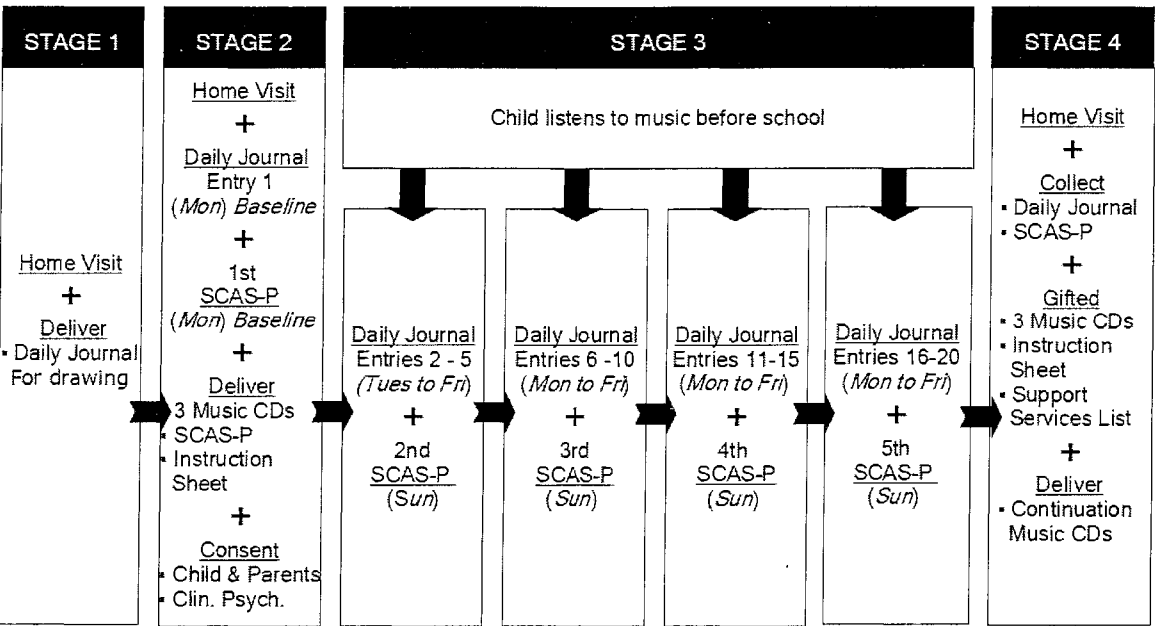


Figure 1. Treatment model.

Immediately when the child returned home from school, her mother presented the Daily Journal. In an environment of her choice, the child completed the Daily Journal entry and returned it to her mother. To complete the data collection procedure, once each week the child's mother completed the SCAS-P.

During Stage 4 as seen in Figure 1, when the treatment was complete, the researcher attended the family home to collect the Daily Journal and SCAS-P booklet and gift the family the three music CDs, instruction sheet and a list of family support services (Appendix H). Lange & Lainhart (2009) reported that treatments should provide continuance to prevent anxiety relapse. Therefore, the researcher created and gifted an additional four CDs with music chosen by the child. The music most frequently chosen

by the child was *Clair de lune* as composed by Claude Debussy performed by David Helfgott.

During research production, the researcher sent an email to the mother requesting family information for the purpose of presenting an opening vignette. Once provided, the researcher grammatically edited the contents of the vignette and returned it to the mother for member checking. The mother then returned the vignette to the researcher and the contents were presented in this paper. Member checking improved validity of results and accuracy of reporting (Liamputtong & Ezzy, 2005). In the interests of maintaining participant anonymity, the child's actual name was replaced with the fictional name of Emma.

Results

Analyses of Daily Journal and SCAS-P quantitative data and Daily Journal qualitative data were performed to test the hypothesis that music reduces anxiety for Emma, a child with AD. In addition, analyses of Daily Journal drawings and music selection were performed to produce meaningful results regarding cognitive capacity and music preference.

Four distinct phases appeared as a result of analyses of Daily Journal and SCAS-P quantitative data measured over 20 consecutive school days. These phases have been operationally defined and utilised for accurate assessment and recording of treatment effect. Baseline represents Emma's anxiety during Stage 2 as seen in Figure 1, whilst mother and child were under researcher tuition (Day 1). Despite this single day measurement not being substantial enough to warrant comparison, Baseline was measured to ensure that both Emma and her mother were able to accurately record

anxiety using the Daily Journal and SCAS-P. Before Event Anxiety (BEA) indicates Emma's anxiety during treatment without reported anxiety events at school (Days 2 to 10). School Event Anxiety (SEA) recorded Emma's anxiety regarding the occurrence of a school event, expressed via the following Daily Journal entry (Day 11):

"I didn't know I wasn't going to be in my Single [sic] desk. I felt angry and frustrated."

After Event Anxiety (AEA) recorded Emma's anxiety for the remainder of the treatment (Days 12 to 20). Anxiety events occurring on Days 15, 17 and 19 were expressed by the following Daily Journal entries:

"I was anxious in the Playground [sic] because I could not catch anyone in chasey [sic]." (Day 15).

"Today I felt really anxious because my teacher was changed with no warning. I thort [sic] my teacher was going to be mrs [sic] X but it was changed." (Day 17).

"today [sic] I was playing a game called "down by the banks" and then I got out an [sic] I kicked one of my friends and Said [sic] a bad word . . . and I got detention at Recess [sic] and lunch." (Day 19).

Emma's NVAAS quantitative responses to the 5 Daily Journal questions were summed, then averaged to ascertain the effect of the treatment. As seen in Figure 2, Emma's mean Daily Journal NVAAS daily anxiety progressed from high during BEA ($M = 22.55$), increased noticeably during SEA as a result of the anxiety event on Day 11 ($M = 39$) then reduced distinctly during AEA ($M = 8.11$) despite anxiety events on Days 15, 17 and 19. A within-subjects t -test revealed a significant difference between the BEA and AEA phases, $t(8) = 10.58, p < .05$, confirming support for the hypothesis.

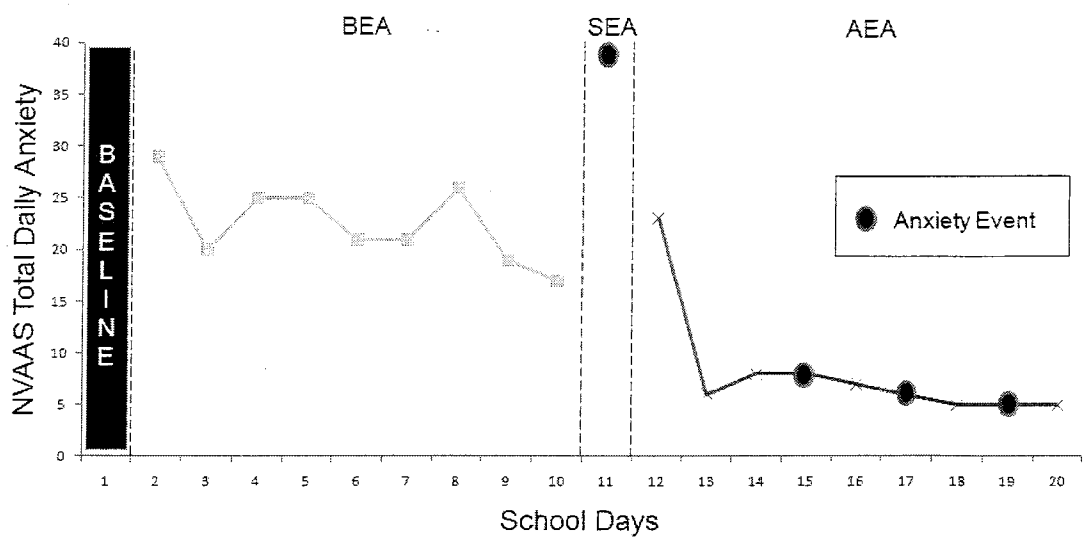


Figure 2. Total daily Numerical Visual Analogue Anxiety Scale (NVAAS) anxiety scores for Before Event Anxiety (BEA), School Event Anxiety (SEA) and After Event Anxiety (AEA) with anxiety events.

To examine Emma’s anxiety as observed by her mother, SCAS-P ratings were compared across BEA, SEA and AEA. As seen in Figure 3, Emma’s SCAS-P scores show minimal variation, not indicating support for the hypothesis. A within-subjects *t*-test confirmed a non-significant difference between BEA and AEA, $t(8) = 10.58, p > .05$. However, assuming that the anxiety event reported by Emma in the Daily Journal on Day 11 created anxiety, the non-significant SCAS-P scores reveal support for the hypothesis due to no significant increase in anxiety observed by her mother during the SEA phase.

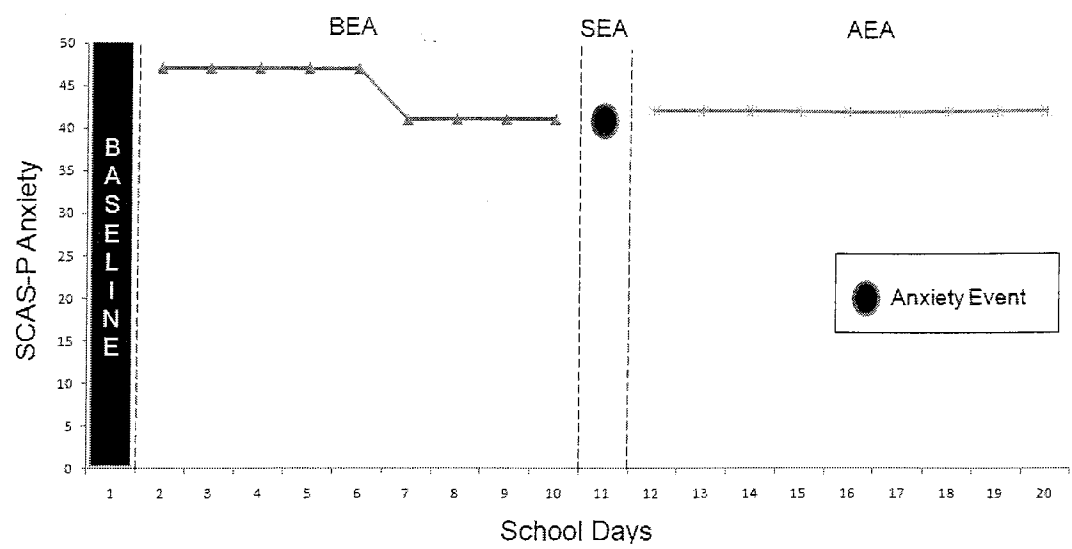


Figure 3. Spence Child Anxiety Scale-Parent Report (SCAS-P) anxiety across Before Event Anxiety (BEA), School Event Anxiety (SEA) and After Event Anxiety (AEA) with Daily Journal anxiety event on Day 11.

To further explore the non-significant SCAS-P within-subjects *t*-test result, an analysis of Emma’s Daily Journal qualitative data was performed to consult the written expressions of anxiety and assess support for the hypothesis. A four-step thematic qualitative analysis was performed by process of data interrogation, coding, grouping data categorically then identifying main themes (Green et al., 2007). BEA revealed a main theme of *really, very very anxious*[sic]; SEA yielded the main theme of *really anxious and upset* and AEA identified the theme of *not feeling anxious at all*. Assessed chronologically over the course of the treatment, the four-step thematic analysis confirmed support for the hypothesis and the assumption that the school event on Day 11 during SEA did increase Emma’s anxiety.

An analysis of drawings from the front and rear covers of the Daily Journal was undertaken to assess Emma’s cognitive ability. As seen in Figure 4, Emma recorded

freehand drawings of her two pet birds displaying noticeable cognitive ability to reproduce images with detail, colour, proportion and orientation. Closer inspection of the front cover revealed the presence of musical notes which represented a cognitive awareness of the use of music within the treatment. The analysis of drawings revealed Emma's considerable perceptual and motor cognitive resources.



Figure 5. Drawings from the front and rear cover of the Daily Journal.

David Helfgott provided *Souvenirs D'Andalousie* rated as stimulating and *Clair de lune* composed by Claude Debussy rated as sedate for the research based on Riders (1985) theory that music progressing from stimulating to sedate elicits more relaxation as a method of anxiety reduction than sedate music alone. An analysis of the researcher journal revealed Emma's comments: "I didn't like it a lot ... it made me a little anxious" in relation to *Souvenirs D'Andalousie* and "It was so lovely I felt like falling asleep!" regarding *Clair de lune*. These comments dispute Rider's theory and suggest that

Emma and David Helfgott share musical rating preference.

Discussion

Empirically validated treatments designed to reduce anxiety for children with AD were previously nonexistent (White, et al., 2009). Of concern, the development of primary school-aged females with AD is affected by severe anxiety (Church, Alisanski, & Amanullah, 2000; Simone, 2009). To bring empirically valid treatments into existence and return development to a normative trajectory, music rated, performed and provided by concert pianist David Helfgott was administered to a 10 year and 11 month old female with AD each morning before school. It was hypothesised that listening to this music would reduce anxiety.

A reduction in mean anxiety and a statistically significant within-subjects *t*-test analysis of NVAAS daily anxiety scores revealed support for the hypothesis. A non-significant within-subjects *t*-test result regarding SCAS-P ratings accounting for a school-based anxiety event further affirmed support for the hypothesis. Furthermore, a chronological four-step thematic analysis of qualitative data from the Daily Journal completed support for the hypothesis. In addition, an analysis of the drawings recorded on the front and rear of the Daily Journal revealed the presence of considerable cognitive resources. Lastly, a qualitative analysis of the researcher journal revealed both a child and external music expert anxiety reducing preference for the *Clair de lune* composed by Claude Debussy performed by David Helfgott. These results are discussed and future research suggested.

It is suggested that the statistically significant quantitative analysis of NVAAS

daily anxiety scores was the product of identifying and implementing evidence-based treatment elements. Firstly, music performed by a single instrument, with limited complexity and highly predictability in nature was chosen as the independent variable (Allen, Hill, & Heaton, 2009). Secondly, the motivation of Emma's family was utilised to develop a strong alliance, the treatment was designed to be delivered in the family home and relevant information provided to ensure effectiveness in the physical absence of the researcher (Brandes, 2009; Coombs & Smith, 2003; Kearney, 2005; Ozonoff et al., 2002). Lastly, Finally, the innovative self-report Daily Journal and scientifically validated parent-report SCAS-P were included to diversify measurement and strengthen the single-case design (Attwood, 2006b; Kearney, 2005).

The application of these evidence-based treatment elements ensured that the research was designed on the most current knowledge regarding anxiety amongst children with AD. It is important to note that the research was formulated, directed, monitored and analysed by the author whom has considerable experience relating to families and individuals with AD. This may have further maximised the application of the evidence-based treatment elements.

People with AD show preference for aloneness and introspective thought (Asperger, 1944; Attwood, 2006b; Brandes, 2009; Kuusikko, et al., 2008). Therefore, it is suggested that support for the hypothesis resulting from quantitative VNAAS scores compared to the non-significant quantitative SCAS-P finding may be a product of the measurement requirements. The Daily Journal enabled Emma to self-report her anxiety in isolation whilst engaging in introspective thought regarding anxiety expressed through written expression. In contrast, the parent-reported SCAS-P involved Emma's mother

rating her daughter's anxiety without consultation with Emma. Regardless of the reported suitable validity and reliability of the SCAS-P, this measure did not yield an accurate assessment of Emma's anxiety. It is suggested that a method for future research to explore the differences between anxiety measurements would be to convert the Daily Journal and SCAS-P scores to standard scores.

Furthermore, a considerable difference was identified between the self-report Daily Journal and parent-report SCAS-P quantitative data in relation to the SEA Day 11. On Day 11 of the treatment, the VNAAS recorded a noticeable increase in anxiety whilst the SCAS-P did not. Confirmation of the anxiety produced on Day 11 was confirmed by qualitative reports from the Daily Journal. This result further suggests that the Daily Journal assessed Emma's anxiety with more accuracy than the SCAS-P.

Of interest, the analysis of Emma's comments recorded in the researcher journal which revealed a preference for the sedate rated *Clair de lune* further strengthens effectiveness of the Daily Journal. In translation Emma suggested that listening to exclusively sedate music elicited more anxiety reduction than music progressing from stimulating to sedate as reported by Rider (1985). It is suggested that this result is an example of music enabling the child with AD to indulge in isolation and introspective thought. Furthermore, both Emma and David Helfgott rated *Clair de lune* as sedate. Further investigations into the similarities in music rating between musicians and children post exposure to various types of music. Furthermore, the identification of underlying musical factors or correlations may lead to the unearthing of music with a high scientific probability to reduce childhood anxiety. In addition, music such as *Clair de lune* may be structurally assessed for rhythm, pitch, tempo, dynamics, timbre, density

and progression to potentially reveal an anxiety reducing musical formula.

It had been suggested that cognitive abilities of people with AD should be explored and harnessed (Frith, 2008). The analysis of drawings from the Daily Journal revealed Emma's considerable perceptual and motor cognitive ability. The analysis of drawings has been scientifically validated and deemed appropriate for children aged between 8 and 12 due to familiarity with drawing implements. Interestingly, the Daily Journal drawings were recorded prior to the commencement of the treatment. It is suggested that this display of cognitive ability was the result of requesting Emma to engage in an area of interest.

It has been reported that children of school-age can reduce anxiety when engaged cognitively with an area of interest (Winter-Messiers et al., 2007). As a result of the cognitive capacity displayed in the drawing analysis, it is suggested that future research may chronological record and assess drawings to represent anxiety as opposed to scales and instruments which may be difficult for young children to comprehend. Such research may reveal extraordinary cognitive abilities akin to those displayed by Dr Temple Grandin, Mr Kim Peek and Mr Stephen Wiltshire (Frith, 2008; Ozonoff et al., 2002).

Daily journals are an effective way of gathering information regarding anxiety amongst children with AD (Attwood, 2006b). The Daily Journal created for the present treatment recorded a statistically significant reduction in anxiety via NVAAS scores, a qualitative reduction in anxiety via the four step thematic analysis and a display of cognitive abilities via the drawing analysis.

It is acknowledged that these results may have held greater scientific validity if

the Daily Journal had been replicated and assessed for reliability and validity. Results obtained post replication of the Daily Journal may yield results with greater scientific and practical application.

Results from the present treatment may have held greater validity via the inclusion of an established anxiety measure such as the Multidimensional Anxiety Scale for Children (MASC) (March, Parker, Sullivan, Stallings, & Conners, 1997). A self-report anxiety assessment for in children and adolescents, the quantitative MASC has achieved excellent test-retest and internal reliabilities (March et al., 1997). Including 39-items, the MASC assesses physical symptomology, harm avoidance, social anxiety, separation anxiety and panic. The limited budget associated with the present research coupled with the desire to collect both qualitative and quantitative data resulted in the creation of the Daily Journal over the use of the MASC.

It is acknowledged that the single-case design involving one female with AD limits generalisation capacity. However, various mechanisms were embedded within the treatment to limit this effect. The single-case design was employed to minimise harm and obtain data rich in meaning and application. In addition, various methods of triangulation were used to increase validity of results. Qualitative and quantitative data was collected on numerous occasions, drawings and researcher journal entries were assessed, David Helfgott was included as an external music expert, member checking of the opening vignette ensured accurate reporting and self-report and parent-report measures were included for a comprehensive assessment of anxiety. A female was purposefully chosen to strengthen the revelatory nature of the design and supplement the limited body of knowledge regarding females with AD in rural areas.

It is suggested that the present results may have held greater generalisation once replicated. To augment this replication, it is suggested that the present treatment be tested on children with and without AD to assess the effect of music in isolation.

One of the most potent scientific threats to the validity of treatment results in the present study was the potential for Emma to report a reduction in anxiety due to knowledge of the desired treatment outcome, known as the Hawthorne Effect (Chiesa & Hobbs, 2008). To limit the possibility of the Hawthorne Effect, Emma and her family were informed of the importance of accurate reporting and baseline Daily Journal and SCAS-P were taken under researcher instruction.

Regardless of the media and public popularity of the Mozart Effect, claims of cognitive benefits reported by Rauscher, Shaw and Ky in 1993 failed to be replicated. This has resulted in much scientific criticism regarding the effectiveness and validity of music within research (Nantais & Schellenberg, 1999). However, within a rigorous scientific design, music has the capability to be effective (Brandes, 2009). The quantitative and qualitative reduction in anxiety reported by the present single-case treatment suggests that music can effectively reduce anxiety for children with AD. It is intended that the findings of the present research be used for replication and to argue for the resurgence of music as a legitimate scientific independent variable.

Mixed-methods revelatory single-case designs minimise risk of harm for children and families (Lange & Lainhart, 2009). Research designed from an evidence-based perspective can provide information, treatment and services for females with AD and their families (Simone, 2009). Treatments formulated to reduce anxiety for children with AD have the potential to improve the lives of children with AD, families, researchers and

practitioners (Morgan, 2006). It is suggested that the present research fulfils these criteria.

In essence, Emma undertook a treatment requiring her to listen to music and attend school with the usual prospect of experiencing anxiety producing events. It was suspected that if Emma did encounter these school-based anxiety events during the treatment period, the most accurate assessment of the treatment would be unveiled. Ultimately, Emma's anxiety did reduce; however, the true impact of the treatment and use of music cannot be determined until the design is replicated amongst a sample large enough to stand up to statistical scrutiny.

As a result of the needs analysis, formation of hypothesis, use of music, scientific triangulation and encouraging results, the scene has been set for future investigations to replicate the use of music to reduce anxiety for children with AD. The genuine impact of the present treatment is best defined by a chronological juxtaposition between remarks made by Emma's mother. As reported in the opening vignette, before the treatment commenced, Emma's mother exclaimed: "*Emma gets so anxious; she and our family simply cannot function*". At the conclusion of the treatment as recorded in the researcher journal, Emma's mother announced: "*Emma is a changed girl! We feel like we have our daughter back*".

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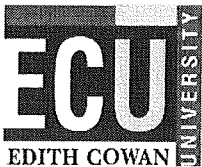
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Hi CHILD'S NAME! On a scale from **1** (*a little anxious*) to **10** (*panic*), please **mark** each line then **write** underneath how anxious you felt at school today about:

a) Going to School?

1 ●—————● 10

b) The playground?

1 ●—————● 10

c) Looking stupid?

1 ●—————● 10

d) What other people think of you?

1 ●—————● 10

e) Being teased at school?

1 ●—————● 10

Date:

Thank you CHILD'S NAME



Dear the CHILD'S NAME family,

Here are some important instructions to remember!

- 1) PARENT'S NAME, in the mornings on school days please repeat this phrase when you give CHILD'S NAME the CD:

"Focus, relax and enjoy the music."

- 2) CHILD'S PARENT, on school days, keeps the Daily Journal, music CD and SCAS-P booklet in a safe place.

Stick this on your fridge and enjoy the Music!

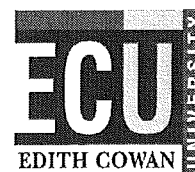
Jeremy Marriott

  or  j.marriott@ecu.edu.au

(If you would like to call the mobile and not leave a message, I will call you back as soon as possible)

Asperger's Disorder: A Musical Treatment for Child Anxiety

Appendix C: Letter to David Helfgott



Dear David Helfgott,

My name is Jeremy Marriott and I am an Honours student in Psychology at Edith Cowan University. I am investigating anxiety reduction for a child with Aspergers Disorder (AD) and their parent. The Human Research Ethics Committee has approved this study.

As a part of this study, a 10 year old child with AD will listen to music each morning before school in an effort to reduce anxiety. To ensure that the child is presented with the most appropriate music, I am required to locate music performed by a single instrument that progresses from stimulating to sedate. I would be honoured if you would rate, perform and provide music that you feel meets this criterion and allow me to use it in my study. If you would like to be involved in the research, please send me a copy of the music you perceive as appropriate.

Please know that at the conclusion of the treatment, I intend to gift the child the music rated, performed and provided by you for this research. This gift will provide not only an incentive, but a method for the child to continue to potentially control anxiety.

Please know that your participation in this study is voluntary. If you would like to discuss any aspect of this study with an independent person who is not related to this study, please contact the *Research Ethics Officer* on (08) 6304 2170.

Thank you

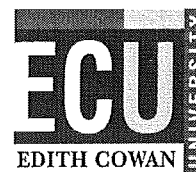
Jeremy Marriott

Principal Researcher:

Edith Cowan University

Mobile: [REDACTED] (if you would like to call the mobile and not leave a message, I will call you back as soon as possible) or Email: j.marriott@ecu.edu.au

Asperger's Disorder: A Musical Treatment for Child Anxiety



Appendix D: Information Letter

Dear Parent,

My name is Jeremy Marriott and I am an Honours student in Psychology at Edith Cowan University. I am investigating anxiety reduction for children with Aspergers Disorder. The Human Research Ethics Committee has approved this study.

As a part of this study, your child will listen to 2 pieces of musical compositions each morning before school. At the end of the school day your child will complete a Daily Journal regarding anxiety. Once each week, you will be required to rate your child's anxiety. I will attend your home three times over a five week period to provide information and materials about the study. If your child is currently undergoing any anxiety reducing treatment, I ask that these treatments continue and are not increased or decreased between the dates 06/06/2010 to 04/07/2010. At the conclusion of the research, I will gift you the compact disk used in the research and provide further music selected by your child. Information identifying you will be destroyed post analysis.

Please be assured that information collected will be held in strict confidence and stored only at Edith Cowan University and my personal data storage device. Please also know that your child's psychologist has signed and agreed to hold your identity and details of the study in equal confidence. Reports and distributed information will not contain any indications as to you or your child's identity. A final report will be made available to you and your family.

Please know that your participation is voluntary. You can withdraw at any stage without penalty. Should participation cause distress, information detailing services will be made available. Please contact my supervisor Dr Bronwyn Harman or myself should you have any questions regarding the content of this letter. If you would like to discuss any aspect of this study with an independent person who is not related to this study, please contact the *Research Ethics Officer* on (08) 6304 2170.

Thank you

Jeremy Marriott

Principal Researcher:

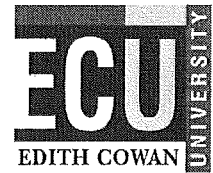
Edith Cowan University

Mobile: [REDACTED] (if you would like to call the mobile and not leave a message, I will call you back as soon as possible) or Email: j.marriott@ecu.edu.au

If you require further information please contact Dr Bronwyn Harman (6304 5021) at the School of Psychology, Edith Cowan University. If you wish to contact someone independent of the study with any question or concern please call the Research Ethics Officer on (08) 6304 2170.

Asperger's Disorder: A Musical Treatment for Child Anxiety

Appendix E: Child Consent Form



I _____ agree to take part in the research

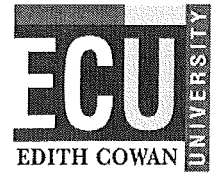
by Jeremy Marriott of Edith Cowan University. I give written consent that:

- ❖ I have read the Information Letter, asked questions and am satisfied with the answers.
- ❖ I have seen that Jeremy Marriott has a current National Police Certificate and Working with Children Card.
- ❖ I understand that my name and information provided will remain confidential between myself and the experimenter and will not be revealed without my written consent.
- ❖ I am aware that I will have to listen to music on my CD player and write in a Daily Journal that I have decorated myself each school day for four weeks. I understand that my parent will provide the CD and Daily Journal for me and keep them safe.
- ❖ I am aware that all information will be held safely by ECU and Jeremy Marriott.
- ❖ I am aware that a university paper about this study that does not mention me or my family's name will be written. I understand that this paper will be given to the university and maybe other places for people to read.
- ❖ I give consent for Jeremy Marriott and my parent to record information about me.
- ❖ I understand that I am a volunteer in this study and can stop at any time without getting into trouble from anyone.
- ❖ I acknowledge that I can have a copy of what Jeremy Marriott writes if I like.

If you require further information please contact Dr Bronwyn Harman (6304 5021) at the School of Psychology, Edith Cowan University. If you wish to contact someone independent of the study with any question or concerns please call the Research Ethics Officer on (08) 6304 2170.

Asperger's Disorder: A Musical Treatment for Child Anxiety

Appendix F: Parent Consent Form



I _____ agree to participate in the research

regarding anxiety for children with Aspergers Disorder by Jeremy Marriott of

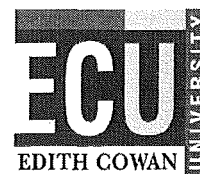
Edith Cowan University. I give written consent that:

- ❖ I have read the Information Letter, asked questions and am satisfied with the answers.
- ❖ I understand that the researcher has a current national Police Certificate and Working with Children Card.
- ❖ I understand that my contribution will remain confidential between myself and the experimenter and will not be revealed without my written consent.
- ❖ I understand the importance of my child not deviating from any regular anxiety or other treatment between 06/06/2010 to 04/07/2010.
- ❖ I am aware that I will be required to assist the my child to decorate the Daily Journal, present the CD and Daily Journal to my child on treatment days, complete the Spence Children's Anxiety Scale Parent Report (SCAS-P) on five occasions, produce documents stating that my child has Aspergers Disorder and keep the SCAS-P booklet along with the Daily Journal to be collected by the Jeremy Marriott at the conclusion.
- ❖ I am aware that information will be held securely by ECU for at least 5 years.
- ❖ I acknowledge that the report generated will maintain my confidentiality and be distributed to my home university, academic journals and other appropriate venues.
- ❖ I give consent for the experimenter to record information and understand that participation is voluntarily and can be withdrawn at any time without penalty.
- ❖ I understand that I will be required to operate a Compact Disk Player.
- ❖ I acknowledge that I can request a copy this form upon request.

If you require further information please contact Dr Bronwyn Harman (6304 5021) at the School of Psychology, Edith Cowan University. If you wish to contact someone independent of the study with any question or concerns please call the Research Ethics Officer on (08) 6304 2170.

Asperger's Disorder: A Musical Treatment for Child Anxiety

Appendix G: Clinical Psychologist Consent Form



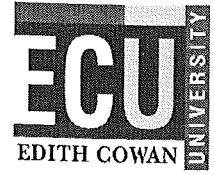
I _____ agree to participate in the research regarding anxiety for a child with Aspergers Disorder by Jeremy Marriott of Edith Cowan University. I give written consent that:

- ❖ I confirm that I will not discuss the research with the participants for the duration of the trial.
- ❖ I understand the importance of the child not deviating from any treatment provided by myself between 06/06/2010 to 04/07/2010.
- ❖ I understand that the researcher has a current national Police Certificate and Working with Children Check Card.
- ❖ I understand that any contact with the experimenter will remain confidential.
- ❖ I acknowledge that the report generated will maintain my anonymity and be distributed to ECU, academic journals and other appropriate venues.
- ❖ I give permission for the experimenter to possess contact information provided by me pertaining to the name, address and telephone details of my client.
- ❖ I understand that I participate voluntarily and can withdraw consent and involvement at any time incurring no penalty.
- ❖ I acknowledge that I can request a copy this form upon request.

If you require further information please contact Dr Bronwyn Harman (6304 5021) at the School of Psychology, Edith Cowan University. If you wish to contact someone independent of the study with any question or concerns please call the Research Ethics Officer on (08) 6304 2170.

Asperger's Disorder: A Musical Treatment for Child Anxiety

Appendix H: Support Services



Please find below details of resources that may assist further. If you would like any further information regarding the personal appropriateness of the services provided, please contact me by email.

Yours Sincerely,

Jeremy Marriott

Mobile: [REDACTED] (if you would like to call the mobile and not leave a message, I will call you back as soon as possible) or Email: j.marriott@ecu.edu.au

► Dr Felicity Adams: Clinical Psychologist: (08) 9751 2348 or

felicityadams@bigpond.com

► Crisis Care—Ph: (08) 9223 1111 (24-hour crisis line)

► Family helpline - Ph: (08) 9223 1100 (24 hour counselling and assistance)
