Psychotropic Drug Treatments for People with Autism and Other Developmental Disorders: A Primer for Practicing Behavior Analysts

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ABSTRACT

Many people with developmental disabilities receive medications prescribed to improve behavior. This manuscript overviews the psychopharmacology of developmental disabilities and considers how practitioners can assist in improving the quality of the pharmacological treatments that their clients receive.

Keywords: applied behavior analysis, autism, developmental disabilities, pharmacology, practitioners, psychotropic drugs.

Behavior analytic practitioners frequently provide services for people with autism or other developmental disabilities who simultaneously receive medications intended to improve their behavior, typically by reducing challenging responses. Research by Christian, Snyckerski, Singh, and Poling (1999) indicates that practitioners know relatively little about these drugs and would like to know more, and our experience in a variety of applied settings confirms that this is the case. The purpose of the present manuscript is to briefly review the psychopharmacology of developmental disabilities, with special emphasis on how behavior analytic practitioners can help to ensure that their clients derive maximal benefits from the drugs that they receive.

The Prevalence of Drug Use

Psychotropic drugs, which are medications prescribed with the intent of improving an individual's mood, cognition, or overt behavior, began to be widely used in the 1950s, following the introduction of the first effective antipsychotic drug, chlorpromazine (Thorazine®). In 1958, Theodore Greiner predicted that "in the years to come, the retarded may claim an all-time record, of having the greatest variety and largest tonnage of chemical agents shoveled into them" (p. 346).

His prediction of widespread psychotropic drug use among people with mental retardation (now termed cognitive or intellectual impairment) proved prophetic. For over 50 years, psychotropic medications have been widely prescribed for people with mental retardation and other developmental disabilities and this continues to be the case. For example, recent surveys indicate that approximately 40-50% of people with autism receive at least one psychotropic medication (e.g., Aman, Lam, & Collier-Crespin, 2003; Green et al., 2006; Goin-Kochel, Myers, & Mackintosh, 2007; Gringras, 2000; Langworthy-Lam, Aman, & Van Bourgondien, 2002; Witwer & Lecavalier, 2005). This prevalence rate is similar to that reported in earlier studies of people with mental retardation (e.g., Gadow & Poling, 1988; Matson et al., 2000; Poling, Laraway, Ehrhardt, Jennings, & Turner, 2004). Given the recent increase in the prevalence of autism (CDC, 2007), it is likely that a substantial number of people who formerly would have been diagnosed with mental retardation now would be diagnosed with autism (or another autism spectrum disorder), so the two populations overlap and drug studies that have been conducted with one group probably have considerable relevance to the other group.

A wide variety of psychotropic drugs are prescribed for people with autism and other developmental disabilities. Antipsychotics are the most used drugs (Mandell et al., 2008; Matson et al., 2000; Poling et al., 2004) and in 2006 risperidone (Risperdal®), an atypical antipsychotic, was approved by the United States Food and Drug Administration (FDA) for treating "irritability" in people with autism between 5 and 17 years of age (U.S. FDA, 2006). Risperidone currently is the only drug that is FDA-approved as a psychotropic medication for people with autism.

Off-Label Prescribing

When other drugs are prescribed to improve the behavior of people with autism, the use is "off-label," which means that the drug is prescribed for a purpose other than that for which it is specifically FDA-approved. Off-label prescribing is an accepted medical practice that is perfectly reasonable if there is reasonable scientific evidence that a given drug is effective for a particular application (Mayhew, 2009; Ventola, 2009). Moreover, autism or another developmental disability can co-exist with a psychiatric disorder, such as depression or attention-deficit/hyperactivity disorder (ADHD), and a drug may be approved for treating one

of these conditions, although not specifically in patients with a particular developmental disability (Thompson, 2007; Tsai, 2001).

Evidence-based service delivery is accepted in all of the helping professions and sound scientific data should guide the choice of any intervention (whether behavioral or pharmacological) intended to benefit people with a developmental disability. Unsound data can lead to the acceptance of treatments that are not actually effective. Greiner (1958) recognized this over 50 years ago, and cautioned “If your aim is helping the retarded, I urge you to avoid the casual clinical trial of drugs. Make them good trials, or don’t make them at all” (p. 13).

Methodological Concerns with Published Studies

Unfortunately, it is difficult to conduct methodologically sound medication evaluations in people with developmental disabilities, who are a protected population, and funding for such research historically has been very limited. Nonetheless, a sizeable number of published articles have reported the effects of various psychotropic drugs in people with mental retardation. Reviewers have been essentially unanimous in bemoaning the weak methodology characteristic of those studies (e.g., Aman & Singh, 1983; Baumeister & Sevin, 1990; Brylewski & Duggan, 1999; Gadow & Poling, 1988). Common and serious shortcomings of many published studies include:

1. Failure to demonstrate clinically significant, as opposed to statistically significant, drug effects.
2. Weak experimental designs, such as open label case studies.
3. Inadequate evaluation of possible adverse effects, including untoward behavioral effects such as general response suppression.
4. Failure to examine desired and untoward effects over a sufficient period of time (people may receive drugs for years, even decades, but few long-term exposure studies have appeared).
5. Failure to examine possible drug interactions. People with developmental disabilities frequently receive two or more psychotropic medications at the same time, but no studies have examined how or if drug combinations interact.

In summarizing what is probably the most comprehensive review of research examining drug effects in people with cognitive impairments (mental retardation), Matson et al. (2000) concluded with strong words:

Our findings were startling and consistent with Baumeister and Sevin’s findings in 1990. Professionals continue to medicate individuals in their care despite a lack of a sound research base to support their treatment decisions. While a small amount of research does exist, it is seriously flawed from a research design perspective. The studies routinely lack appropriate experimental control, and lack reliable measures of drug effect, collateral behaviors, and side effects. Methodological controls are far short of psychological treatment in the field with little improvement over previous decades. This trend is extremely disappointing given the dangerous and restrictive nature of

these treatment options. (p. 291)

In recent years, attention has swung away from the effects of psychotropic drugs in people with intellectual impairments and toward their use in people with autism. Dozens of studies examining the effects of various psychotropic drugs in people with autism have appeared in the past 20 years, and those studies suffer from many of the same shortcomings as those examining drug effects in people with cognitive impairments (Poling et al., in press). As others have pointed out (e.g., Arnold et al., 2000; Matson & Nebel-Schwalm, 2007; McDougle et al., 2000), subjective and ambiguous outcome measures are commonly used to index drug effects, and drug effects on these measures are impossible to translate into alterations in overt behavior. A few studies, however, have assessed drug effects on the directly-observed behaviors of people with autism.

Behavior-Analytic Drug Studies

Valdovinos et al. (2002) examined the destructive behavior of two adults with autism when placebo and four doses of risperidone (1.0, 1.6, 2.0, 2.5 mg/day) were administered. A withdrawal design was used and destructive behavior was quantified through direct observation and through the use of three rating scales, the Aberrant Behavior Checklist – Community (Aman, Singh, Stewart, & Fielding, 1985), the Self-Injurious Behavior Questionnaire (Gualtieri & Schroeder, 1989), and the Clinical Global Impression Scale (Guy, 1976). Weekly functional analysis sessions (using the general methods described by Iwata, Dorsey, Slifer, Bauman, & Richman, 1994) to determine the consequences controlling destructive behavior also were conducted.

Results indicated that “risperidone does decrease destructive behavior and that, for the most part, all of the various measures [of destructive behavior] yielded similar results” (Valdovinos et al., 2002, p. 268). There were no clear differences in levels of destructive behavior across conditions during functional analysis sessions regardless of whether risperidone was administered. Therefore, the function of the behavior was unclear and the study yielded no information regarding the behavioral mechanism responsible for risperidone-induced reductions in destructive behavior.

This article, like a number of other recent publications (e.g., Crosland et al., 2003; Garcia & Smith, 1999; Valdovinos, Ellringer, & Alexander, 2007; Valdovinos et al., 2002; Zarcone et al., 2001, 2004), demonstrates that behavior analytic methods can be used to good advantage in studying the effects of psychotropic drugs.

Conclusions of Research Reviews

Several recent reviews of this literature have appeared (e.g., Bodfish, 2004; Bryson, Rogers, & Fombonne, 2003; Francis, 2005; Gringras, 2000; McDougle & Posey, 2002; Matson et al., 2000; Moussavand & Findling, 2007; Myers, 2007; Myers & Johnson, 2003; Tsai, 2001) and the interested reader is directed to them. Taken collectively, and despite the methodological limitations of the studies evaluated, these reviews support three

conclusions. They follow and are consistent with our own evaluation of the relevant literature.

1. Several different drugs may be of value in reducing challenging behavior in people with autism. Among the individual drugs shown to be useful are medications classified as atypical antipsychotics, typical antipsychotics, tricyclic antidepressants, serotonin-specific reuptake inhibitors, and opioid antagonists (Moussavand & Findling, 2007).
2. Individual differences in response to a given drug are common (i.e., some people improve, others do not) and the factors responsible for the variability are unknown (Arnold et al., 2000). For example, a study of risperidone's effects on the "irritability" of 101 children with autism reported that 69% of them exhibited a positive response to the drug (Research Units on Pediatric Psychopharmacology Autism Network, 2002).
3. Side effects, the nature and severity of which differ across drugs and individuals, sometimes appear and limit a drug's clinical value. For example, risperidone can produce tremor, drowsiness, fatigue, drooling, weight gain, and enuresis (e.g., Ghanizadeh & Kianpoor, 2008; Scahill, Koenig, Carroll, & Pachler, 2007).

Treatment Interactions

Although it is impossible to know on the basis of published research how commonly particular drugs and behavioral interventions are combined, or to predict accurately how they will interact (Poling et al., in press; Weeden, Ehrhardt, & Poling, 2009), research involving people with autism and other developmental disabilities make it clear that interactions can occur (e.g., Fisher, Piazza, & Page, 1989; Hagopian & Anderson, 2010; MTA Cooperative Group, 1999; Napolitano et al., 1999; Northup, Fusilier, Swanson, Roane, & Borrero, 1997; Northup et al., 1999; Pyles, Muniz, Cade, & Silva, 1997; Schroeder, Lewis, & Lipton, 1983; Thompson, Moore, & Symonds, 2007). For example, methylphenidate (Ritalin®), which reduces food intake and subjective craving for food, might serve as an abolishing operation (Laraway, Snyderski, Michael, & Poling, 2003) and reduce the effectiveness of edible reinforcers in a behavior acquisition procedure (cf. Northup et al., 1997, 1999). Risperidone, in contrast, increases appetite for food (Aman, Desmoldt, Derivan, Lyons, & Fielding, 2002; Snyder et al., 2002) and might well serve as an establishing

Table 1. AACAP Principles of Best Practice in Psychotropic Drug Use

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1. Before initiating pharmacotherapy, a psychiatric evaluation is completed.
2. Before initiating pharmacotherapy, a medical history is obtained, and a medical evaluation is considered when appropriate.
3. The prescriber is advised to communicate with other professionals involved with the child to obtain collateral history and set the stage for monitoring outcomes and side effects during the medication trial.
4. The prescriber develops a psychosocial and psychopharmacological treatment plan based on the best available evidence.
5. The prescriber develops a plan to monitor the patient, short and long term.
6. Prescribers should be cautious when implementing a treatment plan that cannot be appropriately monitored.
7. The prescriber provides feedback about the diagnosis and educates the patient and family regarding the child's diagnosis and the treatment and monitoring plan.
8. Complete and document the assent of the child and consent of the parents before initiating medication treatment and at important points during treatment.
9. The assent and consent discussion focuses on the risks and benefits of the proposed and alternative treatments.
10. Implement medication trials using an adequate dose and for an adequate duration of treatment.
11. The prescriber reassesses the patient if the child does not respond to the initial medication trial as expected.
12. The prescriber needs a clear rationale for using medication combinations.
13. Discontinuing medication in children requires a specific plan.

**These practices are recommended by the American Academy of Child and Adolescent Psychiatry (2009) and detailed in that document.*

operation, making food reinforcers more effective in changing behavior.

Appropriate Use of Psychotropic Drugs

One important way that practitioners can maximize benefits for clients who receive psychotropic medication is to be aware of possible interactions between those drugs and the interventions they arrange and to alter their interventions accordingly. Another way is by helping physicians engage in data-based decision making. We have suggested elsewhere (e.g., Poling, 1994; Poling & Ehrhardt, 1999) that the essence of appropriate use of psychotropic drugs entails:

1. Ensuring that the goals of treatment are clear and in the client's best interest.
2. Ensuring that treatment decisions are made on the basis of real drug effects.
3. Ensuring that drug therapy is flexible and integrated with non-pharmacological interventions.

In pursuing these objectives, practitioners are behaving in a manner consistent with best practice guidelines recommended for physicians. Table 1 provides a list of such guidelines as recommended by the American Academy of Child and Adolescent Psychiatry (2009). It is noteworthy that these guidelines are very similar to the provisions for the appropriate use of psychotropic medications for people with

Table 2. Provisions for Appropriate Psychotropic Drug Use in Institutions

Provisions for Appropriate Psychotropic Drug Use in Institutions*

1. Specific target behaviors that are to improve as a function of drug treatment should be delineated.
2. An interdisciplinary team should evaluate the need for medication.
3. Written informed consent should be obtained from the parent or guardian of the client before drug treatment is initiated.
4. The minimal effective dose should be used.
5. Periodic attempts at drug reduction should be scheduled.
6. Drug treatment should be integrated with behavioral and educational intervention.
7. Periodic data-based evaluations of drug efficacy should be arranged.
8. Evaluations of drug effects should include monitoring for side effects.

**These provisions, described by Kalachnik (1988), were established from litigation, legislation, and regulations involving people with mental retardation and other developmental disabilities who resided in institutions.*

mental retardation residing in institutions that were established years ago, initiated in part by litigation, such as Wyatt v. Stickney (1972), and by federal legislation, notably Public Law 96-247, the Civil Rights of Institutionalized Persons Act of 1980. These provisions are listed in Table 2. As Gadow and Poling (1988) discuss, staff in most institutions generally adhered to these provisions, resulting in dramatic decreases in the inappropriate use of psychotropic medications. In his prophetic 1958 article, Greiner noted the importance of protecting vulnerable people from harm:

Sensible adult patients will usually balk when a drug is causing [harmful] symptoms, but the very young and the very old are forced to take drugs, can't complain or stop on toxic symptoms, may not even connect them with the drug. The mentally deficient of any size or age cannot protect themselves either, and they also merit special care to avoid toxic doses (p. 349).

When care providers behave in a manner consistent with the guidelines of Tables 1 and 2, the likelihood that people with a developmental disability will be harmed by drug treatment is minimized and the likelihood that they will receive benefit from such treatment is maximized. By learning these guidelines, sharing them with others, and doing all that is possible to ensure that they are followed, behavior analytic practitioners will do much to benefit their clients. Although the provisions in Table 2 were intended to safeguard people with mental retardation who lived in institutions, they constitute a sound approach to the use of psychotropic drugs in all populations and settings. The same is true of the provisions in Table 1.

Many years ago, Sprague and Werry (1971) proposed that every prescription of a psychotropic medication is in essence an experiment in which the physician and other caregivers hypothesize that administering a specific drug will produce a desired change in one or more aspects of a client's behavior. They hope and expect that the hypothesis will be confirmed,

but must collect relevant data to confirm their expectation. If they do not, patients may be exposed indefinitely to interventions that fail to help, and may even hurt, them.

Measuring Drug Effects

Behavior analysts characteristically are committed to documenting the effects of all of the treatments that they implement, and most practitioners are highly innovative in developing assessment strategies that can be implemented in the everyday world. *These same strategies can be put to good use in evaluating behavioral responses to psychotropic medication.* Assume, for example that an adolescent boy with severe cognitive impairment who resides in a group home engages in pernicious self-injurious behavior that has proven insensitive to

seemingly appropriate behavior-analytic interventions. Ideally, an interdisciplinary treatment team, including a physician and a behavior analyst, will meet to discuss the situation. The behavior analyst will present baseline data indexing the level of self-injury and overview how the response was defined and quantified. The team will discuss treatment options, including medications, and an appropriate intervention, perhaps risperidone, will be selected. Treatment details will be selected (e.g., the initial dose, the titration schedule) and a strategy for monitoring possible side effects selected. McCracken (2005) provides useful suggestions for practical strategies to monitor safety and tolerability of drugs. Physicians will be aware of common side effects of the medications they prescribe and will know how to monitor adverse physiological reactions. The assessment skills of behavior analysts typically are most useful in monitoring untoward behavioral effects, such as general suppression of behavior. Of course, published descriptions of side effects, such as those that appear in the *Physician's Desk Reference* (2010), typically refer to such effects as "cognitive," not behavioral.

After medication is prescribed, follow-up meetings to evaluate the client's status with respect to level of self-injury and possible untoward effects of risperidone (e.g., weight gain, sedation) are held. During these meetings, relevant data will be analyzed and the treatment will be continued unchanged, adjusted with respect to dosage, or discontinued, as appropriate. The behavior analyst will contribute to these meetings by ensuring that data are accurate and presented in a fashion that is easy to interpret. She or he will also ensure that any opportunity for learning appropriate behavior afforded by a reduction in self-injury is realized. If risperidone proves to be effective, the need for medication will be periodically re-evaluated and decisions regarding all interventions that the client receives will continue to be data-based.

In truth, the foregoing scenario often does not occur.

Psychiatrists and other physicians often are unable to participate regularly in team meetings and the best that a behavior analytic practitioner can do is to collect relevant data and make them available to the physician in an accessible form. For example, if she or he knows that psychotropic drug treatment is being considered for a particular client, the behavior analyst working on the case initially could provide baseline data to the physician, perhaps a simple and clearly-labeled graph showing daily occurrences of self-injury which are recorded by group home staff. She or he could continue to provide such data after medication is prescribed and dosage adjustments are made and, if appropriate, collect information relevant to probable side effects (e.g., the patient's weight could be measured each week if risperidone or another drug likely to increase appetite for food is given). Most physicians will find such data highly useful.

By helping to define and measure target responses and to make data-based treatment decisions, a behavior analyst can be invaluable in ensuring that people with developmental disabilities actually benefit from the drugs they receive. Of course, for this to occur, behavior analytic practitioners must become active members of whatever group of people is responsible for a given individual's medication. In our experience, this will not happen automatically in most situations. Nonetheless, practitioners who approach key players (e.g., parents, staff psychiatrists) with tact and patience can often find a meaningful role to play. Allen, Barone, and Kuhn (1993) offer a number of reasonable suggestions for increasing the acceptance of applied behavior analysis among pediatricians and some of their recommendations may help practitioners interact positively with psychiatrists and other physicians who prescribe psychotropic drugs. For example, becoming familiar with the language commonly used by physicians to describe behavior disorders is likely to be of value, as is learning about behavior-rating scales that are commonly used by them (e.g., the Aberrant Behavior Rating scale, the Conner's Teacher Rating Scale). So, too, is learning which physicians are committed to data-based decision making, developing productive professional relationships with them, and encouraging parents and guardians to seek them out. As with behavior analysts, physicians differ in their approach to service delivery. Also as with behavior analysts, physicians are always pressed for time. Don't waste theirs. Because they are responsible for all decisions concerning medications, recognize that the physician is the leader in this domain and the proper role of the

behavior analyst is in a supporting one. Practitioners are well advised to learn all they can about the drugs their clients receive - and the prescribing physician can be an excellent source of information - but it is not the role of the practitioner to suggest drug treatments.

Alternatives and Adjuncts to Drug Treatments

Of course, practitioners can be of value in providing alternatives to and adjuncts for drug treatments. Principle 9 in Table 1 states that "[t]he assent and consent discussion focuses on the risks and benefits of the proposed and alternative treatments." It is interesting and distressing that there are very few comparisons of drug versus behavior analytic procedures as treatments for people with developmental disabilities. As Weeden et al. (2009) indicated, it is especially noteworthy that risperidone has not been compared to a behavior analytic strategy for reducing challenging behavior, because both are widely used for this purpose.

It is evident that both risperidone and applied behavior analysis are empirically validated treatments for reducing challenging behaviors in children with autism. The kind of research that supports their effectiveness differs, however. Most studies evaluating risperidone used a substantial number of participants, indirect measures of problem behaviors, and statistical data analyses (for a review see Jesner, Arif-Adib, & Coren, 2007). In contrast, most studies evaluating behavior-analytic interventions used relatively few subjects, direct measures of problem behaviors, and visual data analysis (for a review see Fahmie & Hanley, 2008). These are fundamentally different research strategies and people who favor one approach are frequently dismissive of the other.

Even if parent or caregiver read and fully understood all of the relevant research literature, that individual would have a difficult time determining whether risperidone or applied behavior analysis was the better option for reducing challenging behavior. If the caregiver sought an expert's opinion, that opinion would likely vary across experts, depending on their disciplines, training, and experience. A psychiatrist would probably, and from her or his perspective appropriately, recommend risperidone. A behavior analyst, also appropriately for him or her, would opt for applied behavior analysis. Both could do so on the basis of data, but neither could do so on the basis of a direct published comparison of the two interventions.

Practitioners should be aware of the empirical evidence supporting the effectiveness of any procedure they recommend and be prepared

to defend that procedure. They should realize, however, that others may argue strongly and with some justification for pharmacological interventions, which are cheaper and easier to implement than behavior-analytical treatments. A point worth making is that pharmacological interventions can be relatively restrictive (i.e., potentially harmful), although the cogency of this argument differs as a function of the drug in question.

If a practitioner argues that a behavioral intervention should be implemented prior to trying a given drug, because the drug is more likely to produce untoward effects, it is important that he or she know the nature and general likelihood of occurrence of those effects. For example, sedation, increased appetite for food, and weight gain are common side effects of risperidone (e.g., Aman et al., 2002), and it is appropriate to point out that these actions might be intolerable for certain patients (e.g., those who are obese or have diabetes) and should be monitored in all treated individuals. It is neither gainful nor accurate, however, to criticize all psychotropic drugs as “chemical straitjackets” that non-selectively suppress all behaviors and inevitably do more harm than good.

Accountable Treatment

Regardless of treatment type, accountable, hence appropriate, treatment requires that: a) goals (i.e., the desired changes in target behaviors) are clear and in the treated individual's best interest; b) procedures (i.e., who does what to whom) are unambiguous and implemented with fidelity, and c) decisions (i.e., whether the intervention is continued, altered, or terminated) are made on the basis of actual changes in target behavior and other relevant characteristics of the participant. As discussed previously, behavior analysts routinely document treatment outcomes and their assessment skills can be put to good use in examining the effects of pharmacological interventions. To ascertain whether a pharmacological intervention is successful in treating a behavior disorder, three questions must be answered: (1) What are the desired effects of the medication? (2) Were those effects obtained? (3) Were there any significant adverse reactions? (Kollins, Ehrhardt, & Poling, 2000). These are easy questions to ask, but they are not so easy to answer, whether in the context of formal research or in practical everyday drug evaluations. In many cases, a behavior analyst can help to collect data that are *suggestive* of medication effects, but not proof positive. That's OK. Marginal data are far superior to no data at all.

Concluding Comment

Prescribing psychotropic drugs for people with developmental disabilities is a common, and sometimes controversial, practice. Although some behavior analysts are highly critical of the use of drugs to manage behavior (e.g., Flora, 2007; Israel, 2009), our reading of the relevant literature indicates that psychotropic drugs are neither good nor bad. They're usually cheap and easy to use, and some people with developmental disabilities benefit greatly from them. Others, of course, derive no benefit, and some are demonstrably harmed by the drugs

they receive. Travis Thompson, a pioneer in using applied behavior analysis to benefit people with developmental disabilities and one of the founders of behavioral pharmacology, appears to agree with our view. In discussing the use of psychotropic drugs in people with autism, he notes: “Medications can be helpful, harmful, or inconsequential, depending on the specific circumstance” (2007, p. 172). Arguing whether psychotropic medications are good or bad, he contends, is as fruitless as arguing about the value of rain, which is priceless in a drought and horrific in a flood. Effective psychopharmacology, like effective behavior analysis, is individualized and data based. Behavior analytic practitioners are often in positions that allow them to increase the likelihood that their clients receive real benefit from the medications that they receive and we encourage them to do so when and wherever they can. The task will rarely be easy, but it will always be worthwhile.

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References

- Allen, K. D., Barone, V. J., & Kuhn, B. R. (1993). A behavioral prescription for promoting applied behavior analysis within pediatrics. *Journal of Applied Behavior Analysis*, 26, 493-502.
- Aman, M. G., & Singh, N. N. (1983). Pharmacological interventions. In J. L. Matson & J. A. Mulick (Eds.), *Handbook of mental retardation* (pp. 317-337). New York: Pergamon.
- Aman, M. G., De Smedt, G., Derivan, A., Lyons, B., & Fielding, R. L. (2002). Double-blind, placebo-controlled study of risperidone for the treatment of disruptive behavior disorders in children with subaverage intelligence. *American Journal of Psychiatry*, 159, 1337-1346.
- Aman, M. G., Singh, N. N., Stewart, A. W., & Field, C. J. (1985). Psychometric characteristics of the Aberrant Behavior Checklist. *American Journal of Mental Deficiency*, 89, 492-502.
- Aman, M. G., Lam, K. S., & Collier-Crespin, A. (2003). Prevalence and patterns of use among individuals with autism in the Autism Society of Ohio. *Journal of Autism and Developmental Disorders*, 33, 525-534.
- American Academy of Child and Adolescent Psychiatry. (2009). Practice parameter on the use of psychotropic medication in children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 48, 961-973.
- Arnold, L. E., Aman, M. G., Martin, A., Collier-Crespin, A., Vitello, B., Tierney, E., Asarnow, R., Bell-Bradshaw, F., Freeman, B. J., Gates-Ulanet, P., Klin, A., McCracken, J. T., McDougle, C. J., McGough, J. J., Posey, D. J., Scahill, L., Siezy, N. b., Ritz, L., & Volkmar, F. (2000). Assessment in multisite randomized clinical trials of patients with autistic disorders: the autism RUPP network. *Journal of Autism and Developmental Disorders*, 30, 99-113.

- Baumeister, A. A., & Sevin, J. A. (1990). Pharmacological control of aberrant behavior in the mentally retarded: Towards a more rational approach. *Neuroscience & Biobehavioral Reviews*, 14, 253-262.
- Bodfish, J. W. (2004). Treating the core features of autism: Are we there yet? *Mental Retardation and Developmental Disabilities Research Reviews*, 10, 318-326.
- Brylewski, J., & Duggan, L. (1999). Antipsychotic medication for challenging behavior in people with intellectual disability: A systematic review of randomized controlled trials. *Journal of Intellectual Disability Research*, 43, 360-371.
- Bryson, S. E., Rogers, S. J., & Fombonne, E. (2003). Autism spectrum disorders: Early detection, intervention, education, and psychopharmacological management. *Canadian Journal of Psychiatry*, 48, 506-516.
- Christian, L., Snyderski, S., Singh, N., & Poling, A. (1999). Direct service staff's perceptions of psychotropic medication in noninstitutional settings for individuals with developmental disabilities. *Journal of Intellectual Disability Research*, 43, 88-93.
- Centers for Disease Control and Prevention. (2007). Prevalence of autism spectrum disorders—Autism and Developmental Disabilities Monitoring (ADDM) network, 14 sites, United States, 2002. *MMWR Surveillance Summaries*, 2007. 56, 12–28.
- Crosland, K. A., Zarcone, J. R., Lindauer, S. E., Valdovinos, M. G., Zarcone, T. J., Hellings, J. A., & Schroeder, S. R. (2003). Use of functional analysis methodology in the evaluation of medication effects. *Journal of Autism and Developmental Disabilities*, 33, 271-279.
- Fahmie, T. A., & Hanley, G. P. (2008). Progressing toward data intimacy: A review of within-session data analysis. *Journal of Applied Behavior Analysis*, 41, 319-331.
- Fisher, W., Piazza, C. C., & Page, T. J. (1989). Assessing independent and interactive effects of behavioral and pharmacological interventions for a client with dual diagnoses. *Journal of Behavior Therapy and Experimental Psychiatry*, 20, 241-250.
- Flora, R. (2007). *Taking America off drugs: Why behavior therapy is more effective for treating ADHD, OCD, depression, and other psychological problems*. Albany, NY: State University of New York Press.
- Francis, K. (2005). Autism interventions: A critical update. *Developmental Medicine & Child Neurology*, 47, 493-499.
- Gadow, K. D., & Poling, A. (1988). *Pharmacotherapy and mental retardation*. Boston: Little, Brown.
- Garcia, D., & Smith, R. G. (1999). Using analog baselines to assess the effects of naltrexone on self-injurious behavior. *Research in Developmental Disabilities*, 20, 1-21.
- Ghanizadeh, A., & Kianpoor, M. (2008). Cessation of risperidone-induced incontinency by valproate in a child with pervasive developmental disorder. *Primary Psychiatry*, 15, 32-34.
- Goin-Kochler, R. P., Myers, B. J., & Mackintosh, V. H. (2007). Parental reports on the use of treatments and therapies for children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 1, 195-209.
- Green, V. A., Pituch, K. A., Itchen, J., Choi, A., O'Reilly, M., & Sigafoos, J. (2006). Internet survey of treatments used by parents of children with autism. *Research in Developmental Disabilities*, 27, 70-84.
- Greiner, T. (1958). Problems in methodology in research with drugs. *American Journal of Mental Deficiency*, 64, 346-352.
- Gringras, P. (2000). Practical pediatric psychopharmacological prescribing in autism: The potential and the pitfalls. *Autism*, 4, 229-247.
- Gualtieri, C. T., & Schroeder, S. R. (1989). Pharmacotherapy for self-injurious behavior: Preliminary tests of the D1 hypothesis. *Psychopharmacology Bulletin*, 25, 264-271.
- Guy, W. (1976). ECDEU assessment manual for psychopharmacology (Revised) U.S. Department of Health, Education, and Welfare Publication ADM, pp. 76-338). Rockville, MD: National Institute of Mental Health.
- Hagopian, L. P., & Anderson, M. E. (2010). Integrating behavioral and pharmacological interventions for severe problem behavior displayed by children with neurogenetic and developmental disorders. In B. K. Shapiro & P. J. Accardo (Eds.), *Neurobehavioral disorders: Behavioral issues and their treatment* (pp. 2319-239). New York: Brookes.
- Israel, M. (2009). *Primer on psychotropic drugs (volume 38)*. Retrieved January 29, 2010 from <http://www.judgerc.org/DrugPrimer.pdf>.
- Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis*, 27, 197-209. (Reprinted from *Analysis and Intervention in Developmental Disabilities*, 2, 3-20, 1982).
- Jesner, O. S., Aref-Adib, M., & Coren, E. (2007). Risperidone for autism spectrum disorders. *Cochrane Database of Systematic Reviews* (1):CD005040.
- Kalachnik, J. E. (1988). Medication monitoring procedures. In K. D. Gadow & A. Poling (Eds.), *Pharmacology and mental retardation* (pp. 231-268). Boston: Little, Brown.
- Kollins, S., Ehrhardt, K., & Poling, A. (2000). Clinical drug assessment. In A. Poling & T. Byrne (Eds.), *Introduction to behavioral pharmacology* (pp. 191-218). Reno, NV: Context Press.
- Langworthy-Lam, K. S., Aman, M. G., & Van Bourgondien, M. E. (2002). Prevalence and patterns of use of psychoactive medicines in individuals with autism in the Autism Society of North Carolina. *Journal of Child and Adolescent Psychopharmacology*, 12, 311-321.
- Laraway, S., Snyderski, S., Michael, J., & Poling, A. (2003). Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis*, 36, 407-414.

- Mandell, D. S., Morales, K. H., Marcus, S. C., Stahmer, A. C., Doshi, J., & Polsky, D. E. (2008). Psychotropic medication use among Medicaid-enrolled children with autism spectrum disorders. *Pediatrics*, 121, 441-448.
- Matson, J. L., & Nebel-Schwalm, M. (2007). Assessing challenging behavior in children with autism spectrum disorders: A review. *Research in Developmental Disabilities*, 28, 567-579.
- Matson, J. L., Bamburg, J. W., Mayville, E. A., Pinkston, J., Bielecki, J., Kuhn, D., Smalls, Y., & Logan, J. R. (2000). Psychopharmacology and mental retardation: A 10 year review (1990-1999). *Research in Developmental Disabilities*, 21, 263-296.
- Mayhew, M. (2009). Off-label prescribing. *Journal for Nurse Practitioners*, 5, 122-123.
- McCracken, J. T. (2005). Safety issues with drug therapies for autism spectrum disorders. *Journal of Clinical Psychiatry*, 66, 32-37.
- McDougle, C. J., & Posey, D. J. (2002). Autistic and other pervasive developmental disorders. In A. Martin, L. Scahill, D. S. Charney, & J. F. Leckman (Eds.), *Paediatric psychopharmacology: Principles and practices* (pp. 563-579). Oxford: Oxford University Press.
- McDougle, C. J., Scahill, L., McCracken, J. T., Aman, M. G., Tierney, E., Arnold, L. E., Freeman, B. J., Martin, A., McGough, J. J., Cronin, P., Posey, D. J., Riddle, M. A., Ritz, L., Swiezy, N. B., Vitiello, B., Volkmar, F. R., Votolato, N. A., & Walson, P. (2000). Research units on pediatric psychopharmacology (RUPP) Autism Network: Background and rationale for an initial controlled study of risperidone. *Child and Adolescent Psychiatry Clinics of North America*, 9, 201-224.
- Moussavand, S., & Findling, R. L. (2007). Recent advances in the pharmacological treatment of pervasive developmental disorders. *Current Pediatric Reviews*, 3, 79-91.
- MTA Cooperative Group. (1999). A 14-month randomized clinical trial of treatment strategies for attention-deficit hyperactivity disorder (ADHD). *Archives of General Psychiatry*, 56, 1073-1086.
- Myers, S. M. (2007). The status of pharmacotherapy for autism spectrum disorders. *Expert Opinion on Pharmacotherapy*, 8, 1579-1603.
- Myers, S. M., & Johnson, C. P. (2007). Management of children with autism spectrum disorders. *Pediatrics*, 120, 1162-1182.
- Napolitano, D. A., Jack, S. L., Sheldon, J. B., Willaims, D. C., McAdam, D. B., & Schroeder, S. R. (1999). Drug-behavior interactions in persons with mental retardation and developmental disabilities. *Mental Retardation and Developmental Disabilities Research Reviews*, 5, 322-344.
- Northup, J., Fusilier, I., Swanson, V., Huete, J., Bruce, T., Freeland, J., Gully, V., & Edwards, S. (1999). Further analysis of the separate and interactive effects of methylphenidate and common classroom contingencies. *Journal of Applied Behavior Analysis*, 32, 35-50.
- Northup, J., Fusilier, I., Swanson, V., Roane, H., & Borrero, J. (1997). An evaluation of methylphenidate as a potential establishing operation for some common classroom reinforcers. *Journal of Applied Behavior Analysis*, 30, 615-625.
- Physicians' Desk Reference 2010*. (2010). Montvale, NJ: Author.
- Poling, A. (1994). Pharmacological treatment of behavioral problems in people with mental retardation: Some ethical considerations. In L. J. Hayes, G. J. Hayes, S. C. Moore, & P. M. Ghezzi (Eds.), *Ethical issues in developmental disabilities* (pp. 149-177). Reno, NV: Context Press.
- Poling, A., & Ehrhardt, K. (1999). Applied behavior analysis, social validation, and the psychopharmacology of mental retardation. *Mental Retardation and Developmental Disabilities Research Reviews*, 5, 342-347.
- Poling, A., Ehrhardt, K., Wood, A., & Bowerman, R. (in press). Psychopharmacology and behavior analysis in autism treatment. In J. A. Matson & E. A. Mayville (Eds.), *Behavioral foundations of effective autism treatment*. New York: Sloan.
- Poling, A., Laraway, S., Ehrhardt, K., Jennings, L., & Turner, L. (2004). Pharmaceutical interventions and developmental disabilities. In W. L. Williams (Eds.), *Developmental disabilities: Etiology, assessment, intervention, and integration* (pp. 105-124). Reno: Context Press.
- Poling, A., Laraway, S., Ehrhardt, K., Jennings, L., & Turner, L. (2004). Pharmaceutical interventions and developmental disabilities. In W. L. Williams (Eds.), *Developmental disabilities: Etiology, assessment, intervention, and integration* (pp. 105-124). Reno: Context Press.
- Pyles, D. A. M., Muniz, K., Cade, A., & Silva, R. (1997). A behavioral diagnostic paradigm for integrating behavior-analytic and psychopharmacological interventions for people with a dual diagnosis. *Research in Developmental Disabilities*, 18, 185-214.
- Research Units on Pediatric Psychopharmacology Autism Network. (2002). Risperidone in children with autism and serious behavioral problems. *New England Journal of Medicine*, 347, 314-321.
- Scahill, L., Koenig, K., Carroll, D. H., & Pachler, M. (2007). Risperidone approved for the treatment of serious behavioral problems in children with autism. *Journal of Child and Adolescent Psychiatric Nursing: Official Publication of the Association of Child and Adolescent Psychiatric Nurses, Inc.*, 20, 188-190.
- Schroeder, S. R., Lewis, M. H., & Lipton, M. A. (1983). Interaction of pharmacotherapy and behavior therapy among with learning and behavior disorders. *Advances in Learning and Behavior Disabilities*, 2, 179-225.
- Snyder, R., Turgay, A., Aman, M., Binder, C., Fisman, S., & Carroll, A. (2002). Effects of risperidone on conduct and disruptive behavior disorders in children with subaverage IQs. *Journal of the American Academy of Child and Adolescent Psychiatry*, 41, 1026-1046.
- Sprague, R. L., & Werry, J. L. (1971). Methodology of psychopharmacological studies with the retarded. In N. R. Ellis (Ed.), *International review of research in mental retardation* (Vol. 5, pp. 147-219). New York: Academic Press.

- Thompson, T. (2007). *Making sense of autism*. Baltimore, MD: Brookes.
- Thompson, T., Moore, T., & Symons, F. (2007). Psychotherapeutic medications for positive behavior support. In S. Odom, R. Horner, M. Snell, & J. Blacher (Eds.), *Handbook on developmental disabilities* (pp. 501-527). New York: Guilford.
- Tsai, L. V. (2001). *Taking the mystery out of medications in autism/Asperger's syndrome*. Arlington, TX: Future Horizons.
- U.S. Food and Drug Administration. (2006). FDA approves the first drug to treat irritability associated with autism, Risperdal <http://www.fda.gov/bbs/topics/NEWS/2006/NEW01485.html> accessed May 28, 2009
- Valdovinos, M. G., Ellringer, N. P., & Alexander, M. L. (2007). Changes in the rate of problem behavior associated with the discontinuation of the antipsychotic medication quetiapine. *Mental Health Aspects of Developmental Disabilities*, 10, 64-67.
- Valdovinos, M. G., Napolitano, D. A., Zarcone, J. R., Hellings, J. A., Williams, D. G., & Schroeder, S. R. (2002). Multimodal evaluation of risperidone for destructive behavior: Functional analysis, direct observations, rating scales, and psychiatric impressions. *Experimental and Clinical Psychopharmacology*, 10, 268-275.
- Ventola, C. L. (2009). Off-label drug information: Regulation, distribution, evaluation, and related controversies. *Pharmacy and Therapeutics*, 34, 428-432.
- Weeden, M., Ehrhardt, K., & Poling, A. (2009). Conspicuous by their absence: Studies comparing and combining risperidone and applied behavior analysis to reduce challenging behavior in children with autism. *Research in Autism Spectrum Disorders*, 3, 905-912.
- Witwer, A., & Lecavalier, L. (2005). Treatment incidence and patterns in children and adolescents with autism spectrum disorders. *Journal of Child and Adolescent Psychopharmacology*, 15, 671-681.
- Wyatt v. Stickney*. (1972). 325 F. Supp. 387 (filed 1972).
- Zarcone, J. R., Hollings, J. A., Crandall, K., Reese, R. M., Marquis, J., Fleming, K., Shores, R., Williams, D., & Schroeder, S. R. (2001). Effects of risperidone on aberrant behavior of persons with developmental disabilities: I. A double-blind crossover study using multiple measures. *American Journal on Mental Retardation*, 106, 525-538.
- Zarcone, J. R., Lindauer, S. E., Morse, P. S., Crosland, K. A., Valdovinos, M. G., McKerchar, T. L., Reese, R. M., Hellings, J. A., & Schroeder, S. R. (2004). Effects of risperidone on destructive behavior of persons with developmental disabilities: III. Functional analysis. *American Journal on Mental Retardation*, 109, 310-321.

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