ASSESSMENT MEASUREMENTS AND STUDY FINDINGS: WASHINGTON COUNTY RURAL HEALTH OUTREACH SERVICES, WORK PLAN

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INTRODUCTION

In the re-application for its HRSA grant Washington County Regional Medical Center's Work Plan stated specific goals and strategies that were to be the subject of assessment by specific measure. Table 1 repeats the goals and strategies as they relate the research agenda to measure the psychological and fitness benefits of martial arts training for overweight and obese children and adolescents.

Table 1: Goals and Strategies, Work Plan as of January, 2007

Goal	Strategy
1. Perform initial and periodic assessments and screening tests	a. Conduct psychological, mental and emotional assessments and a profile of health behaviors
	b. Conduct fitness assessment
	c. Set fitness goals for each child
2. Reduce weight in pounds of overweight and/or obese children and adolescents by 10%	a. Provide educational information for all program participants about the principles and importance of diet, nutrition, and physical activity
	b. Provide additional nutrition information and counseling for overweight and obese children and parents/caregivers
	c. Monitor weight loss progress each 8-10 week period during physical fitness testing
3. Improve the overall fitness of overweight and obese children and adolescents by an increase of 10% in lean body mass	a. Provide taekwondo classes at no charge for overweight children
4. Improve the mental, social and emotional fitness of overweight and obese children and adolescents by 10%	a. On application to the program, test and assess optimism/life orientation, self-esteem, exercise motivation, social physique anxiety
	b. Embed life skills training in martial arts classes
	c. Test participants each belt testing cycle to determine progress

While, the activities of pre-testing and periodic testing were undertaken, there were gaps in the quality control and recording of data that will render it impossible to report on all of the stated psychological and fitness goals. Additionally, these researchers do not have data or information on the following goals and strategies:

Goal 1 c, the setting of fitness goals for each child;
Goal 2 b, nutrition information and counseling for overweight and obese children and parents/caregivers; and,
Goal 3 b, embed life skills training in martial arts classes via the workbook activity.

With respect to Goal 2 a, exercise education and outreach were provided via a monthly newsletter called Dragon Tales. All of the issues of Dragon Tales can be found at www.blackbeltresearch.com. Between January and June of 2007, there were 804 unique visits to the Taekwondo At Wellness Works website where the visitor specifically looked at the Dragon Tales newsletter. Average monthly visits were 134 unique visits to the newsletter page. Visit rates were highest during the first four months of 2007 with a significant drop in visits in May and June. The balance of the following report examines the evidence, where possible, with respect to Goals 4 a, 2 c and 3 a.

FITNESS AND CONDITIONING GOALS

Progress by students toward reduction in weight and increase in lean body mass, goals 2 and 3 above, was to be monitored on a routine cycle concurrent with testing for belt rank promotion. That equates to measuring weight and lean body mass changes every eight to ten weeks. Students were to be weighted and their height was to be taken. These measures were to be converted to BMI with the expectation that weight loss by each student could be tracked overtime. Additionally, a skin fold test was to be taken to measure changes in lean body mass.

The skin fold measures do not appear to have been recorded anywhere on the testing sheets for the period of July 2006 to June 2007. Sporadic observations were taken during the pre-HRSA year 2005/06, but since there is no way to know that the sub-sample of student for which observations were recorded was a representative sub-sample, the data was deemed unreliable.

Up to the November 2006, with each enrollment cycle height and weight measurements were taken and recorded for most students concurrent with admission to the program and with each belt rank testing. These were converted to BMI by the software program FitnessGram. Preliminary evaluation of the of the raw data input, height and weight, suggests that measurement errors render the BMIs unreliable. As discussed below sensitivity in the BMI measurement required precision in the measurement of height and weight. Precision, in turn, required that the individuals manning this testing station all followed the same rules for measuring and recording observations. This does not appear to have been done diligently.

Sensitivity in BMI Measurements
Taekwondo training is vigorous training with estimates of average calories burned per hour of between 500 and 750. Assuming that students made no other changes in physical activities and no changes in calories consumed, the typical student could expect to lose between three and five pounds per belt rank testing cycle, i.e. every eight to ten weeks. Simple variations in decisions about rounding up or down in height measurements could easily swamp/mask losses/gains in weight as measured by the BMI. Similar problems arise when there are minor differences in how precisely height is measured.

Data sheets from the FitnessGram do record the raw observations for all students. There will be an effort to go back to the raw observations on weight for each student and enter this data in to the computer. Once entered the raw observations on each student will be statistically smoothed using simple moving averages techniques. The smoothed series should allow some conclusions regarding the impact of training on weight change. A follow-up report on changes in weigh will be made available to the program as soon as possible.

Conditioning Measures
The style of taekwondo employed in the training program was Songahm Taekwondo, a copy-protected training system owned by the American Taekwondo Association (ATA). The training program is laid out in systematic blocks that can be taught on an eight to ten week cycle. The initial blocks are only moderately physically demanding. In fact, ATA instructors are trained to set a moderately demanding pace for beginning students such that muscles should be tired, but not painfully sore after each workout.

Taekwondo training in general, and ATA taekwondo specifically, provides a blend of all of the necessary types of exercise: balance; flexibility; strength; and, cardiovascular. The ATA training system is moderately progressive in its physical demands across all of the types of exercise.

Concurrent with each belt rank testing students were required to complete a fitness test.[4] The measures were to be taken according to the input criteria in the FitnessGram software. As with the height and weight measurements, the variability in the observations indicates poor testing controls. However, it may be possible to redeem the use of some of this data through the same smoothing techniques to be applied to the weight data.

Some Findings
Students must gain some fitness in order to meet ATA's performance standards for belt rank promotion. The physical benefits of taekwondo are incremental, but students not making at lease some improvement in physical condition will ultimately be unable to meet performance requirements and will not be eligible for promotion to the next rank. The minimum performance standard for promotion for color belts below the rank of Camouflage belt is a C average from all judges in three areas: forms; one-steps (a type of static sparring); and, self-defense. For all ranks Camouflage and above a C average from all judges is required in four areas for promotion: forms; one-steps and sparring; one or more board breaks within three attempts; and, self-defense.

External measures of taekwondo performance standards were employed throughout the program. The Sandersville school followed the ATA testing practice of employing belt rank testing judges from other ATA schools. Hence, a minimum measure of the changes in physical conditioning is the number of students who successfully rank tested at each testing.

Duration of Training: Overall Sample
A total of 149 students joined Taekwondo at Wellness Works in the two year period between July 1, 2005 and June 30, 2007. Of those 149, a total of 110 individuals enrolled as either research subjects (the target population of overweight children and adolescents) or research participants (those non-overweight students who participated in all of the psychological and fitness testing required of subjects). Seven were enrolled as instructors or staff and did not participate in the psychological or fitness testing. Three students joined the school after training

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[4]As noted above, the records post November 2006 are very incomplete.

in an alternative style of taekwondo. Their prior experience with taekwondo placed them outside the testing group. The balance of the 29 students enrolled, but not included in the study group, were 'Tiny Tigers' ages 3 to 5.[5] Table 2 shows the duration of training for 110 participants.

Table 2
Duration of Training and Rank of Dropouts[6,7]

Length of Training in Weeks	Belt Rank Attained	Number of Students	Percent of Total	Percent with Testing Records
Less Than 8 -10	White	2	1.8%	2.6%
8 to 10	Orange	12	10.9%	15.4%
16 to 20	Yellow	14	12.7%	17.9%
24 to 30	Camouflage	16	14.5%	20.5%
32 to 40	Green	5	4.5%	6.4%
40 to 50	Purple	7	6.4%	9.0%
48 to 60	Blue Recommended	1	0.9%	1.3%
56 to 70	Blue Decided	3	2.7%	3.8%
64 to 80	Brown Recommended	5	4.5%	6.4%
72 to 90	Brown Decided	4	3.6%	5.1%
80 to 100	Red Recommended	9	8.2%	11.5%
Enrolled November 2006 or Later & Had Not Tested As of June 30, 2007	Status Undetermined	32	29.1%	
		110		

Unfortunately for the majority of the HRSA grant period, there are no testing records for most of the students enrolled. Thirty-two students, a full 29.1% of the 110 participants in the program, do not have rank test records contained in the ATA database. It is not known at this time how many of the 32 participants were still active as of June 30, 2007, how many were never active, and how many weeks any dropouts may have participated.

For the remaining 78 students the weighted average duration of participation was 39 weeks. Fifty-four percent (53.8%) of the 78 completed between 8 and 30 weeks of training. Another forty-four percent (43.5%) completed between 32 and 100 weeks of training

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[5]Some 'Tiny Tigers' were in fact age six, but an assessment of their maturity indicated that they were not ready to join the young junior group. It should also be noted that some of the participants in the study were actually age 5 when they were enrolled, but their maturity was such that they were able to succeed in the program.

[6]The data for this analysis comes from the ATA Testing Database.

[7]An analysis of dropouts is presented in a separate section below.

Duration of Training By Age
Table 3 shows the duration of training by age group. All 110 participants were divided into three age groups: young juniors ages 6 to 9; juniors ages 10 to 17; and adults who ranged from age 23 to 58. Two participants, both in the Status Undetermined category had no date of birth or age recorded, so total participants by age sums to108.

There was a roughly even split between those who were young juniors, 37 with complete records plus 12 in the Undetermined Status category, and juniors, 29 with complete records plus 18 in the Undetermined Status category. Again, the Status Undetermined category means there is no record of promotional testing and therefore no way to know if or for how long the individual actually participated. There were 11 adults with complete records plus one adult with Undetermined Status.

For the 78 students with complete records there was no difference between the duration of training between the young juniors and the juniors. The youngest age group participated for 35 weeks of training, while the juniors ages 10 to 17, participated for approximately 37 weeks. Adults who enrolled completed a weighted average of 58 weeks of training. Approximately half of the adults who enrolled were still in the program after two years.

Table 3
Duration of Training By Age

Length of Training in Weeks	Belt Rank Attained	Number of Students by Age	Percent of Total	Percent with Testing Records
		Ages 5-9		
Less Than 8 -10	White	2	4.1%	5.4%
8 to 10	Orange	5	10.2%	13.5%
16 to 20	Yellow	6	12.2%	16.2%
24 to 30	Camouflage	10	20.4%	27.0%
32 to 40	Green	2	4.1%	5.4%
40 to 50	Purple	4	8.2%	10.8%
48 to 60	Blue Recommended	0	0.0%	0.0%
56 to 70	Blue Decided	2	4.1%	5.4%
64 to 80	Brown Recommended	1	2.0%	2.7%
72 to 90	Brown Decided	4	8.2%	10.8%
80 to 100	Red Recommended	1	2.0%	2.7%
Enrolled November 2006 or Later & Had Not Tested			0.0%	
As of June 30, 2007	Status Undetermined	12	24.5%	
Sub-Total		49		
		Ages 10-17		
Less Than 8 -10	White	0	0.00%	0.0%
8 to 10	Orange	6	12.77%	20.7%
16 to 20	Yellow	5	10.64%	17.24%
24 to 30	Camouflage	5	10.64%	17.24%
32 to 40	Green	3	6.38%	10.34%
40 to 50	Purple	2	4.26%	6.90%
48 to 60	Blue Recommended	1	2.13%	3.45%
56 to 70	Blue Decided	2	4.26%	6.90%
64 to 80	Brown Recommended	2	4.26%	6.90%
72 to 90	Brown Decided	1	2.13%	3.45%
80 to 100	Red Recommended	2	4.26%	6.90%
Enrolled November 2006 or Later & Had Not Tested				
As of June 30, 2007	Status Undetermined	18	38.30%	
Sub-Total		47		
		Ages 18 and Older		
Less Than 8 -10	White	0	0.00%	0.00%
8 to 10	Orange	0	0.00%	0.00%
16 to 20	Yellow	3	25.00%	27.27%
24 to 30	Camouflage	1	8.33%	9.09%
32 to 40	Green	0	0.00%	0.00%
40 to 50	Purple	1	8.33%	9.09%
48 to 60	Blue Recommended	0	0.00%	0.00%
56 to 70	Blue Decided	1	8.33%	9.09%
64 to 80	Brown Recommended	0	0.00%	0.00%
72 to 90	Brown Decided	0	0.00%	0.00%
80 to 100	Red Recommended	5	41.67%	45.45%
Enrolled November 2006 or Later & Had Not Tested				
As of June 30, 2007		1	8.33%	
Sub-Total		12		

Duration of Training By Weight Classification

A total of 31 students had no weight or BMI data recorded, so Table 4 include the duration of training only for those 79 participants who had a weight and BMI recorded when they enrolled in the program. Of those 79 for whom a weight or BMI was recorded, 6 were in Status Undetermined category. Forty-four (44) participants were classified as Normal weight, meaning they had a BMI of less than 24.5. Another 35 participants were classified as Overweight, meaning they had a BMI of 24.5 or greater.

Table 4
Duration of Training by Weight Classification

Length of Training In Weeks	Belt Rank Attained	Number of Students by Weight	Percent of Total	Percent with Testing Records
		Normal Weight		
Less Than 8 -10	White	0	0.0%	0.0%
8 to 10	Orange	4	9.1%	9.8%
16 to 20	Yellow	6	13.6%	14.6%
24 to 30	Camouflage	8	18.2%	19.5%
32 to 40	Green	4	9.1%	9.8%
40 to 50	Purple	5	11.4%	12.2%
48 to 60	Blue Recommended	0	0.0%	0.0%
56 to 70	Blue Decided	3	6.8%	7.3%
64 to 80	Brown Recommended	2	4.5%	4.9%
72 to 90	Brown Decided	3	6.8%	7.3%
80 to 100	Red Recommended	6	13.6%	14.6%
Enrolled November 2006 or Later & Had Not Tested As of June 30, 2007	Status Undetermined	3	6.8%	
Sub-Total		44		
		Overweight		
Less Than 8 -10	White	0	0.0%	0.0%
8 to 10	Orange	7	20.0%	21.9%
16 to 20	Yellow	6	17.1%	18.8%
24 to 30	Camouflage	8	22.9%	25.0%
32 to 40	Green	1	2.9%	3.1%
40 to 50	Purple	3	8.6%	9.4%
48 to 60	Blue Recommended	1	2.9%	3.1%
56 to 70	Blue Decided	2	5.7%	6.3%
64 to 80	Brown Recommended	1	2.9%	3.1%
72 to 90	Brown Decided	1	2.9%	3.1%
80 to 100	Red Recommended	2	5.7%	6.3%
Enrolled November 2006 or Later & Had Not Tested As of June 30, 2007	Status Undetermined	3	8.6%	
Sub-Total		35		

As Table 4 shows, there was a significant difference between the duration of participation. On average a normal weight student participated for 45 weeks, while an overweight student participated for 34 weeks. However, if the five high ranking adults are eliminated from the normal weight group, the duration for the normal weight group drops to an average of 34 weeks and differences duration of training is not statistically significant for the two weight categories.

Findings, Conclusions and Recommendation: Fitness and Conditioning
While the recommended standard for a healthy level activity has recently shifted to 60 minutes of exercise daily, at the time the taekwondo program was planned the recommendation for children and adolescents was that they engage in moderate physical activity for at least 30 minutes five days per week.[8] Students participating in the program were required to attend classes an average of three time per week.[9] For the youngest age group, age 6 to 9, classes were 40 minutes long. For all other ages, classes were 50 minutes long. Students participating in the program therefore got between 45% and 60% of the recommended weekly amount of exercise depending on the reference standard for recommended physical activity for children and adolescents.

Combining the duration of adherence and an exercise average of between 34 to 37 weeks, or 60% to 70% of a year, the 78 participants who regularly belt rank tested maintained an active lifestyle meeting between 45% and 60% of the recommended weekly amount of exercise depending on the reference standard for recommended physical activity. Additionally, there was no statistically significant difference in the duration of training between the young junior and junior students nor was there a statistically significant difference in the duration of training between the normal weight and overweight students.

The taekwondo program has reached 110 participants between ages 6 and 58. Additionally, the presence of the facility and instructors has engaged another 29 students between the ages of 3 and 5. All of the students in the taekwondo program were introduced to a program of regular physical activity. Whether they were enticed by an "interest in the martial arts" or simply searching for a form of exercise they might enjoy, all were introduced to a program of systematic exercise that embedded life skills such as goal setting and measurement of progress in each testing cycle. It remains an open question as to whether the lessons learned from this experience will carry forward in to life-style changes for participants.

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[8] See *Healthy People 2010, Physical Activity and Fitness*.

[9] In each belt rank testing cycle, students were told that they had to participate in a least 21 classes for an eight week cycle or at least 27 classes for a ten week cycle. Students were not generally allowed to make all of their classes in the final weeks before belt rank testing to insure regular and sustained exercise.

FINDINGS: SURVEY OF DROPOUTS

In May 2007 a follow-up of the dropouts was conducted. Part of the purpose of that survey was to answer the question, post-taekwondo experience had the participant maintained a moderate level of physical activity and if not what were the impediments to regular exercise. As of the May 2007, 43 dropouts could be documented and questionnaires were sent to the address given when they enrolled. Only three surveys were returned as undeliverable. Of the remaining 40 questionnaires mailed, 22 were completed and returned.

Of the 22 respondents, 41%, or 9, were considered overweight at the time they enrolled in the program. The respondents ranged in age from 7 to 50 with 41% or 9 respondents in the young junior age group of age 6 to 9 and 55% or 12 in the junior age group of ages 10 to 17. The average duration of training of the respondents was 30 week, about 4 weeks less than the overall average participation. All of the respondents had left the taekwondo training program at least one year ago.

Respondents were ask in what activity they now most frequently engaged. Only one responded said that they did not have any physical activity in which they engaged. Four activities tied as the most frequent activity: walking; swimming; chores like yard work or cleaning; and team sports. These four activities accounted for 73% of the respondents. Other activities reported were jogging, biking, and gymnastics.

Respondents were asked how many minutes per day and how many days per week they participated in their most frequent physical activity. The weighted average number of minutes the respondents participated in their most frequent activity was 61 minutes or one hour. In fact, 50% of the respondents exercised for one hour at each session in their most frequent activity. However, 18% of the respondents spent no time or less that 5 minutes in physical activity. The remaining 32% participated in their most frequent activity for an average of 35 minutes.

The average number of days in which respondents participated in their most frequent activity was 3 days per week. In fact, 59% responded that they participated in their most frequent activity 3, 4 or 5 days per week.

When asked to compare their physical activity to the level the previous year, approximately the time period in which they were in the taekwondo program, 86% responded that their activity level was more or about the same.[10]

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[10]In the enrollment data provided participants were asked about the number of day and number of minutes they were currently exercising. A comparison of pre-taekwondo and post-taekwondo frequency and duration of exercise will be forth coming.

With respect to the taekwondo program, the most liked activity, 91%, was learning forms. The least liked activity, 51%, was the workbook.

When asked what they would change or the reason for stopping their training, 9 respondents, or 41%, indicated time and/or the requirement to attend 3 days per week was the problem that lead to decision to quite the program.

Conclusions: Dropouts Survey

The dropouts from the taekwondo program report continued rates of physical activity of between 30 and 60 minutes per session an average of three days per week. Additionally, 89% report that their activity level is more or about the same as when they were in the taekwondo program.

The favorite activity when participating in the taekwondo program was learning forms. In the re-organized program which began in July 2007 students do not learn forms until they reach the yellow belt level.

Only one student reported disliking sparring. On the question about things student would change four said they would recommend more time for sparring.

With respect to the pace of the program, only four students felt that they were expected to learn too much in too little time.

When each student enrolled they were asked what they wanted to achieve. Each dropouts goals were included in the questions, "When you enrolled you said that you wanted to XX. XX, and XX. Eighty-seven persent (87%) of respondents reported achieving their goal while participating in the taekwondo program. However, critical to the program goals, the remaining dropouts reported that they had wanted to lose weight and they did not achieve their goal. These same respondents also state that they wanted help and information on dieting and they felt they did not get this assistance.

The time commitment or problems with attending classes the required three time per week was the most frequently cited reason for stopping training. It should be noted that both in literature on marketing and in the literature on adherence to exercise, responses such as 'not enough time' or 'required too much time' are generally interpreted as indication that the respondent does not value the activity highly enough to make it a priority.

MEASUREMENT OF PSYCHOLOGICAL BENEFITS

The measurement of the psychological changes was accomplished by three different tests for adolescents and adults participating in the program: The Life Orientation Test-Revised; Rosenberg Self Esteem Scale; and, the Social Physique Anxiety Scale.   As an alternative to the Rosenberg test, children between the ages of 6 and 12 were given an age appropriate Piers Harris. Each of these are briefly discussed below.

During the pre-HRSA year some psychological testing was done, but during the HRSA grant period a slightly different testing regime was adopted. During the HRSA year, potential participants who indicated an interest in joining the program were tested one to two weeks prior to engaging in any taekwondo activities. They were then re-tested when they began the training program and then were further re-tested at 8 to 10 week intervals concurrent with belt rank testing. Thus the following results are based on changes over time for each individual as their training progressed for only the HRSA year.

The Life Orientation Test-Revised (LOT-R) – (Scheier et al., 1993)

The Lot-R consists of 10 coded items, 3 statements coded in a positive manner, 3 in a negative manner and 4 non-scored items. Subjects respond to the statements by indicating the extent of their agreement along a 5 point Likert scale, ranging from strongly agree to strongly disagree. Factor analyses indicate that the LOT-R can be construed as uni-dimensional, with one score representing whether on is an optimist or a pessimist. The internal reliability (Chronbach's Alpha .78) and test re-test reliability ($r=.68$ over 4 weeks, $r=.60$ over 12 months, $r=.56$ over 24 months and $r=.79$ months over twenty eight months) have been shown to be adequate.

Rosenberg Self Esteem Scale (RSES) (Rosenberg, 1965)

The Rosenberg Self-Esteem Scale is a 10-item self-report measure of global self-esteem. It consists of 10 statements related to overall feelings of self-worth or self-acceptance. The items are answered on a four-point scale ranging from strongly agree to strongly disagree. The SES has also been administered as an interview. The Rosenberg Self-Esteem Scale has demonstrated good reliability and validity across a large number of different sample groups. The scale has been validated for use with both male and female adolescent, adult and elderly populations.

Social Physique Anxiety Scale (SPAS) – (Hart, Leary, & Rjeski, 1989)

The purpose of this scale is to assess the extent to which people become anxious when others' observe or evaluate their physiques. The SPAS is a 12 item self report scale focusing on anxiety arising as a result of others' evaluations of one's body. Participants respond to each item using a 5-point Likert Scale. An alpha reliability coefficient of .90 was reported. An 8-Week test re-test reliability coefficient for a tested sample was .82. Concurrent validity was demonstrated by showing that participants' responses to the SPAS correlated with measures that relate to general concerns with others' evaluations.

Piers Harris

The PHCSCS-2 is based on a child's own perceptions rather than the observations of parents or teachers. Test items are simple descriptive statements, written between a 7-11 year old level. Test-takers indicate whether each item applies to them by selecting a 'yes' or 'no' response.

The PHCSCS-2 provides a Total Score that reflects overall self-concept, plus sub-scale scores (Behavioral Adjustment, Freedom from Anxiety, Happiness and Satisfaction, Intellectual and School Status, Physical Appearance and Attributes, and Popularity) that permit more detailed interpretation. The PHCSCS-2 may be used for routine classroom screening to identify individuals who might benefit from additional evaluation. It is also useful in clinical settings to determine specific areas of conflict, typical coping and defense mechanisms, and appropriate intervention techniques.

Findings: Adolescent and Adult Ages

Results showed significant differences in self esteem and optimism after 32 weeks within the adolescent population (13-18 years old). The researchers suggest that although it is statistically significant, that one should be mindful of how one interprets these numbers. A 2.4 point increase in self esteem and 1.5 increase in optimism should not be considered a large increase after 32 weeks of an activity. Past research on other types of activities suggests much larger increases may be the typical result after experiencing activity for 32 weeks.

Table 5: Self-Esteem, Social Physique and Optimism

		Mean	N	Std Deviation	Std Error Mean
Pair 1	Self Esteem 1	30.85714	14	6.212359	1.660323
	Self Esteem 2	33.28571	14	7.140659	1.908421
Pair 2	Social Physique 1	37	13	9.389711	2.604237
	Social Physique 2	34.76923	13	13.08405	3.628862
Pair 3	Optimism 1	15	14	5.43493	1.452546
	Optimism 2	16.57143	14	5.139804	1.37367

Although not statistically significant, there was a difference in social physique anxiety after 32 weeks. An increase in 3 points on the scale is showing change in mind-set, although not a considerable difference after 32 weeks. Social physique anxiety is a construct in this type of population that is important and should be decreasing, not increasing, over time with an activity. The researchers hypothesized that this would significantly differ as time increased in the program.

Findings: Piers Harris

Results showed No significant differences on any of the Piers Harris scales in the younger aged (Age 7-12) obese groups from week one to week 32. This result may be due to the notion these children are already fairly high in the self concept and thus 32 weeks did not significantly increase self concept. If one examines the numbers, increases did occur, but they were just not statistically significant. The researchers believe that these numbers show very limited self concept change in the Age 7-12 group engaged in taekwondo training.

Table 6: Paired Samples Statistics

		Mean	N	Std Deviation	Std Error Mean
Pair 1	tot1	49.8250	40	8.41210	1.33007
	tot2	50.1750	40	8.94395	1.41416
Pair 2	beh1	12.3500	40	2.01977	0.31935
	beh2	12.4500	40	2.06249	0.32611
Pair 3	int1	14.0000	40	2.20721	0.34899
	int2	14.0250	40	2.09379	0.33106
Pair 4	phy1	8.6750	40	2.22327	0.35153
	phy2	8.6000	40	2.28484	0.36127
Pair 5	fre1	11.6000	40	3.03653	0.48012
	fre2	11.7500	40	2.88008	0.45538
Pair 6	pop1	8.8000	40	2.70043	0.42698
	pop2	8.8750	40	2.79365	0.44172
Pair 7	hap1	8.9750	40	1.42302	0.22500
	hap2	9.1750	40	1.48302	0.23449

Conclusion and Recommendation: Psychological Evaluation

Results showed significant differences in self esteem and optimism after 32 weeks within the adolescent population (13-18 years old). Although not statistically significant, there was a difference in social physique anxiety after 32 weeks. An increase in 3 points on the scale is showing change in mind-set. However, it was expected that social physique anxiety would decline. Results showed No significant differences on any of the Piers Harris scales in the younger aged (Age 7-12) obese groups from week one to week 32.

There are two possible hypotheses as to the increase in social physique anxiety. As note, above, the increase could simply reflect that after 32 week, while self-esteem has increased the student has not had sufficient time to reflect on or feel more confident about physical appearance. Whatever weight losses might have occurred within 32 weeks would have been modest losses of between 12 to 15 pounds.

However, an alternative hypothesis might argue that the taekwondo training had created a greater awareness in the student that a change in physical conditioning was important. Models of exercise adherence, specifically Social Cognitive Theory. Derived from Social Cognitive Theory, self-efficacy is one's perceived ability to preform a specific physical activity. As the

physical demands of the material progressed, students may have increasingly felt they did not have the ability to preform adequately. This hypothesis is supported by the concurrence of the average duration of exercise as 34 weeks.