Weight Gain in Children and Adolescents

Taking Atypical Antipsychotics

By

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To the Faculty of Washington State University:

The members of the committee appointed to examine the Clinical Project of Heather McClure find it satisfactory and recommend that it be accepted.

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Abstract

Atypical Antipsychotic use in children is increasing faster than any other psychotropic used with children. Children and adolescents are being prescribed atypicals to treat a great range of symptoms. Atypical antipsychotics are being prescribed to treat psychosis, aggression, depression, and movement disorders, to name a few. A problem known to affect individuals who take atypical antipsychotics is weight gain. Children using atypicals are also suffering from this possibly life threatening side effect. In the few studies completed on children taking atypical antipsychotics, there is a correlation between weight gain and the implementation of atypical antipsychotics.

The purpose of this manuscript is to explore the literature available on weight gain among children who are taking atypical antipsychotics. The paper will discuss why children are being prescribed atypical antipsychotics, the mechanism or action of atypical antipsychotics, weight gain and atypical antipsychotics, the prevalence of weight gain in children who are taking and who are not taking atypical antipsychotics, health issues related to weight gain, and weight control interventions. The manuscript will review two case studies that show the weight gain in children who were prescribed Zyprexa, an atypical antipsychotic.
Table of contents

Acknowledgements.................................................................................................................. ii

Abstract ................................................................................................................................. iii

Table of contents.................................................................................................................... iv

Reasons why children are being prescribed atypical antipsychotics................................. 2

Atypical antipsychotics mechanisms.................................................................................... 4

Weight gain with atypical antipsychotics.............................................................................. 5

Prevalence of weight gain in children................................................................................ 6

Weight gain in children not taking atypicals........................................................................ 7

Health issues and weight gain ............................................................................................ 7

Control of weight gain ......................................................................................................... 8

Significance to nursing........................................................................................................... 9

Case Studies ....................................................................................................................... 11

Case 1 ............................................................................................................................... 12

Case 2 ............................................................................................................................... 20

Discussion of the two case studies..................................................................................... 27

Conclusion ......................................................................................................................... 28

References ......................................................................................................................... 30

Table 1 ............................................................................................................................... 33

Table 2 ............................................................................................................................... 34
Introduction

Weight gain is a common and potentially deadly side effect of atypical antipsychotics (Allison et al., 1999). Weight gain can predispose an individual to contracting type II diabetes, hypertension, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and many types of cancers (Allison et al., 1999). Weight gain can also cause an individual to discontinue taking the medication, which could lead to a relapse of symptoms. There are high numbers of antipsychotics being prescribed to children. Gracious and Findling (1999) state that half of the children and adolescents in inpatient units and one third of children and adolescents in psychiatric outpatient settings, are being prescribed antipsychotics. Many of these children are suffering from an unusual amount of weight gain.

Atypical antipsychotics were first developed to control psychotic symptoms in adults. The atypicals have fewer neurological side effects than the older typical antipsychotics, like haloperidol and fluphenazine, such as tardive dyskinesia and extrapyramidal side effects. The class of atypical antipsychotics currently includes risperdone, olanzapine, quipapine, aripiprisol, ziprasidone, and clozaril.

There are a number of studies documenting that weight gain occurs in adults who take atypical antipsychotics. The effects of the atypical antipsychotics and weight gain in adults was analyzed during a ten week study (Allison et al., 1999). The weight gain experienced by the adults taking the atypicals was as follows: clozapine, 4.45kg; olanzapine, 4.15kg; risperdone, 2.10kg; and ziprasidone, 0.04kg (Allison et al., 1999). Another study completed by Kinon, Basson, Gilmore, and Tollefson (2001), determined the percentage of weight gain and the physical effects of the weight gain in individuals who took olanzapine over a span of three years. The results indicated that individuals taking olanzapine gained an average of 6.26 kilograms.
compared to a 0.69 kilogram weight gain in the participants taking haloperidol, a typical antipsychotic (Kinon et al. 2001). The results of both of these studies indicated that weight gain was a substantial side effect of taking atypical antipsychotics.

Few studies evaluate the amount of weight gained in populations other than adults taking atypical antipsychotics. The purpose of this paper is to explore the literature available on weight gain among children who are taking atypical antipsychotics. The paper discusses why children are being prescribed atypical antipsychotics, the mechanism or action of atypical antipsychotics, weight gain and atypical antipsychotics, the prevalence of weight gain in children who are taking atypical antipsychotics, health issues related to weight gain, and weight control interventions. The paper presents two case studies that demonstrate weight gain in children who were prescribed Zyprexa, an atypical antipsychotic.

**Reasons why children are being prescribed atypical antipsychotics**

Barbara Gracious noted “Antipsychotics are prescribed for as many as half of child and adolescent psychiatric inpatients and one third of child and adolescent psychiatric outpatients” (2001). This finding was also supported by Martin and Leslie’s (2003) study. Both note that the results indicate more than half of children outpatients were prescribed at least one psychotropic medication (2003). They also noted there has been a 59.5% increase in psychotropic drug use in children since 1997. The largest increase in prescribed psychotropics was in the class of atypical antipsychotics and the amount of psychotropic prescriptions increased by 138.4%. The money spent on atypicals taken by children increased from $4.1 million in 1997 to $6.8 million in 2000, an increase of 65.2% (Martin and Leslie, 2003).
It must also be noted that none of the current atypical antipsychotics are FDA approved to be prescribed to either children or adolescents. Very few psychotropics of any kind are approved for use in children by the FDA. Some of the SSRI's are approved, such as Prozac, Zoloft, and Paxil, but all of them have age and diagnosis limitations. Use of these medications are restricted to adolescents. A few of the mood stabilizers, such as depakote and lamictal are approved by the FDA, but only for seizure control and not for their mood stabilizing properties. It is believed the psychotropic medications are not approved by the FDA because “There are significant delays between when data on safety and efficacy are gathered and when FDA approval is obtained for newer antipsychotics, and there is a lack of financial initiative for manufacturers to obtain FDA approval for medications whose patents have expired (Gracious & Finding, 2001). Doskock (2002) discusses the atypical antipsychotic use in children specifically with Tourette’s syndrome. He makes a point of stating the available studies involving children and atypical antipsychotics are very limited. He notes “the antipsychotics are the second most widely prescribed class of psychotropic drugs for pediatric patients, trailing only (by a wide margin) the psychostimulants” (2002).

So, the question arises, “why are so many children being prescribed atypical antipsychotics?” Although atypicals are used primarily to treat psychosis in adults, aggressive behavior is what atypicals are primarily prescribed for with children. But as time goes on, the uses for atypicals are growing (Table 1 shows uses for atypicals in child psychiatry). Not many studies have been published on the utility of atypical antipsychotics in treating child or adolescent psychiatric disorders. Risperdone has the most studies demonstrating efficacy in psychiatric disorders. Schreiter (2002) studied 11 children and adolescents between 5 and 16 years of age. The children’s most disabling presentation was aggressive and violent behavior.
Aman and colleagues (2002) also used risperdone with children who had disruptive behaviors. The differing factor of the two studies was that the children in the later study also had subaverage IQ’s (2002).

Aggressive behavior was the target symptom in a study on all male children (Buitelaar, 2000). The diagnoses being treated by risperdone in the study were: conduct disorder, attention deficit and hyperactivity disorder, oppositional defiant disorder, pervasive developmental disorder, dysthymia, and intermittent disorder. This study found risperdone was helpful in treating aggressive behavior which is common in many of the diagnosis listed above.

**Atypical antipsychotics mechanisms**

All antipsychotic agents, including both typical and atypical antipsychotics, reversibly block type 2 dopamine receptors (Gracious & Finding, 2001). The antipsychotics are dosed by the affinity they have to the dopamine receptor, the higher the affinity the greater the potency of a given dose. Side effects caused by this category of drugs are related to the binding of receptors in the central nervous system. Some of the receptors bound by antipsychotic medications in the central nervous system are muscarinic, alpha-adrenergic, and serotonergic.

Atypical antipsychotics are known to have a lesser degree of side effects than the typical. This is believed to be because of their high affinity for serotonin receptor and selective blockade of dopamine receptors within the limbic system and not in the basal ganglia (Gracios & Finding, 2001). Kapur, Zipursky and Remington (1999) argue that there is a “threshold” of type 2 dopamine being blocked that needs to be reached before the target symptoms are treated. This threshold is believed to be 60-70% blockage of the dopamine receptors. When the threshold goes beyond 80%, the side effects increase. The trick is then to keep the dosage of the medication
between the “threshold” of 60-80% (Kapur, Zipursky, & Remington, 1999). The authors claim that the elevation of prolactin levels, which affect weight gain, may also have a threshold relationship similar to the threshold relationship of dopamine.

There are several atypical antipsychotics and the dosing range differs greatly (see table 2). The average children’s dose is considerably less than the average adult’s dose. For example, a common adult dose for Risperidone is 4 to 6 mg. The dosing of Risperidone for a child is anywhere between 0.25mg and 6mg. The goal is always to keep the dose as low as possible, but still keep the symptoms under control.

Weight gain with atypical antipsychotics

It is poorly understood why individuals gain weight while taking atypical antipsychotics. It is speculated that the weight gain may be caused because of a disruption of satiety that is mediated by the 5-HT2c receptor blockade in the hypothalamus (Gracious & Finding, 2001). Reynolds, Zhang and Zhang (2002) state that though the reason individuals gain weight is probably multifactor, it is probably related to the 5-HT2c. They state when the receptor was removed in mice, the mice became obese and their feeding increased (Reynolds et all, 2002).

Upon asking a local pharmaceutical representative of Lilly if their company had any data related to weight gain and Zyprexa she had the company send information regarding weight gain. The following quotation was taken from this information and gives an explanation why Lilly believes weight gain is caused by taking Zyprexa:

While the mechanism for associated weight gain among antipsychotics has yet to be established, it appears to be related to specific receptor antagonism. Further, given the multifaceted nature of appetite, it is also reasonable to speculate that weight increase
results from an improved mental state in which patients feel and eat better. The variability in patient experience with respect to antipsychotic drug-associated weight gain argues that this phenomenon is multifactorial, and so far the factors governing this relationship have not been clearly defined. The ability to predict vulnerability to antipsychotic drug-associated weight gain would be a valuable asset to clinical practice (Healey & Kinon, 2002).

Though, the above quote is an answer, it still leaves many questions on why individuals gain weight while taking the atypicals. What is accurate about this quotation is that much is still unknown about the mechanism of why individuals gain weight.

**Prevalence of weight gain in children**

Weight gain and atypical antipsychotics are often associated, but few studies actually put a number on the prevalence of weight gain of children taking atypicals. The most studied atypical antipsychotic with children is risperidone. Kelly, Conley, Love, Horn and Ushchak (1998) in a study titled, “Weight gain in adolescents treated with risperidone and conventional antipsychotics over six months”, is the only study that specifically tested an atypical and its effect on weight gain in a population other than adults. The results of the study are not surprising in that it does state adolescents do gain weight while on risperidone (8.64 kg in six months). The study also reports on that those taking conventional antipsychotics had a mean weight gain of 3.03 kg. (1998). Buitelaar (2002) in a study of 26 children and adolescents taking risperidone reports that 2 of the 26 children gained 8 and 10kg in just 8 weeks time (2000). In a double blind study of risperidone being given to disruptive children with sub average
intelligence, weight gain is also a factor (Aman et al., 2002). This study, reports on 54 patients in the risperidone group and 44 patients in the placebo group. The data indicates that fifteen percent of the individuals gained weight while taking risperidone and only 2% of the placebo group gained weight (Aman et al., 2002).

Weight gain in children not taking atypicals

Weight gain is not only an issue for children who are taking atypicals, but is an issue for all children. Some of the pharmaceutical companies argue that the weight gain associated with atypicals is not caused by the medication itself, but is caused by the normal growth and lifestyle of the child. Ogden (2002) reports that the increase of obesity in all children is dramatic. Since 1960 there has been an 11% increase in overweight children between the ages of 6 through 19 years of age in 1998 (Ogden et al., 2002). The study tests the prevalence of overweight children in 2000 and finds that the numbers are still rising. The findings indicate that 15% of children 6 through 19 year old are overweight. The investigators believe this current trend is due to poor eating habits and low activity levels.

Health issues and weight gain

Kelly and associates (1998) sums up the potential effects weight gain can have on an individual:

Weight gain is a serious side effect of antipsychotic therapy, especially in adolescents. Potential consequences include diminished self image, decreased social interactions, and noncompliance with medications. Health problems associated with obesity are numerous and well documented. Hypertension, coronary artery disease, diabetes, and orthopedic
complications may occur (Kelly et al, 1998, p. 152).

One side effect to weight gain that is a major concern is the risk of developing type 2 diabetes while taking atypical antipsychotics. In November of 2003 the Food and Drug Administration began requesting that all producers of atypical antipsychotics include a warning about hyperglycemia and diabetes mellitus in their product labeling. It is unclear that if the hyperglycemia is caused by the weight gain while taking the atypical or if other factors are causing the hyperglycemia. Lean and Pajonk argue:

It is tempting to think that antipsychotic-induced diabetes is a consequence of weight gain. For example, clozapine and olanzapine have the highest propensity to cause both the weight gain and diabetes. However, patients taking antipsychotic drugs can develop diabetes without significant weight gain or can loose weight. Furthermore, their diabetes usually improves rapidly when the antipsychotic is withdrawn, without significant reduction in body weight, and often recurs rapidly if the drug is started again (2003, Mechanism for Antipsychotic—Associated Diabetes section, para.1).

The recent evidence indicates that determining the cause of diabetes while taking atypicals is crucial and more tests need to be done in this area.

**Control of weight gain**

The evidence shows weight gain has been a side effect of taking atypical antipsychotics, so now the question is “how do you manage and prevent the weight gain”? A study by Littrell, Hillingoss, Kirshener, Petty, and Johnson (2003) tested the effects of educational intervention in preventing antipsychotic-induced weight gain. Their study reported that the individuals who were educated about how not to gain weight did have lower Body Mass Indexes than those who
were not educated. The individuals in the test were to restrict 500 calories from their diet and attend psycho education classes regarding how to live a healthy lifestyle. They also kept food diaries and had dietary evaluations (Litrell et al., 2003). The study results indicated that educating clients about basic health practices, like improving diet and increasing exercise, decreases the amount of weight gain associated with taking atypical antipsychotics. There were many extraneous factors which limit the validity of this study. The sample size was 70 participants, most participants were on haldol a conventional antipsychotic, and the education given to the clients was above and beyond what could be given realistically in a community health setting.

Morrison, Cottingham and Barton (2003) had a small sample size of nineteen and tested if adding Metformin to the medication regime of children taking psychotropic drugs would encourage weight loss. Of the nineteen children only 2 were not taking an atypicals. The results showed that 15 of the subjects lost weight by the addition of the Metformin. The study also found that the steep increase of weight gain was arrested (Morrison et al., 2002).

Significance to nursing

The side effect of weight gain while taking atypical antipsychotics affects the nursing role. An increase in weight increases the likelihood of an individual having other serious health problems. McInnis argues there has been a drastic increase in weight in all Americans, “More than 60% of US adults are now overweight or obese, predisposing over 97 million Americans to a host of chronic lifestyle diseases, particular cardiovascular disease” (2003). Ogden also pointed out weight gain was not just occurring in adults, but also in children (2002). Barlow and
associates agreed that there was a high rise in childhood obesity, “Like adult obesity, childhood obesity prevalence is rising. As these children age, the obesity epidemic will lead to epidemics of diabetes, hypertension, and cardiovascular disease” (Barlow, Trowbridge, Klish, & Dietz, 2002).

Adding atypical antipsychotics, along with these previously presented issues, may compound the problem of weight gain in children and adolescents.

Healthcare providers, including nurses, have a responsibility to keep weight gain to a minimum in children being prescribed atypical antipsychotics. McInnis stated that currently there was a minimal amount of weight loss education given in primary care settings, “…a disturbing low percentage of overweight patients are advised to lose weight, become more physically active, and eat healthy….very few patients report being counseled about increasing levels of physical activity” (2003). Little time needs to be allotted to education about weight loss to show changes in patients lifestyles, “…data supports the premise that encouragement and guidance on physical activity, diet, and/or weight management need not take more than 3 to 5 minutes of an office visit…” (McInnis, 2003).

To help combat the weight gain brought on by atypical antipsychotics nurses will have to take time to educate clients about weight prevention. This educational demand will decrease the amount of time nurses can spend with all clients. The nurse will have to dedicate more time to education and less time to treating the primary symptoms of mental illness. This in turn will create a need for more nursing and healthcare staff to meet the needs of the clients. If the client’s needs are not met, not only will the quality of care decrease on all clients, but many clients will gain weight. It is possible that the weight gain will predispose the client to diabetes, cardiovascular disease, and other chronic lifestyle diseases, but there also is a negative stigma placed on overweight individuals. This stigma will follow the individual into healthcare settings,
“Unfortunately, obese patients often feel unwelcome in medical settings, where they encounter negative attitudes, discriminatory behavior and a challenging physical environment. These negative experiences explain, at least in part, why obese patients are more likely to delay seeing physicians for clinical breast exams, gynecological exams and Pap smears, delays which account for some of the increase health risks of obesity” (Ahmed, Lemkau, & Birt, 2002). The prevention of weight gain will have to be a priority to nurses working with all clients to prevent other significant health issues associated with gaining weight.

The education provided to the client about how to prevent weight gain is an example of primary prevention. Primary prevention is an action that is designed to prevent a disease from occurring (Stanhope & Lancaster, 1996). Once weight gain has occurred the provider must use secondary preventative measures to insure that the disease state does not develop. In instances where weight gain is caused by antipsychotics, secondary prevention would come in the form of medical testing. A provider would test the individual for diabetes, hypertension, heart disease and other weight related health issues. If the client was found to be suffering from a diseased state caused by the weight gain, the provider would then have to use tertiary prevention to eliminate further progression of the disease. For example, if the client was found to have diabetes the provider would start them on medication to help them control their blood sugar. The provider would also show them how to monitor their blood sugar by using a glucometer. Promoting a healthy diet and exercise can be considered a primary, secondary and tertiary form of prevention, as it is used in all of these areas. Nurses will be responsible for caring for the clients who gain weight while taking atypicals and for providing the preventative education to the clients.

Case Studies
Both of the following case studies were on individuals who were seeing a child psychiatrist at Central Washington Comprehensive Mental Health. The cases have many similarities and differences. The first case shows the rapid gain of weight in a Caucasian girl and the second shows weight gain, but not as dramatic, in an African American boy.

Case 1

The first time this client was seen at Comprehensive Mental Health was for a psychiatric evaluation in June of 2000. She was referred into services by another psychiatrist who was ending his current practice. Her legal guardians, who were also the adoptive parents of the client’s biological mother, brought her to the first appointment. At this time she was being prescribed Celexa 20mg twice a day, Orap 2mg at bedtime, and Adderall 20mg in the morning and Adderall 10mg at noon and 5 pm. Her legal guardian, who the client referred to as “Mother”, stated the client had been in special education and had learning disabilities in both writing and math. On admission she carried the diagnoses of ADHD, depression, obsessive compulsive disorder, and Tourette’s disorder. Her guardian mother stated her main concern was the client’s oppositional behavior. She was also worried about the client’s poor social skills and her self-abusive behavior. She reported that the client bit her nails and banged her head when frustrated. The mother was surprised by the little amount of stimulus which aggravates the client. She noted that even her vacuuming or any other loud noises would “make her go into a fit”.

The child had not been hospitalized for any psychiatric reasons, but had been seen by a psychiatrist for her behavior since she was quite young. The mother was unable to give an exact age to when she started treatment. She stated at one point she was tried on Ritalin and failed because it exacerbated her tics. The mother was unaware of any birthing trauma or if the
biological mother was using any substances during pregnancy. She did state the mother and
daughter had to stay in the hospital for longer than normal because they were having problems
bonding.

The client had a significant medical history. She has had two shunts placed in her brain
because of swelling, which were still present. The adoptive mother also stated she at one time
had a cyst on her brain stem.

The client’s biological mother was believed to be bipolar and her uncle was also believed
to be bipolar. Little more is known about her history because her biological mother was adopted.
The client has a half sister that does have Down’s syndrome. Her biological father was currently
in jail on charges of rape. She had little contact with her biological mother. Her adoptive parents
were technically her grandparents as they were the people who adopted her biological mother.
They stated they adopted the client at the age of three months because her biological mother was
neglecting her. The adoptive mother stated the biological mother is a “hypochondriac” and they
had little contact with her.

At this session the psychiatrist that evaluated the client gave her the following diagnosis:
Axis I: ADHD, Depressive disorder, Obsessive compulsive disorder, Tourette’s disorder
Axis II: Mild mental retardation, learning disabilities in math and writing
Axis III: hydroencephalus, brain cyst
Axis IV: Adoption, and other psychosocial issues
Axis V: GAF of 40.

The following appointments summarized in this case study starting on January of 2002.
The client was seen regularly before this date, but this was the date when she was first started on
an atypical antipsychotic. The following information was taken directly from the chart. No labs
were drawn at any point during the treatment. One Assessment of Involuntary Movement Scale (AIMS) was done in January 2002, but there was no record of any follow up AIMS.

On January 17th of 2002 the client had a medication management appointment with the child psychiatrist. At this time she weighed 100 pounds, her blood pressure was 100/60 and her pulse was 72. The doctor noted in his dictation that the client’s ticks continue and she was increasingly irritable. Her mother was reporting that she was continually teased by her classmates, was not sleeping at night and was tired during the daytime. The client was also not eating well and had lost some weight. The doctor also noted the biological mother was known to be bipolar. At the appointment the client was presenting with some flight of ideas and was reportedly oppositional and aggressive. The mother was very concerned as the client was hitting the walls and hitting herself. To help combat her symptoms of aggression and opposition the addition of Risperdal, Zyprexa, and Geodon were discussed. Because of the FDA approval for treatment of mania, Zyprexa was chosen. The doctor noted that he believed some of her symptoms may be caused by mania. The risks of neuroleptic malignant syndrome (NMS) and tardive dyskinesia (TD) were discussed and client was started on 2.5mg of Zyprexa. Client was also currently taking Buspar 30mg BID for aggression, Tenex 5mg a day for ADHD, and Celexa 30mg BID for her depression and OCD. The client currently scores a “0” on the AIMS test.

On February 14th of 2002 the client met with the psychiatrist again. No vitals were taken on this visit. The doctor states the client continued not to sleep and was experiencing no side effects from the Zyprexa. She was reportedly less oppositional in behavior and her tics have stopped all together. Because of this the Zyprexa was increased to 5mg. The client was referred to the nurse to educate the mother about modifying the client’s diet to decrease possibility of weight gain. No changes were made to other medications.
On March 4th of 2002 the client’s mother came to see the nurse. No vitals were taken at this time. The mother states she was rather distressed because the client continues not to sleep and she has noticed a drastic increase in her appetite. She did report her behavior had improved at school. At this time the nurse discussed nutritional interventions with the mother and gave her handouts and a video about nutrition and exercise.

On March 7th of 2002 the nurse staffed the above concerns with the psychiatrist. She also stated to the doctor that the mother called again stating that the client’s appetite was “out of control”. The mother reports the client ate a whole batch of cookies, 2 bananas, and 1 yogurt for a “midnight snack”. The doctor ordered Zyprexa to be increased to 7.5mg at bedtime. He believed this increase will help the client sleep through the night.

On March 14th, 2002 the client had another appointment with the psychiatrist. Her weight was 121 pounds, her blood pressure was 110/70 and her pulse was 84. Even though changes were made the client’s mother reported the client was still sleeping poorly and woke up 2 to 3 times a night. It was during these waking hours that she woke up, and went into the kitchen and “binge eats”. Even though her sleep was erratic her behavior had improved both at school and at home. At this appointment the doctor increased Zyprexa to 10mg at bedtime to help client sleep through the night. No changes were made to other medications.

On April 4th the client came to a medication management appointment with the psychiatrist. Her weight had increased to 130 pounds. Her blood pressure was 100/60 and her pulse was 126. The client had started injuring herself by hitting and banging her head against walls. She continued to not be sleeping well and was gaining weight. Upon asking the client why she was not sleeping well, she reported she was having nightmares. The doctor decided to increase the Zyprexa to 15mg at bedtime. He stated he believed this would decrease her self
injurious behaviors as this had helped to decrease them in the past. No changes were made to other medications.

On April 11th the mother called the nurse and stated the client was still not sleeping well. She tended to go to sleep at night but then woke up 4 to 5 times every hour and often went into the kitchen to “binge eat”. The mother stated she woke up to find client had consumed a whole jar of peanut butter, 2 bananas, and many apples.

After talking with the mother the nurse then staffed the above phone call with the psychiatrist. The nurse also noted that the mother believed the Zyprexa was causing the client to eat “out of control”. The mother also was concerned about the client not sleeping well. The doctor decided to order Ativan 1mg at bedtime to help improve sleep and continued with other medications as prescribed.

On the 12th of April the client came for a medication management appointment with the nurse. Her weight was 136 pounds. The mother stated she was very concerned because of rapid weight gain and breast enlargement. The client had gone up 2 bra sizes since starting Zyprexa. They report they bought new clothes for the client each week because of her excessive weight gain. The client continued to sleep poorly. The mother had the nurse look at the client’s breasts which were bright pink with dark striations. The nurse noted the client’s belly was protruding greatly.

On April 16th the nurse staffed the previous medication management appointment with the psychiatrist. At this time the doctor decided to decrease the Zyprexa to 5mg and increased lorazepam to 2mg. He was hoping that the client’s sleep would improve and to decrease possible side effects caused by the Zyprexa.

On the 25th of April the client had a medication management with the psychiatrist. Her
weight was 139 pounds, her blood pressure was 110/70 and her pulse was 104. The mother reported a drastic increase in the client’s breast size and that she had “purple stretch marks” over 2/3rds of her breasts. She stated that the client was still eating “all of the time” and “she never gets full”. At this point the psychiatrist called to consult with the client’s primary care physician and they decided to discontinue the Zyprexa completely and to continue with all other medications as previously prescribed. The client was instructed to follow up with the primary care physician to discuss the breast enlargement.

The mother called the nurse on May 10th to report the client was doing much better, but she has increased her self injurious behavior at school. She did report client was sleeping better.

On May 16th at a medication management appointment with the psychiatrist the client weighed 125 pounds, her blood pressure was 102/72 and her pulse was 88. The mother reported the clients breast size had decreased and her appetite seemed to be “normal”. She stated she was pleased to find out that the client had lost some weight. She admitted to being worried because the client’s self injurious behavior had increased at both school and home. The doctor discussed the possible addition of Geodon and the mother agreed to give it a try. Geodon 20mg was added to the medication regimen and was to be taken twice a day with the other medications.

On June 20th the client weight was 125 pounds, her blood pressure was 102/72 and her pulse was 88. She came in for a medication management appointment with the psychiatrist. The mother stated the client’s behavior had improved but she was still acting out at school. Her appetite had returned to normal and she was losing weight. The doctor decided to increase the Geodon by 20mg in the morning and 40mg at bedtime. No other medication changes were made.

On September 5th no vitals were taken for the appointment with the psychiatrist. The mother stated the client continued to have anger outbursts at both home and school, but the client
was not having any side effects from the medication. The doctor increased the Geodon to 40mg twice a day to decrease the anger outbursts. No other medications were changed.

On October 17th again no vitals were taken at her medication management appointment. Her behavior had seemed to improve a little, but she was still having the outbursts. The mother stated the client was sleeping well and eating normally. The doctor increased the Geodon to 60mg twice a day and made no other medication changes.

On the 12th of December at her medication management with the psychiatrist the client weighed 123 pounds, had a blood pressure of 110/60, and a pulse of 76. The mother stated she had not noticed much change in behavior with the increase of the Geodon. The doctor increased Geodon to 80mg twice a day. No other medication changes were made.

On January 23rd of 2003 the client had a medication management appointment with the psychiatrist. Her weight was 121, her blood pressure was 120/70 and her pulse was 76. The client continued to have behavior problems at both home and school. No medications were changed at this appointment.

Appointments from this point continue and on April 1st of 2004 the client had a medication management appointment with the psychiatrist and weighted 121, her blood pressure was 130/84 and her pulse was 84. At this point the client was still struggling with her behavior. Her behavior appeared to intensify a week before her menses. The client’s current medications where as follows: Strattera 60mg at bedtime, Tenex 1 and 1/2mg three times a day, Buspar 30mg twice a day, Geodon 100mg twice a day, and Ativan 2 mg at bedtime.

This particular case was chosen because of the rapid increase in appetite and weight gain after the addition of Zyprexa. There were many other issues which were evident regarding this case, but one of the most pronounced was the weight gain. The addition of the Zyprexa
decreased some of the client’s most problematic symptoms. This child was given the Zyprexa to help stabilize her erratic and self-injurious behavior. Many of the studies previously discussed in this paper administered atypical antipsychotics for aggression behavior and most all saw improvement in the child’s behavior (Kelly et al., 1998, Pappadopulos et al., 2002, & Schreier, 1998). This client was given Zyprexa and weight gain did occur. Kinon (2001) admitted that weight gain did occur when individuals were prescribed Zyprexa, but the study showed the weight gain stabilized after prolonged treatment. What was notable about this client was that she had symptoms of increased prolactin levels. This can only be assumed because no levels were drawn. Some of the symptoms of hyperprolactinaemia are: galactorrhea, amenorrhea, oligomenorrhea, vaginal dryness and atrophy, infertility, hirsutism, and acne (Weick & Haddad, 2002). In reference to Zyprexa causing hyperprolactinaemia, Turrone, Kapur, Seeman and Flint state “Patients receiving olanzapine also showed a near doubling of baseline prolactin levels” (2002). Even though the client did gain a considerable amount of weight, 39 pounds after the initiation of the Zyprexa, the client was taken off of the atypical antipsychotic because of the possible hyperprolactinaemia. The symptoms of hyperprolactinaemia and her weight gain decreased after she was taken off of the Zyprexa. Weick and Haddad state this was common in regards to high prolactin levels, “Serum concentrations return to normal within three weeks after patients stop oral treatment but may remain raised for six months after discontinuation…” (2002). This particular client was not longer struggling with the weight gain issues, but continued to have behavior problems. Unfortunately, the Zyprexa did improve her behaviors, but the side effects made continuation of this medication detrimental to her future health.
Case 2

This client first came into services in August of 1999. He was an African American who was 10 years old on the date of the evaluation. He was brought to the appointment by his adoptive parents. They were currently in the process of moving to Sunnyside, Washington and were seeking services. He had eight other siblings, all of which were adopted. He was being prescribed Lamictal 50mg in the morning and 25mg at bedtime, Depakote 250mg twice a day, Effexor XR 37.5mg a day and Risperdal 1 mg, one half at bedtime.

His father reported the client became aggressive and needed to be restrained at least once a day. He stated he had mood swings to where he was “silly and giggly” and then he became aggressive. The parents reported he would appear “manic” for two weeks then would have “normal” behavior for two weeks. He was also very distractible and did not transition well.

The client had had four prior psychiatric hospitalizations, the most recent being in Boise Idaho. He was released on the above medication regimen. He had been tried on neurontin, tegretol, lithium, Adderall, and Ritalin and all have failed to reduce his symptoms.

His medical history included a history of asthma and allergies and he also has experienced petit mal seizures. He was taking Lamictal to control his seizures.

His family history was complicated, which started with his mother who was diagnosed with both schizophrenia and bipolar disorder. His father was also reported to have an unknown mental illness. Nothing was known about his biological siblings.

In school the client had been successful, but had a one on one teaching assistant. He did well in this controlled environment. The father reported there seemed to be more acting out at home and the father had no explanation this. The father reported the client did have learning disabilities in math, reading and writing and was diagnosed with mild mental retardation.
On his mental status exam the client performed within normal limits besides not being able to do simple calculations.

At this time the client was diagnosed as follows:

Axis I: Bipolar, by history and ADHD

Axis II: Mild mental retardation and learning disabilities

Axis III: Asthma and seizures

Axis IV: Adoption and other psycho social issues

Axis V: GAF of 40

The doctor noted the client could not start services until the parents made a permanent move to the area.

In May of 2000 the client relocated to the area and began services. There were very few lab values available in the chart. The lab values available were drawn in May of 2000. They include a depakote level of 76 and an EKG was done which was normal.

The following were appointments that started in February of 2002. It was at this time that the client was started on an atypical antipsychotic. On the 7th he had a medication management appointment with the psychiatrist. On this date he weighed 124 pounds, his blood pressure was 102/70 and his pulse was 80. The mother came to the appointment and reported the client’s aggression had increased since he started taking Geodon 20mg. He had insomnia in the evenings and it took him many hours to fall asleep. She reported him as being “groggy” during the day and was not able to stay awake in class. At this time the client was taking Tenex 4.5 mg every day and 30mg of Buspar a day along with the 20mg of Geodon. The doctor discussed the risks and benefits of Zyprexa and started it at 2.5mg a day to be increased to 5mg after one week.

On March 7th the client had another medication management appointment with the
psychiatrist and his weight was 136, his blood pressure was 110/70 and his pulse was 94. The mother reported the client’s aggression had decreased considerably and he was sleeping well at night. They were somewhat concerned about the weight gain, but were willing to work with it, as his behavior had improved. The doctor did not make any medication adjustments at this time and scheduled a consultation with the nurse to educate family about diet and exercise to decrease the possible weight gain.

On the 25th of April the client came back to meet with the psychiatrist. He weighed 141 pounds, his blood pressure was 90/60 and his pulse was 80. The client was continuing to gain weight and parents stated they were concerned with this side effect. His aggression had decreased and he was doing well in at both school and home. The doctor decided to try and change the Tenex to Adderall to help suppress the weight gain caused by the Zyprexa. He did note that he had a history of doing poorly on Adderall and because of this he would be monitored closely. He advised the mother to slowly taper of the Tenex and Adderall 10mg would be added to the addition of the current medications.

On the 13th of June at a medication management appointment the client’s weight was 138, his blood pressure was 100/60 and his pulse was 80. The mother reported that it seemed the addition of the Adderall decreased the client’s weight but his ADHD symptoms were not controlled as well as with the Tenex. She was continuing to give him the Tenex and had not stopped it as the doctor ordered at the previous appointment. The doctor advised the mother to discontinue the Tenex and that the Adderall would be increased to 20mg to help control the clients ADHD symptoms. All of the other medications were continued as previously prescribed.

On June 27th the mother called the nurse. She reported that she was uncomfortable with the amount of medication the client was taking. She stated she did not want to increase the
client’s Adderall to 20mg and would like to keep it at 10mg. The nurse staffed this information with the doctor and he agreed to decrease the Adderall dose to 10mg.

On July 14th the client was hospitalized in a children psychiatric unit. He was kept on the unit until the 22nd. His mother contacted authorities after the client tried choking her with a “dog chain”. His was discharged with the following diagnosis: Oppositional defiant disorder, Major depression, ADHD, and a rule out of Bipolar disorder. He was discharged on the following medications: Effexor XR 37.5mg in the morning, Zypexa 5mg at bedtime, Trileptal 150mg twice a day, Tenex 1mg three times a day, Buspar 30mg twice a day and Lamictal 100mg twice a day.

The fifteenth of August was the first appointment with the psychiatrist after the client’s hospitalization. On this date he weighed 139, his blood pressure was 98/62, and his pulse was 96. The mother was concerned the client was on too many medications. She felt many of them were unnecessary and he was a “zombie all day”. The doctor stated he would try to cut back on the medications, especially the medications that could cause weight gain. He decreased the Buspar to 15mg twice a day for one week then advised that the Buspar be discontinued. He also decreased the Tenex to 1mg twice a day. He increased the Effexor XR to 75mg in the morning. All of the other medications would be continued as prescribed. He ordered a sodium level at this time, which was 141.

On August the 22nd the client had another medication management appointment with the psychiatrist and his weight was 137, his blood pressure was 110/80 and his pulse was 80. The mother stated the client’s behavior had been “good” and had no complaints other than she wished the client’s medications could be decreased. At this appointment the doctor increased the Effexor XR to 150mg in the morning, decreased the Tenex to 1 and ½ mg a day and discontinued
the Buspar. All of the other medications were continued as prescribed.

On September 12th at a medication management appointment the client’s weight was not taken, his blood pressure was 110/80 and his pulse was 90. The mother reported the client’s oppositional behavior had increased. He ran away from home and became aggressive with his siblings. She believed it was a result from the increase in Effexor. She stated he had a similar reaction while taking Paxil. The doctor decreased the Effexor back down to 75mg in the morning. None of the other medications were changed.

The client was also seen on the 19th of September. His weight was 137, his blood pressure was 110/70 and his pulse was 100. The mother reported the client’s behaviors continue to increase. She stated she was at a loss on how to handle the client. The doctor noted he was not sure about the client’s current ADHD diagnosis and believed his behavior was related to his oppositional defiant disorder. He ordered the mother to give the Tenex for one more week then discontinue. He also decreased the Effexor to 37.5mg for one week and then ordered it to also be discontinued. He increased the trileptal to 400mg every day. All other medications were continued at the previous dose.

On October 31st the client met with the psychiatrist and his weight was 141, his blood pressure was 122/70 and his pulse was 80. The mother reported the client’s aggressive behavior had continued. The doctor decided to increase the Zyprexa to 10mg to help with the aggression. All other meds were continued as prescribed.

The seventh of November the client met with the doctor, but no vitals were taken. The mother reported the client was finally doing better and his aggressive episodes had decreased. The doctor increased the Zyprexa to 15mg at bedtime and did not change any of the other medications.
On the 21st of November at a medication management appointment the client’s weight was 145, his blood pressure was 100/64 and his pulse was 80. The mother was happy with the client’s progress and reported his aggression has decreased, but he still was acting out impulsively. The doctor did not change any of the medications at this time.

On March the 6th at a medication management appointment no weight was taken but the client’s blood pressure was 115/75 and his pulse was 96. The client was still acting impulsively and the mother believed he had ADHD. She stated he acted similar to her other children who were diagnosed with ADHD. None of whom were his biological siblings. The doctor discussed the risks and benefits of Strattera, and then started Strattera at 40mg in the afternoon for 4 days and to be increased to 80mg in the afternoon. No changes were made to the other medications.

On April 17th at a medication management appointment his weight was not taken, but his blood pressure was 120/75 and his pulse was 100. The mother stated she believed the client’s ADHD symptoms had decreased with the implementation of the Strattera. She was now concerned about the weight of the client. The doctor warned her of the possibility of childhood onset diabetes if the client’s weight was not controlled. He warned her that the Zyprexa may be causing some of the weight gain. At this time she stated she does not want to change any medication because the child was doing well at both home and school.

On the 29th of May the client’s weight was 159, his blood pressure was 110/64 and his pulse was 104. He was seen by the psychiatrist. The mother had the client’s blood sugar taken by the primary care physician and she reported it was within normal limits. She stated his behavior was still good. No medication changes were made.

On August the 21st at a medication management appointment the client weighed 158 pounds, his blood pressure was 110/60 and his pulse was 96. The mother stated the client was
doing well but that he was very tired during the day and was sleeping at school. The doctor decreased the Zyprexa to 10mg and no other changes were made.

The twenty fifth of September at a medication appointment not vitals were taken. The mother was frustrated because after the decrease of the Zyprexa the client’s aggression had increased. She stated she did not want the client to be taking the Zyprexa because of the weight gain issues. The doctor discontinued the Zyprexa and started Abilify at 10mg in the morning to be increased to 15mg after one week. All other medications were continued as prescribed.

On the 24th of October at a medication management appointment the client’s weight was 155 pounds, his blood pressure was 90/62 and his pulse was 80. The mother stated the Abilify helped decrease the client’s anger and he was more awake at school and home during the day. The doctor increased the Abilify to 30mg a day and did not change any of the other medications.

The 20th of November at a medication management appointment the client weighed 156, his blood pressure was 120/60 and his pulse was 60. The mother stated the client was doing very well, and no medication changes were made.

The client was last seen on March 4th of 2004 for a medication management appointment with the psychiatrist. His weight was 152, his blood pressure was 120/60 and his pulse was 86. He was reportedly doing well and his meds had not been altered.

The boy’s case was different than the first case, as he was on the Zyprexa for over a year. After a month of treatment on the Zyprexa he gained 12 pounds and after two months gained 17 pounds. At this point the weight seemed to stabilize, but the struggle was to control his symptoms of aggression. It was not until the Zyprexa was increased to a larger dose of 15mg, that his aggressive symptoms were controlled, and from this point he gained another 17 pounds. It took him a year and 3 months to gain this much weight, but the rapid weight gain was still
unusual for a child of this age. The Zyprexa was discontinued 18 months after its initiation and Abilify was started. His current medication regime does appear to control his symptoms and caused little side effects. Kluger discusses another case that was very similar to this case. The difference being it involved a young girl, and the symptoms and the outcome were very similar. The girl, Monica, was put on many different medications and was finally prescribed Zyprexa, "Next Monica was switched to Zyprexa, an antipsychotic that led to serious weight gain. "At 12 years old she had stretch marks," says Hatten. Now, a year later, Monica was taking a four-drug cocktail that includes Tegretal, an anticonvulsant, and Abilify, an antipsychotic. That, at last, seems to have solved the problem" (Kluger, 2003).

The weight gain that occurred seemed to follow the pattern discussed in the study by Kinon. The boy's weight appeared to plateau with the initial implementation of the Zyprexa. The case contradicts Kinon's study because weight gain occurred again as the dose of the Zyprexa increased. Kinon specifically states "Dose was not a significant predictor of long-term changes in weight with olanzapine treatment" (2001).

Discussion of the two case studies
The two cases had many commonalities. Some of the similarities were that both clients had multiple diagnoses after the initial evaluation, both also had mild mental retardation, and learning disorders. Santosh and Baird discussed the implications of prescribing medications to children who have intellectual disabilities. They believe there was a strong need to regulate and study psychotropics used in this population, as their needs and symptoms were different than other individuals with mental illnesses (1999). Another commonality was they both were adopted and were living in situations where they did not have contact with their biological
parents. In case number one, she lived with the parents who adopted her biological mother, but she had little contact with her true mother. In the second case, the boy lived with the adoptive parents and had no contact with his biological family. The boy also was in a family with 8 other adopted siblings. Because of this neither of these children were living in a perfect environment.

Even with these factors taken into consideration, both also have significant biological influences on their behavior. The young girl had Tourette’s, a brain shunt, and had a strong history of mental illness in her biological family. The boy also had a strong history of mental illness from both his maternal and paternal sides of the family. In both cases the most disturbing symptom for them and their families was the acting out behavior. The girl harmed herself when stressed and frustrated, and the boy became aggressive towards family members. In trying to alleviate these symptoms the doctor went down a road battling with not only the erratic symptoms, but also the side effects of the medication.

Though the weight gain in both cases was drastic, the data had many faults. Before scientific generalizations can be made studies with more individuals and less extraneous influences, need to be performed. The case studies provided more knowledge about the positive and negative effects of prescribing atypical antipsychotics to children and adolescents.

**Conclusion**

The amount of research literature available on the weight gain of children and adolescents taking atypicals was limited. The goal of this manuscript was to present literature that would explore the scope of the problem of weight gain experienced by children and adolescents taking atypical antipsychotics. The two case studies presented could give one an idea of how the weight gain presented in a clinical context. There were many unknowns about
why this phenomenon occurs, but the more knowledge gained on the subject will help prescribers make educated decisions on how they prescribe to children and adolescents.

Presently prescribers practices for using atypicals are based on personal clinical experience, not from scientific evidence (Pappadopulus et al. 2002). The future will hopefully open doors of knowledge on this subject and will provide a way for prescribers to make evidence based decisions in their prescribing practices. Presently, with the rapid rise in weight gain with children not taking atypical antipsychotics, it would appear to be unwise to add a medication that may compound this potentially lethal health epidemic.
References


of 5-HT2 and D2 receptor occupancy of clozapine, risperdone and olanzapine in schizophrenia (Electronic version). *The American Journal of Psychiatry, 156*(2), 286-293.


### Table 1

**Uses For Antipsychotics in Children and Adolescents**

**Common uses in child psychiatry**

- Psychoses
  - Schizophrenia
  - Brief Psychotic disorder
  - Schizoaffective disorder
  - Psychotic disorder not otherwise specified
- Mood disorders
  - Treatment-resistant bipolar disorder
  - Bipolar disorder with psychotic features
  - Major depression with psychotic features
- Movement disorders
  - Tic disorders or Tourette’s syndrome
  - Stereotypic movement disorder
  - Autism and pervasive development disorders
  - Intermittent explosive disorder

**Common uses in pediatric medicine**

- Sedation, paradoxical response to benzodiazepines
- Drug-Induced (eg. steroids) psychosis
- Delirium (eg. meningitis or ketoacidosis)
- Chorea
- Organic personality disorder
- Agitation (hospitalization or immobilization)
- Self-injurious behavior (eg. biting)
- Anorexia nervosa

**Potential uses in child psychiatry**

- Disruptive behavior disorders
  - Conduct disorder
  - Severe or treatment-resistant attention-deficit hyperactivity disorder
  - Schizoid or schizotypal personality traits
  - Borderline personality disorder
- Severe stuttering
### Table 2

**Antipsychotics Marketed in the United States and Their Usual Dosage Ranges**

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Child dose for Psychosis (mg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risperdone</td>
<td>0.25 to 6</td>
</tr>
<tr>
<td>Olanzapine</td>
<td>2.5 to 20</td>
</tr>
<tr>
<td>Quetiapine</td>
<td>12.5 to 750</td>
</tr>
<tr>
<td>Clozapine</td>
<td>50 to 300</td>
</tr>
<tr>
<td>Ziprasidone</td>
<td>20 to 180</td>
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