

Running Head: HORSE BOY CAMPS

A Pilot Study of Outcomes for Autistic Children and Their Families after Participation in a  
Horse Boy Camp

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### Abstract

The aim of this pilot study was to explore whether participation in a three day intervention involving horseback riding in nature— a program specifically designed for autistic children and their families called “Horse Boy Camps” - improves child outcomes in terms of social and cognitive functioning, as well as in parental and sibling well-being. Child and family outcomes were measured for 6 families who attended a three-day Horse Boy Camp. There was one autistic child per family who attended the camp (3 male and 3 female;  $M$  age = 9.17;  $SD$  = 2.23). The study found marginally significant improvements in terms of autistic children’s movement sensitivity and sensory and cognitive awareness. In addition parents reported marginally significant improvements in their marital relationship and a trend towards improvement in their autistic child’s relationship with their siblings. A trend towards reduced levels of anxiety in the parent was also found. Horse Boy Camps appear to be a promising intervention for children with autism and their families.

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Autism is an epidemic in Western society. Although exact prevalence rates are unknown, the Center for Disease control estimates that 1 in 110 children in the United States (Rice, 2011) and 1 in 100 children in the United Kingdom (Baron-Cohen et al., 2009) are now classified as having an Autism Spectrum Disorder (ASD). Autism is characterized by social impairments, communication difficulties, and restricted, repetitive, and stereotyped patterns of behaviors. It can be a highly disabling condition, impacting children's ability to interact and function in a complex social world.

While the causes of autism remain largely unknown, there are an increasing number of treatments available to help autistic children function more effectively. In addition to traditional therapies such as Applied Behavioral Analysis (Lovaas, 1987), which tend to rely on extrinsic motivation to shape autistic children's behavior in specified ways, increasing attention is also being focused on interventions that foster a child's curiosity, interest and intrinsic motivation through reciprocal social interactions. These types of relationship-focused interventions encourage and support parents to enhance their use of responsive interactive strategies with their ASD children, and research suggests that this approach can significantly improve children's social and emotional functioning (Mahoney & Perales, 2003).

One promising intervention approach that may enhance intrinsic motivation and reciprocal social interactions among autistic children is animal assisted therapy (Fine, 2006). Animal assisted therapy uses the human-animal bond as an integral part of the treatment process (Bizub, Joy, & Davidson, 2003). A subtype of this therapeutic approach is equine assisted

therapy (EAT), a collective term for all types of activities using horses as a tool in a therapeutic process. EAT typically involves teaching riding skills or else using the horse as a medium to teach balance, communication and social skills. A study by Thomas et al. (2007) found that 11% of parents with an autistic child reported using an EAT as a social therapy intervention. EAT has been found to be an effective intervention for children with different disabilities, including cerebral palsy (Sterba, Rogers, France, & Vokes, 2002;), sensory integration difficulties (Candler, 2003), language disorders, (Dismuke, 1984) and developmental delay (Winchester, Kendall, Peters, Sears, & Winklsy, 2002). There is also some evidence that EAT is effective in enhancing sensory motor, communication, and overall social interaction skills in autistic children (Umbarger, 2007; Garrique, Moutiez, & Galland, 1994; Citterio, 1997; English, 1994; Leitao, 2004), though none of these studies included control groups and therefore have limited value in confirming the effectiveness of EAT for autistic youths.

The one exception was a controlled study of EAT for autistic children conducted by Bass, Duchowny, and Llabre (2009). The study evaluated the effects of EAT on social functioning in children with autism following a 12-weeks horseback riding intervention. Autistic children who took part in the therapeutic riding program exhibited significantly greater sensory seeking, sensory sensitivity and social motivation compared to a wait-list control group, as well as less inattention, distractibility, and sedentary behaviors. The results of this study suggest that EAT improves the functioning of autistic children, and that parents of autistic children should consider equine therapy as an effective treatment option.

The EAT examined in the Bass et al. (2009) study was a traditional program conforming to NARHA (North American Riding for the Handicapped Association) guidelines. This approach typically involves an instructor and trained volunteers who walk alongside the child as he or she

sits alone the horse, teaching skills like mounting and dismounting, reining, or walk/trot. Games such as Simon Says or saying letters of the alphabet while the child sits on a stationary horse are also included to help autistic children gain communication skills. Horsemanship activities such as grooming are taught as well. Parents and other family members are usually not actively involved in the child's riding session.

One limitation of traditional equine therapies is that they were not specifically designed with autism in mind. Rather, they were largely developed in order to teach riding skills to children with physical disabilities such as cerebral palsy. While some autistic children may eventually learn to ride, the main focus of horse therapy for autistic children is on developing cognitive, verbal and social skills rather than horse-riding skills per se, and for that reason a program designed specifically to address the developmental needs of autistic children may be even more beneficial. Also, because traditional therapeutic riding programs do not involve the entire family, a crucial opportunity is missed to address the psychological difficulties experienced by the parents and siblings of autistic children.

The extreme care-giving challenges faced by parents of ASD children means that they experience greater stress and depression than parents of typically-developing children (Baker-Ericzen, Brookman-Fraze & Stahmer, 2005; Ingersoll & Hambrick, 2011), especially among those who have difficulty accepting and coming to terms with their child's autism diagnosis (Milshtein, Yirmiya, Oppenheim, Koren-Darie, & Levi, 2010). Smith and colleagues (2010) found that mothers of an ASD child spent more time caring for their children, spent fewer hours engaged in leisure activities, and experienced more stress and arguments at home than did mothers of typically developing children. The normally developing siblings of ASD children also tend to experience psychological problems such as stress and depression (Gold, 1993). Siblings

may feel anger and frustration at the extra chores and responsibilities they have to take on (Kaminsky & Dewey, 2002). In fact, eighty percent of siblings of autistic children have little or no involvement in childhood activities such as youth groups, hobbies and recreational classes due to their parents' focus on treating their sibling's disorder (Barak-Levey, Goldstein & Weinstock, 2010).

Fortunately, EATs can provide fun and leisure for the parents and siblings of autistic children, while also reducing their stress and enhancing their psychological well-being. Studies on equine-assisted psychotherapy indicate that contact with horses is an effective means of healing depression, stress and trauma among non-disabled populations (Ewing, MacDonald, Taylor, & Bowers, 2007; Klontz, Bivens, Leinart, & Klontz, 2007; Masini, 2010; Schultz, Remick-Barlow, & Robbins, 2007; Yorke, Adams, & Coady, 2008). Thus, involving non-autistic parents and siblings in EAT would provide an opportunity to enhance family well-being in addition to helping autistic children themselves.

There is a new method of equine therapy that has been designed intentionally with the needs of autistic children and their families in mind. Rupert Isaacson developed an approach called the Horse Boy Method (see [www.horseboyworld.com](http://www.horseboyworld.com)) after finding that horses immensely improved the functioning of his son Rowan, who is autistic. The Horse Boy Method is used by instructors in riding school settings and is also applied in three-day Horse Boy camps in which several families with autistic children camp in nature, and everyone including parents and siblings have the opportunity to ride and participate in group activities (e.g., sitting around the camp fire, taking nature walks, playing group games.) In order to understand why Horse Boy camps may be an innovative and effective way of helping autistic children and their families, it is first necessary to examine the unique features of the Horse Boy Method.

Unlike most therapeutic riding interventions the entire family is encouraged to come for the therapy session and to spend several hours at the riding location. Parents interact with both the child and EAT provider, providing a sense of security for the child and also providing invaluable information about the child's interests that the therapist can capitalize on. Siblings are also encouraged to play and ride, so that they have a fun day out with their autistic brother or sister. An emphasis is also placed on providing a stimulating environment for autistic children – environments that are designed to enhance motivation, physical activity, and intrinsic interest. For example, there might be small animals, swings, trampolines, and other fun activities for the children and their siblings, which often helps them relax with their family before getting on a horse. Therapists also do as much riding as possible on nature trails rather than being confined to a riding arena. Therapists trained in the Horse Boy method are highly focused on using the riding experience to promote communication and completion of tasks. For instance, the therapist might ask questions like “where do you want to go?” “should we go fast or slow?” with the immediate reward of actually taking the action requested by the child.

In order to help facilitate this communication, therapists trained in Horse Boy method use horses for both sensory work and back riding. Sensory work involves the child lying and relaxing on the horse while it grazes. It is hypothesized that gentle contact with the horse may help to calm the nervous system, especially since the horse tends to provide a gentle rocking motion as it grazes (Solodkin, Hlustik, Buccino, 2007). It also allows for a stronger emotional bond with the horse. Siblings and parents are also given time to lie on the horse in this relaxed way. Back-riding involves an adult rider sitting behind the autistic child in an oversized saddle, allowing for faster gaits like trot and canter which may stimulate the cerebellum (Bass et al., 2009), as well as enhancing the enjoyment of riding and thereby increasing intrinsic motivation. The close body

contact with the adult rider holding the child from being may also release oxytocin (Holt-Lunstad, Birmingham, & Light, 2008). An additional advantage of back riding is that children can communicate with the adult rider without looking at them directly in the face, which may reduce the anxiety experienced by many autistic children in face-to-face contact situations (Kleinhans et al., 2010). All horses used with the Horse Boy Method are also trick-trained to perform tricks such as smile or bow. These tricks can be elicited by the use of one or two word commands, and provide a highly motivating context for autistic children to speak.

The Horse Boy Method is being increasingly adopted by therapeutic riding stables, and in fact the Riding for the Disabled Association (RDA) in the UK has officially adopted Horse Boy methods in its guidelines for its program of equine therapy for autistic children.

One of the most innovative ways in which the Horse Boy method is being employed, however, is in three day Horse Boy Camps, in which several families with autistic children ride and camp in nature (this intervention is described in more detail in the methods section).

There have been many testimonials to the effectiveness of Horse Boy camps in terms of spurring language, social, and cognitive development for autistic children, and also in terms of helping families start to take a more positive and hopeful outlook on their child's condition. Clearly, however, scientific research is needed to determine if the novel therapeutic approach has merit. The proposed pilot study examined whether there were significant impacts of participation in Horse Boy camps for autistic children and their families following completion of the camp.

In line with previous research it was hypothesized that attending a three-day Horse Boy Camp would have a significant impact on the functioning of the child with autism in terms of their language and communication as well as their social and sensory functioning. As previously

mentioned Horse Boy Method emphasizes the use of back-riding and sensory work when working with children with autism. Back-riding allows the child to ride safely at faster gaits like trot and canter which has been suggested to stimulate the cerebellum (Bass et al, 2009), a part of the brain linked by some researchers to cognitive functions such as attention and language (Wolf, Rapoport &, Schweizer, 2009). Sensory work involves the child with autism lying body-to-body on a horse and relaxing up there while the horse grazes. Both observer reports and previous research have indicated that this might help calm the nervous system, especially since the horse tends to provide a gentle rocking motion as it grazes (Solodkin, Hlustik, Buccino, 2007). Working with social animals, such as horses, in general has also been shown to have a positive effect on the social functioning of children with autism (Bass et al, 2009).

It was also hypothesized that attending a three day Horse Boy Camp would have a significant impact on the parents and siblings of the child with autism. Previous EAT studies have shown that contact with horses is an effective way of healing depression, stress and anxiety in non-disabled populations (Ewing, MacDonald, Taylor, & Bowers, 2007; Klontz, Bivens, Leinart, & Klontz, 2007; Masini, 2010; Schultz, Remick-Barlow, & Robbins, 2007; Yorke, Adams, & Coady, 2008). It was therefore anticipated that attending the camp would significantly decrease the anxiety, stress and depression of the parents who attend the camp. Parenting a child with autism has also been found to lead to feelings of social isolation and a lack of connectedness with the outside world (Higgins, Bailey & Pearce, 2005). This is thought to be, in part, due to the stigmatization that these parents often feel in public situations (Gray, 1993). The focus within Horse Boy Method on providing a social setting where three to four families can meet and spend time together in a judgment free environment is therefore anticipated to have a

positive impact on the feelings of social connectedness experienced by parents who attend the camp.

Moreover, it was hypothesized that there would be significant improvements in the relationship between the child with autism and their siblings as well as family functioning in general, given that the focus at a Horse Boy Camp is on the family as a whole. All family members take part in various activities which create bonding experiences that bring the family closer together.

## **Methods**

### **Participants**

Families who had booked to attend a three-day Horse Boy Camp were invited to take part in the research study. The camps were advertised on the Internet and by contacting local and national autism groups. Individuals who signed up for the research study were given a reduced fee to attend a camp. A total of 9 families signed up for the research study. However, 3 did not fully complete the post-study measures and were dropped from the study, leaving a sample size of 6. Of these 6 families, 4 had both parents attending and 2 had only one parent attending. One parent filled out the survey per family (1 male and 5 females; 5 Caucasian and 1 Hispanic). There was one autistic child per family who attended the camp (3 male and 3 female;  $M$  age = 9.17;  $SD = 2.23$ ). 5 of the families had siblings in attendance.

### **Measures**

Participants were asked to complete an on-line survey one week before and one month after attending a Horse Boy Camp. A variety of measures were used to assess the impact of camp attendance for autistic children and their parents and siblings.

**Autism Symptoms.** Participants were given the Autism Treatment Evaluation Checklist (ATEC) (Autism Research Institute<sup>2</sup>, 1999) is a 77 item questionnaire specifically developed to measure treatment effects in individuals with ASDs. The questionnaire consists of 4 subscales: speech/language/communication (e.g. 'Knows own name') (14 items); sociability (e.g. 'Ignores other people') (20 items); sensory/cognitive awareness (e.g. 'Responds to own name') (18 items) and health/physical behavior (e.g. 'Bed-wetting') (25 items). Responses are given on a scale from 1 (not descriptive) to 3 (very descriptive) for the first three subscales and from 1 (not a problem) to 4 (serious problem) for the health/physical behavior subscale. Based on these responses scores are computed for each domain. A recent study found that the ATEC has high internal consistency and is correlated with standardized measures of cognitive, language, and adaptive behavior skills and severity of autism symptoms (Magiata, Moss, Yates, Charman & Howlin, 2011).

**Sensory Processing.** Participants were given the Sensory Profile - Short (Dunn, 1999) is administered to parents or teachers. The measure addresses the degree to which children exhibit problems in terms of sensory processing, modulation, and behavioral and emotional responses to sensory stimulation. For the purposes of this study, the subscales will be used that assess Tactile Sensitivity (e.g. 'expresses distress during grooming'), Movement Sensitivity (e.g. 'becomes anxious or distressed when feet leave the ground') and Underresponsive/Seeks Sensation (e.g. 'becomes overly excitable during a movement') (a total of 17 items). Responses are given on a scale from 1 (almost always) to 5 (nearly never) and based on these responses a score is computed for each domain. Internal consistency of the sections within the scale range from .70 to .90 (Dunn, 1999).

**Family Impact.** Participants were given the Family Impact Questionnaire (Donenberg & Baker, 1993), which assesses the impact of parent's perceptions of their child's impact on their

family compared to ‘most children his/her age.’ For the purpose of this study the subscales that assess; feelings and attitudes towards child (e.g. ‘I feel like I could be a better parent with my child’); impact on marriage (e.g. ‘My spouse and I disagree more about how to raise this child’); impact on siblings (e.g. ‘My child prevents his/her siblings from participating in activities more’); and general impact (e.g. ‘Compared with other children my child's age, the impact of my child on our family is?’) will be assessed (33 items total). Responses are given on a scale from 0 (not at all) to 3 (not very much) and based on these responses a score is computer for each subscale as well as a total score. Internal consistencies of the subscales range from .83 to .92 (Donenberg & Baker, 1993).

**Depression, Anxiety, and Stress.** Participants were given the DASS-21 (Lovibond & Lovibond, 1995), a commonly used 21-item scale measures adults’ levels of depression (e.g. ‘I couldn’t seem to experience any positive feeling at all’), anxiety (e.g. ‘I was aware of dryness of my mouth’) and stress (e.g. ‘I found it hard to wind down’). Responses are given on a scale from 0 (does not apply to me at all) to 3 (applies to me very much). Participants are given a separate score for depression, stress and anxiety with higher scores indicating higher levels. The three scales comprising the DASS have been shown to have excellent internal consistency both for the 42 and 21 item version of the scale (Brown et al, 1997).

**Social Connectedness.** Participants were given the Social Connectedness Scale (Lee & Robbins, 1995), which measures the degree of interpersonal closeness that individuals feel between themselves and other people, both friends and society (e.g. ‘I feel disconnected from the world around me’) Responses are given on a scale from 1 (strongly agree) to 5 (strongly disagree) with higher scores representing a stronger sense of belonging. Internal consistency reliabilities for the Social Connectedness Scale are generally around  $\alpha = .91$ .

**Self-Compassion.** Participants were given the Self-Compassion Scale – Short Form (Raes, Pommier, Neff, & Van Gucht, in press). Contains 12 items assessing self-compassion in terms of self-kindness (e.g. ‘I try to be understanding and patient towards aspects of my personality I don’t like’) versus self-criticism (reverse-coded, e.g. ‘I’m disapproving and judgmental about my own flaws and inadequacies’); a sense of common humanity (e.g. ‘I try to see my failings as part of the human condition’) versus isolation (reverse-coded, e.g. When I’m feeling down, I tend to feel like most other people are probably happier than I am’); and balanced awareness of negative emotions (e.g. ‘When something painful happens I try to take a balanced view of the situation’ versus over-identification (reverse-coded, e.g. ‘When I’m feeling down I tend to obsess and fixate on everything that’s wrong’). Responses are given on a 5-point scale ranging from 1 (almost never) to 5 (almost always) and a mean score of self-compassion is then calculated. The short form of the Self-Compassion Scale has near perfect correlation with the long form when assessing total scores.

### **Intervention**

The intervention involved participation in a Horse Boy Camp, which is a three day/ two night immersion into the Horse Boy method. During a camp up to four families camp together in cabins, bunk houses or tents with a team of trained Horse Boy staff, volunteers and horses. Each camp is led by a trained camp leader who has completed a basic Horse Boy Method training course as well as a Horse Boy Camp training course and participated in at least three prior Horse Boy Camps. The camps took place at a facility that was approved by Horse Boy staff members as a suitable environment for Horse Boy Method.

A regular camp day is variable and tailored to the needs of individual families, however, but there are a number of essential components that must be present. For a location to be

classified as suitable for a Horse Boy Camp it therefore must have access to nature trails for riding and hiking, be closed to the general public, have outside play equipment such as a trampoline and swings and have a secure place to keep the horses. The therapy must be presented in the context of a fun family adventure in nature, involving camping, sitting around a camp fire, nature walks, and intensive horseback riding for all interested family members. For this reason each camp must involve several autism families so that they can gain a sense of community and share mutual experiences in a safe and supportive environment.

Each camp must also involve a highly skilled adult rider who can sit behind the child in an oversized saddle to accommodate faster gaits like trot and canter, possibly providing stimulation of the cerebellum and providing a fun and relaxed context for communication that does not provoke face-to-face anxiety. This rider must be approved by Horse Boy Staff members as being trained to a suitably high standard to stimulate language development by using verbal commands to elicit highly motivating actions from the horse such as trot, smile or bow. Sensory therapy, which involves allowing all family members to relax on the horse while it grazes, helping to calm the nervous system, must also be provided.

### **Results**

Due to the small sample size the decision was made to use non-parametric tests to analyze the data. For this reason the decision was also made to count p values of less than .10 as marginally significant, and p values of less than .15 as a trend. A series of matched-pair Wilcoxon Signed Rank tests were used to determine whether there were significant pre/post changes in the study variables.

Results are presented in Table 1. Results indicated that after attending a three day Horse Boy Camp, autistic children showed marginally significant improvements in terms of their

movement sensitivity and sensory and cognitive awareness. In addition there was a marginally significant improvements in terms of participants reports that their child had less of a negative impact on their marital relationship than before camp participation...

There were also trends suggesting that camp participation improved the relationship between the autistic child and their siblings, generally had less of a negative impact on the whole family, and also resulted in reduced anxiety for parents.

Results did not indicate that camp participation resulted in significant changes in the following child outcomes: communication, sociability, health and physical behavior, tactile sensitivity or sensation seeking. Additionally no significant changes were reported in terms of parental stress, depression, connectedness, self-compassion or parents' feelings and attitudes towards their child with autism.

### **Discussion**

Participation in the camp was reported by parents to have a marginally significant effect on their child's movement sensitivity, which involves the degree to which children exhibits anxiety and distress in relation to heights or activities where the child's feet had to leave the ground. Children with autism are frequently observed to experience difficulties with sensory processing, so much so that a recent study found support for the universality of these features across the spectrum (Ben-Sasson et al, 2009). Lane et al. (2010) identified three distinct sensory processing subtypes in autism, one of which was related to movement sensitivity. The researchers also found that movement sensitivity was a unique predictor of maladaptive behaviors, leading them to conclude that the use of sensory-based interventions should be continued in the remediation of communication and behavioral difficulties in autism. The finding that participation in a Horse Boy Camp significantly decreased movement sensitivity suggests

that it may be a useful intervention for autistic children who exhibit sensory processing difficulties that are related to movement.

Another interesting finding was the report by parents that attending a Horse Boy Camp had a marginally significant effect on their child's sensory and cognitive awareness, which refers to the extent to which a child has difficulty processing sensory information and understanding their world. One of the most fundamental and unique aspects of Horse Boy Method is its emphasis on allowing the child to lie body-to-body on the horse and relax there while it grazes. Both observer reports and previous research have indicated that this might help calm the nervous system, especially since the horse tends to provide a gentle rocking motion as it grazes (Solodkin, Hlustik, Buccino, 2007). Additionally, the Horse Boy Method places an emphasis on using the horse as a vehicle to explore the exterior world which is why so much of the riding occurs, not a in a riding arena, but out on the trail. Practitioners are trained to talk as much as possible about the things that they observe and come across on the trail in order to help the child delight in and order the world around them. Previous studies have identified several features within a school classroom that have been observed to impair the sensory functioning of children. These include bright artificial colors and light, pattern glare and echoing (Shabha, 2006), all of which are less likely to be a problem out on the trail than in a riding arena or classroom. It is therefore possible that the use of the horse as a vehicle to explore the natural world coupled with the sensory work is what caused parental reports of improved sensory and cognitive awareness in their children with autism after attending a Horse Boy Camp.

In addition to having a positive effect on the child his or herself, it was also found that attending a Horse Boy Camp had a positive impact on the parents and siblings of the child with autism. As hypothesized, study participants reported that their child had less of a negative impact

on their marital relationship after attending a Horse Boy Camp, although again this result was marginally significant. Parenting a son or daughter with ASD poses a number of unique challenges, any of which may take their toll on a marriage. While the extent of this toll is yet to be agreed on it is generally assumed that divorce rates are higher amongst parents of special needs children than the population in general (Hartley et al, 2010). These increased divorce rates are thought, in part, to be due to the high-level of parenting demands and stress and subsequent lack of attention devoted to one's spouse due to the extreme care-giving needs of a child with autism (Shapiro et al., 2000). During a three-day Horse Boy Camp an emphasis is placed on facilitating time and space for couples to spend time together safe in the knowledge that their child is being well-cared for. An example of this would be creating an opportunity for a couple to take a walk alone together while their children are participating in other activities with staff members and volunteers. It could be that taking the time for each other during the camp encourages parents to continue to take the time for each other once they return to the life. It is important to note that only four of the six families who took part in the study had both parents attend the camp which might be why the result only came out as marginally significant. Further research is needed, however, to test the validity of this assumption.

Parents also reported reduced levels of anxiety after attending a camp, although this result was only trending toward significance. Numerous studies have shown that animal assisted therapies, including EAT, can have ameliorative effects on the anxiety levels of both adults and children (Ewing, MacDonald, Taylor, & Bowers, 2007; Klontz, Bivens, Leinart, & Klontz, 2007; Masini, 2010; Schultz, Remick-Barlow, & Robbins, 2007; Yorke, Adams, & Coady, 2008). Additionally the emphasis placed on social support and community at the camps is also likely to have had a positive impact on parental anxiety levels. Studies show that social support is a

protective factor for the adaptation of parents of children with autism and informal support (from friends but also other parents of children with disabilities) has been found to be the most critical (Lounds, 2004). It is possible that in a larger sample size this result would have been significant.

Participation in the camp also appeared to improve the relationship between the child with autism and their siblings according to parental reports (this finding again trended towards significance). As previously mentioned, eighty percent of siblings of children with autism have little to no involvement in normal childhood extracurricular activities (Barak-Levey, Goldstein & Weinstock, 2012) which can lead to feelings of anger and frustration (Kaminsky & Dewey, 2002). Recent research on siblings of developmentally challenged children has led clinicians to now advocate the use of family-based, as opposed to child-based, interventions that take into account the needs of the siblings (Schuntermann, 2007). With this in mind it is therefore possible that the focus within Horse Boy Method on the whole family and the inclusion of siblings in all activities might explain this improved relationship although again further research is needed before any firm conclusions can be drawn. This is an important finding as studies have indicated a non-conflicting sibling relationship is a protective factor for later maladjustment in the siblings of children with developmental disorders (Fisman et al, 1996).

Contrary to our expectations, none of the other variables measured came out as significant or as trending towards significance. Previous research investigating EAT as a therapeutic intervention for children with autism has indicated that it does significantly increase sensory motor, communication, and overall social interaction skills (Umbarger, 2007; Garrique, Moutiez, & Galland, 1994; Citterio, 1997; English, 1994; Leitao, 2004). Additionally EAT has been found to reduce stress and enhance psychological well-being in non-disabled populations (Ewing, MacDonald, Taylor, & Bowers, 2007; Klontz, Bivens, Leinart, & Klontz, 2007; Masini,

2010; Schultz, Remick-Barlow, & Robbins, 2007; Yorke, Adams, & Coady, 2008). This suggests that our lack of significant findings in these areas could well be due to the small sample size recruited for the present study.

### **Limitations and Future Research**

One of the major limitations of this study is the small sample size, which was in part due to the limited number of places available on each camp and in part due to families not wishing to take part in the study or dropping out of the study half way through. Despite the use of non-parametric tests the small sample size makes it possible that results were missed that would have been statistically significant in a larger sample. Another limitation of the study is that it did not use an active control group, which means that study results could have been due to the mere participation of families in some sort of group activity. Additionally results were based on the self-reports of parents rather than objective observations.

Future research could address these limitations by replicating the study in a larger sample, comparing outcomes after participation in a Horse Boy camp with those of families attending some other sort of group activity. Data should also be collected via methods of direct observation, and siblings could be asked directly about their feelings about their sibling with autism. It might also be useful to have teachers fill out the child outcome measures in order to see if any of the results found generalized to the classroom.

Additionally the Horse Boy Foundation is in the process of developing a method of working with children with autism without horses called Horse Boy Learning. This is based around the same principles of Horse Boy Method, namely facilitating communication and learning through exploration of their environment, but can be taught to parents of children with autism for use in daily life. The premise is that more intensive time working with these methods

will facilitate even greater changes in the child. In fact, this was shown in a study by Jenkins, Schuchard & Thompson (2012) that investigated the effects that high versus low intensity home based interventions had on children's autistic symptoms. Their results indicated that the greatest gains were found when parents administered high intensity interventions to their children. Therefore, evaluation of the impact of participation in the Horse Boy Learning program would be another fruitful avenue for future research.

Despite its limitations, this study provides preliminary support for the use of the Horse Boy Method as an effective therapeutic intervention for children with autism and their families. Horse Boy camps are unique because they involve methods of equine therapy specifically designed for the needs of autistic children. Moreover, their focus on the family as a whole, the fact that the camps take place in a peaceful natural environment, and the variety of activities offered on the camps mean that not only is the intervention effective, it is fun and enjoyable for all.

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Table 1

*Pre-test and Post-test Scores for Child Outcomes Analyzed with Wilcoxon Signed Ranked Non-Parametric Tests*

Outcome	Pre-test	Post-test	<i>p</i> value
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	
Speech/Language/Communication	2.51 (.48)	2.52 (.48)	.45
Sociability	2.30 (.34)	2.34 (.16)	.75
Sensory & Cognitive Awareness	2.15 (.51)	2.32 (.41)	.07*
Health & Physical Behavior	2.78 (.48)	2.92 (.39)	.35
Tactile Sensitivity	3.55 (1.43)	3.37 (1.01)	.75
Movement Sensitivity	3.67 (1.43)	4.17 (1.49)	.08*
Underresponsive/Seeks Sensation	3.31 (1.33)	3.45 (1.00)	.68
ATEC Total Score	9.74 (1.66)	10.12 (1.14)	.25
Sibling A Relationship	3.33 (.67)	3.40 (.75)	.59
Sibling B Relationship	3.05 (.92)	2.70 (.66)	.65

†  $p \leq .10$

Table 2

*Pre-test and Post-test Scores for Parent Outcomes Analyzed with Wilcoxon Signed Ranked Non-Parametric Tests*

Outcome	Pre-test <i>M (SD)</i>	Post-test M (SD)	<i>p</i> value
Depression	24.40 (8.88)	10.67 (5.28)	.50
Anxiety	19.60 (6.23)	15.67 (2.66)	.11††
Stress	27.20 (10.83)	24.00 (5.06)	.68
Connectedness	4.28 (1.00)	4.40 (1.14)	.50
Self-Compassion	3.45 (.60)	3.48 (.43)	.79
Feelings & Attitudes towards child	36.20 (.53)	41.83 (4.26)	.27
Marital Relationship	20.00 (1.87)	23.60 (5.13)	.10††
Sibling Relationship	23.33 (4.73)	26.33 (6.35)	.11††
General Impact on family	5.75 (3.20)	8.20 (2.28)	.14††

††  $p < .15$