Treatment Approaches for Self-injurious Behavior in Individuals with Autism: Behavioral and Pharmacological Methods

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Abstract

This paper reviews behavioral and pharmacological approaches to the treatment of self-injurious behavior in autism. Both behavioral and pharmacological approaches offer a multitude of treatment options which we hope to elucidate. In providing this review, the goal is to provide an awareness of the treatment options available and to prompt further research on effective treatments for SIB in individuals with autism, specifically behavioral function-driven pharmacological treatment.
Keywords: autism, self-injury, functional assessment, psychotropic medication.

The most recent report published by the Centers for Disease Control (CDC) note the prevalence of autism to be approximately 1 out of every 150 live births with a male to female ratio of 4 to 1 (CDC, 2007). Autism is a heterogeneous neurodevelopmental disorder characterized by a wide array of symptoms but with some commonalities (Volkmar & Klin, 2005). Symptoms are primarily noted in three domains; specifically impairments in social interaction and communication, and engagement in repetitive behaviors.

Social interaction impairments may include the failure to develop appropriate peer relationships, lack of desire to share social enjoyments or interests, or lack of social reciprocity. Impairments in communication may include a delay in the development of spoken language, the ability to initiate or continue a conversation, stereotyped or repetitive use of language, or lack of spontaneous pretend play or social imitative play. Finally, those with autism may also engage in repetitive and stereotyped behavior such as abnormal preoccupation with one or more patterns of interest, the need for strict routines, preoccupation with parts of objects, repetitive motor mannerisms, and self-injurious behavior. Self-injurious behavior (SIB) is any harmful behavior that an individual inflicts upon himself/herself and is usually considered to be the most pressing issue facing individuals with developmental disorders or mental retardation, including autism (Barrera, Violo, & Graver, 2007; Dawson, Matson, & Cherry, 1998; Murphy, Hall, Oliver & Kissi-Debra, 1999; Newell, Sprague, Pain, Deutsch, & Meinhold, 1999). About 5 to 16 percent of individuals with mental retardation exhibit SIB (Richman & Lindauer, 2005) with the severity of the SIB correlated with the severity of the delay (Baghdadli, Pascal, Grisi & Aussilloux, 2003).

The etiology of autism and SIB are still being researched and debated. To date, there have been many candidate genes identified (e.g., SERT, MAOA, FOXP2) as potential causes of autism (Wassink, Brzustowicz, Bartlett, & Szatmari, 2004). Given the multitude of genes and the diversity of phenotypic expression, there is suggestion that the underlying cause of autism may vary across children. Similarly there are multiple behavioral and biological correlates that influence the onset of SIB. This paper specifically addresses the treatment of SIB focusing on behavioral and pharmacological methods. Within each of these methods there is a wide array of options that will be assessed. By reviewing all of these options we hope to provide an awareness of the treatment options available and provide a prompt for further research on effective treatments for SIB in individuals with autism.

It is difficult to find one comprehensive course of treatment for autism as it is generally considered to be a heterogeneous disorder. Attempting to find comprehensive treatment for SIB is equally challenging as there may be multiple variables maintaining SIB – environmental and/or physiological. Since is it hypothesized that in some cases, SIB may be the result of many interacting effects of genetics, biochemistry, and environment, understanding the behavioral and biological function of SIB may aid in the development of a treatment regimen, especially in those cases where SIB is treatment resistant, a common feature of SIB (Sandman, 1988).

Behavioral Treatment of Self-injurious Behavior

The foremost approach for the treatment of SIB in individuals with autism is behaviorally based. Research has demonstrated that for many individuals SIB is socially mediated warranting environmental modifications (Iwata, Pace, et al., 1994). Determining the function of SIB and selecting treatments based on these functions is paramount for successful treatment. Functional assessments allow for the identification of the relations between SIB and relevant antecedents and consequences on an individual basis (Iwata, Dorsey, Slifer, Bauman, & Richman 1982/1994; Iwata et al., 1994; Harding et al., 2005). The results of functional assessments subsequently guide the process of selecting appropriate and functionally relevant treatment.

Assessments may be conducted in various ways. Ideally, an initial interview with caregivers would be conducted to determine what, if any, hypothesized function of SIB has been identified. Then, observations of the individual can be conducted informally, ideally in the settings and times when SIB is most likely to occur (Durand & Merges, 2001). Analogue functional analysis can also be conducted (Iwata et al., 1982/1994). Analogue functional analysis involves the systematic presentation and/or removal of stimuli or conditions hypothesized to be maintaining the behavior of interest. The presentations of these conditions are intended to reflect what occurs in one's natural environment. Of the various conditions conducted, a control condition is included. The advantage of this type of assessment is that once a function is determined, an intervention can be designed that targets those variables demonstrated to be maintaining problem behavior. This may include the withholding of the reinforcers maintaining the behavior or the delivery of a reinforcer for an alternative to the problem behavior (Saunders, Saunders, Brewer, & Roach, 1996). In this section, we review those behavior functions most commonly observed for SIB and the interventions demonstrated to be effective for treating SIB under these conditions. Although punishment procedures have been reported as a treatment for SIB, the focus of this review are those treatments targeting the conditions under which SIB is most likely to occur (function-based).

Escape Maintained. Empirical evidence indicates that for some, SIB is a learned operant behavior (Newell, Sprague, Pain, Deutsch & Meinhold, 1999). In fact, in a review conducted by Iwata and colleagues (1994), it was discovered that in a majority of analogue functional analyses reviewed SIB was maintained by negative reinforcement or escape from some noxious stimulus (e.g., demands, social interactions). Common treatments for SIB maintained by negative reinforcement include escape extinction, noncontingent negative reinforcement/escape (NE), and differential negative reinforcement (DNR) (Rojahn, Schroeder, & Hoch, 2008). An escape extinction procedure involves rearranging contingencies so that SIB no longer results in reinforcement (i.e., escape). For example, Pace et al. (1993), continued to present instructions using physical guidance when SIB occurred during treatment. This intervention resulted in dramatic decreases in SIB. Although escape extinction has been demonstrated to be effective in decreasing SIB, a common side effect of this procedure may be an initial increase in incidence of SIB (extinction burst) (Goh & Iwata, 1994; Pace, Iwata, Cowdery, Andree, & McIntyre, 1993; Zarcone et al., 1993). However, Zarcone and colleagues (1993) have demonstrated that

extinction bursts may be mitigated by simultaneously incorporating a fading procedure that gradually increases the number of demands with an escape extinction procedure.

NE is a variation of extinction in which the contingency between SIB and the escape consequence is eliminated. Mace et al. (1998) determined that the use of a warning stimulus for aversive events (i.e., task demands) combined with NE and noncontingent reinforcement (access to items or escape from demands) decreased SIB. Vollmer et al. (1995) studied two young males who displayed SIB, one of whom exhibited autistic-like behaviors. All treatment sessions began with a three-prompt request to "come to the table." The sequences consisted of a verbal request, modeling, and then physically guiding the individual. During baselines, the response was identical to the escape condition in the functional analysis. During the NE condition, breaks were allowed for the participant on a fixed time interval; subsequently, SIB no longer influenced the frequency of breaks. Results showed that NE was effective in suppressing SIB immediately.

The final procedure used to treat negatively reinforced SIB is DNR. This involves the manipulation of reinforcement contingencies so that desired behaviors instead of SIB are reinforced. In the Vollmer et al. study (1995), one of the two participants was also treated using a DNR procedure. At 20-s intervals, in the absence of SIB, the participant was allowed to escape at the end of the 30-s interval. The DNR procedure was demonstrated to effectively decrease SIB while increasing the length of intervals without SIB.

Maintained by Access to Attention/Tangible Items. Within the literature, results of analogue functional analysis, have generally shown that SIB occurs with higher probability in those conditions in which access to social attention and tangible or food items are contingent upon SIB (Barrera, Violo & Graver, 2007; Iwata, Pace et al., 1994; Oliver, Hall & Murphy, 2005; Repp, Felce & Barton, 1988; Richman & Lindauer, 2005; Symons, Hoch, Dahl & McComas, 2003). Ancillary to this conceptualization, the research also supports a mutual reinforcement paradigm (Oliver, Hall & Murphy, 2005).

According to this paradigm, one of two things happens: 1) SIB that is initially nonsocially reinforced will come under control of social reinforcement or 2) social reinforcement mediates the transition from stereotypic behavior to SIB (Oliver, Hall & Murphy, 2005; Richman & Lindauer, 2005). In other words, stereotypies and SIB with possible nonsocial etiologies will become increasingly maintained through social reinforcement. However, this model has been found to be more appropriate with mild SIB cases. More severe SIB may be explained better by nonsocial reinforcement contingencies to be discussed later.

A treatment for SIB that has gained empirical support is Functional Communication Training (FCT) (Harding et al., 2005). FCT provides an alternate, socially-appropriate communicative behavior to replace problem behavior (Braithwaite & Richdale, 2000; Harding et al., 2005). In FCT, problem behavior is viewed as a communicative response. If problem behavior is reduced or eliminated without providing a replacement, the individual is left without a way of communicating needs or wishes (Durand & Merges, 2001). Four factors that influence the success or failure of FCT include: ensuring the new communicative response matches the function of the challenging behavior; assessing the likelihood that the new response will produce the desired outcome; assessing the individual's ability to choose or control the outcome; and making the problem behavior non-functional (Durand & Merges, 2001). Braithwaite and Richdale (2000) evaluated the efficacy of FCT in treating a boy with autism who engaged in severe SIB. One of the primary functions identified for SIB was access to preferred toy items. After a short series of training sessions in which an alternate response to the problem behavior was taught (requesting desired items) the occurrence of SIB rapidly reduced to zero levels.

Additional treatments that have been successful in treating SIB maintained by positive reinforcement include: extinction, differential reinforcement of other behavior (DRO), differential reinforcement of alternative behavior (DRA), differential reinforcement of incompatible behavior (DRI), and noncontingent reinforcement (NCR) (Rojahn et al., 2008). Non-contingent reinforcement refers to the delivery of a reinforcer on a response-independent basis. Therefore, the reinforcer is made available to the individual on a timed schedule. A limitation of NCR is that although the SIB may be reduced, an alternative behavior is not strengthened (Carr et al., 2000).

Non-socially Mediated (Sensory or Automatic). When a functional analysis indicates that the SIB is being maintained by automatic reinforcement, treatment has to focus on non-socially mediated sources of reinforcement. Sensory or automatic reinforcement seems to account for one quarter of all SIB cases (Iwata, Pace, et al., 1994). Within an analogue functional analysis, differential rates of SIB occurring in the absence of social consequences or high and undifferentiated responding across all test conditions may suggest automatic reinforcement. If a sensory or automatic function of SIB is suspected, the recommendation is to conduct further assessment testing function-specific treatments against conditions where an individual may have access to other sources of reinforcement such as sensory extinction and response-independent continuous access to alternative sources of stimulation (McKerchar, Kahng, Casioppo, & Wilson, 2001).

Sensory extinction involves attenuating or blocking the hypothesized reinforcer. In the response-independent strategy continuous access to the stimuli is allowed thereby decreasing the effectiveness of the reinforcement for SIB. The findings in a study by DeLeon et al. (2000) suggest an importance of identifying multiple preferred stimuli for individuals to avoid satiation. In another study, Magnussen and Gould (2007) investigated the use of a response-independent approach through the application of protective equipment (i.e., helmet) combined with the contingent removal of the protective equipment (negative punishment procedure) to reduce the SIB of an adolescent with autism. During the initial analysis, SIB was present in all conditions, but highest in the alone and play conditions. This suggested that the SIB was not likely maintained by social consequences. During treatment conditions (i.e., continuous access to protective equipment), the individual wore the helmet throughout the session, and there were no programmed consequences for SIB. During contingent removal of protective equipment, the individual wore the helmet until an instance of SIB occurred, in which a piece of the helmet was removed. Once the individual counted to10 with his hands folded in this lap and without attempting SIB, the helmet was reapplied. During contingent helmet removal sessions, SIB was reduced to near zero levels almost immediately. Kennedy and Souza (1995) found that when an individual, who engaged in eye poking, wore plastic safety goggles, eye poking decreased. Further analysis revealed that eye poking appeared to occur in periods of low stimulation. So that, when this individual was then presented with a competing source of visual stimulation (video games) rates of SIB decreased. Additional analysis demonstrated lower rates of SIB occurred when visual stimulation was contingently removed when the individual engaged in SIB. These results demonstrate the effectiveness of contrasting treatment conditions with test conditions to determine what variables are affecting SIB.

For some individuals, the incidence of SIB may be affected by presenting physiological conditions such as pain. O'Reilly (1997) found that otitis media (an ear infection) resulted in higher rates of SIB under certain conditions of an analogue functional analysis (when a radio was played loudly and when it was turned off contingent on SIB) than when the participant did not have otitis media. Additionally, Carr and colleagues (2003) found that problem behaviors such as SIB were more likely to occur when participants were menstruating than when they were not suggesting that menstrual discomfort influenced the incidence of SIB particularly during demand conditions within an analogue functional analysis.

Maintained by Other Controlling Variables. There are occasions in which the results of an analogue functional analysis are ambiguous in which SIB is not observed in any of the conditions providing no clear relationship between the behavior and the environment. In these cases, one should consider altering possible motivating operations (establishing and abolishing) to affect the incidence of SIB. By definition, motivating operations are stimuli that effectively alter the reinforcing value of a consequence. For example, upon obtaining ambiguous results on an initial analogue functional analysis, Hanley and colleagues (1998) introduced wrist weights as a potential intervention. Through their analysis, it was determined that wrist weights decreased SIB to a level in which it was possible to introduce additional treatments. This study provides an example of how an intervention (wrist weights) seemed to alter the reinforcing value of SIB. Increasing response effort, such as in this case (the amount of force one needs to exert to engage in SIB), appeared to effectively decrease SIB (Hanley et al., 1998; Zhou, Goff, & Iwata, 2000). Increasing the effort required to complete the behavior essentially decreased the reinforcing value of engaging in the behavior.

Another example of how one can alter motivating operations is to provide an individual control or choice. Saunders et al. (1996) was able to significantly decrease the rate of SIB in two adolescents by establishing supported routines, which allowed the teens to engage in activities at their own pace, thus providing control. Another example of choice affecting rates of SIB was provided by Harding and colleagues (2005). In this study, it was ultimately determined that location appeared to be the controlling variable of SIB. In the first analogue functional analysis conducted, it appeared that SIB was automatic as there were high rates in the control condition. However, when the two individuals were given a choice of placement (i.e., wheelchair or couch) during the control condition, self-injury was reduced to almost zero in the second functional analysis. The reduction in SIB, suggests that the antecedent variable, location, influenced SIB expression.

Multiple Functions. Results of analogue functional analyses that suggest the behavior is controlled by multiple sources of reinforcement should be interpreted with caution. One way to determine if SIB has multiple functions is to impose matched and mismatched treatments for each identified function. This method was investigated by Kuhn and colleagues (1999). Using matched and mismatched treatments, it was determined that SIB was automatically reinforced and sensory extinction was the most effective treatment for reducing the behavior dramatically.

Hypotheses from functional analyses suggesting the behavior may be controlled by multiple sources of reinforcement are not always accurate. To validate the suggestion of multiple sources, both matched and mismatched treatments can be imposed on various baselines corresponding with the hypothesized functions. A matched treatment would be based on the hypothesized function, while a mismatched treatment would be unrelated to the hypothesis. This method was investigated by Kuhn et al. (1999) by applying it to the results of a functional analysis suggesting three alternative functions of the behavior. The results suggested that the behavior was reinforced automatically and sensory extinction was the most effective treatment for reducing the behavior dramatically. In this case, only one source was effectively reinforcing the behavior, suggesting that functional analyses can be misleading. Jensen et al. (2001) suggests conducting functional assessments on a longitudinal basis to provide a framework for reducing the frequency of SIB and then maintaining those intervention gains over an extended period of time. This would help avoid mistakes or wrong conclusions from functional analyses while also updating the information on antecedents and consequences maintaining the problem behavior. These studies are a reminder to avoid quick judgments and to be rigorous in appropriate intervention decisions.

As previously mentioned, the results of an analogue functional analysis may at times suggest multiple functions of SIB. Effective treatment of behavior maintained by multiple reinforcers would necessitate learning multiple communicative alternatives. Using FCT, Day, Horner, and O'Neill (1994) effectively replaced problem behavior only after all the new communication responses were acquired.

Each response served to replace each previously identified function of the problem behavior. Further research supports that it is feasible to teach more than one communicative response at a time (Sigafoos & Meikle, 1996).

Pharmacological Treatment of Self-Injurious Behavior

As previously stated, SIB may be resistant to behavioral treatment. However, the use of psychotropic drugs could help treat, or at least maintain, decreased rates of SIB in autism in conjunction with behavioral interventions, especially for those individuals for whom the function of SIB is determined to be automatic or sensory in nature. It is essential that behavior analysts become versed in and understand the basic biological mechanisms and processes involved when using psychotropic drugs as it is an unfortunate reality that many individuals with intellectual and developmental disabilities such as autism use one, if not multiple, psychotropic drugs (Valdovinos, Schroeder, & Kim, 2003). Additionally, preliminary research provides support for the possibility that psychotropic drugs can serve to alter the conditions under which problem behavior occurs (Valdovinos, Ellringer, & Alexander, 2007). Furthermore, research on psychotropic drugs has shown that the pharmacological treatments are more effective if they follow a particular biological mechanism underlying the SIB.

Selective Serotonin Reuptake Inhibitors. SIB may be a result of dysfunctional serotonergic systems. Canitano (2006) found elevated serotonin levels in one-third of individuals with autism, which he related to an increase in brain serotonin metabolism. Carmianti, Deriaz and Bertschy (2006) have also proposed a malfunction in the serotonin reuptake process. Additionally, some research has suggested that SIB in individuals with mental retardation may be interpreted as symptoms of depression, anxiety, and obsessive-compulsive behavior (Janowsky, Shetty, Barnhill, Elamir & Davis, 2005; Luiselli, Blew & Thibadeau, 2001). Some variables that may predict a positive response to antidepressants include a presence of an underlying mood disorder, the appearance of compulsive-like behavior, challenging behaviors that seem impulsive, poor or no reaction to other classes for other psychotropic medications, and hyperarousal (Luiselli et al., 2001). Therefore, the abnormalities of serotonin found in some individuals with autism suggest that the use of serotonergic antidepressants may be an effective pharmacological approach for the treatment of SIB and autism.

SSRIs such as fluoxetine (Prozac), fluvoxamine (Luvox), and sertraline (Zoloft) have been found to decrease aggression in individuals with autism. Moreover, the drugs have shown dose-dependent effects on SIB, with higher doses typically more effective in reducing aggressive behavior (Carmianti et al., 2006). Clomipramine (Anafranil), a tricyclic antidepressant, was also found to decrease the frequency and intensity of SIB in individuals with autism contingent on dose used. For example, Luiselli and colleagues (2001) found that clomipramine only decreased SIB with doses under 125 mg; at higher doses, the drug was found to actually increase SIB. Severe side effects were also found with clomipramine, which may deter its use (Janowsky et al., 2005; Luiselli et al., 2001).

Conversely, there have been some antidepressants showing no positive effect in treating SIB in individuals with autism. Busiprone (Buspar), a 5-HT partial agonist, was found to decrease aggression and SIB only when administered to individuals without autism. Levels of aggression and SIB actually increased in individuals with autism who were given busiprone (King, & Davanzo, 1996; Potenza, Holmes, Kanes, & McDougle, 1999). These results indicate there may be an ideal candidate for certain antidepressants. The varying degrees of effectiveness illustrate the diverse and difficult nature of the disorder.

Another factor influencing the efficacy of the antidepressants is the concomitant nature of medication. Venlaxafine (Effexor), an antidepressant that at low doses improves repetitive behaviors, hyperactivity, inattention, and social and communication deficits, helped improve SIB in two individuals

diagnosed with autism within one week of administration. The improvements, which were maintained for 18 months, however, were a result of venlaxafine stabilizing the individuals' existing medication regime (Carmanti et al., 2006).

Generally, antidepressants have been found to help treat SIB in some individuals with autism, but there are several variables that contribute to the efficacy of the drug(s) showing the idiosyncratic nature of autism and SIB. Furthermore, the use of antidepressants is not recommended for children with autism given the severity of potential side effects based on the developmental differences in the serotonin pathways. (Carmianti et al., 2006; Potenza et al., 1999).

Antipsychotics. Animal research has implicated the overstimulation and super-sensitivity of dopamine receptors in the development of SIB (Canitano, 2006; Hammock, Schroeder & Levine, 1995). Thus, the use of antipsychotics has been a suggested method of treatment for SIB in individuals with autism. A first generation (typical) antipsychotic found to be effective in treating aggression is haloperidol (Haldol). However the effects were found to be short term with severe side effects, such as dyskinesia. These factors have created concerns regarding long-term usage especially with children (Hellings et al., 2006; McCracken et al., 2002; Reinblett, Abanilla, Jummani & Coffey, 2006; RUPP, 2005). Loxapine, another typical antipsychotic, has also been found to be effective. In one case study, within 10 days of administration, loxapine helped decrease aggression and increase prosocial behavior. There were obvious short-term and intermediate term benefits found, such as with haloperidol, however, there were less severe side effects (Reinblett et al., 2006).

Because of the concerns with side effects, the use of atypical antipsychotics is preferred. For example clozapine (Clozaril), an effective treatment for schizophrenia, was found to a have a dose-dependent decrease of SIB in participants diagnosed with autism (Hammock et al., 1995) and olanzapine (Zyprexa) helped decrease core and related symptoms of autism (Potenza et al., 1999). A majority of the research on atypical antipsychotics has been with risperidone (Risperdal), which has been recently approved by the Food and Drug Administration (FDA) for the treatment of symptoms associated with autism.

Risperidone is a post-synaptic dopamine and serotonin blocker (Hellings et al, 2006). Like the other antidepressants and antipsychotics that have been used to treat autism, risperidone improves peripheral symptoms such as maladaptive behavior, irritability, aggression, hyperactivity and SIB. In some cases, risperidone has been found to show improvements by the second week of treatment (Barrera, Violo, & Graver, 2007). There are also dose-dependent outcomes with risperidone, with low to intermediate doses more effective in targeting moderate to severe SIB (Valdovinos et al., 2002). And unlike the other drugs, risperidone tends to target severe cases of SIB (McCracken et al., 2002). The side effects of the drug are also less severe and generally limited to increased appetite, weight gain and lethargy.

Additionally, research on risperidone has addressed long-term usage and discontinuation. This research has found that risperidone is a well-tolerated drug and can be effective up to 6 months (RUPP, 2005). The decrease of SIB was maintained with prolonged use of risperidone, and upon discontinuation, relapse had a later onset compared to the use of a placebo (Hellings et al., 2006; Toost et al., 2005). Risperidone also helped increase adaptive functioning, which included limiting the environmental triggers for SIB and providing more opportunities for educational and behavioral treatment (RUPP, 2006; Zarcone et al., 2004). This last point is particularly important because pharmacological treatments should be part of a multimodal treatment approach, which includes behavioral interventions.

Generally, the use of antipsychotics has shifted from typical to atypical antipsychotics, primarily because of concerns with severe side effects in children. Both have demonstrated to be effective for the

treatment of autism, and particularly, SIB. However, like the other drugs, the antipsychotics do not address the core symptoms of autism, such as social and communication skills, which drive the need for a multimodal approach to treating autism and SIB. Using risperidone provides opportunity to implement educational and behavioral approaches as the maladaptive symptoms will be better maintained.

Opioid Antagonists. An abnormality in pain control, and specifically ß - endorphin levels, in individuals with SIB and autism suggests opioid antagonists would be an effective treatment, particularly for SIB. Presumably, the opioid antagonists would restore normal pain thresholds either by sedation or by making SIB more aversive (Taylor et al., 1991). The findings that have lead to the use of opioid antagonists support the addiction hypothesis. The most prevalent opioid antagonist is naltrexone (ReVia). Prior to naltrexone, nalxone was used, which was less potent and only showed short term benefits (Benjamin, Seek, Tresise, Price, & Gagnon, 1995).

Research on naltrexone has found that, as with antidepressants and antipsychotics, it targets peripheral behavioral symptoms and not the core symptoms of autism; naltrexone helps decrease withdrawal and SIB, and somewhat increases verbal behavior (Elchaar, Maisch, August & Wehring, 2006; Willemsen-Swinkels et al., 1996). It also has dose-dependent effects, with optimal benefits observed at doses between .5 and 2.0 mg/kg (Campbell et al., 1993; Elchaar et al., 2006; Taylor et al., 1991). Additionally, naltrexone may be more beneficial for certain individuals with SIB and autism. The research suggests that individuals with severe and nonsocially reinforced SIB are better responders to the drug; those with lower ß - endorphin levels also tend to respond better (Elchaar et al., 2006; Taylor et al., 1991). Symons, Thompson and Rodriguez (2004) also found that males respond better than females with females often requiring extremely high doses.

However, despite these positive findings, there are some paradoxical findings in the naltrexone research. The use of naltrexone may in fact be worse in the long-term, increasing relapse rates if discontinued, and in some cases naltrexone treatment not found to be different than a placebo (Benjamin et al., 1995; Campbell et al., 1993; Willemsen-Swinkels et al., 1995). In general, naltrexone is only found to be effective for severe SIB in short-term instances with much individual variation in responding.

Conclusion

Self-injurious behavior in autism presents significant challenges that merit the use of empirically validated treatment. Behavioral and pharmacological treatments are two highly researched treatment options available for individuals with SIB and autism. In the absence of clear behavioral function for SIB, research has found multimodal treatments to be effective. Nonetheless, the first step in determining which treatment approach will be most efficacious treating SIB in an individual diagnosed with autism is to conduct a functional assessment (Crosland et al., 2003; Harteveld & Buitelaar, 1997; King, 2000; Repp, Felce, & Barton, 1988; Smith, 1996). For example, if SIB has a solely social function, then drug treatment may not be appropriate; on the other hand, if SIB is determined to have an automatic or nonsocial function, then drug treatment could be effective (Smith, 1996). Additionally, the use of functional analysis methodology throughout drug treatment may provide information regarding the efficacy of the use of psychotropic drugs for socially mediated SIB. That is to say, future research should explore if specific functions of SIB are more amenable to specific pharmacologic treatment than other functions (Schaal & Hackenberg, 1994). For example, data suggest that atypical antipsychotics may more efficacious in treating escape-maintained problem behavior (Crosland et al., 2003). Determining the function of SIB should ultimately guide the type of treatment regime whether behavioral or pharmacological.

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