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The effects of Naltrexone on severe self-injurious behavior in inpatient adults with developmental disabilities

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THE EFFECTS OF NALTREXONE ON SEVERE SELF-INJURIOUS BEHAVIOR IN INPATIENT ADULTS WITH DEVELOPMENTAL DISABILITIES

By,
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ABSTRACT

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The purpose of this thesis was to explore the probability that Naltrexone can reduce self-injurious behavior, specifically the frequency, as measured by total number of incidents, and severity, measured by total number of self-inflicted injuries. Naltrexone is a pure opiate antagonist, which internally alters the reinforcement contingencies that maintain self-injurious behavior. One of the factors that contribute to the maintenance of self-injurious behavior is the endorphins that are naturally released when the body experiences pain. These endorphins can cause a pleasant, euphoric feeling, which internally reinforces self-inflicted painful experiences.

Available records were reviewed for 7 male inpatient adults with developmental disabilities to ascertain the effects of Naltrexone on their severe self-injurious behavior and rates of self-inflicted injuries. Data was be presented in terms of behavior frequencies for baseline phase, lasting six months, and treatment phase, also six months in duration. A t-test was used to compare baseline and treatment phases.

The data presented in this study allows this researcher to reject the null hypothesis (of no effect) and accept the alternate hypothesis that there would be a difference in self-injurious behavior, as measured by injury rates and frequencies of behavior, between the baseline and treatment phases. Although the behavior frequency did not decrease significantly the severity of SIB did decrease significantly as evidenced by the reduction in injuries.

MINI-ABSTRACT

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The purpose of this thesis was to explore the probability that Naltrexone, an opiate antagonist, can reduce self-injurious behavior, specifically the frequency, as measured by total number of incidents, and severity, measured by total number of self-inflicted injuries. Although the behavior frequency did not decrease significantly when a t-test was run to compare means, the severity of SIB did decrease significantly as evidenced by the reduction in injuries.

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Chapter 1: The Problem

Need

Severe self-injurious behavior, such as head banging or eye poking, occurs in inpatient adults and children with developmental disabilities. Few methods effectively reduce the long-term frequency or severity of these behaviors. Approved behavior modification must be regimented and maintained indefinitely to prevent reoccurrences. In addition, current practices are often highly restrictive in nature, limiting patients' freedom of movement and often increasing levels of agitation. Antipsychotics, such as Zyprexa, while effective, are designed to treat symptoms that many of the patients do not possess, and they have many undesirable side effects.

Naltrexone therapy may provide a less restrictive alternative for reducing self-injurious behavior in the developmentally disabled population. Naltrexone does not restrict movement, has fewer side effects than antipsychotics, and can be used long-term. If shown to be effective, Naltrexone will give therapists insight about the maintenance of self-injurious behavior and ideas for new methods of behavior modification.

Purpose

The purpose of this study is to compare the frequency and severity of self-injurious behavior before and after the initiation of Naltrexone therapy. This research on the use of Naltrexone to treat self-injurious behavior may have implications for its future

use.

Hypothesis

Naltrexone will reduce the self-injurious behavior, as measured by frequency and severity, in seven inpatient males with developmental disabilities.

Theory

Self-injurious behavior (SIB), or self-mutilation, is a behavior or behaviors that can be maintained through many means, such as successful task avoidance, pain attenuation, seeking attention from caregivers, an internal stimulus response system not observable by anyone else, or by simple self-stimulation, to name a few. All of these maintenance factors have one thing in common: they have a natural schedule of reinforcement built in to guarantee that the self-injurious behavior continues. The school of Behaviorism teaches us that any behavior that is reinforced is more likely to be repeated in the future and any behavior that is punished is less likely to be repeated in the future.

Self-mutilation behaviors have been successful for many developmentally disabled individuals throughout their lives to achieve some sort of reinforcement, whether it is task avoidance of self-stimulation, which is difficult to override with simple behavior modification. Many of these individuals have been engaging in the same types of behaviors for the majority of their lives, which has established a very strong connection between the behaviors and their reinforcers. It is this connection that creates the need to superimpose strict, consistent reinforcement and punishment contingencies over

controlling maintaining contingencies that may be as yet unknown.

Self-injurious behaviors may be either internally or externally reinforced. Internal reinforcement refers to self-stimulation or pain attenuation conditions, in which individuals know how to trigger their own opiate systems to release endorphins, which make them feel pleasure or numbness to pain, respectively. If an individual engages in self-stimulatory head banging, eventually the opiate system responds and releases pleasurable endorphins that cause euphoria, like a "runners high", obviously reinforcing their head banging. This high has an addictive quality, similar to the addictive quality of other drugs like marijuana. Although there is no drug withdrawal, the individual has a strong desire to experience those pleasurable feelings and will work to achieve this natural consequence the only way they know how, which is through self-injury.

Another example of internally reinforced self-injurious behavior occurs in individuals who have arthritis pain and may, for example, bang on their wrists or bang their fists into the wall, in essence also alerting the opiate system to a painful stimulus. Again, endorphins are released, numbing the arthritis pain and reinforcing the behavior. This is a sort of self-medication. An additional condition that produces internal reinforcement for self-injury is when an individual experiences a psychotic disorder or other condition that causes them great internal physical or emotional distress and tension, and the only way they know how to release that tension is to mutilate themselves. Again, this self-mutilation is allowed by the opiate system through the release of endorphins and numbing of the target area.

Externally reinforced self-injurious behavior is that which allows an individual to successfully avoid a non-preferred task or to attain a caregiver's attention. For example,

if a caregiver attempts to brush an individual's teeth, and the individual finds that task aversive, he may hit himself in the head to make the caregiver leave him alone. After years of using this technique effectively, there is a very reinforcing value of that behavior, and it quickly generalizes to other tasks or situations. What starts out as a way to avoid tooth brushing turns into a way to avoid any request, and the behavior becomes very problematic. As the caregivers start to compensate for the behavior by preventing task avoidance, the individual must make to behavior progressively more severe in order to affect the same results. As this occurs, the individuals learn to engage their opiate systems, through classical conditioning, in order to allow for the severity of their behaviors. When they anticipate the aversive situation or task and become agitated, their bodies have a conditioned response of the release of endorphins *prior to* actual self-injury. Through classical conditioning, their bodies know the cues (conditioned stimuli) for impending self-injurious behavior (unconditioned stimulus). When the self-injury occurs, *it does not hurt.* These severe cases are the types of subjects the selected for this research.

There are two ways of affecting the governing reinforcement contingencies: by applying external, environmental changes that both weaken the relationship between the self-injurious behavior and the reinforcers and simultaneously reinforce an alternate, functional behavior, or by chemically altering the individual's system to disallow the reinforcement to occur. The researcher will be exploring the latter of the two because there is a clear distinction between the baseline and treatment phases, unlike in the case of behavior modification through environmental manipulation.

Behavior modification must be consistent at all times, not just when a particular

therapist is present or on weekdays. The relationship between severe self-injury and reinforcement is so strong that the behavioral reinforcement must be stronger in order to override the already existing contingency. A large state facility, such as the one in which this research was conducted, with a small number of trained therapists to each individual served, does not facilitate effective behavior modification and retraining schedules of reinforcement. Small, private facilities with one psychologist and multiple therapists for each small group of individuals served allow for nearly constant individual time to retrain effective communication and functional equivalents. Internally manipulated reinforcement schedule alteration, such as medications that affect the opiate system, provide consistent weakening of the behavior-reinforcer relationship, and eventual extinction of the self-injury.

In agreement that endogenous opioids are in part responsible for self-injurious behavior in adults with developmental disabilities, it follows that an opioid receptor blocker, such as Naltrexone, may help reduce the frequency and severity of these behaviors. The mechanism by which Naltrexone reduces self-injurious behavior and the resulting injuries is by manipulating the maintaining reinforcement schedule of contingencies by blocking the addictive properties of endorphin release from the brain. In other words, when an individual engages in self-injurious behaviors, the endorphin release is blocked by the Naltrexone, and the behavior causes the individual to feel pain rather than pleasure or lack of pain, as the case may be.

Behaviorally, the self-injurious behavior is no longer reinforced, so the relationship between the behavior (SIB) and the consequence (release of endorphins) is weakened. In addition, the element of pain, which played little or no role to the

behavioral components of the reinforcement schedules, is introduced into the equation. Not only is self-injury not followed by reinforcement, but also it is now *punished* with a painful consequence. This further weakens the positive relationship between self-injurious behavior and pleasure. Any behavior followed by a punishment (negative consequence) is less likely to be repeated in the future. The behavior will extinguish through both absence of a pleasurable consequence and presence of an aversive.

Definitions

For the purposes of this study, inpatient facility refers to a state run developmental center, in which nearly 600 males with developmental disabilities reside. An individual with developmental disability refers to someone whose full-scale intelligence quotient (IQ) on a widely accepted intelligence test (e.g. WAIS-R/WAIS III or Stanford-Binet) were more than two standard deviations below the mean, or approximately below 70. Most of the individuals served in the developmental center have been classified as "Mentally Incapacitated" and in need of a guardian' because their cognitive deficits preclude their ability to make sound judgments about their own well-being.

Self-injurious behavior refers to any behavior that an individual exhibits an overt act that by nature causes injury to himself, or a behavior that by nature puts the individual at risk for self-inflicted injuries or is intended to cause injury to himself. Some examples of self-injurious behavior, or SIB, are head banging, skin picking or cutting, eye poking, self-inflicted bite wounds, rectal digging, face slapping, ear banging, and extraction of one's own teeth.

Assumptions

This research is based on the assumption that data collection remains consistently accurate throughout the study, and that those responsible for data collection are not influenced by the introduction of a new type of medication. It is also assumed that the methods of behavior modification and client-staff interactions remained stable over baseline and treatment phases of study.

Limitations

This research study may be limited by the small sample size (n=7). Naltrexone is not widely used and availability of patients is limited. The small sample size may limit the applicability of the results to the general population of developmentally disabled inpatients. In addition, due to the small sample size, when a t-test is run to compare phases of study, one individual's data can greatly influence the degree of significance.

Overview

In Chapter 2, all related research and literature are reviewed. The design of this study, description of the individuals in the sample, and the measures of the variables are discussed in Chapter 3. In Chapter 4 are the analysis and interpretation of the results. The history of Naltrexone, and its previous clinical successes and failures, gives researchers direction in its future use.

Chapter 2: Review of Literature

Introduction:

Over the past 15 years, hundreds of studies have shown Naltrexone to be effective in treating a variety of conditions, from self-injurious behaviors to eating disorders and alcohol addiction. The studies that apply specifically to this thesis, which will be reviewed first, involve the elimination of self-injurious behaviors in developmentally disabled adults. Throughout the rest of the chapter, other aspects of Naltrexone therapy will be discussed, such as longitudinal studies and long-term follow-up, Naltrexone in combination with other therapies, the effects of Naltrexone on learning and social skills, paradoxical effects of Naltrexone, and implications for children. In addition, studies that yielded results that do not support the use of Naltrexone, as well as reported side effects, will also be reviewed and discussed.

Effects of Naltrexone on SIB in developmentally disabled adults:

Due to their cognitive deficits, individuals with developmental disabilities may manifest different psychiatric disorders, such as schizophrenia, and process information differently than those of average intelligence. This may be the main cause of self-injurious behaviors and other maladaptive behaviors exhibited by the mentally retarded population. Naltrexone may be one of the medications utilized to address the different psychiatric issues of inpatients.

Casner, Weinheimer, and Gualtieri compiled one of the most comprehensive studies documenting the success of Naltrexone in an inpatient center (similar to the developmental center used in this thesis) for individuals with developmental disabilities in 1996. They performed a retrospective review of the entire population of the state schools (inpatient) of Texas (total 8000), of whom 56 severely and profoundly retarded individuals were treated with Naltrexone for self-injurious behavior. They found that, based on the opinion of treating professionals, 50 percent of the individuals were maintained on the drug, and 25 percent of the subjects were classified as unequivocal responders based on objective response criteria.

A study completed in 1992 discusses the benefits of Naltrexone over other medications, such as neuroleptics, because of the lack of controlled study or the impending side effects (Osman and Loschen, 1992). Reneric and Bouvard (1998) found that opiate receptor antagonists, such as Naltrexone, help reduce stereotypic behaviors in a variety of pathologies, such as autism, schizophrenia, obsessive-compulsive disorder, Tourette syndrome, and posttraumatic stress disorder. Stereotypic behaviors are characterized by compulsive, repetitive, and uncontrollable. They can be of a reward-seeking or addictive nature. Naltrexone blocks the opiate response that reinforces the repetitive behavior, thus theoretically altering the reinforcement schedule to extinguish the behavior.

Naltrexone in Combination With Other Therapies:

Some individuals present with such extreme self-injurious behavior that they require more than one type of pharmacological treatment to relieved of symptoms.

Naltrexone may be used in combination with other types of medication, such as sedative neuroleptics, to eliminate SIB and agitation. For example, Kanbe and Bovier (1992) found that Naltrexone, in association with propanolol and clopenthixol-decanoate, stopped SIB in a 30-year-old man with autism within a few weeks. The subject was followed for more than 2 years and had not relapsed, demonstrating the long-term efficacy of Naltrexone therapy.

Naltrexone may enhance behavioral and environmental mediations of self-injurious behavior. Subjects' responses to staff interventions were measured before and during Naltrexone trials in a study by Frank J. Symons (et al, 2001). There was a greater degree of response to behavioral intervention and staff behavior during treatment with Naltrexone than during placebo phase, and SIB was significantly reduced in 3 out of 4 subjects.

Functional communication training and Naltrexone together may also reduce SIB when it is determined that the behavior has a communicative value. That is, if a patient starts to engage in self-injury when he wants something to drink, he may be able to learn to raise his hand as a functionally equivalent behavior. Symons (et al, 1998) utilized functional communication training with Naltrexone to successfully reduce self-injury in a 12-year-old boy with autism and severe communication and cognitive deficits. It involved teaching the boy skills that would achieve the same type of reinforcement as the maladapthive behavior once did, eliminating the need for self-injury. Naltrexone enhanced the effects of training by further reducing the reinforcement value of SIB by blocking the endorphin response.

The limitation to functional equivalency training is that the actual function of the

behavior must be discernable. It is not always possible to narrow the meaning of the behavior, or what the patient is attempting to achieve or resolve with the behavior. A patient may utilize SIB to attenuate pain, for self-stimulatory reasons, to gain attention, or to avoid a task. The treatment of SIB becomes increasingly difficult if the patient engages for more than one reason, complicating the clinician's understanding of the behavior. Combination of therapies becomes even more important when the client is more complicated.

Longitudinal Studies and Follow-ups:

Naltrexone not only reduced SIB in the majority of subjects, but there is evidence of its longevity. Tonya White (et al, 2000) eliminated a 3-year-old boy's self-injurious behavior and maintained the reduction throughout the three-year follow-up. Self-injury was also eliminated or reduced long term in studies conducted by W. David Crews, Jr. (et al, 1993 and 1999), Barrett (et al, 1989), White (et al, 2000), and Sandman (et al, 2000). Subjects were observed months, even years post-Naltrexone therapy with the continued success of near-zero behavior rates. David W. Crews (et al, 1999) observed a mentally retarded female, who had previously responded therapeutically to Naltrexone therapy, both two and four years post-medication. Despite many changes in direct care staff and living arrangements, the woman remained nearly free from SIB.

James W. Bodfish (et al, 1997) conducted a study in which the reduction on SIB was only maintained after cessation of Naltrexone for 2 of the total 9 subjects. Despite the relative low percentage of long-term success, there was a dramatic reduction in self-injurious behavior throughout drug therapy for all subjects, 4 subjects demonstrated a

significant reduction in stereotypical behavior, and 1 subject increased interaction with adaptive material. The variety of results illustrates individuality in response to Naltrexone therapy.

Effects of Naltrexone on Learning and Social Skills:

Learning and attention to task are important to improve the quality of life by helping those with developmental disabilities and psychiatric disorders achieve a greater degree of independence. In addition to reducing rates of self-injurious behavior, Naltrexone therapy has been shown to increase positive social interactions (e.g. verbalizations, increased seeking of social contact, and social exploration) and learning capacity in numerous subjects. In a study by James W. Bodfish (et al, 1997), one subject of 9 demonstrated increased adaptive material interaction along with reduced rates of self-injury. Curt A. Sandman (et al, 1993) found that his subjects not only displayed reduced SIB, but also improved significantly in measures of learning and attention during and subsequent to Naltrexone treatment.

Anne S. Taylor (et al, 1990) reports on a 14-year-old child with autism who was receiving Naltrexone treatment for SIB. Redults indicated a marked decrease in SIB and and increased social relatedness during treatment pahses, and a maintained inmrovement during the second placebo phase of study. Lensing and Panksepp (1991) observed 4 severely mentally retarded boys (aged 5-21 years) who were treated with Naltrexone. The use of the opiate antagonist not only reduced positive symptoms of autism (hyperactivity, aggressivity, and self-injurious behavior), but also greatly increased positive social behaviors. The positive social gains lasted up to two days after the last dose of Naltrexone, much later than the peak period of opiate receptor blockade.

In 1991, Taylor, et al, found that their 20-year-old mildly retarded subject, when tested on memory and learning weekly, demonstrated marked improvements in both memory and attention without influencing activity levels. In combination with a dramatic reduction of SIB without causing sedation, the subject likely experienced an overall better quality of life. Taylor, et al, conducted further research, on additional developmentally disabled subjects, which supported his initial results. Naltrexone again increased attention and independence.

Where data was collected for the purpose of the study on social interaction, there is a general positive effect of Naltrexone. There were, however, studies in which excessive sedation occurred in the subjects, such as the ones conducted by Willemsen-Swinkels (et al, 1995) and Campbell (et al, 1993). Sedation can impact negatively on interaction levels and abilities of subjects, possibly negating the positive effects of Naltrexone.

Implications for Children:

Naltrexone has been used to successfully treat children with self-injurious behavior related to psychiatric disorders and developmental disabilities for at least 15 years. For example, Tonya White (et al, 2000) presents the case of a 3-year-old boy who responded well to treatment with Naltrexone. Near zero behavior rates were maintained more than three years through the follow-up period. Panksepp and Lensing (1991) administered Naltrexone to four individuals with severe mental retardation and autism, all of who responded well to treatment. Clinicians saw a marked decrease in symptoms such as stereotypical behavior, self-injurious behavior, aggressiveness, and hyperactivity; and

improvement in positive social interactions.

Overall, children responded as well to treatment with Naltrexone as adult subjects, with no additional side effects, as illustrated by Symons (et al, 1998), Leboyer (et al, 1992), Barret (et al, 1989), Ryan (et al, 1989), Leboyer (et al, 1988), and Herman (et al, 1987).

Paradoxical Effects of Naltrexone on SIB:

Although there is an overwhelming body of research supporting the use of Naltrexone and other opiate receptor antagonists in the treatment of self-injurious behavior in individuals with autism and developmental disabilities, some research has failed to support its efficacy. Gibson (et al, 1995) conducted a study with 20 subjects, all of who showed a non-significant decrease of high baseline SIB. Overall, if SIB did not decrease with the administration of Naltrexone, there was also no increase in maladaptive behaviors. Zingarelli, et al, supports this in 1992, as well as Willemsen-Swinkels, et al, in 1995, Luiselli, et al, in 1989, and Ricketts, et al, in 1992, all of whom conducted research yielding non-significant results.

Some studies, such as those by Benjamin (et al, 1995), Szymanski (et al, 1987), and Campbell (et al, 1993), yielded a dramatic increase in self-injurious behavior in its subjects. In these cases, Naltrexone was discontinued and behaviors returned to baseline frequencies and intensities. Naltrexone unexpectedly increased drug-induced self-biting behavior in rats in a 1999 study by Turner, et al. This study was conducted to draw a self-injurious behavior model to parallel human behavior.

Tonya White, et al (2000) treated a 3-year-old boy with Naltrexone for severe self-injurious behavior. He was not responsive to behavioral interventions, but responded

favorably to medication. Researchers and clinicians saw a marked increase in the child's SIB for a period of two weeks before the behavior disappeared completely over the next several months. The gains were maintained over a three-year follow-up period. These results illustrate not only a durable reduction in SIB, but also an extensive extinction burst period during the initial treatment. Research yielding results of increased SIB, such as Benjamin, et al, only lasted 10 days and may not have weathered the inevitable early behavioral storm before the SIB was extinguished.

Reported Side Effects:

The majority of subjects did not experience adverse side effects during Naltrexone therapy; however, there were a limited number of subjects who experienced sedation, weight loss, sleep disturbance, and nausea. A study conducted by Ricketts (et al, 1992) yielded negative results in which there was no clinical decrease in SIB and the single male subject experienced symptoms somewhat like depression, including weight loss, increased sleep disturbance, and lack of pleasure. Campbell (et al, 1993) reported some cases of excessive sedation, decreased appetite, and vomiting, none of which were severe enough to require a dose reduction.

In 1994, Thompson (et al) conducted research in which 1 of 8 subjects experienced hypotension (low blood pressure) and bradycardia (persistently slow heartbeat) during administration of Naltrexone, but the therapy was overwhelmingly successful with a reduction in self-injury and no reported side effects in 7 subjects. Finally, in 1989, Barrett (et al) designed a study in which a 12-year-old mentally retarded female with severe self-injurious behavior was treated with Naltrexone, reducing her SIB

to near zero. During the open trial, the subject had an abrupt loss of vision. The cause was not determined to be Naltrexone, but medication was discontinued to investigate the problem.

Summary:

There were conflicting results yielded in this review of previous research on Naltrexone therapy and its efficacy in treating individuals with severe self-injurious behavior. Of the 48 studies reviewed, 38 (79 percent) reported clinically significant success with Naltrexone, while 2 (4 percent) reported an exacerbation in SIB and 8 (7 percent) reported no apparent change in SIB relative to the variables studied. Naltrexone has been used successfully in children in 8 studies reviewed, of which all 8 supported its use.

In combination with other therapies, whether behavioral or pharmaceutical, Naltrexone may be even more effective. Research by Kanbe and Bouvier found that Naltrexone, along with other drug theraries, stopped SIB in a 30-year old man within a few weeks, results that were maintained for over 2 years. Frank J. Symons, along with his colleagues, found that behavioral interventions were enhanced when applied during Naltrexone trials, significantly reducing SIB in 3 of 4 subjects.

In contrast with many neuroleptics, Naltrexone often has a lasting effect on behavioral success even after the medication is discontinued. Tonys White (et al, 2000) followed a child for three years post-Naltrexone, during which time he remained free of self-injury. Studies conducted by Crews (et al, 1993, 1999), Barrett (et al, 1989), and Sandman (et al, 2000) all reported long tern success long after drug trials, often despite

major life changes, such as living environment, direct care staff, and roommates.

Learning, social skills, and attention to task may also be greatly improved in developmentally disabled and autistic individuals. Although not the primary purpose of Naltrexone, these improvements are secondary benefits when self-injurious behavior is reduced. Subjects may increase social relatedness (Taylor, et al, 1990) and demonstrate marked improvements in both memory and learning capabilities (Sandman, et al, 1993). In 1991, Taylor, et al, noted that the improvements in memory and attention in her subjects did not influence activity levels adversely, such as with sedation. The absence of side effects and sedation help insure that the subjects' quality of life is not affected by the medication.

Clinicians and researchers offered theories as to why some individuals responded favorably to opiate receptor blocking medication while others failed, such as the individual's motivation for engaging in the behavior and specific psychiatric diagnosis. For example, in 1998, Symons was again able to reduce SIB in a subject by teaching him a functionally equivalent behavior because his motivation in self-injury was communication of an unmet need. Knowing and understanding each individual is a vital part of effectively developing a treatment package that will effective ameliorate self-injurious behavior. Used properly, and in combination with the right interventions, Naltrexone may be an important component in the plans of many inpatients with severe SIB.

Chapter 3: Design of Study

Sample

The subjects examined in this study were 7 adult males with developmental disabilities. All subjects resided in an inpatient developmental center, which is a long-term care facility located in New Jersey. The patients' ages ranged from 33-52, with a mean age of 41.9. All subjects have an Axis 2 diagnosis of Mental Retardation, with IQ scores ranging from 6-55 (mean=19). The subjects had all resided in inpatient facilities for the majority of their lives, and all had severe self-injurious behavior. Behavior modification programs were in place to address self-injurious behavior for all subjects with little or no success.

Subject 1 was a 37-year-old developmentally disabled man (IQ=16) who has Down's Syndrome. In addition to Naltrexone, this gentleman took Prozac to address depressive symptomology. This man has detached both retinas by hitting himself in the eyes and head. He also scratched his eyes and rubbed them hard enough to cause bruising. Although less severe, he also engaged in headbanging, as well as banging other parts of his body into hard objects, skin picking, and stomping his feet. He had a behavior modification program in place to address these behaviors, which had caused him bilateral blindness and had been a barrier to successful programming and socialization for most of his life.

Subject 2 was a 51-year-old man with developmental disabilities (IQ=20) who

carries the following diagnoses: Autism, Obsessive-Compulsive Disorder, and Schizophrenia, Chronic, Undifferentiated type. In addition to Naltrexone, this gentleman took the psychotropic medications Haldol and Zoloft. His self-injurious behaviors included cutting himself with sharp objects, such as toys or broken glass, and skin picking. He had scars all over his arms from the severe damage he had caused himself over the years, and he had engaged in this behavior most of his life.

Subject 3 was a 42-year-old man with developmental disabilities (IQ=10) who carried the diagnoses of Impulse Control Disorder and Stereotypic Movement Disorder with Self Injurious Behavior. He took Paxil and Risperdal in addition to Naltrexone to manage his behaviors, including SIB, aggression, and pica, associated with his psychiatric conditions. This man's SIB consisted of slapping his face and head and biting his hands and arms. It was theorized that his SIB was internally driven and exacerbated by his sensitivity to noise. He repeatedly caused severe injuries to himself mostly by biting his arms, but had also inflicted injuries by head banging. Again, he had engaged in these behaviors most of his life.

Subject 4 was a 34-year-old man who functioned within the profound range of mental retardation (IQ=6). He had a diagnosis of Autism and took the psychotropic medication Prolixin in addition to Naltrexone. This gentleman banged his ears with his fists so severely that he required restraints several times per month in the form of a padded helmet that he is unable to remove. His ears were deformed from repeated self-inflicted trauma throughout his life, and behavior modification programs had been ineffective in reducing his self-injurious behavior.

Subject 5 was a 44-year-old man with developmental disabilities (IQ=18) who

carried a diagnosis of Autism. It was believed by his treatment team that his IQ was actually higher than was reflected on tests because each time he was tested he stopped in the middle of the examination to engage in severe self-injurious behavior to avoid the tasks at hand. He was capable of reading his own behavior modification programs. In addition to Naltrexone, this man took Depakote and Zyprexa to address his behavioral repertoire of severe head banging, self-biting, self-hitting, and self-pinching, as well as hitting walls and doors. His face and head were scarred from the severity of his SIB, and he averaged 27 incidents per month. He appeared to try to isolate himself by sitting with his shirt over his head away from stimulation, so the perceived function of his behavior was escape in addition to automatic, positive reinforcement. His self-injurious behavior had been chronic throughout his life.

Subject 6 was a 33-year-old man who functioned within the mild range of mental retardation (IQ=55) and carried a diagnosis of Autism. He was hearing impaired and communicated through American Sign Language. This gentleman engaged in a variety of ritualistic behaviors, such as marking a calendar at precisely the same time every day, touch restore behaviors with his (and others') personal items, check-recheck behaviors, and other routine behaviors frequently attributed to those with Autistic Disorder. His self-injurious behavior consisted of penile insertion (inserting foreign objects into the urinary meatus), as well as head banging, ear pulling, and slamming his jaws together. In addition to self-injurious behavior, this subject destroyed property (breaking glass or other objects) and could become aggressive (hitting or biting staff or peers). SIB and property destruction were thought to be maintained by automatic positive reinforcement (sensory stimulation), and aggression occurred mostly when he was frustrated.

Subject 7 was a 52-year-old man who functioned within the profound range of mental retardation (IQ = 9). He was diagnosed with Autism and Epilepsy, and engaged in SIB in the form of slapping his neck and head, hand biting, head banging, and penis pinching. He also engaged in aggressive behaviors (kicking, biting, head butting) and pica (ingesting cigarette butts, band-aids, and feces). His SIB and aggression served a communicative function as well as being self-stimulatory in nature. This subject did not cause any self-inflicted injuries during any phase of this study although his frequency was extremely high. In addition to Naltrexone, this subject received Depakote for seizures, which may have also helped to regulate his moods.

Measures

The method of data collection for the purpose of this study was available record review. This researcher did not administer any medication to new patients for the purpose of study, but gathered data from files of those who had already been prescribed Naltrexone to address self-injurious behavior prior to this research.

The dependent variable in this study was the frequency of self-injurious behavior and self-inflicted injuries. Frequency of self-injurious behavior and frequency of injury resulting from self-injurious behavior will be collected and recorded for each subject during the baseline condition, defined a six full months prior to Naltrexone therapy, and during the treatment condition, defined as the first full six months of Naltrexone therapy.

The reliability of this data was not absolute because of the method in which it was originally collected. Para-professional resident living staff wrote incidents on incident recording forms as they occurred. Often, the frequency gathered at the end of the month

underestimates the actual frequency of behavior. However, since this phenomenon took place during both conditions, baseline and treatment, a general trend in behavior can be accurately ascertained.

Injury data was highly reliable because each injury, no matter how minor, was recorded on a form and reviewed by at least 5 people in 5 departments. Accurate descriptions of each injury were required, and the nature and cause of each injury was provided. Injury frequencies were an excellent indication of the severity of self-injurious behavior and the urgency of behavioral and pharmacological intervention.

Design

This study was descriptive in nature, exploring the affects of Naltrexone on 7 developmentally disabled males.

Testable Hypothesis

Null hypothesis: There will be no difference in self-injurious behavior, as measured by frequency of behavior and severity (number of self-inflicted injuries), between baseline and Naltrexone therapy phases of study.

Alternate hypothesis: There will be a reduction in self-injurious behavior, as measured by frequency of behavior and severity (number of self-inflicted injuries), in the Naltrexone treatment phase of

study when compared to the baseline phase.

Analysis

A t-test was be utilized to compare data from the baseline to the Naltrexone treatment phases of study.

Summary

Available records were reviewed for 7 male inpatient adults with developmental disabilities to ascertain the effects of Naltrexone on their severe self-injurious behavior and rates of self-inflicted injuries. A t-test was be used to determine overall effects between baseline and treatment phases. Relationships, if any were determined between the use of Naltrexone, frequency of self-injurious behavior, and self-inflicted injuries for all subjects together to determine a possible trend. In Chapter 4, data will be presented in terms of behavior frequencies for baseline phase, lasting six months, and treatment phase, also six months in duration.

Chapter 4: Analysis of Results

In Chapter 1, the researcher hypothesized that Naltrexone would reduce both the frequency and severity of self-injurious behavior in seven inpatient males with developmental disabilities. This hypothesis requires that not only does the researcher gather data on behavior frequencies, but on rates of self-inflicted injuries as well. Chapter 4 will outline findings and state their significance in relation to the null and alternate hypotheses.

Retatement of Testable Hypothesis

Null hypothesis: There will be no difference in self-injurious behavior, as measured by frequency of behavior and severity (number of self-inflicted injuries), between baseline and Naltrexone therapy phases of study.

Alternate hypothesis: There will be a reduction in self-injurious behavior, as measured by frequency of behavior and severity (number of self-inflicted injuries), in the Naltrexone treatment phase of study when compared to the baseline phase.

Interpretation of Results

T-tests were performed to compare both self-injurious behavior rates and self-inflicted injury rates in the baseline, pre-treatment phase of study to the treatment phase of study, during which all participants received the psychotropic medication Naltrexone. The data collected does not clearly support a reduction in behavior frequencies from baseline to treatment phases ($p>.05$); however, there was a significant reduction in self-inflicted injuries during the Naltrexone treatment phase when compared to baseline ($p=.024$). These data indicate that although the frequency of self-injurious behavior did not reduce significantly for this sample of the population, the severity of their behavior was affected by Naltrexone, yielding fewer injuries despite the non-significant reduction of SIB.

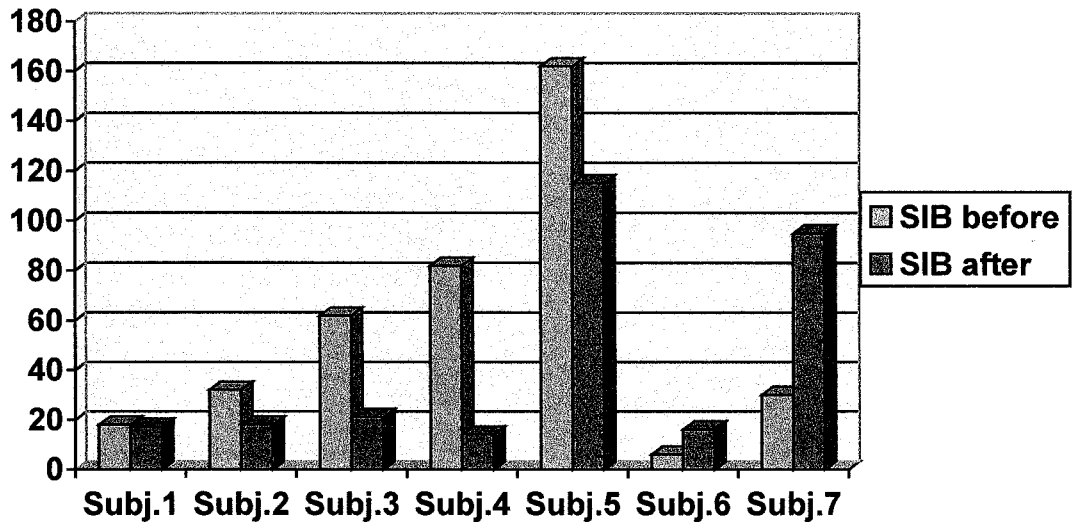

Figure 4.1 *Total number of incidents of self-injurious behavior the six full months prior to Naltrexone initiation (SIB before) and the first six full months of treatment (SIB after).*

In Table 4.1, the researcher presents the frequencies of self-injurious behavior for

each subject (numbered 1-7) before and during Naltrexone treatment phases. The total frequency was calculated by adding the frequencies for each of the six full months prior to Naltrexone treatment for "SIB before" and the first full six months for "SIB after". Although there was no clinical significance found in this sample of the population, it should be noted that for five of the individuals studied, their behavior rates decreased during the treatment phase.

Self-inflicted injury data for each subject (1-7) in the sample is presented in Figure 4.2. Data is presented in much the same way with injuries as it was with rates of self-injurious behavior; "Injuries before" refers to the total number of self-inflicted injuries for each subject in the six full months prior to Naltrexone therapy, and "Injuries after" indicates the total number of self-inflicted injuries in the first full six months of treatment.

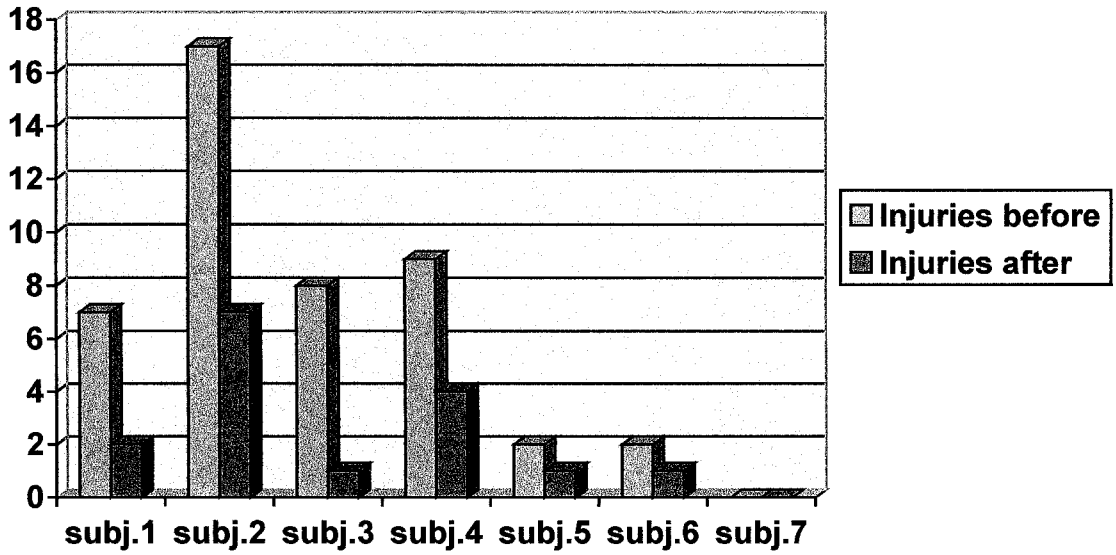

Figure 4.2 *Total numbers of self-inflicted injuries in the six full months prior to Naltrexone treatment (Injuries before), and the first full six months of treatment (Injuries after).*

It is clear that the severity of self-injurious behavior decreased in the treatment condition for all individuals in the sample whose SIB caused injury, even in the case of Subject 6, noting that even though the frequency of his self-injurious behavior increased (see fig 4.1) the rate of self-inflicted injuries decreased.

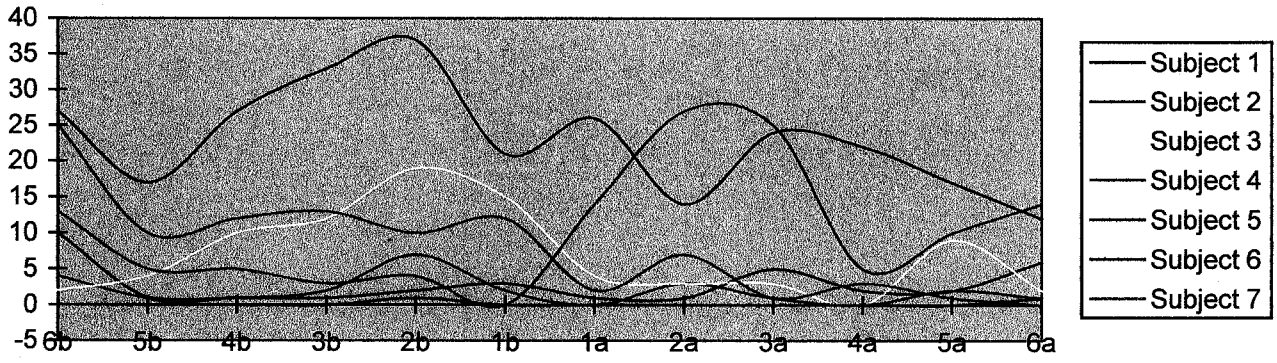

Figure 4.3 *Self-injurious behavior frequencies over time for each subject, starting 6 months before treatment and concluding 6 months after treatment initiation.*

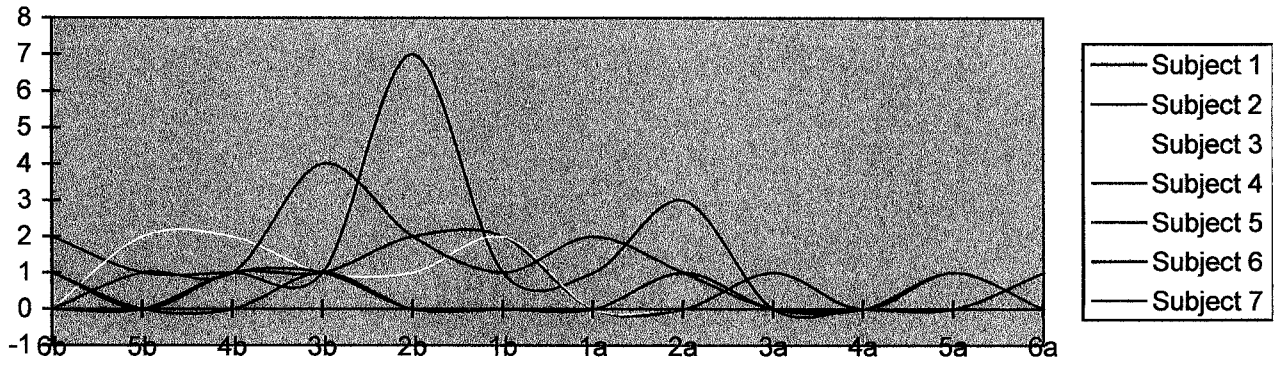

Figure 4.4 *Self-inflicted injury rates over time for each subject, starting 6 months before treatment and concluding 6 months after treatment initiation.*

Each subject's behavior frequencies over time are graphed in Figure 4.3. The

months are across the bottom, "6b" indicating 6 months before treatment, and "1a" indicating 1 month after treatment, and so on. As the lack of statistical significance indicates, there is no clear reduction in overall behavior frequency when the subjects are viewed together. The significant reduction in self-inflicted injuries can be clearly seen in this figure as all of the subjects are viewed together. Each subject's injuries are plotted over time in Figure 4.4.

In addition to a significant reduction in injuries for all individuals in the sample, data indicate that, for five of the seven subjects, both injury reduction and a clear decrease in the rates of self-injurious behavior warranted, through the clinical judgment of their treating psychologists and physicians, that they continue with Naltrexone therapy. These subjects, numbers 1,2,3,4, and 5, benefited both behaviorally and occupationally, meaning that their severe self-injurious behaviors were no longer providing a barrier to social and programmatic success.

In conclusion, the data presented in this study allows this researcher to reject the null hypothesis that there would be no difference found in self-injurious behavior, as measured by frequency of behavior and self-inflicted injuries, between baseline and Naltrexone therapy phases of study. This researcher is able to accept the alternate hypothesis that there would be a difference in self-injurious behavior, as measured by injury rates and frequencies of behavior, between the baseline and treatment phases. Although the behavior frequency did not decrease significantly when a t-test was run to compare means, the severity of SIB did decrease significantly ($p=.024$), as evidenced by the reduction in injuries.

Summary

The null hypothesis was rejected based on these data, and the alternate hypothesis was accepted. There was a change in the severity of self-injurious behaviors from the baseline to the treatment phase based on an overall decrease in self-inflicted injuries. Overall, there was no significant reduction in the frequency of SIB, but the behavior frequency did decrease significantly for five of the seven individuals.

Chapter 5: Summary and Conclusions

Summary

The purpose of this thesis was to explore the probability that Naltexone therapy can reduce self-injurious behavior, specifically the frequency, as measured by total number of incidents, and severity, measured by total number of self-inflicted injuries. Naltexone is a pure opiate antagonist, which internally alters the reinforcement contingencies that maintain self-injurious behavior. One of the factors that contributes to the maintenance of self-injurious behavior is the endorphins that are naturally released when the body experiences pain. These endorphins can cause a pleasant, euphoric feeling, which internally reinforces self-inflicted painful experiences. After repeated behavioral patterns, SIB is pleasurable rather than painful, and can improve mood and feelings of well-being. Naltrexone blocks the endorphin reaction in the body, thus allowing the individual to experience the painful consequence of his behavior, thus changing the reinforcement schedule to reduce the likelihood that the self-injurious behavior will be repeated in the future.

There were conflicting results yielded in this review of previous research on Naltrexone therapy and its efficacy in treating individuals with severe self-injurious behavior. Of the 48 studies reviewed, 38 (79 percent) reported clinically significant success with Naltrexone, while 2 (4 percent) reported an exacerbation in SIB and 8 (7 percent) reported no apparent change in SIB relative to the variables studied. Naltrexone

has been used successfully in children in 8 studies reviewed, of which all 8 supported its use. Knowing and understanding each individual is a vital part of effectively developing a treatment package that will effective ameliorate self-injurious behavior. Used properly, and in combination with the right interventions, Naltrexone may be an important component in the plans of many inpatients with severe SIB.

Available records were reviewed for 7 male inpatient adults with developmental disabilities to ascertain the effects of Naltrexone on their severe self-injurious behavior and rates of self-inflicted injuries. Relationships, if any will be determined between the use of Naltrexone, frequency of self-injurious behavior, and self-inflicted injuries for all subjects together to determine a possible trend. Data was be presented in terms of behavior frequencies for baseline phase, lasting six months, and treatment phase, also six months in duration. A t-test was used to compare baseline and treatment phases.

The data presented in this study allows this researcher to reject the null hypothesis that there would be no difference found in self-injurious behavior, as measured by frequency of behavior and self-inflicted injuries, between baseline and Naltrexone therapy phases of study. This researcher was able to accept the alternate hypothesis that there would be a difference in self-injurious behavior, as measured by injury rates and frequencies of behavior, between the baseline and treatment phases. Although the behavior frequency did not decrease significantly when a t-test was run to compare means, the severity of SIB did decrease significantly ($p=.024$), as evidenced by the reduction in injuries.

Conclusions

This researcher hypothesized that Naltrexone would reduce self-injurious behavior, as measured by frequency of behavior and number of self-inflicted injuries, from the baseline to the treatment phases of study. The data presented allow the researcher to reject the null hypothesis that there would be no difference in frequency and severity of self-injurious behavior between baseline and treatment phases and accept the alternate hypothesis. There was a significant reduction of self-inflicted injuries during the treatment phase of study as compared to baseline, but there was not a statistically significant reduction in the frequency of SIB.

Discussion

The findings in this thesis are consistent with the literature reviewed in Chapter 2 in that Naltrexone has mixed results. For five of the seven participants, Naltrexone significantly reduced both the frequency and severity of self-injurious behavior, but for the other two subjects their SIB was exacerbated in terms of frequency, but not severity. Subject 6 shows and increase in frequency and a decrease in severity, as measured by the decrease in self-inflicted injuries. Due to the small sample size (n=7), the t-test detected an insignificant reduction in total number of incidents of SIB, but when the subjects are viewed individually, five had clear success and were continued Naltrexone therapy long term.

The pool of research on Naltrexone and its effects on self-injurious behavior is relatively small because it is a new medication, and often facilities are unwilling to

tolerate the initial exacerbation in behavior associated with any extinction technique. This limits the number of subjects available to any one researcher. Self-injurious behaviors are complex and there are many causes, and are often maintained by multiple reinforcement contingencies in each individual person, making it difficult to pinpoint one particular function. Naltexone yields varying degrees of success, both in the literature and in this study, due in part to the diverse backgrounds, circumstances, diagnoses, and chemical compositions of the people who engage in SIB.

To create a comprehensive assessment of the efficacy of Naltrexone, one must accurately track the number of self-inflicted injuries in addition to behavioral frequencies. Both the literature and this study support that although the actual behavior may not decrease in frequency, the severity may change significantly through injury reduction. The researcher is confident that this study contributed to the limited body of knowledge and field research on Naltrexone and supported its use in inpatients with self-injurious behavior.

Implications for Future Research

There are several areas of this study that would contribute to a more comprehensive understanding of the mechanisms by which Naltrexone reduces or fails to reduce self-injurious behavior and why. A thorough functional analysis of each subject, although time-consuming, would accurately pinpoint the reinforcement contingencies that maintain his self-injurious behavior, thus contributing to the prescription of appropriate treatment plans. In addition, the exploration of how IQ contributes to the function of SIB

might lend insight into these severe behaviors. Lastly, an experimental design rather than available record review would most certainly increase the integrity of data collection for the purposes of strict analysis.

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