

## Wii™ Yoga Vs. A Traditional Exercise Program

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### Abstract

The purpose of this study was to compare the results of Wii™ yoga versus a traditional structured exercise intervention regarding posture and self-esteem. The data were analyzed using a bivariate correlation and repeated measures 2-way ANOVA with the level of alpha set at  $p < .05$ . Four participants (4 females) from Wheeling Jesuit University took part in the study. Two females completed a traditional exercise intervention, consisting of strengthening and stretching exercises from a certified personal trainer for 6 weeks, 3 times a week. The other 2 female participants completed the Wii™ yoga for the same number of sessions. Self-esteem was measured by implementing the Rosenberg Self-Esteem Scale to the participants before the exercise intervention and after the exercise intervention. No significant difference was found using SPSS™ Version 19.0 in the study. However, the data indicate that if there had been a larger sample size, it would have increased the statistical power of the study showing that there could have been a statistically significant difference.

### Introduction

Yoga originated in India and has been a common, popular practice for thousands of years [1]. Yoga is defined to mean “union’ of the mind, body and spirit”, or the “science of the mind [2].” It has grown in popularity in the last 50 years in the United States, and it continues to grow. Here in America, yoga focuses on the postures, breathing, and meditation aspects of the practice [2]. It is often considered an exercise that influences the mind in addition to the body. Therefore, yoga, in theory, could improve self-esteem.

The practices of yoga’s breathing techniques are thought to target the autonomic nervous system, promoting relaxation [1]. Poses that are held in the practice are thought to improve strength and flexibility, both of which could improve posture. The Wii Fit™ attempted to take these specific aspects of yoga and to allow people to exercise in front of their own TV. The gaming system attempts to monitor a person’s fitness progress. The yoga aspect of the exercises claims to improve posture if the person continues doing these exercises daily. In the aforementioned articles, yoga has been shown to possibly improve both posture and self-esteem in addition to other benefits. Can the Wii™ gaming system have these benefits as much as a traditional exercise program in a gym?

### Review of Literature

In one study, adults with a kyphosis angle of 40 degrees or greater underwent hour-long yoga classes 3 days per week for 24 weeks. This study consisted of 118 women and men aged 60 and older. The causes of kyphosis not only “include loss of anterior intervertebral disc height,” but also “weakness of the erector spinae, abdominal muscles, and shoulder girdle.” The study used Hatha yoga with specific poses that focused on flexibility, strength, and proprioceptive awareness in order to improve kyphosis. “Participants randomized to yoga experienced a 4.4 % greater improvement in flexicurve kyphosis angle and a 5% greater improvement in the kyphosis index than control participants.” Some benefits of this study were that yoga did not present any negative side effects, and it was a randomized controlled study. The power of the study was hindered by its small sample size and lack of generalizability [3].

Hatha yoga, which is an all-encompassing term including many types of yoga, was used in a pilot study to treat kyphosis, but only women were included. The experimenters modified 4 series of poses to

target the postural muscles. These poses were made more challenging every 3 weeks. Posture was assessed by height, measuring the distance from tragus to wall, and the thoracic curve by use of the Debrunner kyphometer. These measurements were recorded at the beginning of the study and follow-up. This showed that yoga may influence women’s posture by decreasing kyphosis and also enhancing their well-being. The limitations of this study include a small sample size of 21 females, biased experimenters, and non-randomization [4].

A meta-analysis compared yoga to exercise regarding several health outcomes. The researchers found 81 studies in the PubMed database that included yoga asanas as the main intervention. After comparing the different studies they found that yoga was superior to exercise in almost every aspect except physical fitness. However, it was not clear how the effects of yoga and exercise differ, and further studies need to be done in order to distinguish between them [5].

First-year medical students were evaluated as to how yoga affected their physical health. The students participated in biweekly Hatha yoga classes that were one hour in length and consisted of asanas (poses and postures), pranayamas (controlled breathing), and meditation from a certified yoga teacher. Four different questionnaires were given at baseline, week 8, and week 16 that measured general health, perceived stress, depressive symptoms, and satisfaction, in which the latter was only given at the end. This pilot study found that improvements were made in all aspects that were measured by the questionnaires. This indicated that in these particular students, yoga helped them to cope with stress. Limitations included a small sample size, the absence of a control group, and the fact that the yoga group was volunteer-based. This might indicate that these were students who were in need of an intervention and more willing to change [6].

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The Iyengar yoga method, including asanas and pranayamas in a specifically-timed sequence, was used to treat chronic low back pain in one study. The treatment group received two 1.5-hour classes each week for 16 weeks that focused on correcting alignment and posture in which the problems stemmed from imbalances in the musculoskeletal system. The intervention was meant to strengthen the core muscles which affect posture and to lengthen constricted muscles. The control group and the treatment group both received newsletters each week plus two 1-hour lectures regarding education on back care and pain. The study found that yoga therapy is more helpful than education alone in treating chronic low back pain. It was helpful to find this study because it focused on targeting the back muscles, which control posture. The main problem with the study was that there was insufficient statistical power [7].

One study developed a yoga program for older adults. Surveys were first sent to experts to develop and review a program for older adults. Older adults were then asked for their input after participating in the program for 1 month. The program, called Silver Yoga Programme, was given in 70-minute sessions, 3 times per week. The program was based on both Hatha yoga and Raja yoga. This combination involved a warm-up, stretching postures of Hatha yoga, relaxation, and guided-imagery meditation Raja yoga. The participants felt that the program was challenging but very helpful, resulting in positive feedback after 1 month. There were, however, several limitations. Revisions that were made were not validated by the experts. Also, it was a convenience sample comprised of only 14 senior women and therefore was not representative of the whole older adult population [8].

A yoga intervention was researched in an ethnic minority population for chronic low back pain. Adults were randomly assigned to a yoga group or to a usual care control group that only continued to receive their routine medical care and medications. The yoga intervention lasted 12 weeks, and participants were evaluated at baseline, 6 weeks, 12 weeks, and 26 weeks. The protocol involved 12 weekly 75-minute yoga classes, which progressively got more difficult in 3-week increments. The classes all started and ended with a relaxation exercise and contained postures and breathing in the middle. Average pain level for the previous week, back-related function, and pain medication use were all recorded on numeric scales at the appropriate times. The study concluded that yoga participants showed significantly less pain and medication use at 12 weeks compared with the usual care group. Strengths of the study include the randomized design, a standard yoga intervention that is reproducible, and using participants of a racially diverse, low-income population. The limitations of the study were not blinding and self-reporting measures as assessment. These measures included an 11-point numeric rating scale for average pain level and the modified Roland-Morris Disability Questionnaire for back related function. Also, the usual care group did not receive any additional attention as did the yoga group [9].

A study assessed the body, mind, and spirit differences between yoga students compared with college students. One hundred thirty-five students from sociology, criminal justice, and exercise and health classes completed a survey instrument. Their sample also consisted of yoga practitioners who were taking Hatha yoga classes. They used the Body, Mind, Spirit Wellness and Characteristic Inventory (BMS) instrument consisting of 44 questions in 3 sections, which assessed global health issues. Their results showed significant differences in physical, mental, and spiritual wellness categories. Under physical wellness, 71% of the

yoga students marked the answer reporting that they often/always maintained their fitness by exercising regularly compared to only half of the college students. In mental wellness, more yoga practitioners than college students marked on the answer sheet reporting that they had a strong sense of morals/values and that they more often expressed their feelings with others. In spiritual wellness, significantly more yoga practitioners felt that they expressed their spirituality appropriately and in a healthy way compared to college students. Some benefits of this study were that significant differences were found for many of their measures. However, they did have a relatively small sample size [2].

In a pilot study, fourth and fifth grade students who participated in yoga were compared to a comparable group of students who did not participate in yoga. The students who were in the yoga group did yoga for 1 hour a week for 12 weeks. The main purpose of this study was to see if yoga would have an effect on the children's well-being. They assessed this by using the Harter's Global Self-Worth and Physical Appearance Subscales, and Perceptions of Physical Health and Yoga Teachings questionnaires [9]. They also assessed the well-being of the children by measures of flexibility and balance. Their results showed no significant differences, but the children who participated in yoga reported fewer negative behaviors in response to stress and had better standing balance compared to the group that did not participate in yoga. The benefits of this study were that yoga did have a positive effect on the children's well-being even though they did not find significant results. One limitation of the study was its small sample size, which affected the power of the study [1].

Dittman and Freedman conducted a two-part study that evaluated attitudes about body image and eating in women practicing postural yoga. Body awareness, intuitive eating, spiritual beliefs, and motivations of women practicing yoga were assessed by a Likert-type scale and several questionnaires. In order to clarify the questionnaire answers, more information was obtained from recorded interviews. These interviews covered topics of body dissatisfaction and eating disorders. The results in part 1 showed the yoga practitioners with normal Body Mass Indexes (BMIs) had high scores of body awareness, body responsiveness, intuitive eating, body satisfaction, and spiritual readiness. The women in part 2 reported more positive attitudes towards making healthy eating choices and their bodies. One limitation of the study was the possibility of respondent bias. The benefits of the study were that yoga can have a positive influence on individuals regarding eating choices and their bodies [10].

Wii Fit™ activities were compared to brisk treadmill walking and jogging in a study conducted by Graves et. al. Adolescents, young adults, and older adults were evaluated for cardio respiratory benefits and enjoyment. The study found that the treadmill produced a higher intensity than the Wii Fit™. However, group enjoyment was greater for the Wii Fit™ balance and aerobics when compared with treadmill walking and jogging. Overall, this study found that Wii Fit™ is a good exercise program for low to moderate intensity level exercises [11].

The preceding articles found a variety of positive effects produced by yoga. Two studies concluded that yoga could be used to correct hyperkyphosis in older adults and enhance well-being. Yoga was also found to be superior to exercise in numerous ways excluding general physical fitness. This exercise included a mix of aerobic exercise as well as gentle, nonaerobic exercises with stretching. Yoga was also found to help medical students cope with stress. The intervention of yoga successfully alleviated low back pain in two studies, including a minority population. Grade school students were tested, and their

standing balance and flexibility both improved compared to other students who did not practice yoga. It was found that this exercise can be done by a senior population as well, so almost anyone can do yoga. When comparing yoga practitioners with college students, the yoga practitioners were more likely to make healthy choices. Yoga practitioners with normal BMIs had high scores of body awareness, body responsiveness, intuitive eating, body satisfaction, and spiritual readiness. The women also reported more positive attitudes towards eating and their bodies. In the final study, Wii Fit™ was shown to produce positive attitudes toward exercise, but it did not allow the participants to work out as intensely as they did on a treadmill. Yoga has been shown to help our bodies in many different ways. This study will see if yoga in a studio and Wii Fit™ Yoga can improve posture in a young adult population, which we believe will also improve self-esteem.

**Methods**

The purpose of this study was to compare the results of Wii™ yoga versus a traditionally structured exercise intervention regarding posture and self-esteem. Participants were recruited by convenience, and the experimenters placed an advertisement in “This is News to Me” which is an e-mail sent out weekly to all students at Wheeling Jesuit asking for participants. The targeted population was non-athletes ranging between the ages of 18-24. Exclusion criteria included current collegiate athletes and individuals that already participated in yoga or individuals that exercised 3 times a week. Inclusion criteria included a convenience sample of Wheeling Jesuit University students who were between the ages of 18-24. Participants included 4 female undergraduate students from Wheeling Jesuit University. Participants were selected randomly and then were assigned to either the traditional exercise program or to the Wii™ yoga program. Two females completed a traditional exercise intervention, which consisted of strengthening and stretching exercises from a certified personal trainer for 6 weeks, three times a week. The other 2 female participants completed the Wii™ yoga for the same number of sessions.

The Wii Fit™ Yoga exercises are set up in rows that correspond to difficulty of the poses. Participants completed the first 2 rows of exercises the first week, the third row was added for the second week, and then the fourth row was added for the third week. These poses are included

in Appendix A. The two participants in the traditional exercise program did 1 set of 10 the first week for each exercise that required resistance bands. The second week the experimenters progressed to 2 sets of 10, and then finally progressed to 3 sets of 10 during the third week of the program. They held each stretch for 20 seconds the first week, then progressed to 30 seconds the second week. The experimenter explained each exercise to the participants and demonstrated the correct form to ensure that the participants were benefitting from the exercises. This program is shown in Appendix B.

Results were conducted for posture using a grid with a plumb line. Pictures were taken at baseline and at week 7. The camera used was the Kodak EasyShare™ M1033 Digital Camera with 10 megapixels. Female participants were asked to wear shorts and a sports bra for analysis. A sticker was placed at the acromioclavicular joint and greater trochanter for points of reference. Each participant stood sideways in front of the Posture Zones™ Portable Style Posture Grid. A picture was taken that was used for measurements only. Forward head was measured by lining the participant up with a plumb line and the experimenters measured how far forward in degrees the external auditory meatus was from the plumb line. Modesty was maintained due to all experimenters and participants being female. Advantages of this measurement are that it is objective and a reliable way to assess posture. A limitation may be that it will be difficult to ensure accuracy in the participant’s distance from the grid as well as the photographer’s distance from the patient. It may also be difficult to have proper alignment with the plumb line.

Self-esteem was measured by implementing the Rosenberg Self-Esteem Scale to the participants before the exercise intervention and after the exercise intervention. The survey, shown in Appendix C, consists of 10 items rated on a Likert-scale from strongly agree to strongly disagree. This is unidimensional with a convergent validity of 0.67 with Kelly Repertory Test, 0.83 with Health Self-Image Questionnaire, and 0.56 with interviewers’ ratings of self-esteem. The 2-week test-retest coefficient was 0.85. [12]. Advantages of questionnaires are that they are objective measures that can analyze psychological issues. Participants can answer the questions anonymously so they will be likely to answer truthfully; however, since this study is not blinded they may answer according to what the researchers are trying to demonstrate. A limitation of questionnaires is that the participants may not agree with any of the available choices.

ID	Group	Pre Posture (degrees)	Post Posture (degrees)	Posture Difference	Pre Rosenberg	Post Rosenberg	Rosenberg Difference
1	Yoga	3.37	2.12	1.25	24	28	-4
2	Yoga	1.64	1.74	-.10	27	27	0
3	Exercise	1.85	3.47	-1.62	25	30	-5
4	Exercise	2.05	1.74	.31	18	20	-2

Table 1: Data.

Correlations			
		Posture Difference	Rosenberg Self-Esteem Scale Difference
Posture Difference	Pearson Correlation	1	.257
	Sig. (2-tailed)		.743
	N	4	4
Rosenberg Self-Esteem Scale Difference	Pearson Correlation	.257	1
	Sig. (2-tailed)	.743	
	N	4	4

Table 2: Bivariate Correlation of Posture and Self-esteem.

## Results

The data, as displayed in Table 1, were analyzed using a bivariate correlation and repeated measures 2-way ANOVA with the level of alpha set at  $p < .05$  on SPSS™ Version 19.0. The bivariate correlation showed no statistically significant difference, but it showed a positive correlation between posture and self-esteem improvement. The correlation, shown in Table 2, was .257 and Sig. (two-tailed) was .743. The 2-way ANOVA showed no statistically significant difference between the yoga and exercise groups for posture or self-esteem. In Table 3, the posture analysis of exercise compared to yoga was Sig. (two-tailed) .952 for time and Sig. (two-tailed) .406 for time\* group. There was an interaction for posture between the 2 groups as demonstrated in Figure 1. There was no interaction for self-esteem between the 2 groups as shown in Figure 2. The self-esteem analysis of exercise compared to yoga was Sig. (two-tailed) .159 for time and Sig. (two-tailed) .609 for time\*group, which is shown in Table 4.

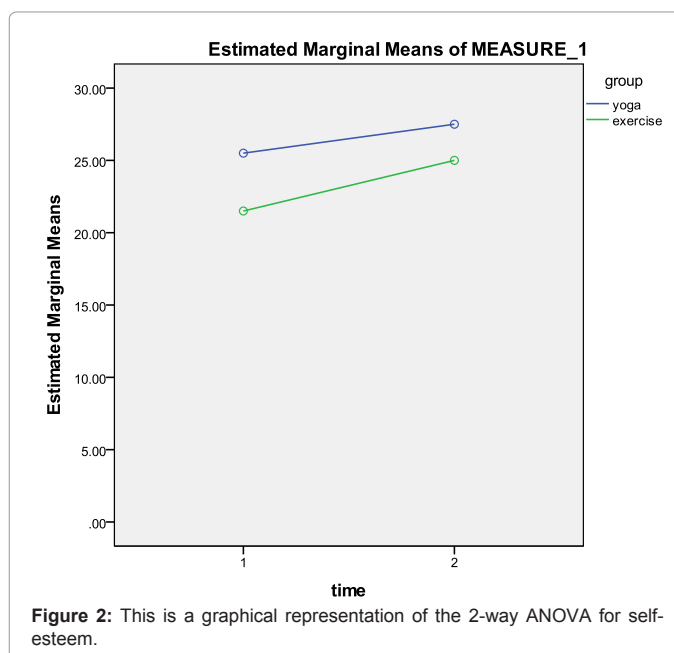
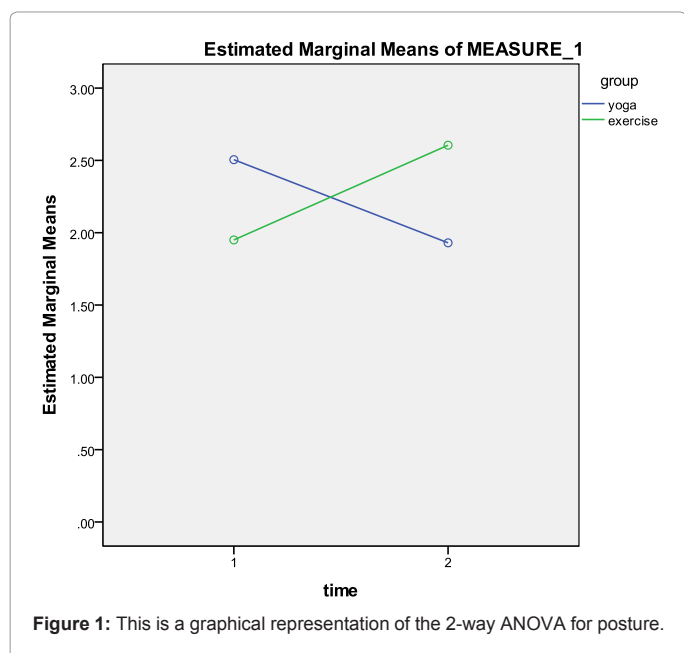
## Discussion

Although no significance to the study was found, the data indicate that if there had been a larger sample size, it would have increased the statistical power of this study. For example, all participants but one improved on the Rosenberg Self-Esteem Scale. These results support the hypothesis because it was predicted that self-esteem would improve following both interventions. With posture, 2 participants moved toward the plumb line and 2 moved away, getting worse with the intervention. However, Figure 1 shows that there was an interaction between the participants in each group when analyzing posture. This indicates the possibility of significance.

There were several limitations to this study in addition to the aforementioned small sample size. The experimenters believe that the change was so minimal because of the chosen population. They were all healthy, college-age females without significant deficits prior to the intervention. Human error was a possibility when utilizing the Posture

Tests of Within-Subjects Effects						
Measure: MEASURE_1						
	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	.003	1	.003	.005	.952
	Greenhouse-Geisser	.003	1.000	.003	.005	.952
	Huynh-Feldt	.003	1.000	.003	.005	.952
	Lower-bound	.003	1.000	.003	.005	.952
time * group	Sphericity Assumed	.756	1	.756	1.091	.406
	Greenhouse-Geisser	.756	1.000	.756	1.091	.406
	Huynh-Feldt	.756	1.000	.756	1.091	.406
	Lower-bound	.756	1.000	.756	1.091	.406
Error(time)	Sphericity Assumed	1.387	2	.693		
	Greenhouse-Geisser	1.387	2.000	.693		
	Huynh-Feldt	1.387	2.000	.693		
	Lower-bound	1.387	2.000	.693		

Table 3: Posture 2-way ANOVA.



Tests of Within-Subjects Effects						
Measure: MEASURE_1						
	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	15.125	1	15.125	4.840	.159
	Greenhouse-Geisser	15.125	1.000	15.125	4.840	.159
	Huynh-Feldt	15.125	1.000	15.125	4.840	.159
	Lower-bound	15.125	1.000	15.125	4.840	.159
time * group	Sphericity Assumed	1.125	1	1.125	.360	.609
	Greenhouse-Geisser	1.125	1.000	1.125	.360	.609
	Huynh-Feldt	1.125	1.000	1.125	.360	.609
	Lower-bound	1.125	1.000	1.125	.360	.609
Error(time)	Sphericity Assumed	6.250	2	3.125		
	Greenhouse-Geisser	6.250	2.000	3.125		
	Huynh-Feldt	6.250	2.000	3.125		
	Lower-bound	6.250	2.000	3.125		

Table 4: Self-esteem 2-way ANOVA.

Zones™ software because the experimenter had to select the points on the pictures taken of the participants. The markers that identified the acromion process from the side view did not show up well when the pictures were viewed on the program. Some pictures were taken of the participants with their hair covering their external auditory meatus. It was also possible that the participants did not stand the same both times since they knew that forward head posture was being analyzed during the second picture. The final limitation identified was that compliance for the intervention was not monitored. The participants were allowed to exercise at their convenience so it is possible that they were not faithful for the entire 6 weeks, 3 times per week.

Future studies could obtain a larger sample size and use a higher resolution camera so that the posture measurements are more accurate. Also, experimenters could use participants who have significant forward head posture prior to the experiment to see if there is a significant change rather than using a healthy younger population. The experimenters could also schedule set times for the participants to exercise to ensure that they are compliant with the program. A money incentive could also improve compliance.

## Conclusion

No significance was found in the study. The results indicate that both yoga and exercise could potentially improve posture and self-esteem. Further studies need to be done with a larger sample size to confirm this hypothesis.

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