

Evidence-based practices in intellectual disability and behaviour disorders

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Purpose of review

To critically review the most recently published studies on the treatment of challenging behaviours/behaviour disorders for individuals with intellectual disability.

Recent findings

Literature published in the review period was from three traditions: applied behaviour analysis, psychopharmacology, and service evaluation. Applied behaviour analysis treatments have a large evidence base, and recent research has focused on refining issues such as dealing with low rate behaviours, improving generalization, the effects of choice-making, and setting event variables that may affect treatment outcomes. Recent interest in risperidone as a treatment for behaviour disorder has dominated the literature on pharmacological interventions. Several empirical studies support the use of risperidone in children, although a recent review is more sceptical of the quality of the evidence to date. A small number of service evaluation studies suggest in particular that applied behaviour analysis technologies can be scaled up to benefit large numbers of patients.

Summary

Applied behaviour analysis methods for the assessment and treatment of behaviour disorders continue to be the focus of research, and continue to result in positive outcomes. Recent data show the value of using applied behaviour analysis technologies as a service model for people with behaviour disorders. Pharmacological treatments, especially risperidone, also have a developing evidence base despite a lack of understanding of their mechanisms of action. A number of questions about behaviour disorders remain unanswered, especially whether early intervention may be effective and their putative relationship with psychiatric conditions.

Keywords

applied behaviour analysis, behaviour disorders, challenging behaviour, pharmacological treatment, service models

Abbreviations

ABA	applied behaviour analysis
FCT	functional communication training
N-CBRF	Nisonger Child Behavior Rating Form
NCE	noncontingent escape
PCP	person-centred planning
PDD	pervasive developmental disorder

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0951-7367

Introduction

The purpose of the present review is to consider recent evidence on interventions for behaviour disorders in children and adults with intellectual disabilities. We have included studies published during 2004 and the first few months of 2005, and used a broad definition of behaviour disorder. Thus, we have included studies of classic 'challenging behaviour' (such as self-injury, aggression towards others or the environment, stereotyped/repetitive behaviours), studies of general problem behaviours in individuals with intellectual disabilities, and behaviour problems labelled with common psychiatric terminology (especially conduct disorder, attention deficit hyperactivity disorder (ADHD)/hyperactivity). The main sections of the review focus on evidence for interventions using methods derived from applied behaviour analysis (ABA), pharmacological interventions, and also a number of service delivery models. However, the literature review also identified a number of general issues that have implications for our understanding and treatment of behaviour disorders in intellectual disability and it is to these that we turn first.

General issues on behaviour disorders and intellectual disability

Behaviour disorders in individuals with intellectual disabilities clearly constitute a significant clinical concern. A 3-year longitudinal study of 13 preschool children by Green and colleagues [1] suggests that behaviour disorders can emerge early and are highly persistent. When behaviour disorders are not treated, they can develop into serious, life-threatening actions once children develop physically and enter adolescence and young adulthood. Many psychological intervention studies of adults with intellectual disabilities are focused on cases when behaviour disorders are likely to have been present for many years, posing significant challenges for intervention. Early intervention for behaviour disorders is thus clearly

Curr Opin Psychiatry 18:469–475. © 2005 Lippincott Williams & Wilkins.

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Current Opinion in Psychiatry 2005, 18:469–475

warranted. However, there were no studies in the review period on early psychological intervention for behaviour disorders.

A further significant issue is illustrated in research by Rojahn and colleagues [2**] who studied the relationships between psychiatric conditions and behaviour problems in adults with intellectual disabilities. As indicated earlier, a broad range of terms are used to describe behaviour disorders in individuals with intellectual disabilities; some, but not all, of these refer to psychiatric conditions. Rojahn's research data suggest that behaviour problems may well be symptoms of underlying mental health problems but that the relationships between behaviour problems and psychiatric conditions are select and differential. Thus, aggressive/destructive and self-injurious behaviours were related to impulse control and conduct problems, and stereotyped behaviours were related to pervasive developmental disorders and less strongly to psychosis. Of particular interest was the finding that depression, mania and anxiety were unrelated to self-injurious behaviours and aggression/destructive disorders, suggesting that these behaviours are not atypical manifestations of mood and anxiety disorders. However, there is as yet no consensus as to whether behaviour disorders are separate clinical conditions in intellectual disability or merely a part of the symptom pattern for coexisting psychiatric problems. More conceptual and empirical work is needed to explore this question, but the main implication for now is that it is important to clearly define the behaviour of interest in any intervention study if we are to evaluate the strength of an evidence base. Studies using ABA methods are characteristically strong on definitions of behaviour.

Within the review period, there were two useful studies examining large numbers of patients with behaviour disorders, exploring their access to intervention. In a Canadian sample of 625 adults and children with intellectual disabilities and behaviour disorders, Feldman and colleagues [3*] found that 97% were receiving some form of intervention but that the majority of these were informal (55%) (i.e. poorly recorded, and typically not evaluated). Formal recorded interventions were more likely to be present when the individuals engaged in more dangerous behaviours, and when formal interventions were in place; 60% included the use of behaviour controlling drugs. Data from Australia also show that many individuals with intellectual disabilities are given a range of drugs, often involving polypharmacology, to control their behaviour [4*].

These studies illustrate that many individuals with intellectual disabilities are not in receipt of therapeutic interventions for their behaviour disorders, let alone

interventions with an established evidence base. Thus, a review of evidence for interventions is needed, including how treatment approaches might be developed into effective service models. The frequent use of pharmacological interventions supports the need for a review of the evidence base in this domain. Each of these issues is reviewed in the following sections.

Interventions based on the principles of applied behaviour analysis

Central to contemporary applied behaviour analytic models of intervention is the prior identification of the cause or function(s) of behaviour. Function in this context broadly refers to the change brought about by a given behaviour in the individual's external or even internal environment. Studies in the review period continue to support the efficacy of function-based interventions for challenging behaviours such as aggression, self-injurious behaviour, and property destruction. Interventions in the review period included functional communication training (FCT), choice-making, noncontingent reinforcement, and extinction. Overall, a theme identified in several of the studies is that low rates of reinforcer quality or density in the environment operate as setting events for the occurrence of challenging behaviour. While there remains an emphasis on demonstrating the effectiveness of single behavioural interventions on the frequency of a given target behaviour, a small number of studies reflected the use of combined behavioural intervention. This begins to approach the complexity of the multi-element behaviour support plans more common in service settings. Unfortunately, quality-of-life outcomes as a result of behavioural interventions were rarely reported, suggesting that researchers are not yet routinely using this important dimension as an outcome variable.

Controlled studies

FCT is one of the most frequently recommended behaviour analytic interventions for the treatment of challenging behaviour, and was the most common intervention reported in the review period. Accumulating evidence from prevalence studies suggests that escape – from demands or social situations – is one of the most common functions of challenging behaviour [5]. This is reflected in studies during the review period in which escape or task avoidance was identified as the primary function of challenging behaviour. Peck Peterson and colleagues [6] demonstrated that while the implementation of FCT to request breaks from educational tasks (i.e. escape) can, alone, reduce the frequency of challenging behaviour, it also increases task avoidance which is itself often a problem in education and work settings. However, when FCT was combined with increased reinforcement associated with the avoided task relative to avoidance itself, task engagement increased without a concurrent increase in problem behaviour and work tasks were more

frequently requested. This study demonstrates that FCT for escape is ineffective in increasing task engagement without concurrent changes to the motivative dimensions of avoided tasks, and that in such cases combined interventions are warranted to address both environmental deficits and skills deficits in the individual. In another study investigating FCT but using a modified analogue assessment procedure to identify the function of low-rate occurrence of challenging behaviours, Tarbox *et al.* [7^{*}] demonstrated that noncontingent attention and FCT to request task termination was associated with reductions in attention and escape-maintained aggression in two adults with severe and profound intellectual disability in a sheltered workshop setting. Collateral recording of task engagement did not occur but the absence of a higher rate, or increased quality, of reinforcement for task engagement suggests task engagement is unlikely to have been affected.

Two other studies contributed to an increased understanding of the conditions under which augmentative communication strategies such as FCT are most effective. Schindler and Horner [8^{**}] demonstrated that FCT does not automatically reduce problem behaviours in settings other than those in which FCT is taught. When three children with autism, aged 4–5 years, underwent FCT in one setting to reduce problem behaviour in school, problem behaviour reduced in that setting but not in three other targeted settings in school and in the family home. However, with prompting and with reinforcement contingent on the augmentative communication response in these other settings, a reduction in problem behaviours in those settings was observed. Mildon and colleagues [9] combined FCT with noncontingent escape (NCE) in the treatment of escape-maintained problem behaviour and to increase compliance with task demands. Their results suggest that the initial implementation of NCE creates an opportunity to subsequently teach a functionally equivalent response to the problem behaviour. NCE combined with FCT was subsequently changed to NCE and FCT with a changing criterion (i.e. a changing number of tasks had to be completed before the functionally equivalent response was reinforced). In this condition, no increase in problem behaviour was observed and compliance increased.

One of the more interesting findings in the review period concerns the use of extinction. Fisher *et al.* [10^{*}] reported that for four individuals with intellectual disability, destructive behaviour was maintained by access to adult interaction. Both noncontingent attention and noncontingent access to items of high interest combined with extinction were equally effective in bringing about rapid reductions in destructive behaviour, and both were differentially more effective than extinction alone. That there was no difference between the two interventions

suggests that setting or motivating events, such as environmental deprivation or unpredictability of reinforcer delivery, may have increased the salience of adult interaction as a reinforcer at the outset. A second study by Long and colleagues [11] also demonstrated that the introduction of noncontingent access to items of high interest to the individual can bring about reductions in the frequency of problem behaviour maintained by automatic reinforcement and problem behaviour maintained by escape during hygiene routines. Noncontingent access to items of high interest probably reduces escape-maintained problem behaviour by making the demand context less aversive. However, both studies in the review period on competing stimuli suggest that environmental deprivation operates as a setting or motivating event for problem behaviour. A concern, in terms of social validity of these studies, is that they do not contain an explicit contingency to teach an alternative response to the challenging behaviour.

Meta-analysis and reviews

Shogren and colleagues [12^{**}] conducted an excellent review on choice-making as an intervention for the treatment of problem behaviour. Specifically, they identified 13 studies that examined the effects of one of two choice interventions: interventions that allowed individuals to choose the order in which they completed assigned tasks, and interventions in which individuals chose between two activities. Meta-analysis results indicate that facilitating individuals with intellectual disability to make choices significantly reduced problem behaviour to below baseline rates of behaviour. Interestingly, choice-making as an intervention was associated with greater reductions in aggressive problem behaviours than nonaggressive problem behaviours. Overall, these results suggest that when individuals with intellectual disability increase their self-determination, behavioural problems can reduce.

Adam and colleagues [13] conducted a review of 26 studies evaluating behavioural interventions in the treatment of pica, from 1975 onwards. Earlier studies were associated with an absence of functional assessment and the use of procedures that could be classed as aversive (contingent aversive presentation, overcorrection, physical restraint, time out, facial screening, and negative practice). Only four of the studies reported the use of functional assessment, and functions identified for pica were primarily physiological and social. All interventions reported reductions in pica. However, there were a large number of interventions that could be classed as aversive. Nonaversive approaches, such as noncontingent presentation of food/attention, discrimination training and differential reinforcement, appear equally effective in the treatment of pica. Thus, the need for and validity of aversive procedures is in question.

Pharmacological interventions

The prevalence rate for the prescription of psychotropic medication for the treatment of challenging behaviours has been a cause for concern given the lack of empirical data on their effectiveness [4[•]]. Over the review period, the vast majority of articles focused on the effects of atypical antipsychotic medication and, in particular, the effects of risperidone on behaviour disorders. In a review of empirical research on the effectiveness of risperidone from 1992 to 2004, Singh *et al.* [14^{••}] identified only six studies that met the methodological criteria for sound psychopharmacological investigation. They concluded, with some caution, that risperidone may be an effective treatment for *some* individuals with certain behavioural presentations.

Over the review period, four studies investigating the effects of risperidone on behaviour disorders occurring in children with intellectual disability or pervasive developmental disorders (PDDs) were identified. A strength of this cohort of studies is the use of common outcome assessment instruments, notably the Aberrant Behavior Checklist (ABC) and the Nisonger Child Behavior Rating Form (N-CBRF), and very similar age ranges of children. In an 8-week, randomized, double-blind investigation of children aged between 5 and 12 years, Shea and colleagues [15] reported significantly greater improvements in the risperidone group on subscales of the N-CBRF and ABC than the placebo group. The most prevalent side effect was somnolence, reported in 72.5% of the medication sample. However, approximately 90% of the risperidone group received at least one concurrent medication during the trial, such as analgesics or sedatives. A study by Aman and colleagues [16[•]] combined data from two previously published 6-week placebo-controlled trials and investigated risperidone in the treatment of children in the same age range with disruptive behaviour disorders and comorbid ADHD. Compared with the placebo groups, risperidone treatment was associated with greater improvement on measures of conduct problems and hyperactivity. Concurrent stimulant medication was not associated with greater improvements on these measures, thereby questioning the efficacy of such medication in the treatment of hyperactivity.

In two open-label studies examining children with intellectual disabilities a similar pattern of results was observed, but these studies also allowed for an investigation of the long-term effects of risperidone. Findling and colleagues [17[•]] reported improvements in disruptive behaviours as measured by the conduct disorder subscale of the N-CBRF over a 48-week period. Croonenberghs and colleagues [18[•]] reported improvements on the conduct disorder, insecure/anxious, hyperactive, self-injury/stereotypic, self-isolated/ritualistic and overly sensitive subscales of the N-CBRF in 363 children aged between 7 and

14 years prescribed risperidone over a 12-month period. In this latter study, there was no significant difference between gains observed at 4 weeks and at 12 months, suggesting that improvements are unlikely to be observed after an initial 4 weeks. Gains were observed on basic measures of memory and attention at 12 months, providing some tentative evidence that learning may not be affected by risperidone. However, these measures were administered prior to commencement of medication and at the completion of the study and consequently it is unclear how attention and learning were affected after initial medication and throughout the trial. A high rate of side effects was noted in both studies (97% and 91%), with the most common side effect being somnolence, reported in 30% and 33%, respectively [17[•],18[•]]. Though somnolence was reported as mild and generally transient, the relationship between somnolence and behaviour reduction is unclear. Elevated levels of serum prolactin were noted in both studies after approximately 4 weeks. Though levels returned to the nonclinical range at approximately 9 months, they remained elevated compared with baseline. The incidence of extrapyramidal effects was low, but weight gain above typical developmental gain was observed. The number of children receiving behavioural interventions concomitantly with the use of risperidone or placebo was not specified in either study.

Guidelines in respect of the use of risperidone were also published in the review period [19^{••}]. These are to be welcomed as they standardize dosage and titration schedules for risperidone with respect to aggression, irritability, and problems of impulse control in individuals with intellectual disability. These guidelines also specify that functional assessment should be used in the evaluation of behaviour disorders. However, the guidelines do not identify the criteria under which risperidone should be discontinued. This is unfortunate, as data in the review period identify optimal clinical response within 4 weeks of treatment onset. Furthermore, the use of medication must be balanced against relapse on discontinuation and failure to specify the necessity of function-based behavioural interventions, which have been shown to bring about reductions in challenging behaviour and improve adaptive skills.

The role of a second atypical antipsychotic, olanzapine, in the treatment of behaviour disorders exhibited by children and adults with PDD was reported by Stavrakaki and colleagues [20]. Though improvements were noted using the Clinical Global Impressions scale (CGI) and the Global Assessment of Functioning across seven individuals aged between 8 and 52 years over a 26-week period, all had comorbid axis I diagnoses and were receiving unspecified behavioural interventions, making firm conclusions about the efficacy of olanzapine impossible. The use of basic measures of behaviour change such as the CGI has also been noted to overestimate improvements [14^{••}]. A

case study by Symons and colleagues [21[•]] reported a decrease in self-injurious behaviour in a 13-year-old girl as a result of treatment with clonidine. Substantial clinical effects were observed within 4 weeks, which, like earlier studies, suggests that if atypical antipsychotics are to be effective, it will be within a short time frame.

A final study by Zarcone and colleagues [22^{••}] is particularly notable for the inclusion of functional analysis methodology (i.e. analogue assessment) in determining the efficacy of risperidone on destructive behaviour. In contrast to the majority of other studies, which relied on rating scales to measure outcomes, this study tracked the actual rate of clearly defined behaviours on a per minute basis across five analogue conditions and across medication phases for 13 individuals. Risperidone was effective in reducing destructive behaviour (compared with placebo) for 10 individuals. For seven of these individuals, the occurrence of destructive behaviour did not covary with specific environmental/analogue conditions.

Service models

Behaviour disorders have also received some interest at a broader level of intervention – that of service design and service models, whether these are directed explicitly at behaviour disorders or whether the behaviour disorder is a measured outcome. There were four studies of this kind published in the review period. One key service management issue is whether to colocate people with behaviour disorders or to include them in community settings with other service users. Robertson and colleagues found that colocating people with behaviour disorders in community-based supported accommodation cost more [23^{••}] and was associated with more physical restraint interventions [24]. In both types of settings, behaviour disorders were stable over a 10-month period and there were few ABA technologies in place to reduce behaviour (<15% of service users), but high levels of antipsychotic medication were in use [24].

A general service model that is becoming popular in Western societies is the use of person-centred planning (PCP) with service users. Holburn and colleagues [25[•]] studied 20 adults with intellectual disabilities and behaviour disorders receiving PCP and a matched group of service users who received standard interdisciplinary service planning. The data showed that quality of life improved more for the PCP group when compared with the matched controls, and many more of the PCP group were able to relocate to a community service setting. However, no data are presented on changes in behaviour disorders as a result of the two different service models.

Most informative are data from two large-scale studies examining the application of ABA technologies in the treatment of behaviour disorders. Asmus and colleagues

[26^{••}] summarized data on 138 cases referred to a short-term inpatient unit that used functional analysis and behavioural intervention methods. These cases were those that had not been successfully treated in an outpatient clinic using similar techniques, though failure to achieve consistently in implementation of behavioural intervention is a characteristic of outpatient settings. Most cases were for the treatment of aggression, disruptive behaviours, and self-injury. For 66% of cases, behaviour problems were reduced by 90% when the average rates of behaviour in baseline were compared with the final three treatment session observations. These effects were achieved in an average of 10 days of assessment and ABA treatment. This was a highly specialized ABA assessment and treatment service with input from other professionals and thus is not easy to replicate. However, the data are supportive of a high degree of effectiveness with a sample of difficult-to-treat cases. Unfortunately, follow-up data are not available on a consistent basis so the extent to which these gains are maintained when individuals leave the inpatient service is unknown.

The final study of interest adopted a different approach to the use of ABA technologies. A staff training model was adopted by McClean and colleagues [27^{••}] whereby ABA assessment and intervention skills were taught and staff members developed behaviour support plans, as a part of their training, for 138 service users with behaviour disorders. As this was a clinical service model, there were no control group data available but 77% of cases were deemed a success (70% or more reduction in rates of behaviour disorder from baseline levels) and these changes were shown to hold over a 2-year follow-up period. This is one of the few studies to provide data on maintenance of reductions in challenging behaviours over a significant period of time and one that addresses ABA in general service settings.

Conclusion

The present review identifies the dominance of two approaches for the treatment of behaviour disorders in individuals with intellectual disabilities. First, there is mounting evidence that risperidone can have relatively fast suppressing effects on behaviour disorders in children with intellectual disabilities. However, there remain questions about the effects of somnolence on reductions in behaviour disorder and, despite emphasizing the issue on treatment guidelines [19^{••}], there are few examples of studies combining the analysis and treatment methods of ABA with risperidone intervention [22^{••}]. Second, assessment and treatment approaches from ABA perspectives continue to be the focus of clinical research. The evidence base here is well established [28], and the necessity of preintervention functional assessment has been confirmed. Themes in the review period were attention to broader environmental variables, and multielement

treatments. These themes fit very well with the translation of controlled intervention studies into service models for people with intellectual disabilities and behaviour disorders.

In terms of implications for services, there was no clear evidence of benefits of colocating individuals with behaviour disorders, and no data on the effects of PCP on behaviour disorders (although this model seems to help achieve quality-of-life improvements). However, there were encouraging data in the review period on using ABA principles as a service model. In particular, a short-term inpatient service relying on comprehensive behavioural assessment and intervention may contribute to reductions in behaviour disorder for hard-to-treat cases, and a competency based staff skills training model may be an effective method for disseminating ABA skills and achieving a service-wide impact with positive changes on behaviour problems.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

- 1 Green VA, O'Reilly M, Itchon J, Sigafoos J. Persistence of early emerging aberrant behavior in children with developmental disabilities. *Res Dev Disabil* 2005; 26:47–55.
- 2 Rojahn J, Matson JL, Naglieri JA, Mayville E. Relationships between psychiatric conditions and behavior problems among adults with mental retardation. *Am J Ment Retard* 2004; 109:21–33.
- An empirical study using factor analysis methods to identify putative relationships between behaviour disorders and psychiatric conditions.
- 3 Feldman MA, Atkinson L, Foti-Gervais L, Condillac R. Formal versus informal interventions for challenging behaviour in persons with intellectual disabilities. *J Intellect Disabil Res* 2004; 48:60–68.
- A large survey that emphasizes inconsistent approaches to the treatment of behaviour disorders, and the need for the development of clear treatment protocols within services.
- 4 McGillivray JA, McCabe MP. Pharmacological management of challenging behavior of individuals with intellectual disability. *Res Dev Disabil* 2004; 25:523–537.
- A record review study identifying a concerning level of pharmacological agents to manage rather than proactively treat behaviour disorders.
- 5 Hanley GP, Iwata BA, McCord BE. Functional analysis of problem behavior: a review. *J Appl Behav Anal* 2003; 36:147–185.
- 6 Peck Peterson SM, Cangiglia C, Royster AJ, *et al.* Blending functional communication training and choice making to improve task engagement and decrease problem behaviour. *Educ Psychol* 2005; 25:257–274.
- 7 Tarbox J, Wallace MD, Tarbox RSF, *et al.* Functional analysis and treatment of low-rate problem behaviour in individuals with developmental disabilities. *Behav Interv* 2004; 19:73–90.
- Presents a potential methodology for use in establishing the functions of behaviour disorders that occur at low frequency.
- 8 Schindler HR, Horner RH. Generalized reduction of problem behaviour of young children with autism: building trans-situational interventions. *Am J Ment Retard* 2005; 110:36–47.
- Treatment study that emphasizes the importance of planning for the generalization of intervention effects across settings.
- 9 Mildon RL, Moore DW, Dixon RS. Combining noncontingent escape and functional communication training as a treatment for negatively reinforced disruptive behaviour. *J Positive Behav Interv* 2004; 6:92–102.
- 10 Fisher WW, DeLeon IG, Rodriguez-Catter V, Keeney KM. Enhancing the effects of extinction on attention-maintained behavior through noncontingent delivery of attention or stimuli identified via a competing stimulus assessment. *J Appl Behav Anal* 2004; 37:171–184.
- Treatment study showing that enriching the social environment (e.g. increasing attention noncontingently) can be an effective behaviour reduction strategy.
- 11 Long E, Hagopian LP, DeLeon IG, *et al.* Competing stimuli in the treatment of multiply controlled problem behaviour during hygiene routines. *Res Dev Disabil* 2005; 26:57–69.
- 12 Shogren KA, Faggella-Luby MN, Jik Bae S, Wehmeyer ML. The effect of choice making as an intervention for problem behaviour: a meta analysis. *J Positive Behav Interv* 2004; 6:228–237.
- An integration and metaanalysis of 13 studies assessing the impact of providing choice on behaviour disorder. Evidence of the effectiveness of this intervention strategy is found.
- 13 Adam DB, Sherman JA, Sheldon JB, Napolitano DA. Behavioral interventions to reduce pica of persons with developmental disabilities. *Behav Modif* 2004; 28:45–72.
- 14 Singh AN, Matson JL, Cooper CL, *et al.* The use of risperidone among individuals with mental retardation: clinically supported or not. *Res Dev Disabil* 2005; 26:203–218.
- A useful review of evidence for the effectiveness of risperidone as an intervention for behaviour disorders. Few studies with good methodological standards were found.
- 15 Shea S, Turgay A, Carroll A, *et al.* Risperidone in the treatment of disruptive behavioural symptoms in children with autistic and other pervasive developmental disorders. *Pediatrics* 2004; 114:634–641.
- 16 Aman MG, Binder C, Turgay A. Risperidone effects in the presence/absence of psychostimulant medication in children with ADHD, other disruptive behaviour disorders and subaverage IQ. *J Child Adolesc Pharmacol* 2004; 14:243–254.
- Study combining data from two trials, and exploring the interaction between risperidone and stimulant medication effects.
- 17 Findling RL, Aman MG, Eerdeken M, *et al.* Long-term, open-label study of risperidone in children with severe disruptive behaviours and below average IQ. *Am J Psychiatry* 2004; 161:677–684.
- Study investigating the effects of risperidone on behaviour disorder in children over 48 weeks.
- 18 Croonenberghs J, Fegert JM, Findling RL, *et al.* Risperidone in children with disruptive behaviour disorders and subaverage intelligence: a 1-year, open label study of 504 patients. *J Am Acad Child Adolesc Psychiatry* 2005; 44:64–72.
- Long-term study suggesting that the putative beneficial effects of risperidone may occur within the first few weeks of medication.
- 19 Aman MG, Gharabawi GH. Treatment of behaviour disorders in mental retardation: report on transitioning to atypical antipsychotics, with an emphasis on risperidone. *J Clin Psychiatry* 2004; 65:1197–1210.
- Much needed clinical guidelines on the use of risperidone in the management of behaviour disorders.
- 20 Stavrakaki C, Antochi R, Emery PC. Olanzapine in the treatment of pervasive developmental disorders: a case series analysis. *J Psychiatry Neurosci* 2004; 29:57–60.
- 21 Symons FJ, Thompson A, Realmuto G. Clonidine for self-injurious behaviour. *J Acad Child Adolesc Psychiatry* 2004; 43:1324–1325.
- Case report indicating the potential for clonidine in the treatment of behaviour disorders.
- 22 Zarcone JR, Lindauer SE, Morse PS, *et al.* Effects of risperidone on destructive behaviour of persons with developmental disabilities. III: Functional analysis. *Am J Ment Retard* 2004; 109:310–321.
- An excellent example of a study combining ABA methods with assessment of the effectiveness of pharmacological intervention for behaviour disorders.
- 23 Robertson J, Emerson E, Pinkney L, *et al.* Quality and costs of community-based residential services for people with mental retardation and challenging behavior. *Am J Ment Retard* 2004; 109:332–344.
- Practically significant research showing that colocation of people with behaviour disorders has no economic or treatment benefits.
- 24 Robertson J, Emerson E, Pinkney L, *et al.* Treatment and management of challenging behaviours in congregate and noncongregate community-based supported accommodation. *J Intellect Disabil Res* 2005; 49:63–72.
- 25 Holburn S, Jacobson JW, Schwartz AA, *et al.* The Willowbrook Futures Project: a longitudinal analysis of person-centered planning. *Am J Ment Retard* 2004; 109:63–76.
- One of very few studies evaluating the effects of person-centred planning and indicating some promise as a method of improving quality of life for people with behaviour disorders.
- 26 Asmus JM, Ringdahl JE, Sellers JA, *et al.* Use of a short-term inpatient model to evaluate aberrant behavior: outcome data summaries from 1996 to 2001. *J Appl Behav Anal* 2004; 37:283–304.
- Very encouraging data showing that a short-term specialist ABA service model may be effective in the treatment of cases difficult to manage via community services.

- 27** McClean B, Dench C, Grey I, *et al.* Person Focused Training: a model for
• delivering positive behaviour supports to people with challenging behaviours.
J Intellect Disabil Res 2005; 49:340–352.

Clinical research demonstrating how significant changes in behaviour disorders can be achieved by high-quality competency-based training of the workforce.

- 28** Carr EG, Horner RH, Turnbull AP, *et al.* Positive behavior support for people with developmental disabilities: a research synthesis. Washington, DC: American Association on Mental Retardation; 1999.