



Title Registration for a Systematic Review: Interventions for Anxiety in School-aged Children with Autism Spectrum Disorder (ASD): A Systematic Review

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TITLE OF THE REVIEW

Interventions for Anxiety in School-aged Children with Autism Spectrum Disorder (ASD): A Systematic Review

BACKGROUND

Autism spectrum disorders (ASD) are a group of neurodevelopmental disorders. Children with ASD typically have difficulty with communication and social interaction, and may be overly dependent on routines, place extreme foci on items, and/or extremely dislike changes to their environment. These symptoms appear on a continuum, with some children experiencing only mild symptoms, while others experience quite severe symptomatology.

The number of children diagnosed with ASD has increased over time. While the current rate of prevalence in the United States (US) is the same as the rate reported in 2012 (1 in 68 children), it is a significant jump from the 1 in 88 children reported in 2008; and the 1 in 150 children reported in 2002 (Autism Speaks, 2016; Centers for Disease control and Prevention, 2016). This growth in prevalence has also been seen in other countries. For example, the Survey of Disability, Ageing and Carers (SDAC) conducted by the Australian Bureau of Statistics (ABS) shows that in 2009, about 64,400 people had been diagnosed with ASD, and in 2012, this had increased to 115,400 (ABS, 2016). More recent population-level data has been collected by the ABS (see ABS, 2016), however it is currently not publicly available. Where possible, up-to-date prevalence rates will be included in our review. In addition, to increasing numbers, recent research shows that the number of students with ASD attending mainstream schools is also increasing (Zainal & Magiati, 2016). The exact reason for the increase in prevalence is unclear, but may be related to changes in the Diagnostic and Statistical Manual of Mental Disorders (DSM).¹

ASD often co-occurs with other mental illnesses, including Attention-Deficit/Hyperactivity Disorder (ADHD), learning difficulties, depression and anxiety. Anxiety symptoms have been noted in individuals with ASD since Leo Kanner and Hans Asperger first described this disorder more than 70 years ago. Recent research continues to show that those with ASD exhibit significantly higher rates of anxiety symptoms when compared to (i) typically developing individuals (Bellini, 2006; Gadow, DeVincent, Pomeroy, & Azizian, 2005; Lopata et al., 2010), and (ii) those with other disorders, including Down's Syndrome (Evans,

¹ The DSM is the diagnostic system used by clinicians and researchers in the US and Australia to diagnose and classify mental disorders, including ASD. It has received many updates since its inception, with the DSM-5 being the current edition. The section for ASD-related diagnoses was changed considerably in this edition, and the revised diagnosis is more accurate and provides a more useful way of diagnosing individuals with autism-related disorders. Under the DSM-5 criteria, individuals with ASD must show symptoms from early childhood, even if those symptoms are not recognized until later. One would expect that this change ought to have decreased the rate of new diagnoses, but this does not appear to have occurred.

Canavera, Klinepeter, Taga, & Maccubbin, 2005), Williams Syndrome (Rodgers, Riby, Janes, Connolly, & McConachie, 2012), and Conduct Disorder (Green, Gilchrist, & Cox, 2000).

Although the reported rate of anxiety for those with ASD varies widely (e.g., from 13% to 84%; van Steensel, Bogels, & Perrin, 2011), the majority of studies suggest that a more realistic estimate is 40 to 50 percent. A systematic review by van Steensel et al. (2011) supported this by reporting that 39.6 percent of the 2,121 individuals included in the reviewed studies met criteria for clinically elevated levels of anxiety.

The majority of studies undertaken in the area of anxiety and ASD have included young children, older adolescents and adults. While fewer studies have been undertaken with school-aged children, those studies that have been conducted suggest a high occurrence of anxiety (Ashburner et al., 2010; Gjevik et al., 2011; Lecavalier et al., 2006).

The prevalence of anxiety among school-aged children is of particular concern considering research showing that anxiety during this period has a negative impact on intellectual functioning and academic achievement, and broadly on a child's overall school-functioning. Schools may present students with ASD particular cognitive, social and behavioural challenges that may be associated with higher levels of anxiety and impaired school-functioning. Anxiety also has long term impacts, and if left untreated, persists into adulthood (US Public Health Service, 2000), and can progress into other disorders, such as depression (Seligman & Ollendick 1998). Moreover, chronic anxiety is correlated with reduced employment opportunities and social networks, and thus is associated with societal and economic burden (Velting et al. 2004; Davis et al. 2008). Research with an ASD population showed that anxiety negatively impacts a child's ability to participate in home, school and community settings, and effects child and family well-being and quality of life above and beyond the core symptoms of ASD (Davis III, White, & Ollendick, 2014; Pellecchia et al. 2015). Interventions and programs that aim to address anxiety and the challenges that school-aged children with ASD face in educational environments, may improve their overall school-functioning, and later life-outcomes.

Against this background, the need for accurate treatment of anxiety in school-aged children with ASD is evident. Hence, the proposed systematic review aims to examine the effectiveness of interventions for anxiety, and anxiety related school-functioning, for school-aged children with ASD.

Since children spend a significant portion of their day at school, teachers and clinicians working in the education sector have significant responsibility for recognising signs of ASD and anxiety, and in implementing interventions and supports that are evidence-based and tailored to the needs of the child. Further, decision-making regarding treatment should be informed by the latest evidence available. However, the sheer volume of published research, and the different aims, foci and methodology of those studies, makes evidence-based practice extremely difficult for professionals, including for those working in the education sector.

In summary, this review aims to synthesise evidence by employing a framework synthesis approach to accommodate the anticipated diverse types of available studies given that the focus is on interventions that address anxiety and school-related functioning in school settings or family contexts. It is anticipated that these studies may use quasi-experimental or mixed-methods designs, in addition to randomised control trials.

While clinical studies will not be excluded per se, this review seeks to move beyond interventions that are relevant for clinical practice and care in clinical settings, and prioritise studies that draw out implications for school-aged children that will help their functioning in real-world settings such as the school and the home.

Results of the review are intended to inform professionals working in the education sector and parents, but will also be likely inform policy makers in this sector.

OBJECTIVES

The proposed review will aim to answer the following questions.

1. What are the interventions for anxiety of school-aged children with ASD that have been used in school, family, and - to a lesser extent - clinical settings?
2. What is the effectiveness of interventions for anxiety of school-aged children with ASD that have been used in school, family, and - to a lesser extent - clinical settings?
3. What are the sources of variability in response to the intervention (i. e. what works for whom and how)?
4. What are the evidence-based practices that professionals working in schools and parents can employ to mitigate anxiety-related symptoms in school-aged children with ASD?

EXISTING REVIEWS

A number of narrative and systematic reviews on various aspects of anxiety in ASD have been published in the last ten years. These reviews have covered phenomenology and prevalence of anxiety (e. g. White et al., 2009; MacNail, Lopez & Minnes, 2009; VanSteensel et al., 2010), assessment (Wigham & McConachie, 2014; Lecavalier et al., 2014) and treatment (Johnco & Starch, 2015; Kreslins, Robertson, & Melville, 2015; Ung, Selles, Small, & Storch, 2015; Vasa et al., 2014; Sukhodolsky, Bloch, Panza, & Reichow, 2013).

However, none of the reviews published thus far have: (i) focused specifically on school-aged children with ASD; (ii) covered the range of available treatments but instead focussed only on specific treatments, such as, for example, Cognitive Behavior Therapy or psychosocial treatments; (iii) explored mediators and moderators of treatment outcomes; (iv) provided

practical guidance for education professionals and parents to enable increased use of evidence-based treatments in their everyday practice.

INTERVENTION

Rotheram-Borus et al. (2012) proposed that all existing interventions for anxiety incorporate one or more of the following seven elements: (i) psychoeducation, (ii) exposure, (iii) cognitive restructuring, (iv) parent training or parent psychoeducation, (v) relaxation, (vi) modelling, and (vii) self-monitoring.

This review will include all treatments in schools, families or in clinical settings that encompass at least one of these elements. Where studies occur in a clinical setting, priority will be given to studies that seek to draw out implications for real world settings such as the family and school. As pharmacological agents are not generally prescribed in school settings, studies investigating the efficacy of pharmacological agents for treating anxiety will not be included. All forms of assessing children are eligible for inclusion in the review, including diagnostic interviews, ratings scales - irrespective of the informant (e.g. student, parent, teacher), behavioural and physiological monitoring.

Examples of included studies

1. Chalfant, A. M., R. Rapee and L. Carroll (2006). Treating Anxiety Disorders in Children with High Functioning Autism Spectrum Disorders: A Controlled Trial. *Journal of Autism and Developmental Disorders*, 37 (10): 1842-1857.

A family-based, cognitive behavioural treatment for anxiety in 47 children with comorbid anxiety disorders and High Functioning Autism Spectrum Disorder (HFA) was evaluated. Treatment involved 12 weekly group sessions and was compared with a waiting list condition. Changes between pre- and post-treatment were examined using clinical interviews as well as child-, parent- and teacher-report measures. Following treatment, 71.4% of the treated participants no longer fulfilled diagnostic criteria for an anxiety disorder. Comparisons between the two conditions indicated significant reductions in anxiety symptoms as measured by self-report, parent report and teacher report. Discussion focuses on the implications for the use of cognitive behaviour therapy with HFA children, for theory of mind research and for further research on the treatment components.

2. Wood, J.L. et al. (2009). Cognitive behavioral therapy for anxiety in children with autism spectrum disorders: A randomized, controlled trial. *The Journal of Child Psychology and Psychiatry*, 50 (3): 224–234

Background: Children with autism spectrum disorders often present with comorbid anxiety disorders that cause significant functional impairment. This study tested a modular cognitive behavioral therapy (CBT) program for children with this profile. A standard CBT program was augmented with multiple treatment components designed to accommodate or remediate

the social and adaptive skill deficits of children with ASD that could pose barriers to anxiety reduction. Method: Forty children (7-11 years old) were randomly assigned to 16 sessions of CBT or a 3-month waitlist (36 completed treatment or waitlist). Therapists worked with individual families. The CBT model emphasized behavioral experimentation, parent-training, and school consultation. Independent evaluators blind to treatment condition conducted structured diagnostic interviews and parents and children completed anxiety symptom checklists at baseline and post-treatment/post-waitlist. Results: In intent-to-treat analyses, 78.5% of the CBT group met Clinical Global Impressions-Improvement scale criteria for positive treatment response at post-treatment, as compared to only 8.7% of the waitlist group. CBT also outperformed the waitlist on diagnostic outcomes and parent reports of child anxiety, but not children's self-reports. Treatment gains were maintained at 3-month follow-up. Conclusions: The CBT manual employed in this study is one of the first adaptations of an evidence-based treatment for children with autism spectrum disorders. Remission of anxiety disorders appears to be an achievable goal among high-functioning children with autism.

Example of excluded study - As it is a pharmacological treatment

Couturier, J., & Nicolson, R. (2002). A retrospective assessment of Citalopram in children and adolescents with Pervasive Developmental Disorders. *Journal of Child and Adolescent Psychopharmacology*, 12(3): 243-8.

Although selective serotonin reuptake inhibitors have been used to treat symptoms of aggression and anxiety in children and adolescents with pervasive developmental disorders (PDDs), there are no published reports of the use of citalopram in this population. The purpose of this study was to examine the benefits and adverse effects of citalopram in a group of children and adolescents with PDDs. Target behaviors included aggression, anxiety, stereotypies, and preoccupations. Seventeen patients with PDDs (14 with autistic disorder, three with Asperger's disorder) (mean age = 9.4 +/- 2.9 years; range 4-15 years) were treated with citalopram for at least 2 months (mean duration of treatment = 7.4 +/- 5.3 months; range 1-15 months). Treatment was initiated at a low dose (5 mg daily) and was increased by 5 mg weekly as tolerated and as necessary. The mean final dose was 19.7 +/- 7.8 mg (range 5-40 mg). Outcome was based on a consensus between clinician and parents, using the Improvement item of the Clinical Global Impressions Scale as a guide. Ten (59%) children were judged to be much improved or very much improved regarding target behaviors. Core symptoms of PDDs (social interactions, communication) did not show clinically significant improvement. Citalopram was generally well tolerated, although four patients developed treatment-limiting adverse effects: two with increased agitation, one with insomnia, and one with possible tics. The results of this case series suggest that citalopram has beneficial effects on some interfering behaviors associated with PDDs with few adverse effects. Controlled trials are warranted.

POPULATION

The target population for the review is school-aged children diagnosed with an ASD (inclusive of autism, ASD, Autistic Disorder, Asperger's Disorder, Asperger Syndrome, atypical autism, or PDD-NOS), and anxiety symptoms or a diagnosis of an anxiety disorder. No restrictions will be imposed in terms of background variables such as socio-economic status, or profiles of children with ASD - for example with respect to characteristics such as IQ or ASD severity/classification. However, where possible, the mediating or moderating influence of these variables on the treatment outcome(s) will be explored.

The focus is on school-aged children rather than earlier intervention since diagnosis of children with ASD who function at a relatively higher level often does not occur until primary school (Fombonne, 2003). To be included in the review, either all subjects in a study have to be of school age or a majority of subjects have to be of school age.

OUTCOMES

Primary outcomes

Studies in the review will have anxiety as their main outcome.

Secondary outcomes

Secondary outcomes to be considered in the review will be a wide variety of school-functioning related outcomes that often relate to anxiety, social or emotional skills in the school or family setting, school engagement, learning outcomes or academic achievement.

STUDY DESIGNS

Study designs to be included can be experimental (i.e. random allocation of subjects to treatment and control groups) as well as quasi-experimental designs. Consideration will be given to the application of different sets of criteria used to assess the quality of the study design and resulting evidence (e.g., Chambless and Hollon, 1998; Joanna Briggs Institute 2014). The set ultimately chosen will depend on the body of primary research studies included in the review.

While single subject studies often lack generalisability and tend not to use standardised assessments and outcome measures making comparability to other studies difficult, examples of this work are important (e.g., Beretvas & Chung, 2008; Ganz, Earles-Vollrath, Heath, Parker, Rispoli, & Duran, 2012; Hedges, Pustejovsky & Shadish, 2012; Shadish, Hedges & Pustejovsky, 2014). Such designs are often published in psychology and in educational research and therefore, single subject studies may be considered in the review, but will likely be included in a separate section of the report.

Examples of included studies

Clarke, C.D. (2012) An evaluation of a brief school-based cognitive behavioural therapy programme for children with ASD (Doctoral thesis, University of London, London, England). Retrieved from <http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.573003>

Autistic Spectrum Disorder (ASD) is characterised by difficulties with social interactions, communication and rigid/stereotyped behaviours, with a prevalence of around 1 % within the population. Research has shown that children with ASD also have heightened feelings of anxiety compared to typically developing peers, particularly with social anxiety. Cognitive Behavioural Therapy (CBT) has empirical evidence that demonstrates its efficacy in supporting children with ASD to manage their anxiety. However, these studies have only shown improvements in the children's anxiety using standardised questionnaires. As such, it is difficult to infer whether the gains made using CBT are long-term, or whether it leads to a qualitative improvement in children's interactions with their community. Typically, CBT is typically delivered by Child and Adolescent Mental Health Services, which can be inaccessible to some children and their families. This study employed a mixed methods approach to understand the effectiveness of a six week, group administered, secondary school-based CBT programme. 28 children took part in the research, with 14 in the treatment-as-usual group and 14 in the experimental group. All children completed the Wechsler Abbreviated Scale of Intelligence, the Social Responsiveness Scale, Spence Children's Anxiety Scale - parent and child versions (SCAS-P/C), the Coping Scale for Children and Youth (CSCY). Qualitative data was also collected through parent and child interviews using a semi-structured technique. Post-intervention data consisted of the SCAS-P/C and the CSCY and further parent and child interviews. Follow-up measures were taken six to eight weeks after post-intervention using the SCAS-Parent and child versions and the CSCY. Results suggest children who took part in the intervention had reduced levels of anxiety compared to the TaU group, both at post - intervention and follow-up. However, these improvements were not at a clinically significant level. Interview data, analysed using Thematic Analysis, provided unique insight into the process of cognitive change, the nature of anxiety in children with ASD and highlighted potential barriers to change for these children. Furthermore, the parents identified a lack of post diagnostic support and the view of their child's constantly changing profile of needs. The results are related to their implications for the professional educational psychologist, who is considered to be well placed to respond to the identified needs of this group and to implement CBT programmes in schools. Methodological issues and weaknesses are discussed as well as implications for further study

Reaven, J., Blakeley-Smith, A., Culhane-Shelburne, K. & Hepburn, S. (2012). Group cognitive behavior therapy for children with high-functioning autism spectrum disorders and anxiety: A randomized trial. *Journal of Child Psychology and Psychiatry*, 53 (4): 410-419. DOI: 10.1111/j.1469-7610.2011.02486.x

Background: Children with high-functioning autism spectrum disorders (ASD) are at high risk for developing significant anxiety. Anxiety can adversely impact functioning across school, home and community environments. Cognitive behavioral therapies (CBT) are frequently used with success for children with anxiety symptoms. Modified CBT interventions for anxiety in children with ASD have also yielded promising results. Methods: Fifty children with high-functioning ASD and anxiety were randomized to group CBT or treatment-as-usual (TAU) for 12 weeks. Independent clinical evaluators, blind to condition, completed structured interviews (Anxiety Disorders Interview Schedule-Parent Version; ADIS-P) pre- and post-intervention condition. Results: Forty-seven children completed either the CBT or TAU condition. Results indicated markedly better outcomes for the CBT group. Significant differences by group were noted in Clinician Severity Ratings, diagnostic status, and clinician ratings of global improvement. In the intent-to-treat sample, 10 of 20 children (50%) in the CBT group had a clinically meaningful positive treatment response, compared to 2 of 23 children (8.7%) in the TAU group. Conclusions: Initial results from this randomized, designed treatment study suggest that a group CBT intervention specifically developed for children with ASD may be effective in decreasing anxiety. Limitations of this study include small sample size, lack of an attention control group, and use of outcome measures normed with typically developing children.

Sofronoff, K., Attwood, T. & Hinton, S. (2005). A randomised controlled trial of a CBT intervention for anxiety in children with Asperger syndrome. *Journal of Child Psychology and Psychiatry*, 46 (11): 1152-1160.

Background: The aim of the study was to evaluate the effectiveness of a brief CBT intervention for anxiety with children diagnosed with Asperger syndrome (AS). A second interest was to evaluate whether more intensive parent involvement would increase the child's ability to manage anxiety outside of the clinic setting. Methods: Seventy-one children aged ten to twelve years were recruited to participate in the anxiety programme. All children were diagnosed with AS and the presence of anxiety symptoms was accepted on parent report via brief interview. Children were randomly assigned to one of three conditions: intervention for child only, intervention for child and parent, wait-list control. Results: The two intervention groups demonstrated significant decreases in parent-reported anxiety symptoms at follow-up and a significant increase in the child's ability to generate positive strategies in an anxiety-provoking situation. There were a number of significant differences between the two interventions to suggest parent involvement as beneficial. Conclusions: The sample of children with AS in this study presented with a profile of anxiety similar to a sample of clinically diagnosed anxious children. The intervention was endorsed by parents as a useful programme for children diagnosed with Asperger syndrome and exhibiting anxiety symptoms, and active parent involvement enhanced the usefulness of the programme. Limitations of the study and future research are discussed.

The following study could be included although only if it were possible to separate the data for school-aged children as some of the subjects are in pre-school. However, it illustrates the

type of school-family collaborative treatments that will be considered for inclusion in the proposed review:

Ruble, L.A., Dalrymple, N.J. & McGrew J.H. (2010). The effects of consultation on individualized education program (IEP) Outcomes for young children with autism: The Collaborative Model for Promoting Competence and Success. *Journal of Early Intervention*, 32(4), 286-301.

The effects of a teacher consultation intervention were examined—namely, the collaborative model for promoting competence and success (COMPASS), which was designed to improve objectives of individualized education programs for children with autism. The intervention consists of an initial parent–teacher consultation, followed by four teacher consultations across the school year. Thirty-five teachers and a randomly selected child with autism (M age = 6.1 years) from each classroom participated. Compared to the non-intervention teacher–child dyads, the intervention teacher–child dyads showed improvements in individualized education program objectives, with a large effect size ($d = 1.51$).

Examples of potential studies - single-case study methodology

Camacho, R., Anderson, A., et al. (2014). Conducting a function-based intervention in a school setting to reduce inappropriate behaviour of a child with autism" *Behaviour Change* 31(1): 65-77.

Although function-based interventions have been shown to be effective, the methods utilised to carry out functional behaviour assessments (FBA) have practical limitations. This study explored the relative utility and feasibility of three FBA methods in a school setting to inform a function-based intervention to reduce problem behaviour in a boy with autism. The study consisted of: (1) indirect and direct assessments, (2) a modified functional analysis, and (3) the intervention. New video technology, Behavior Capture, was trialled to facilitate data collection in the classroom. All methods contributed to identifying the function of the problematic behaviour, though only the functional analysis provided conclusive results. A peer-mediated intervention based on these findings conducted in the school playground reduced the problem behaviours. All FBA methods could be applied in the school setting and provided useful information. Novel technology was helpful in facilitating data collection. A naturalistic intervention was successful in reducing problem behaviours and increasing play skills.

Vanderhoek, A & Fielding-Barnsley, R. (2004). Developing unique social stories as a behavioural intervention for an eight-year old boy with Asperger Syndrome [online]. In B. Bartlett, F. Bryer, and D. Roebuck (Eds.), *Educating: Weaving Research into Practice: Volume 3* (pp. 194-210). Nathan, Qld: Griffith University, School of Cognition, Language and Special Education.

This case study examined the effectiveness of social story interventions for an eight-year-old Chinese boy diagnosed with mild Asperger's disorder in an international school in Hong Kong. A personalised approach based on Carol Gray's (1994) *Social Story Handbook* was utilised. Social stories focus on teaching children with ASD the social cues and behaviours they need to know to interact with others in a socially appropriate manner. Specifically the following behaviours were targeted: calling out to the teacher, laughing inappropriately, repeating what the teacher said and frequent visits to the toilet. Pre-intervention observations were made over a one week period followed by a two-week intervention which concluded with post-intervention observations over a one-week period. After this brief intervention promising results were obtained particularly in calling out and inappropriate laughter. The learning support teacher who initiated this intervention has been successful in transferring these skills to the classroom teacher who continues to use the social stories on a daily basis.

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Lead review author: The lead author is the person who develops and co-ordinates the review team, discusses and assigns roles for individual members of the review team, liaises with the editorial base and takes responsibility for the on-going updates of the review.

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ROLES AND RESPONSIBILITIES

Please give a brief description of content and methodological expertise within the review team. It is recommended to have at least one person on the review team who has content expertise, at least one person who has methodological expertise and at least one person who has statistical expertise. It is also recommended to have one person with information retrieval expertise. Please note that this is the *recommended optimal* review team composition.

- **Content:**

Dr Julie Kos will provide the content expertise. Dr Kos has published on the topic of Attention-Deficit/Hyperactivity Disorder (ADHD). Published articles include:

Kos, J., Richdale, A.R., & Hay, D.A. (2006) Children with Attention Deficit Hyperactivity Disorder and their teachers : a review of the literature. *International Journal of Disability, Development and Education* 53(2), 147-160

Kos, J. M., A. L. Richdale and M. S. Jackson (2004). Knowledge about Attention-Deficit/Hyperactivity Disorder: A comparison of in-service and pre-service teachers. *Psychology in the Schools* 41(5): 517-526.

Kos, J. & Richdale, A. (2004). The history of attention-deficit/hyperactivity disorder. *Australian Journal of Learning Disabilities*, 9(1), 22-24.

She regularly supervises doctoral students in the areas of ADHD and ASD, and has assessed a number of doctoral and masters theses in relation to ADHD and ASD as well. Dr Kos is a regular reviewer for various journals, including, the *Australasian Journal of Special Education*, the *International Journal of Disability, Development and Education*, the *Australian Educational Researcher* and the *International Journal of Inclusive Education*, and is ACER's lead contact for the Autism CRC.

For further content guidance, she will work closely with the proposed advisory panel members, particularly Dr Mirko Uljarević who has agreed to contribute detailed topic relevant advice to the review free of charge in return for being a co-author on the published review.

- **Systematic review methods:**

Dr Petra Lietz was a co-author on two systematic reviews demonstrating her expertise with this method.

Best M, Knight P, Lietz P, Lockwood C, Nugroho D, Tobin M (2013). The impact of national and international assessment programmes on education policy, particularly policies regarding resource allocation and teaching and learning practices in

developing countries. Final report. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Lietz, P., Tobin, M. & Nugroho (2016) Understanding PISA and Its Impact on Policy Initiative: A Review of the Evidence In. L. M. Thien et al. (Eds.), *What Can PISA 2012 Data Tell Us?* (pp. 181-205). Rotterdam, The Netherlands: Sense Publishers.

- **Statistical analysis:**

Dr Petra Lietz has extensive experience in statistical analyses as evidenced by her many publications, including:

Lietz, P. (2006). Issues in the change in gender differences in reading achievement in cross-national research studies since 1992: A meta-analytic view. *International Education Journal*, 7(2), 127-149.

Lietz, P. (2006). A meta-analysis of gender differences in reading achievement at the secondary school level. *Studies in Educational Evaluation* (32), 317-344.

Lietz, P. (2006). Quantitative Analyses: Multivariate Statistics. In N. Groeben & B. Hurrelmann (Hrsg.) *Empirische Unterrichtsforschung in der Literatur- und Lesedidaktik* (p. 481-512). Weinheim: Juventa.

Lietz, P., & Kotte, D. (2006). Quantitative Analyses: Univariate and bivariate Statistics. In N. Groeben & B. Hurrelmann (Hrsg.) *Empirische Unterrichtsforschung in der Literatur- und Lesedidaktik* (p. 443-480). Weinheim: Juventa.

Schreier, M., & Lietz, P. (2006). Quantitative Data Gathering Techniques. In N. Groeben & B. Hurrelmann (Hrsg.) *Empirische Unterrichtsforschung in der Literatur- und Lesedidaktik* (p. 361-397). Weinheim: Juventa.

Lietz, P., & Kotte, D. (2005). Manual and automatic estimates of growth and gain across year levels: How close is close?. In S. Alagumalai, D. Curtis, & N. Hungi (Eds.) *Applied RASCH measurement: A book of exemplars*, Chapter 5 (pp. 79-96). Dordrecht: Springer.

- **Information retrieval:**

Ms Jenny Trevitt is an experienced librarian with more than 10 years experience as a librarian in ACER's Cunningham Library. Ms Trevitt has also been directly involved with information retrieval for previous systematic reviews as detailed above.

- **Support staff:**

Mrs Elizabeth O’Grady will provide research support to the review team. Elizabeth has extensive experience in education research methods as well as statistical analysis as demonstrated by the following publications:

Redmond, G., Skattebol, J. et al (2016) *Are the kids alright? Young Australians in their middle years: Final report of the Australian Child Wellbeing Project*, Flinders University, University of New South Wales and Australian Council for Educational Research, www.australianchildwellbeing.com.au

Lietz, P., O’Grady, E., Tobin, M., Murphy, M., Macaskill, G., Redmond, G., Dix, K. and Thomson, S. (2015). *Australian Child Wellbeing Project Technical Report* The Australian Council for Educational Research, Melbourne.

De Bortoli, L; Buckley, S, Underwood, C, O’Grady, E, Gebhardt, E. (2014). ICILS 2013: Australian students’ readiness for study, work and life in the digital age. Melbourne: ACER.

Proposed advisory panel

The following members of the proposed advisory panel will provide invaluable expertise to guide the proposed review.

Professor Cheryl Dissanayake is the Founding Director of OTARC, Australia’s first research centre dedicated to ASDs established in 2008. OTARC is Australia's first centre dedicated to research on Autism Spectrum Disorders. It provides a vehicle for research activities, evidence-based intervention programs, training opportunities and collaboration between community services and research centres/universities involved in autism research both in Australia and overseas. OTARC is situated in the [School of Psychology and Public Health](#) within the [College of Science, Health and Engineering \(SHE\)](#) at La Trobe University in Melbourne, Australia.

Professor Dissanayake has been an autism researcher since 1984, when she began her PhD at Monash University. On completion she undertook a postdoctoral fellowship in the Sigman lab at UCLA, and has established and led an active research program since joining La Trobe University in 1996. In addition to her scholarly activities, with numerous grants and publications, Prof. Dissanayake was instrumental in bringing together Victorian and Australian autism researchers, having co-founded the Autism Victoria ASD Research Group (in 2003), the Australasian Autism Research Alliance (in 2005), the Australasian Autism Research Collaboration (in 2009) and the Australasian Society for Autism Research (2011), a member based society of which she is vice-President. She is also a Project Leader in the Autism Cooperative Research Centre of which La Trobe University is an Essential Partner.

Dr Mirko Uljarević completed his PhD in the Wales Autism Research Centre, Cardiff University and is now an Autism CRC Postdoctoral Research Fellow based in the Olga

Tennison Autism Research Centre, La Trobe University, Melbourne, Australia. He is currently working on a large, Autism CRC funded longitudinal study of Australian school-leavers with autism that aims to describe the outcomes and identify risk and resilience factors for these young people and their families during the transition from secondary school into adult life. His other research interests include a strong focus on repetitive behaviours and co-morbid conditions in individuals with autism as well as focus on well-being in parents of children with autism, particularly exploring stress, anxiety and depression, and factors contributing to individual differences in parental outcomes

Dr Giacomo Vivanti is an Assistant Professor, Early Detection and Intervention and Drexel University. He graduated magna cum laude in Psychology from University of Milan and received a doctoral degree in Cognitive Science from the University of Siena, Italy, in 2008. During 2008-2010 he received postdoctoral fellowship training on autism at the University of California Davis MIND Institute, and in 2010 he became Research Fellow at the Olga Tennison Autism Research Centre in Melbourne, Australia, where he worked on a federally funded 5-year project on autism early intervention. His career as a scientist has been driven by a key-commitment, namely understanding the nature of learning difficulties in autism and developing effective programs to address such difficulties within community-based settings. This commitment reflects his life experience of growing up with two brothers affected by autism, as well as his diverse clinical and research background.

Dr. Vivanti serves in the Editorial Board of the Journal of Autism and Developmental Disorders and the Encyclopedia of Autism Spectrum Disorders. He is also a member of the Department of the Health Committee to establish evidence-based guidelines for autism treatment in Italy, a certified therapist and trainer in the “Early Start Denver Model” autism intervention program, and a member of the Early Start Denver Model Training Advisory Group. Dr. Vivanti is now Assistant Professor in the Early Detection and Intervention research program at the A.J. Drexel Autism Institute.

Associate Professor Amanda Richdale is a founding staff member at the Olga Tennison Autism Research Centre (OTARC). She joined OTARC in 2009 following an honorary appointment in 2008. She completed her PhD at La Trobe University in 1992 and took up a lecturing position in Psychology and Disability Studies at RMIT University in 1993, remaining there until 2008. Her research interests are in autism spectrum disorder, specific learning difficulties and developmental disorders, paediatric sleep and anxiety. Associate Professor Richdale is also experienced in the assessment and diagnosis of developmental disabilities, in particular ASD and specific learning difficulties and has taught in a range of areas, including Developmental Psychology, Biological Psychology and Child Psychopathology, including specialist teaching in autism and in children’s sleep. Associate Professor Richdale was Chair of the former Autism Victoria Professional Panel and was co-founder of the Autism Victoria (now AMAZE) Autism Spectrum Disorder Research Group (2003) and the Australasian Autism Research Alliance (2005). She was a member of the group of autism researchers who founded the Australasian Research Collaboration (2009),

and a member of the founding (interim) committee of the Australasian Society for Autism Research (2011). She is currently Chair of the EPIC Early Intervention Centre's Committee of Management and a committee, member of the APS Interest Group Psychology of Intellectual Disability and Autism. She is a project leader in the Autism Cooperative Research Centre; La Trobe University is an Autism CRC essential partner.

Dr Darren Hedley holds a PhD and B. Psych (Hons) from Flinders University, South Australia and an MA in Counselling Psychology from the California School of Professional Psychology (CSPP) in Mexico City. His research interests include employment in individuals with an ASD; anxiety; face recognition and emotion processing; early assessment and diagnosis; and confidence-accuracy calibration in diagnostic decision making. At OTARC he is researching the transition to employment in adults on the autism spectrum, focusing on social impact factors and the barriers and enablers to workplace success. Prior to joining OTARC, Dr Hedley completed a clinical fellowship in neurodevelopmental paediatric psychology at The Ohio State University in the Child Development Center of Nationwide Children's Hospital. There he specialized in assessment and diagnosis of children with intellectual and developmental disability, including autism spectrum disorder, under the mentorship of Professor James A. Mulick. He then worked in the Facial Affective and Communicative Expressions (F.A.C.E.) lab at Emerson College in the Department of Communication Sciences and Disorders, where he undertook research into motion capture, eye-tracking and bio-physiological measures to investigate how children with ASD integrate and produce verbal and nonverbal information, such as facial expressions and language. Dr Hedley has published work in referred journals, and is an ad hoc reviewer for the leading autism and psychopathology journals. He is a member of the Australian Psychological Society (MAPS), American Psychological Association (APA) and APA Division 33, Intellectual and Developmental Disabilities; Australasian Society for Autism Research (ASfAR); and the International Society for Autism Research (INSAR).

FUNDING

Neither the team members who are proposing to undertake this systematic review nor the Australian Council for Educational Research receive any financial support from any other source for this project, nor do they intend to apply for funding from other sources at this stage.

POTENTIAL CONFLICTS OF INTEREST

There are no known potential conflicts of interest.

PRELIMINARY TIMEFRAME

Note, if the protocol or review are not submitted within 6 months and 18 months of title registration, respectively, the review area is opened up for other authors.

- Date you plan to submit a draft protocol:

We plan to submit a draft protocol by 31st October 2016.

- Date you plan to submit a draft review:

We plan to submit a draft review by 30th April 2017.

In our experience, the time period between the draft review and the finalisation of a systematic review can span 3-4 months. Hence, the final systematic review is envisaged to be completed by August 2017 at the latest.

AUTHOR DECLARATION

Authors' responsibilities

By completing this form, you accept responsibility for preparing, maintaining, and updating the review in accordance with Campbell Collaboration policy. The Coordinating Group will provide as much support as possible to assist with the preparation of the review.

A draft protocol must be submitted to the Coordinating Group within one year of title acceptance. If drafts are not submitted before the agreed deadlines, or if we are unable to contact you for an extended period, the Coordinating Group has the right to de-register the title or transfer the title to alternative authors. The Coordinating Group also has the right to de-register or transfer the title if it does not meet the standards of the Coordinating Group and/or the Campbell Collaboration.

You accept responsibility for maintaining the review in light of new evidence, comments and criticisms, and other developments, and updating the review every five years, when substantial new evidence becomes available, or, if requested, transferring responsibility for maintaining the review to others as agreed with the Coordinating Group.

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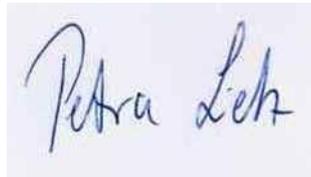
The support of the Coordinating Group in preparing your review is conditional upon your agreement to publish the protocol, finished review, and subsequent updates in the Campbell Library. The Campbell Collaboration places no restrictions on publication of the findings of a Campbell systematic review in a more abbreviated form as a journal article either before or after the publication of the monograph version in *Campbell Systematic Reviews*. Some journals, however, have restrictions that preclude publication of findings that have been, or

will be, reported elsewhere and authors considering publication in such a journal should be aware of possible conflict with publication of the monograph version in *Campbell Systematic Reviews*. Publication in a journal after publication or in press status in *Campbell Systematic Reviews* should acknowledge the Campbell version and include a citation to it. Note that systematic reviews published in *Campbell Systematic Reviews* and co-registered with the Cochrane Collaboration may have additional requirements or restrictions for co-publication. Review authors accept responsibility for meeting any co-publication requirements.

I understand the commitment required to undertake a Campbell review, and agree to publish in the Campbell Library. Signed on behalf of the authors:

Form completed by: Dr Petra Lietz

Date: 11 July 2016

A rectangular box containing a handwritten signature in blue ink that reads "Petra Lietz".