







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## Does Long-term Equine Assisted Learning have an Effect on Childhood Weight Management?

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## Abstract

In the United States, overweight and obesity (<https://www.omicsgroup.org/journals/obesity-weight-loss-therapy.php>) have been described as an epidemic. Unfortunately, the current weight management interventions are not able to reverse the continual increase in the weight of the United States citizens. Appearing unrelated, New York State is the home to more than 200,000 horses, most of them used for pleasure purposes. There is a growing body of knowledge identifying how the horse can have a positive impact on the health and wellness of people.

**Objective:** This prospective cohort pilot study was designed to examine the impact of Equine Assisted Learning (EAL) on long-term weight management during childhood.

**Methods:** Seventeen overweight and obese female children, 7 to 12 years of age participated in a year-long program that met for 27 sessions with total contact time of 93 hours.

**Results:** There was a trend for change in body fat to be associated with both baseline (BL) body weight ( $r=0.53$ ,  $p=0.06$ ) and age ( $r=0.55$ ,  $p=0.10$ ). Mean BL height and body weight of the first ( $n=5$ ) and second ( $n=8$ ) cohorts differed ( $59.5 \pm 1.1$  vs.  $53.8 \pm 5.8$  in,  $p=0.05$  and  $129.8 \pm 14.2$  vs.  $101.0 \pm 21.0$  lb,  $p=0.02$ , respectively), and children in the first cohort tended to be older ( $10.3 \pm 1.2$  vs.  $9.3 \pm 0.5$  year,  $p=0.09$ ), and thus analyzed separately. Mean sedentary time at BL for the 2 cohorts was  $18.6 \pm 6.7$  h/wk, and was reduced to  $14.6 \pm 10.7$  h/wk by year 1 ( $p=0.097$  for time). There were clearly decreases over time in sweetened drink and fat consumption for both cohorts ( $p=0.004$  for both variables).

**Conclusion:** Results from the two separate cohorts of the Healthy as a Horse (HaaH) pilot study demonstrate a unique opportunity to further examine the use of the horse as a tool to assist in the continued development of effective programs to prevent, identify and treat childhood overweight and obesity.

## Keywords

Weight management; Childhood; Overweight; Obesity; Equine

## Introduction

In the United States, overweight and obesity have been described as an epidemic; 70.7% of adults and 32% of United States children aged 2-19 are currently categorized as overweight or obese [1]. Among 9<sup>th</sup> through 12<sup>th</sup> grade students, 15.2% are overweight and nearly 21% are obese [2]. The term epidemic, which has historically been used to describe communicable diseases (<https://www.omicsonline.org/scholarly/communicable-diseases-journals-articles-ppts-list.php>), has been modified to embrace noncommunicable diseases, such as obesity, that engender the same public health risks. It is predicted that, if the current trend of weight gain continues, 42% of adults will be obese and 11% of adults will be morbidly obese by 2030 [3-6]. These numbers are staggering when the mental and physical health care costs associated with obesity, including depression (<https://www.omicsgroup.org/journals/depression-and-anxiety.php>), poor self-esteem, Type II Diabetes (<https://www.omicsonline.org/scholarly/diabetes-journals-articles-ppts-list.php>), and heart disease, are considered.

Specific to Broome County in New York State, 14.6% of children 2 to 4 years of age who are participants in the federally funded health and nutrition program Women, Infants and Children (WIC) are obese [7] (Data on other age groups is unavailable). According to the Gallup-Healthways Well-Being Index, with an obesity rate of 37.6%, Binghamton, New York was ranked second on the list of America's most overweight cities [8].

Trying to be and stay healthy is a struggle that is especially difficult for individuals, children, busy families and the elderly. Each year the Centers for Disease Control (CDC) [9] reflects this struggle in its bleak forecasts on the rates of overweight/obesity, diabetes, heart disease (<http://www.imedpub.com/scholarly/coronary-heart-disease-journals-articles-ppts-list.php>) and cancer. Assisting communities in an effort to improve the health of its citizens is the focus of many national, state and local agencies and organizations [10-12].

Appearing seemingly unrelated, New York State is the home to more than 200,000 horses, most of them used for pleasure purposes. The median income of the average horse owner is \$36 K-\$60 K per year; the horse industry provides over 35,000 full-time Equivalent (FTE) jobs in New York and, produces goods and services valued at \$2.4 billion annually. Historically, the horse has been a partner in the economic development of the United States (US) since their return from central Asia in 1492 by the Spanish. The number of horses in the United States reached nearly 26.5 million in 1915 when the horse was at the heart of transportation, national, state and local security, product development and product disbursement. The number of horses in the US reached its lowest point in 1992 when the total horse population had reached 2.2 million. The US currently is seeing a gradual increase reaching 9.2 million as of 2012 [13,14].

HaaH has added to the growing body of knowledge identifying how the horse can have a positive impact on the health and wellness of people

[15-17]. This proposed study will demonstrate the horse's further capacity to be an active member of both the health care (<https://www.omicsonline.org/health-care-reviews.php>) team and the community coalition team. With approximately 9.2 million horses in the United States, we have an untapped resource to potentially assist us in improving the health and wellness of people.

## Materials and Methods

The conceptual framework of the study that was utilized is the Community Organization Model. The Community Organization Model "is a process through which community groups are helped to identify common problems, mobilize resources, and develop and implement strategies to reach collective goals" [18]. IRB approval was obtained from State University of New York at Oneonta. Retention rates were monitored, as well as, Pre and Post-data using the Food Frequency Questionnaire, Rosenberg Self Esteem questionnaire, Pearson Activity and DXA were analyzed.

### Objective

This prospective cohort pilot study was designed to examine the impact of Equine Assisted Learning (EAL) on long-term weight management (<https://www.omicsonline.org/scholarly/weight-management-journals-articles-ppts-list.php>) during childhood.

### Methods

Equine Assisted Learning (EAL) [19] is learner-centered experiential education methodology which, at its center, features the partnership between horses and humans. Using EAL to prevent and treat obesity in children, as well as provide health promotion (<https://www.omicsgroup.org/journals/nutraceuticals-emerging-trend-in-public-health-promotion-2167-1052-1000e142.php?aid=72305>) education to the families, offers expanded opportunities to reach new populations, especially in rural areas. The Equine Assisted Growth and Learning Association (EAGALA) Model [19] provides a standard and structure for providing Equine Assisted Psychotherapy and Equine Assisted Learning sessions. The EAGALA Model provides a framework of practice, allowing for infinite opportunities for creativity and adaptability to various health promotion challenges.

#### The EAGALA Model framework includes

- The Team Approach -- An Equine Specialist, a Mental Health professional, and horses work together.
- Focus on the ground -- No horseback riding is involved in the EAGALA sessions. Instead, effective and deliberate techniques are utilized where the horses are metaphors in specific ground-based experiences.
- Solution-Oriented -- The basis of the EAGALA Model is a belief that all clients have the best solutions for themselves when given the opportunity to discover them. Rather than instructing or directing solutions, the model allows the client to experiment, problem-solve, take risks, employ creativity, and find their own solutions that work best for them.

The results of the HaaH program will also help address the challenge of retention. The results of the program demonstrate the ability of the horse to assist the health professional in keeping children, their families, and participants of health promotion programs engaged. Equine Assisted Learning (EAL) is a standardized learner-centered experiential education methodology, featuring the partnership between horses and humans.

### Participants

Two cohorts of overweight and obese children (total n=17 females, 9.8 ± 1.0 year, 94.2 ± 3.6 percentile BMI-for-age) were recruited for the HaaH program from family practice and pediatric medical offices throughout Broome and Tioga Counties in upstate New York. Participants and their families received education in the following areas: equine care and riding, human nutrition (<https://www.omicsonline.org/nutrition-food-sciences.php>), communication, stress management, leadership, team development and healthy lifestyle change. Participants' baseline (BL) data was collected at the start of the program and after one year, and included anthropometrics (height, weight) and body composition analysis via Dual-Energy X-ray Absorptiometry. Thirteen participants (77%) had completed the NCS Pearson Activity Survey data at BL and 1 year. Sedentary time was calculated based on the sum of reported hours watching TV, DVD/ video, reading/homework, playing video games, internet/computer on both weekdays and weekends.

### Statistical analysis

Descriptive statistics, paired t-tests and Pearson correlation analyses were calculated using SPSS v.23.

## Results

Thirteen participants among the 2 cohorts had complete body composition data at BL and 1 year. In the total sample (n=13), there was a trend for change in body fat to be associated with both BL body weight (r=0.53, p=0.06) and age (r=0.55, p=0.10) (Table 1). Mean BL height and body weight of the first (n=5) and second (n=8) cohorts differed (59.5 ± 1.1 vs. 53.8 ± 5.8 in, p=0.05 and 129.8 ± 14.2 vs. 101.0 ± 21.0 lb, p=0.02, respectively), and children in the first cohort tended to be older (10.3 ± 1.2 vs. 9.3 ± 0.5 year, p=0.09), and thus analyzed separately (Table 1). Children completing cohort 1 did not gain body weight over the 1 year, and there was a trend for a decreased BMI-forage percentile (-3.4 ± 3.0 percentile points, p=0.06). Children in cohort 1 also significantly decreased their total percent body fat over the 1 year study (-2.8 ± 2.2%, p=0.05)

(Table 1).

Variables	Cohort 1		Cohort 2	
	BL	Year 1	BL	Year 1
Body fat (percentage)	42 ± 5	39 ± 4	39 ± 4	41 ± 5
Body weight (pounds)	130 ± 14	134 ± 14	101 ± 21	113 ± 26
Age	10 ± 1	11 ± 1	9 ± 1	10 ± 1
Height (inches)	60 ± 1	62 ± 1	54 ± 6	57 ± 4

**Table 1:** Change in body fat, weight and age.

In cohort 2, participants gained a significant amount of body weight ( $10.0 \pm 7.6$  lb,  $p=0.007$ ), and their body fat increased over the 1 year period ( $+2.1 \pm 2.3$ ,  $p=0.03$ ) (Table 1). Mean sedentary time at BL for the 2 cohorts was  $18.6 \pm 6.7$  h/wk, and was reduced to  $14.6 \pm 10.7$  h/wk by year 1 ( $p=0.097$  for time) (Table 1). Pearson correlation analyses revealed older girls were more sedentary at baseline ( $r=0.60$ ,  $p=0.04$ ), and those more sedentary at baseline were also more sedentary at year 1 ( $r=0.54$ ,  $p=0.03$ ). Greater increases in total body fat at year 1 were associated with increases in sedentary time at year 1 ( $r=0.55$ ,  $p=0.05$ ), and in particular increase in android body fat at year 1 were associated with increases in sedentary time at year 1 ( $r=0.56$ ,  $p=0.05$ ) (Table 2).

Variables	Cohorts 1 and 2
Base Line (hours)	19 ± 7
Year 1 (hours)	15 ± 11

**Table 2:** Change in sedentary time.

**Food group scores:** At both baseline and Y1, N=6 girls completed the FFQs from Cohort 1 and N=10 from Cohort 2. There were clearly decreases over time in sweetened drink and fat consumption for both cohorts ( $p=0.004$  for both variables), however larger decreases were observed in Cohort 2 ( $p=0.06$  and  $p=0.03$ , respectively, for the timeby- cohort interaction). **Self Esteem:** At both baseline and year 1, N=6 girls completed the Self Esteem Questionnaire from Cohort 1 and N=6 from Cohort 2. While there was no significant effect of time, or timeby- cohort effect for total Self-Esteem score, after 1 year in the program, girls in both cohorts were more likely to strongly agree with the statements "I am satisfied with myself" ( $p=0.009$ ), and "I have a positive attitude about myself" ( $p=0.04$ ) compared to baseline.

### Limitation

A limitation of this pilot study is the number of participants. As a result of the small sample size, generalization to the population at large is not possible. Further research is needed in this area to observe the results on a larger population size

### Conclusion

According to a study by Ciccone et al. [20] a paradigm shift is needed to better educate and equip patients in the management of their chronic disease. Using a disease and care management (D&CM) model, they studied the effect of embedding a care-manager nurse into the treatment team. They found, by linking the patients with a caremanager nurse, an increase in patient knowledge, readiness for change and improved self-management of their disease. This enabled the patient to become a partner in the treatment team. Looking at the results from the two separate cohorts of the HaaH pilot study, there exist a unique opportunity to further examine the use of EAL as a tool to assist in the continued development of effective programs to prevent, identify and treat childhood overweight and obesity. The D&CM model could provide a foundation for this further study.

A randomized controlled trial is needed to explore if the observed differences in the body composition changes between cohorts 1 and 2 are the result of the interactions with the horse and the EAL methodology. A higher BMI-for-age during childhood is associated with earlier onset of pubertal maturation, and we have observed different trends between cohorts regarding total body fat as well as body fat distribution. Future studies will need to include the Tanner Scale to better estimate pubertal maturation in order to control for its possible influence on change in adiposity in this type of intervention and will include the family nutrition and physical activity (<https://www.omicsonline.org/osteoporosis-and-physical-activity.php>) tool which will provide more appropriate feedback. Additionally, with an anticipated effect size of 2.18 and desired statistical power level of 0.8 ( $p=0.05$ ), a post-hoc sample size will require 10 in each sample arm (control and treatment). Finally, this pilot study demonstrates that participation in a year-long equine program can reduce overall sedentary time in overweight/obese females between the ages of seven and twelve.

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