



**UNIVERSITI PUTRA MALAYSIA**

**THE EFFECTIVENESS OF EQUINE-ASSISTED THERAPY (EAT) IN  
MALAYSIA**

**ASIYAH ABIDAH BINTI AHMAD SHAH**

**Ip  
FPV 2017 62**

**THE EFFECTIVENESS OF EQUINE-ASSISTED THERAPY (EAT) IN  
MALAYSIA**

ASIYAH ABIDAH BINTI AHMAD SHAH

A project paper submitted to the  
Faculty of Veterinary Medicine, Universiti Putra Malaysia

In partial fulfillment of the requirement for the  
DEGREE OF DOCTOR OF VETERINARY MEDICINE

Universiti Putra Malaysia  
Serdang, Selangor Darul Ehsan

March, 2017

## CERTIFICATION

It is hereby certified that we have read this project paper entitled “The effectiveness of Equine-assisted Therapy (EAT) in Malaysia”, by Asiyah Abidah binti Ahmad Shah and in our opinion it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the course VPD 4999 – Final Year Project.

---

**DR. HAFANDI AHMAD**

**BSc. (UPM), MSc. (UPM), PhD (La Trobe University, Australia)**

Senior Lecturer,  
Faculty of Veterinary Medicine  
Universiti Putra Malaysia  
(Supervisor)

---

**DR. NORANIZA MOHD ADZAHAN**

**DVM (UPM), MVM (UPM), PhD (UPM)**

Senior Lecturer,  
Faculty of Veterinary Medicine  
Universiti Putra Malaysia  
(Co-supervisor)

## DEDICATION

In the name of Allah, The Most Benevolent, The Most Merciful

Mostly dedicated to:

My late Ayah, Ummi and the Shahz Clan.

For their love, care, great source of motivation, inspiration, encouragement and endless support.

## ACKNOWLEDGEMENTS

Praised be to Allah the Most Merciful and the Most Compassionate who has given me the strength to embark on this study and witness its fruition.

The efforts which culminated in the writing of this thesis owe a great deal to a number of people. First and foremost among them is Dr. Hafandi Ahmad through whose inspiring patience in guidance and encouragement I am profoundly grateful. From the depth of my heart I wish to record my utmost thanks for his keen interest, kind assistance and generous supervision. I also wish to record my deepest appreciation to Dr. Noraniza Mohd Adzahan for her genuine endeavour, unfailing support and useful criticisms.

I also wish to record my thanks to the Faculty of Veterinary Medicine, Universiti Putra Malaysia for granting me the opportunity to do this study of which I was always eager to know. For the completion of this thesis, I wish to thank the respective organizations of the PRTC Equestrian Club and the Yayasan Sultan Idris Shah in Ipoh, Perak for their cooperation and assistance. The same goes to the subjects of my study, Afiq, Tasnim, Ikhwan, Azrin and Shaun, and their parents for their kind support in allowing me to conduct this study on them. In acknowledging the toil of my teachers and the counsels of my colleagues, who helped throughout the completion of this thesis even from the tiniest bit of advice and guidance, mere words would not suffice.

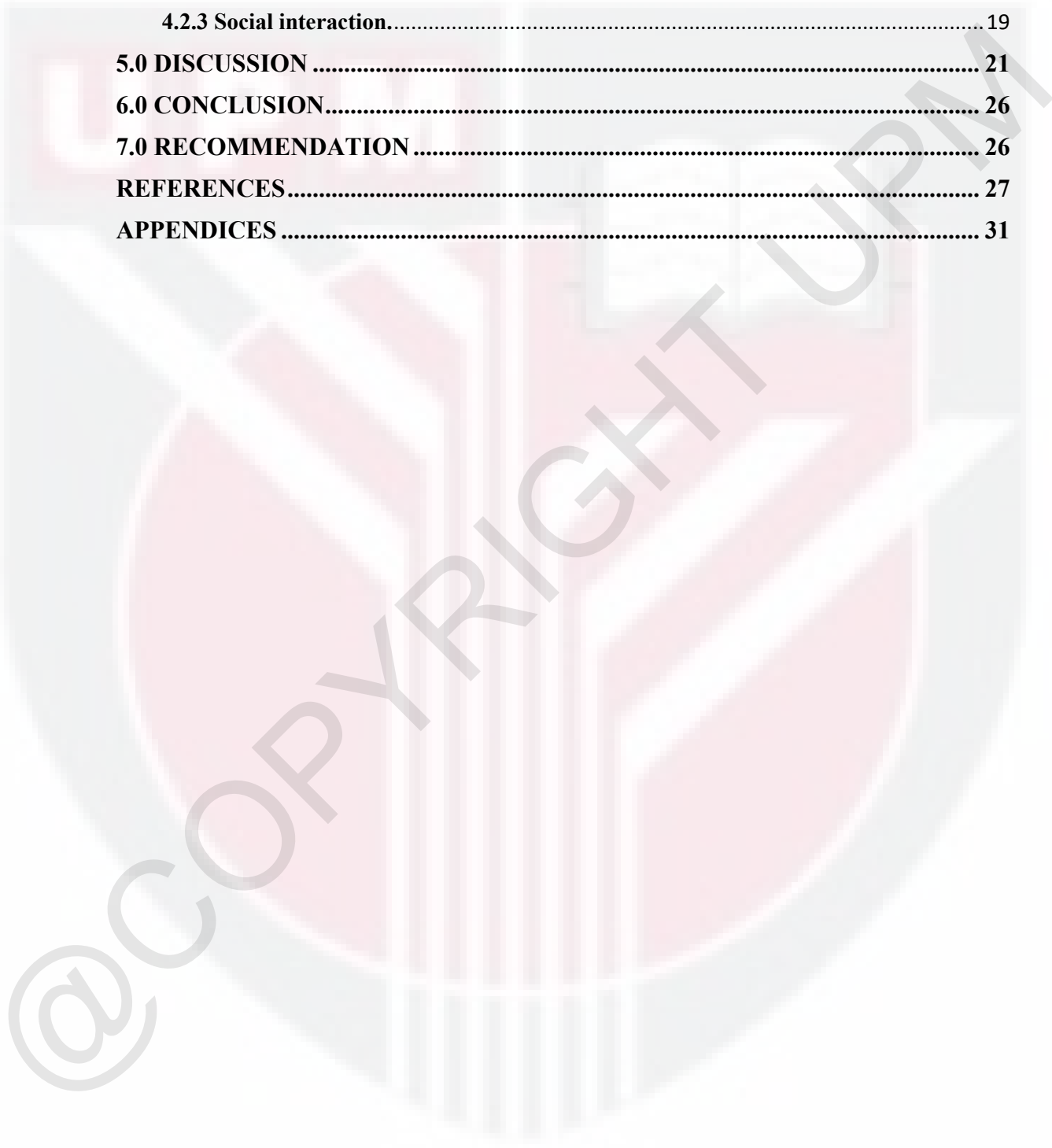
For their teachings of the finer points in life, I owed the greatest indebtedness of my beloved family, whose inspiration and motivation I am forever grateful. I enjoyed the loving and loyal companionship of my mother, Rahimi Arshad and my siblings, ‘Umar Faruq, Luqman Hakim, Umm Salamah, Maryam Sofiyah and Ibrohim Hanif, their partners, Diani Dian, Wan Normayani, Rusydi, Norehan and children. It is for her inexhaustible support and care, at times in the midst of lost and demotivation, that I wish to dedicate this work to my mother. To my brothers and sisters, and my siblings-in-law, I wish to present this as a gift for their endless support and prayers. To my nieces and nephews, Sarah, Hannah, Yusuf, Hannan, Uzair, Muaz and Imran, I wish to thank them for their cheerfulness that comforts me at times of distress and I wish to present this for their inspiration. Last but never the least ever, the result of this effort is dedicated to my ever-loving and inspiring late father, Ahmad Shah Mohd Noor, may Allah have mercy upon him, by whose death I have yet to recover from such a great loss.

## TABLE OF CONTENTS

### TABLE OF CONTENTS

<b>TITLE.....</b>	<b>i</b>
<b>CERTIFICATION .....</b>	<b>ii</b>
<b>DEDICATION.....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>iv</b>
<b>TABLE OF CONTENTS.....</b>	<b>vi</b>
<b>LIST OF ABBREVIATION.....</b>	<b>viii</b>
<b>LIST OF TABLES .....</b>	<b>ix</b>
<b>LIST OF FIGURES .....</b>	<b>x</b>
<b>ABSTRAK .....</b>	<b>xi</b>
<b>ABSTRACT.....</b>	<b>xiii</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>1.1 Background .....</b>	<b>1</b>
<b>1.2 Justification .....</b>	<b>4</b>
<b>1.3 Objective.....</b>	<b>4</b>
<b>1.4 Hypothesis.....</b>	<b>5</b>
<b>2.0 LITERATURE REVIEW.....</b>	<b>6</b>
<b>2.1 Mechanisms and benefits of EAT .....</b>	<b>6</b>
<b>3.0 MATERIALS AND METHODS .....</b>	<b>10</b>
<b>3.1 Subject.....</b>	<b>10</b>
<b>3.2 Observation .....</b>	<b>11</b>
<b>3.3 Data collection .....</b>	<b>12</b>
<b>3.4 Statistical analysis .....</b>	<b>13</b>
<b>4.0 RESULTS .....</b>	<b>14</b>
<b>4.1 Effects of horseback riding on ADHD and ASD patient’s capabilities after five sessions of RDA.....</b>	<b>14</b>
<b>4.2 Patients performances by major groupings. ....</b>	<b>15</b>
<b>4.2.1 Cognitive performance. ....</b>	<b>15</b>

<b>4.2.2 Physical capabilities.....</b>	<b>17</b>
<b>4.2.3 Social interaction.....</b>	<b>19</b>
<b>5.0 DISCUSSION .....</b>	<b>21</b>
<b>6.0 CONCLUSION.....</b>	<b>26</b>
<b>7.0 RECOMMENDATION .....</b>	<b>26</b>
<b>REFERENCES.....</b>	<b>27</b>
<b>APPENDICES .....</b>	<b>31</b>



**LIST OF ABBREVIATION**

UPM	=	Universiti Putra Malaysia
FPV	=	Faculty of Veterinary Medicine
PRTC	=	Perak Turf Club
EAT	=	Equine-assisted Therapy
RDA	=	Riding for the Disable Association
NARHA	=	North American Riding for the Handicapped Association
DS	=	Down Syndrome
ASD	=	Autism Spectrum Disorders
ADHD	=	Attention Deficit Hyperactivity Disorders
<i>et al.</i>	=	et al. (abbr. Latin) et all (and others)

**LIST OF TABLES**

TABLE 1: Participating patients' information	.....10-11
TABLE 2: The scoring of the patients capabilities	.....12

**LIST OF FIGURES**

FIGURE 1: A little girl receiving tests gazes into pool containing ducklings being used as a part of medical therapy in 1956.....1

FIGURE 2: Effects of horseback riding on ADHD and ASD patient’s capabilities after five sessions.....14

FIGURE 3: The cognitive performance (mental) of each patient before and after joining the program.....15

FIGURE 4: The physical capabilities of each patient before and after joining the program.....17

FIGURE 5: The social interaction performance of each patient before and after joining the program.....19

**ABSTRAK**

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek Tahun Akhir.

**KEBERKESANAN TERAPI DENGAN BANTUAN EKUIN (EAT) DI  
MALAYSIA****Oleh****Asiyah Abidah binti Ahmad Shah****2017****Penyelia: Dr. Hafandi Ahmad****Penyelia bersama: Dr. Noraniza Mohd Adzahan**

Terapi dengan bantuan ekuin (EAT) telah diwujudkan di seluruh dunia sebagai salah satu strategi rawatan alternatif yang berkesan untuk beberapa masalah penyakit psikologi. Ia mempunyai kapasiti untuk membuah hasil positif untuk kanak-kanak dan orang dewasa yang mempunyai masalah kesihatan mental dan/atau fizikal. Namun begitu, program terapi ini adalah terhad di Malaysia, memandangkan kebanyakan komuniti di Malaysia lebih memilih fisioterapi dan rawatan menggunakan ubat. Sehubungan dengan itu, tujuan kajian ini dijalankan adalah untuk menyelidik keberkesanan terapi dengan bantuan ekuin di Malaysia, dalam menambahbaik kondisi kesihatan pesakit dengan pelbagai masalah psikologi. Sebanyak lima ekor kuda terlatih dari PRTC *Equestrian*

*Club*, Perak, Malaysia telah digunakan untuk beberapa mekanisme program termasuk menunggang, bersosial dan kesan kognitif pada pesakit-pesakit yang mempunyai latar belakang masalah kekurangan upaya fizikal dan mental yang berbeza seperti Sindrom *Down* (DS), autisma (ASD) dan *Attention Deficit Hyperactivity Disorder* (ADHD). Kelakuan dan prestasi keupayaan pesakit ( $n=5$ ) seperti fungsi kognitif, fizikal dan sosial diperhatikan sebelum dan selepas menyertai program ini untuk tiga minggu. Data kelakuan mereka daripada ketiga-tiga sesi dimasukkan dan dibandingkan menggunakan analisis ujian *Mann-Whitney U* (SPSS Statistik 22). Keputusan kajian menunjukkan bahawa kondisi pesakit-pesakit DS, ASD dan ADHD selepas menyertai program ini meningkat secara positif dari segi fizikal, mental mahupun sosial, yang mana membuktikan program EAT adalah positif dan berkesan, walaupun analisis statistik adalah tidak signifikan ( $P>0.05$ ). Tambahan pula, kajian ini menunjukkan bahawa penggunaan kuda dari segi fisiologi dan pergerakan anatomi dalam membantu merawat kondisi pesakit manusia akan memberi kesan yang positif kepada keupayaan fizikal dan mental pesakit. Oleh itu, program EAT perlu lebih dikembangkan untuk menawarkan alternatif lain yang lebih berkesan untuk merawat atau memulihkan masalah penyakit psikologi di Malaysia.

**Katakunci:** terapi dengan bantuan ekuin (EAT), penyakit psikologi, kuda

## **ABSTRACT**

Abstract of the project paper presented to the Faculty of Veterinary Medicine in partial requirement for the course VPD 4999 – Final Year Project.

### **THE EFFECTIVENESS OF EQUINE-ASSISTED THERAPY (EAT) IN MALAYSIA**

**By**

**Asiyah Abidah Ahmad Shah**

**2017**

**Supervisor: Dr. Hafandi Ahmad**

**Co-supervisor: Dr. Noraniza Mohd Adzahan**

Equine-assisted therapy (EAT) is established worldwide as an effective treatment alternative or strategy for a number of psychological disorders. It has the capacity to deliver positive outcomes for children, adolescents and adults with mental and/or physical health problems. However, this therapy program is limited in Malaysia, since the community preferred physiotherapy and medicinal treatments. Thus, the purpose of this study is to investigate the effectiveness of EAT in Malaysia, in terms of improving the health condition of patients with different psychological problems. A total of five trained horses from the PRTC Equestrian Club, Perak, Malaysia were utilised for several programs mechanisms including riding, socializing and cognitive effects on the participating patients with different background of physical and mental disabilities such

as Down Syndrome (DS), Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD). The behavior and capability performances of the patients ( $n=5$ ) such as cognitive functions, physical and social were monitored before and after joining the program for three sessions. The behavior data from the three sessions were compared using Mann-Whitney U Test analysis (SPSS Statistics 22). Results showed that the condition of DS, ASD and ADHD patients after participating the program positively improved physically, mentally and socially which indicate a positive effects of EAT program, despite non-significant ( $P>0.05$ ) statistical analysis. In addition, this study shows that the use of horses in terms of physiological and anatomical movement in the treatment of human conditions will give a positive impact to the patient's physical and mental capabilities. Thus, the EAT program should be further developed in order to offer better alternative to treat or cure the psychological disorders in Malaysia.

**Keywords:** equine-assisted therapy (EAT), psychological disorders, horses

## 1.0 INTRODUCTION

### 1.1 Background

The relationship between animals and sick people has shown excellent connection and does have beneficial properties that help the recovery. The presence of animals in therapies has produced huge benefits as it combats ones loneliness, helps focus attention, encourage exercises and communication, and promotes physical and emotional contact. According to Bert *et al.* (2016), animal-assisted therapy (AAT) is a health intervention that is meant to improve physical, social, emotional or cognitive functioning using animals as an integral part of the treatment. A photographer, Francis Miller reported in LIFE Magazine in 1956 about University of Michigan's hospital at Ann Arbor that has established a recreation program that is considered educational and therapeutic at the same time to their pediatric patients since 1926.



Figure 1 shows a little girl receiving tests gazes into pool containing ducklings being used as a part of medical therapy in 1956.

On the other hand, defining an overview of equine-assisted therapy (EAT), Smith (2016) states that it is a type of treatment that incorporates equine activities and/or the equine environment. It is considered as an alternative treatment that has the capacity to deliver positive outcomes for patients of all ages including children, adolescents and adults with mental and/or physical health problem (Frewin & Gardiner, 2005). It is believed that horse therapeutic benefits were recognized from the year 460 B.C. by Hippocrates, referring to horseback riding as a universal exercise (Hardy, 2011). Horse riding was recognized as a way to improve health and the well-being of people with a disability rather than just as a means of transportation since way back in the ancient Greek times.

According to “History of Equine Therapy and Equine Assisted Activities” (2017), the first study to report the value of the riding therapy was in 1875 where a French physician named Cassaign used riding for treatment of various conditions including certain neurological disorders by improving posture, balance and joint movement as well as psychological improvement. During World War I, Oxford Hospital offered riding therapy for wounded soldiers as they discovered the benefits of the therapy in England. By 1950’s, British physiotherapists explored the possibilities of the therapy for all types of conditions. With the support from the Royal Family, the British Riding for the Disabled Association (RDA) was founded in 1969.

The riding therapy was introduced in Scandinavia in 1946 following two devastating outbreaks of poliomyelitis. A horsewoman named Liz Hartel was also affected with the disease. She was able to walk again with the help of surgery and physiotherapy but she was determined to ride independently again. Her daily supervised riding sessions improved her muscle strength and coordination and she won the silver medal for Dressage at the 1952 Helsinki Olympic Games which brought the attention to riding for the disabled. Liz Hartel and Ulla Harpoth, a physical therapist from Copenhagen then uses horses as therapy for their patients.

The therapeutic horseback riding was later introduced in the United States and Canada in 1960 and the North American Riding for the Handicapped Association (NARHA) was founded in 1969. NARHA serves as an advisory body to the various riding for the disabled groups across the US and provides safety guidelines and training, certifies therapeutic riding instructors, accredits therapeutic riding centers according to its own high standards, disseminates information, and offers low-cost insurance to its member organizations.

The RDA in Malaysia started in 1988 and was officially registered in October 1994 as a charitable organization under Royal Patron YAM Raja Dato Seri Azureen Sultan Azlan Shah. Presently, the RDA Malaysia actively operates in six areas around peninsular Malaysia, namely The Royal Selangor Polo Club, Bukit Kiara Equestrian and Country Resort, Perak Turf Club & Equestrian Centre, RDA

Penang Turf Club, Selangor Turf Club and Equestrian Centre, and The Malaysian Armed Forces Equestrian Centre.

### **1.2 Justification**

Many studies especially from the western and developed countries such as United States of America, United Kingdom, Canada and even Japan has proven that the equine-assisted therapy (EAT) is indeed effective in treating mental and/or physical conditions of human patients. Study and research on this program or treatment however is still underdeveloped in Malaysia. This is due to limited facilities that offer the program, which is not convenient for patients living away from the facilities, and minimal participation from our community who prefer the more mainstream treatment modalities which includes physiotherapy and medicinal treatments.

### **1.3 Objective**

- To investigate the effectiveness of equine-assisted therapy (EAT) in relation to human psychological and physiological health conditions in Malaysia.
- To discuss the use of physiological and anatomical movement of horses in the treatment of psychological and physiological conditions in Malaysia.

#### 1.4 Hypothesis

- Null hypothesis: EAT has no significant effect in treating psychological and physiological issues.
- Alternative hypothesis: EAT has significant effect in treating psychological and physiological issues.

## **2.0 LITERATURE REVIEW**

According to Smith (2016), equine-assisted therapy (EAT) is a type of treatment that incorporates equine activities and/or the equine environment. The rehabilitative goals of this therapy are related to the patient's needs and the medical professional's standards of practice. As mentioned by Frewin & Gardiner (2005), EAT is gaining recognition world wide as an effective treatment alternative or strategy for a number of different client groups and it has the capacity to deliver positive outcomes for children, adolescents and adults with mental and/or physical health problems. Those health problems includes attention deficit hyperactivity disorder – ADHD (Busch *et al.*, 2016), autism spectrum disorder (Borgi *et al.*, 2015), cerebral palsy and down syndrome (Smith, 2016). As described by Gergely (2012), there are several variations of EAT practiced today, all of which have distinct guidelines, standards and theoretical foundations that underlie their mission. According to her, this includes the equine-facilitated learning (EFL), equine-facilitated therapy (EFT), equine-assisted psychotherapy (EAP), equine-assisted experiential therapy (EAET), equine-facilitated mental health (EFMH) and many others.

### **2.1 Mechanisms and benefits of EAT**

Hardy (2011) described another term used in EAT as hippotherapy which is considered as a part of a treatment strategy and is used by physical, occupational and speech therapists to achieve functional outcomes. Hippotherapy is defined as a physical, occupational or speech therapy treatment that utilizes equine movement by which the horse's movement influences the rider that specifically improves rider's independence in

daily living activities such as sitting, dressing and walking. He also mentioned that a classic hippotherapy uses only the motion of the horse's hind quarters and pelvis to elicit physical responses from the rider.

As quoted by Hardy (2011), Casady & Nichols-Larsen (2004) and Heine (1997) claimed that horseback riding influences multiple systems that includes sensory motor, cognition, respiration, speech production, and behavioural, social and psychological domains. Shumway-Cook & Woollacott (1995) said that the interactions between these systems cause changes in the system themselves which includes improvements in balance, strength, endurance, perception and other functional skills. These changes are the direct result from the responses to the horseback movement and from experiences relating to interactions with a horse. Macauley (2003) states that consistent and repetitive movement of the horse stimulates the rider's sensory motor system allowing the nervous system to build its physical and cognitive responses. Other than that, the vestibular system is also stimulated by the horse's movement, changes in direction and speed. In addition to that, proprioceptors which is the receptors that give information from our muscles, tendons, ligaments and joints are being activated which consecutively result in improved proprioception.

Wiley (2010) mentioned that during the riding, the rider goes through a number of exercises intended to benefit him or her. She suggested that the warmth of a horse jointed with its rhythmical movements creates a unique stimulus for the ride. The various activities such as turning backwards on the horse increases postural reactions and give

them the ability to place weight on their arm by laying them on the horse's hindquarters, laying down on the horse can improve muscle tone and helps to support an overall relaxed feeling and reaching forward towards the ears of the horse or reaching behind to the tail challenges the rider's balance, trunk control and range of motion. Wiley also quoted from Bertoti (1988) that EAT contributes to decreased spasticity, improve weight shift, balance, rotational skills and postural control. Wiley also claimed that horse movement does not only benefits riders physically but also mentally and emotionally. Children will be able to gain social skills, speech improvements, self-esteem, self-control and respects for others. The position of a child sitting on the horse's back puts the child in the ideal position to improve control of the diaphragm and trunk muscles which are important for speech production.

Uchiyama, Ohtani and Ohta (2011) mentioned that 90% of horses motion in acceleration shows a similarity in human walking. The exercise intensity of horse riding at walking gait is similar to human walking indicated by the non-significant differences in heart rate and breathing rate between the two conditions. This is supported by Bertoti (1988), Fleck (1992) and Potter *et al.* (1994) as they quoted from that conclude that the movement of horse's pelvis during horseback riding actually provides motor and sensory inputs to the human body. The reciprocal movement of the horse produces pelvic movement in the rider's body that resembles human ambulation. Besides that, walking is the easiest exercise to enhance health and cardiorespiratory fitness.

They also quoted from Harada *et al.* (2009) that walking could provide sensory input that can stimulate brain activity, including the prefrontal cortex that is important to regulate movement control, attention, selective information processing and the organization of goal-directed movements. Verghese *et al.* (2007) states that walking provides sensory inputs to improve cognitive functioning and dementia in older people (Uchiyama, Ohtani & Ohta, 2011). Ploughman *et al.* (2005) stated that exercise can help to regulate the protein levels of brain-derived neurotrophic factor (BDNF), hence physical activities such as running or walking can improve learning. However for physically challenged patients, continuous walking would be a problem. Hence, horse riding which can mimic the normal human walk will provide the same stimulation more efficiently in providing motor and sensory inputs in the treatment of individuals with physical disabilities and cardiorespiratory fitness and weight control can be achieved.

Previous study by Borgi *et al.* (2015), reveals that there is an improvement in social functioning in the group of children with autism spectrum disorder that is attending EAT program compared to the control group, a milder effect on motor abilities, and improved executive functioning was observed at the end of the EAT program. Another evidence by the study conducted by Klontz, Bivens, Leinart, & Klontz (2007) reported that reductions in psychological distress and enhancements in psychological well being were significant immediately following treatment and were stable at 6-month follow-up. These studies provide support for the use of animal-assisted intervention programs as complementary intervention strategies for such patients.

### 3.0 MATERIALS AND METHODS

A total of 5 trained horses and ponies from the PRTC Equestrian Club, Ipoh were selected per session to involve in the equine-assisted therapy program which is the horseback riding program introduced by the Riding for the Disabled Association (RDA) together with the participating patients (n=5) each session with various mental and physical health problems for three weeks. The horses and ponies were kept in an individual stable and were fed with chaff. The riding program was held once a week at the club, which is on every Thursday for a period of thirty minutes per person.

#### 3.1 Subject

Five participating patients of (n=5) of the program include patients from various backgrounds. Table 1 below shows the patients information.

Patient	Age	Gender	Race	Health problem	Duration joining the program
1	12 y/o	Male	Malay	Autism Spectrum Disorder (ASD)	<1 year, 2 sessions
2	9 y/o	Male	Malay	Down Syndrome (DS) & Mental Impairment	3 years, >5 sessions
3	10 y/o	Male	Malay	Attention Deficit Hyperactivity Disorders (ADHD) & Dyslexia	1 year, >5 sessions

4	13 y/o	Male	Malay	Down Syndrome (DS)	>3 years, >5 sessions
5	10 y/o	Male	Indian	Attention Deficit Hyperactivity Disorders (ADHD) & Autism Spectrum Disorder (ASD)	<1 year, 5 sessions

### 3.2 Observation

Preliminary observation of the patients' body posture, walking habits and behaviour were observed and recorded as they entered the club. Their interactions with other people and the horses were also noted before the program starts. As they entered the riding paddock, their capabilities were further observed closely from getting onto the horse, riding it, listening to and performing the instructions given by the trainer along the 30 minutes duration until they get down from the horses and the data were recorded. Some of the capabilities parameters that were observed includes ability to focus, listening, understanding, ability to differentiate, expression of tantrum, talking, walking, running, riding, bonding with the horse, socializing with the surrounding people and ability to be independent.

The scoring of their capabilities are as follows in table 2:

Score	Performance
0	Unable to do
1	With assistance/delayed
2	Without assistance

These parameters were then grouped into three major categories which are the cognitive performance which includes ability to focus, listen, understand, differentiate and expression of tantrum, the physical capability which includes ability to talk, walk, run and ride, and lastly the social interaction which covers ability to bond with the horse, socialize with people and ability to be independent. The individual performances based on categories were measured depending on the patients' ability to perform each parameters within the categories as mentioned previously. This means that the scoring for cognitive performance (mental) will be measured out of 5 parameters, whereas physical capability (physical) is scored out of 4 parameters and social interaction (social) is scored out of 3 parameters.

### **3.3 Data collection**

Some information and data on the patients details and the feedbacks from the patient and/or their parents were obtained through the organizations and interviewing method. Some of the details collected were the patient's name, age, gender, race, health problem and the total period of time since they first joined the RDA program. The

improvement of their conditions and feedbacks were noted from the interview. Their conditions before joining the program were also traced back.

### **3.4 Statistical analysis**

For this project, the data on the performance of each patients capabilities according to the major groupings which includes the cognitive performance, physical capabilities and social interaction of the first session encountered during the study period were analyzed using Mann-Whitney U Test on the SPSS 22. The test is done to test the patient's capabilities improvements of each category before and after the riding treatment. If the P value is less than 0.05 ( $P < 0.05$ ), it is considered significant.

## 4.0 RESULTS

### 4.1 Effects of horseback riding on ADHD and ASD patient's capabilities after five sessions of RDA.

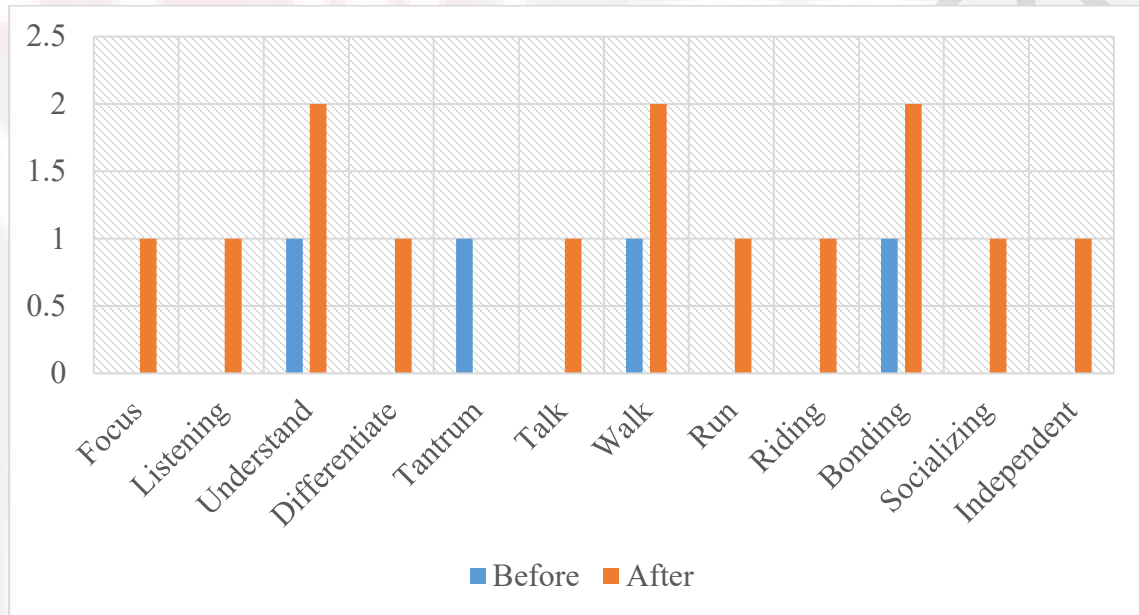


Figure 2: Effects of horseback riding on ADHD and ASD patient's capabilities after five sessions.

The above bar chart shows the effect of horseback riding on a patient with ADHD and ASD in regards to his capabilities after joining the program for five sessions. From the chart, we can appreciate that the patient is now able to understand, walk and bond with the horse without assistance anymore when compared to previously where he needed assistance in performing those capabilities. As an overall performance, the patient shows improvements on every other parameters where they increase in performance, except for

one parameter which is expressing tantrum. The patient has shown no expression of tantrum anymore after five sessions of RDA.

## 4.2 Patients performances by major groupings.

### 4.2.1 Cognitive performance.

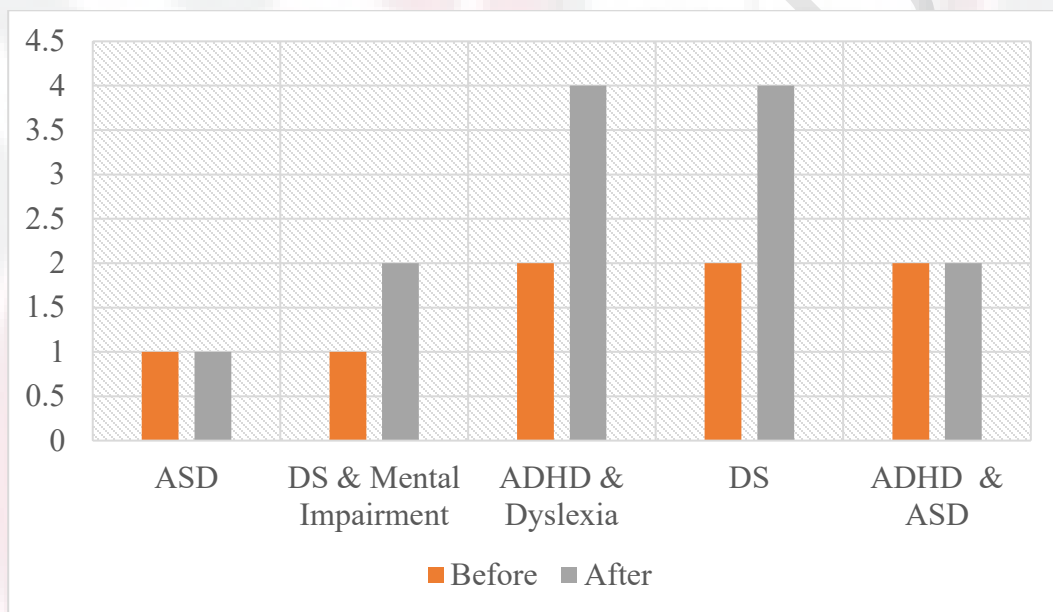


Figure 3: The cognitive performance (mental) of each patients before and after joining the program.

### Mann-Whitney Test

Ranks <sup>a</sup>				
	Treatment	N	Mean Rank	Sum of Ranks
Count	Before	5	4.40	22.00
	After	5	6.60	33.00
	Total	10		

a. Capability = Mental

Test Statistics <sup>a,b</sup>	
	Count
Mann-Whitney U	7.000
Wilcoxon W	22.000
Z	-1.247
Asymp. Sig. (2-tailed)	.212
Exact Sig. [2*(1-tailed Sig.)]	.310 <sup>c</sup>

a. Capability = Mental

b. Grouping Variable: Treatment

c. Not corrected for ties.

Figure 3 shows that three of the patients shows improvement in cognitive performance compared to before joining the program. The parameter that all patients were able to improve is the lack of tantrum expression. Two patients were able to do all other parameters which includes focus, listen, understand and differentiate whereas another one patient was able to listen and understand only. The remaining two patients that did not show any improvement were known to have ASD. From the Mann-Whitney U test, the cognitive performance shows no significant value as  $P > 0.05$ .

#### 4.2.2 Physical capabilities.

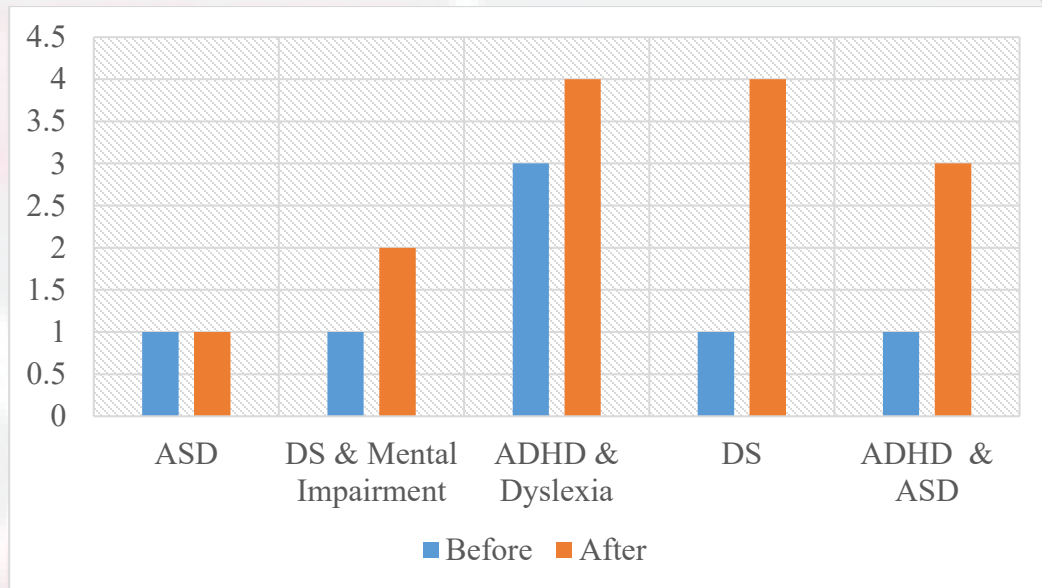


Figure 4: The physical capabilities of each patients before and after joining the program.

#### Mann-Whitney Test

Ranks <sup>a</sup>				
	Treatment	N	Mean Rank	Sum of Ranks
Count	Before	5	3.90	19.50
	After	5	7.10	35.50
	Total	10		

a. Capability = Physical

**Test Statistics<sup>a,b</sup>**

	Count
Mann-Whitney U	4.500
Wilcoxon W	19.500
Z	-1.795
Asymp. Sig. (2-tailed)	.073
Exact Sig. [2*(1-tailed Sig.)]	.095 <sup>c</sup>

a. Capability = Physical

b. Grouping Variable: Treatment

c. Not corrected for ties.

Figure 4 shows that most patients shows improvements in the physical capabilities. Two of the patients were able to perform all four capabilities without delay or assistance. Another two did show improvements except for the ability to ride by themselves and one of them could not talk in a clear language yet. The remaining patient however was only able to walk with assistance and was not showing marked improvement in any other parameters. From the Mann-Whitney U test, the physical capabilities also shows no significant value as  $P > 0.05$ .

### 4.2.3 Social interaction.

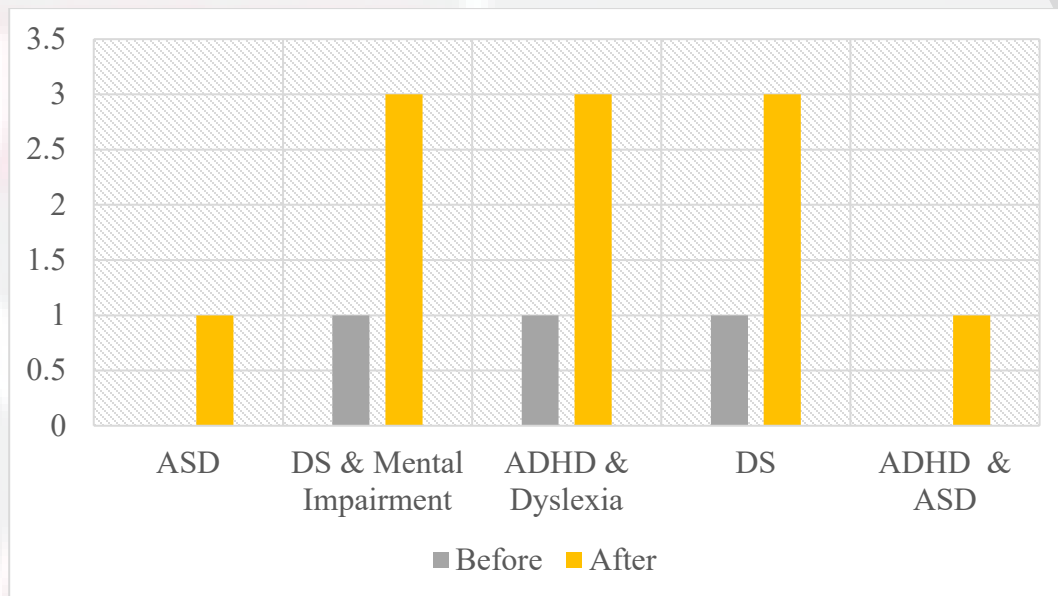


Figure 5: The social interaction performance of each patients before and after joining the program.

### Mann-Whitney Test

Ranks <sup>a</sup>				
	Treatment	N	Mean Rank	Sum of Ranks
Count	Before	5	3.60	18.00
	After	5	7.40	37.00
	Total	10		

a. Capability = Social

**Test Statistics<sup>a,b</sup>**

	Count
Mann-Whitney U	3.000
Wilcoxon W	18.000
Z	-2.154
Asymp. Sig. (2-tailed)	.031
Exact Sig. [2*(1-tailed Sig.)]	.056 <sup>c</sup>

a. Capability = Social

b. Grouping Variable: Treatment

c. Not corrected for ties.

Figure 5 shows that all five patients shows improvements in their social interaction performance. The parameter that all patients were able to do was to bond with the horses and ponies. Three patients without ASD shows marked improvement where they were able to bond with the horse, socialize with other people and able to be independent after joining RDA compared to before. Although this category shows some degree of improvement by all patients, the Mann-Whitney U test shows that social interaction also shows no significant value as  $P > 0.05$ .

## 5.0 DISCUSSION

Figure 2 has shown marked improvement in the patient's capabilities in terms of understanding, walking and bonding with the horse. He also showed improvements in the ability to focus, listen, differentiate, talk, run, riding, socializing, being independent and most importantly does not express tantrums anymore. This is evidence to support that equine-assisted therapy by which in this project through horseback riding, can actually give positive impacts to patients with mental and/or physical health problems. This also supports the claim that riding therapy does towards silver medal achiever for Dressage at the 1952 Helsinki Olympic Games, Liz Hartel who was able to walk and ride independently again after being affected by poliomyelitis disease where she believed has improved her muscle strength and coordination ("History of Equine Therapy and Equine Assisted Activities", 2017).

Moving on to the patients performances according to major groupings. Figure 3 is showing the result of RDA on each patients in terms of cognitive performance. Three of the patients showed improvements except for the other two students that is suffering from ASD. The patients with ASD did not show any improvement compared to their previous conditions. This could be depending on the severity of the patients' conditions. Another reason is the fact that autism patients are indeed smart but they could not tune to our standard language or achievements. Hence, the treatment modalities should be tuned in with the patients' capability. By doing so, the patients might be able to understand more and surprise us in their own way. For instance, one patient with autism named Carly

Fleischmann was reported by Goldberg & Putrino (2009) having the ability to finally communicate with her surroundings after life-long speech therapies when she discovered her communication method, which is through typing out the words in a computer or tablet. However this does not mean that every autistic patient is able to communicate through this, hence EAT become one of the alternatives.

Figure 4 on the other hand shows the result of physical capabilities performance after the program. Two patients with the longest exposure to the program (DS patient) and the most physically healthy (ADHD and dyslexia patient) were able to perform all capabilities without delay or assistance. Another two patients with ADHD & ASD and DS & mental impairment also improved in the physical capabilities again with similar reasons which are being less physically challenged and exposed to EAT longer respectively. The one patient that did not show any marked improvement in this study remains his ability to walk although with minimal assistance could be due to the fact that the patient had only joined the program for two sessions. This means that other than being less physically challenged, time, consistency and commitment can also help to improve physical capabilities, which is one of the goal of the therapy. This result is supported by a study by del Rosario-Montejo, Molina-Rueda, Muñoz-Lasa, & Alguacil-Diego (2015), that shows improved gross motor functions especially in crawling, kneeling and standing in patients with delayed psychomotor. The improvements were more pronounced after uninterrupted therapy. Hence, it proves that EAT has a positive impact on psychomotor development.

On another note, figure 5 shows the patients' social interaction with the horse, with the people around them and the ability to become independent. Surprisingly, this is the only group that shows improvements by all five patients. One parameter that they shared was the ability to bond with their horses or ponies, by which the one patient that has ASD could finally showed some degree of improvement compared to the other groups. A study conducted by Sánchez, Castro, Herrera, & Juárez (2014) in Spain on the hormonal changes analysis by the effects of EAT in autistic population, shows that the cortisol level were actually decreased in the patients which proves that EAT is able to reduce stress level. They also discover that the progesterone levels were increased which proves the improvement of emotional canal. This shows that contact with horses are able to create an emotional canal to the patients which improves their behaviour and could calm them down. This could be the reason that the patient with ASD in this study was able to bond with the horse as a person that works with an animal is buffered from stress and anxiety as stated by Hart (2000). According to him and Barker & Dawson (1998), the joy of working with animals can actually stimulate the person's desire to participate in activities and can increase one's range of social interactions.

Despite the improvements portrayed through the major groupings regarding the benefits that the horseback riding or RDA gave to patients with various backgrounds, all three major groupings shows non-significant results of the statistical analysis. All P values from the Mann-Whitney U test were more than 0.05 which indicative of a non-significant result. This is however a common limitation faced by EAT researchers as supported by Altman (1991). He stated that the positive clinical effects of EAT or RDA noticed during

observation or close monitoring, are not always reflected in the results of statistical tests.

This is due to a small sample size that decreases the power of the statistical test to detect a clinically meaningful effect as statistically significant. In other words, even if a clinical improvement occurred, the probability that the statistical analysis will detect it as significant is very small.

The mechanism on how does an equine-assisted therapy, by means the horseback riding helps in improving the patients' condition is still under research. According to Uchiyama, Ohtani and Ohta (2011), 90% motion in the horse acceleration shows similarity in normal human walking. They believe that walking is the most accessible exercise to enhance health and cardiorespiratory fitness. Hence, horse riding would mimics the normal human gait which is essential for patients with physical restrictions that they cannot walk properly as it stimulate walking exercise more easily and effectively. Harada *et al.* (2009) supports by stating that the sensory input provided by walking, where in this case is through horseback riding, could stimulate brain activity including the prefrontal cortex which is important to regulate movement control, attention, selective information processing and the organization of goal-directed movements. Verghese *et al.* (2007) further supports by stating that walking could provide sensory inputs to improve cognitive functioning and dementia in older people which is evidence to show its benefits. This is because exercise is able to help regulate the protein levels of the brain-derived neurotrophic factor (BDNF), thus physical activities such as running or walking could improve learning (Ploughman *et al.*, 2007)

During the horseback riding therapy of the EAT program, the trainers require the patients to perform several task which includes leaning forward and put one of their hands on the horse's neck, and leaning backward and put one of their hands on the horse's rump for a few seconds before changing directions at stationary and also during riding. Wiley (2010) suggests that such activities actually challenges the patient's balance, trunk control and range of motion. Wiley also states that through this therapy, patients will be able to gain social skills, speech improvements, self-esteem, self-control and respect for others. She claimed that speech could be improved through the sitting position during riding. Sitting on the back of a horse puts a patient in an ideal position to improve the control of the diaphragm and trunk muscles, which are necessary for the production of speech. On top of that, the rhythmic horse gait creates an environment that is calm for the patients to practice easy fluent speech. From these evidences, horseback riding does benefits the patients in many ways possible.

## **6.0 CONCLUSION**

The equine-assisted therapy (EAT) is able to improve patient's self-acceptance, personal development, relationship awareness, responsibility, respect for others, help for recovery, social skills, assertiveness, increase in self-esteem, spiritual development and an overall positive change. The EAT is indeed an effective alternative treatment which gives a positive impacts to patient's physical and mental capabilities.

## **7.0 RECOMMENDATION**

Since the result of this study is statistically non-significant due to a small sample size of the project, further study should include a bigger sample size and of course a longer study period to be able to get a more appropriate significant result in order to significantly prove EAT efficacy. Although most batches of RDA participants for EAT are usually in small groups to ease the monitoring process of the patients progress, larger sample size can be obtained by involving more groups from all facilities that offers the program and to follow the groups for a longer time frame to enable more reliable result to be obtained. In order to further understand the mechanisms that make the therapy works, a joint study between the veterinary and human medical field are preferred in order for us to appreciate more in depth the nature of both animal and human perspectives and benefits. The EAT program all over Malaysia should be further developed and supported in order to offer better alternative to treat or cure psychological disorders in Malaysia.

## REFERENCES

- Altman, D. (1991). Statistics in medical journals: Developments in the 1980s. *Statistics In Medicine*, 10(12), 1897-1913. <http://dx.doi.org/10.1002/sim.4780101206>
- Bert, F., Gualano, M., Camussi, E., Pieve, G., Voglino, G., & Siliquini, R. (2016). Animal assisted intervention: A systematic review of benefits and risks. *European Journal Of Integrative Medicine*, 8(5), 695-706. <http://dx.doi.org/10.1016/j.eujim.2016.05.005>
- Borgi, M., Loliva, D., Cerino, S., Chiarotti, F., Venerosi, A., & Bramini, M. et al. (2015). Effectiveness of a Standardized Equine-Assisted Therapy Program for Children with Autism Spectrum Disorder. *J Autism Dev Disord*, 46(1), 1-9. <http://dx.doi.org/10.1007/s10803-015-2530-6>
- Busch, C., Tucha, L., Talarovicova, A., Fuermaier, A., Lewis-Evans, B., & Tucha, O. (2016). Animal-Assisted Interventions for Children with Attention Deficit/Hyperactivity Disorder: A Theoretical Review and Consideration of Future Research Directions. *Psychological Reports*, 118(1), 292-331. <http://dx.doi.org/10.1177/0033294115626633>
- del Rosario-Montejo, O., Molina-Rueda, F., Muñoz-Lasa, S., & Alguacil-Diego, I. (2015). Effectiveness of equine therapy in children with psychomotor impairment. *Neurología (English Edition)*, 30(7), 425-432. <http://dx.doi.org/10.1016/j.nrleng.2013.12.017>

Dorotik-Nana, C. (2017). *A Short History of Equine Therapy*. *Psych Central.com*.

Retrieved 25 January 2017, from <http://blogs.psychcentral.com/equine-therapy/2011/01/a-short-history-of-equine-therapy/>

Frewin, K. & Gardiner, B. (2005). New Age or Old Sage? A review of Equine Assisted Psychotherapy. *The Australian Journal Of Counselling Psychology*, 6(2), 13-17.

Retrieved from [http://www.pciranch.com/files/Research-new\\_age\\_old\\_sage.pdf](http://www.pciranch.com/files/Research-new_age_old_sage.pdf)

Gergely, E. (2012). Equine-Assisted Psychotherapy: A Descriptive Study. *Dissertation*, 107. Retrieved from

<http://scholarworks.wmich.edu/cgi/viewcontent.cgi?article=1111&context=dissertations>

Goldberg, A. & Putrino, L. (2009). *Teen Locked in Autistic Body Finds Inner Voice*. *ABC News*. Retrieved 7 March 2017, from

<http://abcnews.go.com/2020/MindMoodNews/story?id=8258204&page=1>

Hardy, J. (2011). Therapeutic Riding and Its Effect on Self-Esteem. *Education Masters*, 68. Retrieved from

[http://fisherpub.sjfc.edu/cgi/viewcontent.cgi?article=1067&context=education\\_ED\\_masters](http://fisherpub.sjfc.edu/cgi/viewcontent.cgi?article=1067&context=education_ED_masters)

*History*. (2017). *Pathintl.org*. Retrieved 25 January 2017, from

<http://www.pathintl.org/about-path-intl/about-path-intl/history>

*History of Equine Therapy and Equine Assisted Activities.* (2017). *Stable Life, Inc.*.

Retrieved 25 January 2017, from <https://www.stablelifeinc.org/history-and-benefits-of-eaa>

Klontz, B., Bivens, A., Leinart, D., & Klontz, T. (2007). The Effectiveness of Equine-Assisted Experiential Therapy: Results of an Open Clinical Trial. *Society & Animals, 15*(3), 257-267. <http://dx.doi.org/10.1163/156853007x217195>

Miller, F. (1956). Animals Makes a Hospital Happy. *LIFE*, 165 - 168. Retrieved from [https://books.google.com.my/books?id=vkEEAAAAMBAJ&pg=PA165&dq=michigan+hospital&hl=en&sa=X&ei=qvVaUoTnB8XokQfM4YDQDw&redir\\_esc=y#v=onepage&q=michigan%20hospital&f=false](https://books.google.com.my/books?id=vkEEAAAAMBAJ&pg=PA165&dq=michigan+hospital&hl=en&sa=X&ei=qvVaUoTnB8XokQfM4YDQDw&redir_esc=y#v=onepage&q=michigan%20hospital&f=false)

Pauw, J. (2000). Therapeutic Horseback Riding Studies: Problems Experienced by Researchers. *Physiotherapy, 86*(10), 523-527. [http://dx.doi.org/10.1016/s0031-9406\(05\)60986-8](http://dx.doi.org/10.1016/s0031-9406(05)60986-8)

Ploughman, M., Granter-Button, S., Chernenko, G., Tucker, B., Mearow, K., & Corbett, D. (2005). Endurance exercise regimens induce differential effects on brain-derived neurotrophic factor, synapsin-I and insulin-like growth factor I after focal ischemia. *Neuroscience, 136*(4), 991-1001. <http://dx.doi.org/10.1016/j.neuroscience.2005.08.037>

Sánchez, C., Castro, F., Herrera, S., & Juárez, J. (2014). Hormonal Changes Analysis by Effects of Horses Assisted Therapy in the Autistic Population. *Procedia - Social*

*And Behavioral Sciences, 132, 87-91.*

<http://dx.doi.org/10.1016/j.sbspro.2014.04.282>

Smith, C. (2016). *EAAT Benefits*. *Pathintl.org*. Retrieved 13 October 2016, from <http://www.pathintl.org/resources-education/resources/eaat/194-eaat-benefits>

Smith, C. (2016). *EAAT Definitions*. *Pathintl.org*. Retrieved 13 October 2016, from <http://www.pathintl.org/resources-education/resources/eaat/193-eaat-definitions>

*The history and development of Equine Therapy*. (2017). *Asocequinoterapia.org*.

Retrieved 25 January 2017, from

<http://www.asocequinoterapia.org/english/Historia.htm>

Uchiyama, H., Ohtani, N., & Ohta, M. (2011). Three-dimensional analysis of horse and human gaits in therapeutic riding. *Applied Animal Behaviour Science, 135*(4), 271-276. doi:10.1016/j.applanim.2011.10.024

Wiley, A. (2010). *Horse Therapy: A Life-Changing Treatment*. Retrieved from <https://www.nshss.org/media/1434/wiley.pdf>

## APPENDICES



The figures portrays the usage of animal therapy in University of Michigan's hospital. Top left: A nurse watching with smiles as a young boy in body braces is feeding a piglet. Top right: Nurse tending to a child playing with a puppy. Bottom left: Nurse holding a black rabbit for a 19 year old girl during her testing. Bottom right: A room full of children, nurses and animals watching as a ferret is crawling across the high-wire.



The figures is introducing the subjects of this study. Top left: One of the patient is having Down Syndrome (DS) with mental impairment, while another one is having Autism Spectrum Disorder (ASD). Top right: This patient has DS. Bottom left: This patient has Attention Deficit Hyperactivity Disorder and dyslexia. Bottom right: The patient is having ASD and ADHD.



Figures shows the EAT program which is riding for the disabled (RDA) done in PRTC Equestrian Club, Ipoh. Top left: The paddock area where the program is held. Top right: A patient petting the horse during riding. Middle left: Patients listening to trainer's instruction. Middle right: A brave patient trying to get onto the horse to ride it. Bottom left: A patient is being guided by trainers to get use to touch the horses.