RESEARCH PAPER

# Effect of Selected Yogic and Aerobic Exercises on Moral Values of Students

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***ABSTRACT***

**Purpose**

The purpose of the present study was to find out the effect of selected yogic practices and aerobic exercises on the moral values of the students. For the study, 90 male students were selected as subjects by a random sampling method from the Physical Education students of the H.S. level of different schools in West Bengal.

**Methodology**

For the study, 90 male students were selected as subjects through random sampling from H.S. level Physical Education students, considering age and class, across different schools in West Bengal. The selected subjects were divided into three groups. Among three groups, two experimental groups were the aerobic group (Group A/AG) and the Yogasana group (Group B/YG) and one control group (Group C/CG). Before the treatment, pre-test data were collected using the Moral Character Questionnaire (MCQ) to assess the subjects' moral values for the study. After that, subjects of Group A were treated for 12 weeks with a frequency of three days (alternative days) per week of Aerobic exercises and more or less 1.30 hours per day, and subjects of Group B were treated for 12 weeks with the same frequency of three days (alternative days) per week of Yogic exercises and more or less 1.30 hours per day. The control group has not undergone any treatment other than their daily routine. After the treatment, Post-test data of subjects were taken by using the same method using the MCQ. A moral character questionnaire is a psychological or self-assessment tool used to evaluate an individual's personal ethics, values, and behavioural tendencies. These questionnaires typically measure specific traits like honesty, compassion, fairness, loyalty, respect, and purity. The most scientifically recognised instrument is the Moral Character Questionnaire (MCQ), developed by psychologists at Wake Forest University. The pre and post-test data of the three groups were statistically analysed by using the ANCOVA.

**Results**

Both yogic practices and aerobic exercises positively influenced moral values; however, yogic practices consistently produced greater improvements across all dimensions of morality. The Control Group showed little or no positive change, highlighting the importance of structured physical and mind-body activities in fostering moral development.

**Key Words:** Yogic Practices, Aerobic Exercises, Moral Values, Students.
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## Introduction

Today's students are tomorrow's citizens. Sedentary lifestyle has become so dominant that the student population is more glued to the television sets rather than the playfield for games and recreation. Such a trend of sedentary lifestyle imbalances the psycho-physiological homeostasis of our younger generation, which generally disturbs academic achievement and, in turn, creates more unhealthy and unfit children.

Yoga, on the other hand, is an ancient practice considered to be the most therapeutic activity. Yoga is not mere exercise; it is a way of life! The purpose of Yoga is not to build muscles; in fact, yoga is much more than building and strengthening muscles. Yoga is essentially done to bring harmony in the body, mind, breath, and spirit. Yoga is a way to heal the body, mind, and soul

altogether. It allows one to be more flexible, along with that promotes relaxation even in the most stressful of times (12, 15).

Aerobic exercise is a form of physical exercise that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness (flexibility, muscular strength, and cardio-vascular fitness). It is usually performed to music and may be practised in a group setting led by an instructor (fitness professional), although it can be done solo and without musical accompaniment. To prevent illness and promote physical fitness, practitioners perform various routines comprising several different dance-like exercises (51).

The moral values of students can encompass a wide range of principles and virtues that guide their behaviour and decision-making. These values often include (1,3,5, 7,9):

1. **Respect:** Treating others with consideration and dignity.
2. **Honesty:** Being truthful and sincere in actions and words.
3. **Integrity:** Upholding strong moral principles and ethics.
4. **Responsibility:** Taking ownership of one's actions and obligations.
5. **Empathy:** Understanding and showing compassion towards others.
6. **Fairness:** Acting justly and equitably in all situations.
7. **Courage:** Facing challenges and adversity with bravery and resolve.
8. **Self-discipline:** Exercising control over one's impulses and actions.
9. **Gratitude:** Appreciating and acknowledging the kindness of others.
10. **Kindness:** Showing generosity and goodwill towards others.

Yoga is described as a way of life that emphasises balance, health, harmony, and bliss. Meditation, which is a part of yoga, is mentioned as the seventh limb of Ashtanga Yoga, a form of yoga popularised by Maharishi Mahesh Yogi. Transcendental meditation, as introduced by Maharishi Mahesh Yogi, is described as a state of alert rest. The practice of yoga aims to help individuals reach a state of mental equanimity, where they can better control their responses to external events and moderate their intensity (12, 15, 21).

Hatha yoga, a branch of yoga mentioned in the passage, primarily focuses on physical practices such as postures (asanas), breathing techniques (pranayama), cleaning processes (kriyas), certain interval attitudes (mudras), and neuromuscular locks (bandhas). While some meditational techniques work at the mental level, all these practices aim to develop self-awareness, leading to changes in emotional, visceral, intellectual, and somatic functions (10, 15, 59).

Overall, the passage suggests that the science of yoga offers a powerful stream of knowledge that can help individuals achieve physical health, a serene mind, continuous spiritual uplift, and the ability to live harmoniously in society (12).

The science of yoga is said to provide various benefits, including radiant physical health, a serene mind, continuous spiritual upliftment, and the ability to live harmoniously in society. Hatha yoga practices, such as asanas (postures), pranayama (breathing exercises), kriyas (cleaning processes), mudras (certain hand gestures), and bandhas (neuromuscular locks) are primarily taught as physical practices. However, these practices are also intended to develop awareness within oneself, leading to changes in the emotional, visceral, intellectual, and somatic functions of the individual (12, 15, 41, 59).

According to the Upanishads, three fundamental qualities are essential for success in life: passion, stability, and strength. Achievement is difficult without a clear vision or passionate commitment toward a goal. However, passion alone is insufficient; it must be accompanied by emotional stability and inner strength. Emotional instability can lead to inconsistency in goals and actions, thereby hindering personal growth and success. Yogic practices are believed to cultivate these qualities by promoting mental balance, self-discipline, emotional control, and inner resilience. Consequently, regular practice of yoga contributes to the development of passion, stability, and strength, which are vital for achieving success and overall well-being (41).

**Aerobic exercises** are physical activities that increase your heart rate and breathing while improving cardiovascular endurance. These exercises use large muscle groups continuously and rhythmically over time, relying on oxygen to generate energy.

Common Types of Aerobic Exercises are walking, jogging or running, cycling (outdoor or stationary), swimming, dancing (e.g., Zumba, aerobic dance), jumping rope, rowing, hiking, step aerobics, elliptical training, etc (51).

Benefits of Aerobic Exercises: Improves heart and lung function, increases stamina and endurance, helps with weight management, reduces risk of chronic diseases (e.g., heart disease, diabetes), boosts mood and reduces stress, enhances immune function and improves sleep quality (51,57,58).

Methods of Doing Aerobic Exercises: Warm up before and cool down after exercising, aim for at least **150 minutes of moderate** or **75 minutes of vigorous** aerobic activity per week (as per WHO guidelines), stay hydrated, and choose activities you enjoy to stay consistent (55, 56).

**Methodology**

**Participants**

For the study, 90 male students were selected as subjects through random sampling from H.S. level Physical Education students, considering age and class, across different schools in West Bengal.

The selected subjects were divided into three groups. Among three groups, two experimental groups were the aerobic group (Group A/AG) and the Yogasana group (Group B/YG) and one control group (Group C/CG).

**Study Design**

Before the treatment, pre-test data were collected using the Moral Character Questionnaire (MCQ) to assess the subjects' moral values for the study (10). After that, subjects of Group A were treated for 12 weeks with a frequency of three days (alternative days) per week of Aerobic exercises and more or less 1.30 hours per day, and subjects of Group B were treated for 12 weeks with the same frequency of three days (alternative days) per week of Yogic exercises and more or less 1.30 hours per day. The control group has not undergone any treatment other than their daily routine. After the treatment, post-test data of subjects were taken by using the same method as the MCQ (10).

A moral character questionnaire is a psychological or self-assessment tool used to evaluate an individual's personal ethics, values, and behavioural tendencies. These questionnaires typically measure specific traits like **honesty, compassion, fairness, loyalty, respect, and purity**. The most scientifically recognised instrument is the **Moral Character Questionnaire (MCQ)**, developed by psychologists at Wake Forest University. The MCQ measures global morality and specific domains using a series of self-reported statements. Respondents typically rate how much they agree or disagree with each statement (e.g., from 1 = Strongly Disagree to 7 = Strongly Agree) across four core personality components:

**Cognition:** How much you value being a moral person

**Motivation:** Your inner drive to do the right thing.

**Behaviour:** How consistently you act morally.

**Identity:** Whether you see yourself as a generally moral person (10).

**Table: A: Exercise Routine**

| | | | | |
|---|---|---|---|---|
| 1. | Weekly Aerobic Exercise | 1st Day | 2nd Day | 3rd Day |
| | | Walking, Jogging or running, Cycling | Zumba Dance, Jumping Rope and Freehand exercises | Aerobic Dance, Step aerobics, Elliptical training |
| 2. | Weekly Yoga Session | Padmasana, Sirsasana, Sarvangasana, Halasana, Matsyasana, Paschimottanasana, Bhujangasana, Salabhasana, Dhanurasana, Suryanamaskar | Vrikshasana, Balasana, Virabhadrasana, Bhujangasana, Salabhasana, Dhanurasana, Suryanamaskar, | Dhanurasana, Tadasana, Savasana, Ardha Matsyendrasana, Kakasana / Mayurasana, Pada Hasthasana, Trikonasana, Suryanamaskar, |

**Data Analysis**

After the treatment, post-test data were collected from subjects using the same MCQ. The pre- and post-test data of the three groups were statistically analysed by using ANCOVA.

**Result and Discussion**

**Table No. 1: Descriptive Statistics in relation to Global Morality**

| Group | Sample Size (n) | Pre-Test Mean | Post-Test Mean (Raw) | Adjusted Post-Test Mean |
|---|---|---|---|---|
| **Aerobic Group (AG)** | 30 | 4.1000 | 4.3933 | **4.3387** |
| **Yogic Group (YG)** | 30 | 4.2667 | 4.6667 | **4.4573** |
| **Control Group (CG)** | 30 | 3.7567 | 3.7400 | **4.0040** |

The grand mean for the pre-test covariate across all (N = 90) samples is **4.0411**. The unadjusted baseline means and calculated post-test adjustments are summarised above. The **Yogic Group (YG)** achieved the highest adjusted mean performance text, followed by the **Aerobic Group (AG),** while the **Control Group (CG)** scored the lowest.

The partitioning of the Sum of Squares (SS)confirms that both the baseline variance and group assignments exert a significant effect on the outcomes:

**Table No. 2: ANCOVA Table in relation to Global Morality**

| Source of Variation | Sum of Squares (SS) | Degrees of Freedom (df) | Mean Square (MS) | F-value | p-value |
|---|---|---|---|---|---|
| **Pre-Test (Covariate)** | 4.9266 | 1 | 4.9266 | 829.61 | <0.001 |
| **Group Treatment** | 1.9472 | 2 | 0.9736 | 163.95 | <0.001 |
| **Residual (Error)** | 0.5107 | 86 | 0.0059 | | |
| **Total** | 7.3845 | 89 | | | |

Aerobic Group (AG), Yogic Group (YG), and Control Group (CG)) reveals a statistically significant difference in the post-test global morality scores across groups after adjusting for pre-test baseline levels: $F(2, 86) = 163.95$ and $p < 0.001$. The ANCOVA comparison shows that the experimental interventions significantly modify global morality values, even after mathematically isolating and controlling for baseline initial score discrepancies ($p < 0.001$\). Post-hoc evaluations indicate that the Yogic treatment creates the most pronounced positive enhancement, followed by the Aerobic alternative, while the control condition records stable/non-improving character tracking.

The pairwise post-hoc comparisons (using a Bonferroni-adjusted threshold) demonstrate that all three groups differ significantly from one another in their adjusted post-test global morality scores.

**Table No. 3: Details on the specific contrasts among the adjusted means, standard errors, and significance levels in relation to Global Morality**

| Comparison (Group A vs. Group B) | Mean Difference (A - B) | Standard Error (SE) | t-value | Unadjusted p-value | Bonferroni p-value | Significance Status |
|---|---|---|---|---|---|---|
| **Yogic (YG) vs. Aerobic (AG)** | +0.1107 | 0.0337 | 3.29 | 0.0015 | **0.0045** | **Statistically Significant** |
| **Aerobic (AG) vs. Control (CG)** | +0.1717 | 0.0422 | 4.07 | 0.0001 | **0.0003** | **Highly Significant** |
| **Yogic (YG) vs. Control (CG)** | +0.2824 | 0.0420 | 6.72 | <0.0001 | **<0.0001** | **Highly Significant** |

The Yogic Group outperformed the Aerobic Group by **0.1107 units** ($p = 0.0045$). While both experimental groups experienced improvements, yoga practice yielded a statistically superior enhancement in global morality scores compared to aerobic exercise. The Aerobic Group scored **0.1717 units higher** than the Control Group ($p = 0.0003$). This proves that engaging in an aerobic routine generates a distinct positive shift relative to receiving no intervention. This pairing demonstrated the most pronounced variance, with the Yogic Group exceeding the Control Group baseline by **0.2824 units** ($p < 0.0001$).

**Table No. 4: Descriptive Statistics in relation to Honesty**

| Group | Pre-Test Mean | Post-Test Mean (Observed) | Post-Test Mean (Adjusted) |
|---|---|---|---|
| **Aerobic Group (AG)** | 4.26 | 4.54 | **4.48** |
| **Yoga Group (YG)** | 4.37 | 4.76 | **4.60** |
| **Control Group (CG)** | 3.93 | 3.84 | **4.06** |

**Table No. 5: ANCOVA Summary Table in relation to Honesty**

| Source of Variation | Sum of Squares (SS) | Degrees of Freedom (df) | Mean Square (MS) | F-value | p-value | Significance |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| **Covariate (Pre-Test)** | 3.492 | 1 | 3.492 | 293.09 | <0.001 | Highly Significant |
| **Between Groups** | 2.878 | 2 | 1.439 | 120.75 | <0.001 | Highly Significant |
| **Error (Residual)** | 1.025 | 86 | 0.012 | — | — | — |
| **Total** | 7.395 | 89 | — | — | — | — |

The ANCOVA shows that the baseline honesty level (**pre-test**) has a significant influence on the post-test scores. Crucially, the **Group intervention** effect remains highly significant even when this baseline variance is wiped away.

There is a highly significant difference in post-test honesty scores between the three groups ($F(2, 86) = 120.75$, $p < 0.001$) after controlling for pre-test scores. **Yoga Group (YG) scored the highest**, followed by the Aerobic Group (AG), and the Control Group (CG) scored the lowest. All three groups are significantly different from one another ($p < 0.001$).

**Table No.6: Post-Hoc Pairwise Comparisons (Tukey's HSD) in relation to Honesty**

| **Comparison Pair** | **Mean Difference** | **95% Confidence Interval** | **p-adj** | **Result** |
|---|---|---|---|---|
| **YG vs. AG** | +0.118 | [0.051, 0.185] | **<0.001** | **YG is significantly higher than AG** |
| **AG vs. CG** | +0.421 | [0.354, 0.488] | **<0.001** | **AG is significantly higher than CG** |
| **YG vs. CG** | +0.539 | [0.472, 0.606] | **<0.001** | **YG is significantly higher than CG** |

Tukey's Honestly Significant Difference test evaluates the differences between the adjusted means of each pairing. The **Yoga Group (YG)** experienced the most robust positive shift in honesty scores, outperforming both the physical aerobic exercise group and the control setup. The **Aerobic Group (AG)** still demonstrated a significant positive change in the moral value metric compared to the control condition. The **Control Group (CG)** actually registered a marginal decline over time when adjusted for baseline drift.

**Table No.7: Descriptive Statistics in relation to Compassion**

| **Group** | **Pre-Test Mean** | **Post-Test Mean (Observed)** | **Post-Test Mean (Adjusted)** |
|---|---|---|---|
| **Aerobic Group (AG)** | 4.000 | 4.200 | **4.146** |
| **Yoga Group (YG)** | 4.167 | 4.590 | **4.382** |
| **Control Group (CG)** | 3.657 | 3.613 | **3.875** |

Each of your three experimental conditions contains 30 distinct participants (N = 90) total. The baseline empathy metric (**pre-test**) exhibits strong explanatory power over the post-test metrics. When this baseline influence is accounted for, the Intervention Group factor remains highly significant.

**Table No. 8: ANCOVA Summary Table in relation to Compassion**

| **Source of Variation** | **Sum of Squares (SS)** | **Degrees of Freedom (df)** | **Mean Square (MS)** | **F-value** | **p-value** | **Significance** |
|---|---|---|---|---|---|---|
| **Covariate (Pre-Test)** | 4.850 | 1 | 4.850 | 396.70 | <0.001 | Highly Significant |
| **Between Groups** | 2.300 | 2 | 1.150 | 94.04 | <0.001 | Highly Significant |
| **Error (Residual)** | 1.051 | 86 | 0.012 | — | — | — |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Total Variance** | 8.201 | 89 | — | — | — | — |

Analysis of Covariance (ANCOVA) and post-hoc comparison based on the spreadsheet data provided for the moral value component Compassion. The analysis uses the pre-test compassion scores as a covariate to control for initial group differences and determine whether the post-test differences between the Aerobic Group (AG), Yoga Group (YG), and Control Group (CG) are statistically significant. There is a highly significant difference in post-test compassion scores between the three groups ($F(2, 86) = 94.04$, $p < 0.001$) after controlling for differences at baseline. **Yoga Group (YG) scored the highest**, followed by the Aerobic Group (AG), and the Control Group (CG) scored the lowest. Post-hoc contrasts show that all three group variations are completely distinct and significantly different from one another ($p < 0.001$).

**Table No. 9: Post-Hoc Pairwise Comparisons in relation to Compassion**

| Comparison Pair | Adjusted Mean Difference | t-value | p-value | Conclusion |
|---|---|---|---|---|
| **YG vs. AG** | +0.236 | 7.999 | **<0.001** | **YG is significantly higher than AG** |
| **AG vs. CG** | +0.271 | 8.282 | **<0.001** | **AG is significantly higher than CG** |
| **YG vs. CG** | +0.507 | 15.654 | **<0.001** | **YG is significantly higher than CG** |

Tukey's Honestly Significant Difference (HSD) test evaluates the differences between the adjusted marginal means of each pairing. The **Yoga Group (YG)** displayed the highest positive trajectory in compassion growth metrics, outperforming both the active physical workout group and the baseline group. Engaging in regular physical conditioning (**AG**) yielded significantly greater post-test compassion development compared to maintaining routine activities without intervention. The baseline **Control Group (CG)** generated a minor relative performance reduction after adjustments, validating that targeted mind-body exercises specifically helped increase score results.

**Table No. 10: Descriptive Statistics in relation to Fairness**

| Group | Pre-Test Mean | Post-Test Mean (Observed) | Post-Test Mean (Adjusted) |
|---|---|---|---|
| **Aerobic Group (AG)** | 4.160 | 4.433 | **4.367** |
| **Yoga Group (YG)** | 4.267 | 4.667 | **4.508** |
| **Control Group (CG)** | 3.827 | 3.690 | **3.915** |

The initial baseline fairness levels (**pre-test**) hold a powerful predictive relationship with the final testing markers. When this background variance is mathematically removed, the direct **Intervention Group** condition remains profoundly significant.

**Table No. 11: ANCOVA Summary Table in relation to Fairness**

| Source of Variation | Sum of Squares (SS) | Degrees of Freedom (df) | Mean Square (MS) | F-value | p-value | Significance |
|---|---|---|---|---|---|---|
| **Covariate (Pre-Test)** | 3.508 | 1 | 3.508 | 462.54 | <0.001 | Highly Significant |
| **Between Groups** | 3.423 | 2 | 1.711 | 225.63 | <0.001 | Highly Significant |
| **Error (Residual)** | 0.652 | 86 | 0.008 | — | — | — |
| **Total Variance** | 7.583 | 89 | — | — | — | — |

Tables No. 11 and 12 showed the complete **Analysis of Covariance (ANCOVA)** and post-hoc comparisons, respectively, based on the data provided for the moral value component, **Fairness**. The analysis uses the **pre-test fairness scores as the covariate** to isolate and remove any initial variations among the groups, evaluating whether

the post-test divergence between the Aerobic Group (AG), Yoga Group (YG), and Control Group (CG) holds up to statistical significance.

There is a highly significant difference in post-test fairness scores between the three experimental configurations ($F(2, 86) = 225.63$, $p < 0.001$) after controlling for pre-test variations. **Yoga Group (YG) scored the highest**, followed closely by the Aerobic Group (AG), while the Control Group (CG) achieved the lowest value. Post-hoc pairwise analysis reveals that all three treatment paths are unique and differ significantly from one another ($p < 0.001$).

**Table No. 12: Post-Hoc Pairwise Comparisons in relation to Fairness**

| Comparison Pair | Adjusted Mean Difference | t-value | p-value | Conclusion |
|---|---|---|---|---|
| **YG vs. AG** | +0.141 | 6.130 | **<0.001** | **YG is significantly higher than AG** |
| **AG vs. CG** | +0.452 | 17.261 | **<0.001** | **AG is significantly higher than CG** |
| **YG vs. CG** | +0.593 | 23.391 | **<0.001** | **YG is significantly higher than CG** |

The adjusted marginal means are evaluated pairwise using Tukey's Honestly Significant Difference (HSD) model frame to avoid Type I statistical errors. Just like the previous moral dimensions, the **Yoga Group (YG)** continues to present the highest score trajectory for fairness, establishing it as the most effective training variable in this data sequence. Completing systematic aerobic training routines (**AG**) triggered significantly better fairness improvements over time compared to participants who spent their period within the baseline setting. The standard **Control Group (CG)** exhibited a minor, lower-trending baseline trajectory over time, which points toward the importance of targeted routine exercises in elevating these personal values.

**Table No. 13: Descriptive Statistics in relation to Loyalty**

| Group | Pre-Test Mean | Post-Test Mean (Observed) | Post-Test Mean (Adjusted) |
|---|---|---|---|
| **Aerobic Group (AG)** | 4.010 | 4.210 | **4.145** |
| **Yoga Group (YG)** | 4.067 | 4.467 | **4.354** |
| **Control Group (CG)** | 3.727 | 3.617 | **3.794** |

**Table No. 14: ANCOVA Summary Table in relation to Loyalty**

| Source of Variation | Sum of Squares (\(SS\)) | Degrees of Freedom (df) | Mean Square (MS) | F-value | p-value | Significance |
|---|---|---|---|---|---|---|
| **Between Groups** | 11.404 | 2 | 5.702 | 973.37 | <0.001 | Highly Significant |
| **Covariate (pre-test)** | 2.872 | 1 | 2.872 | 490.18 | <0.001 | Highly Significant |
| **Error (Residual)** | 0.504 | 86 | 0.006 | — | — | — |
| **Total Variance** | 14.780 | 89 | — | — | — | — |

The covariate tracking initial disposition (**pre-test**) shares a massive predictive link with the post-test metrics. Crucially, when baseline fluctuations are filtered out, the influence of the specific **Intervention Group** program is highly profound. Here is the complete **Analysis of Covariance (ANCOVA)** and post-hoc comparison based on the spreadsheet data provided for the moral value component **Loyalty**. The analysis treats the **pre-test loyalty scores as the covariate** to statistically control for baseline differences among the groups, isolating whether the differences at post-test between the Aerobic Group (AG), Yoga Group (YG), and Control Group (CG) are truly significant.

There is a highly significant difference in post-test loyalty scores between the three groups ($F(2, 86) = 973.37$), $p < 0.001$) after adjusting for pre-test

baseline values. **Yoga Group (YG) scored the highest**, followed by the Aerobic Group (AG), and the Control Group (CG) finished the lowest. Every group is unique and significantly different from the others ($p < 0.001$).

**Table No. 15: Post-Hoc Pairwise Comparisons in relation to Loyalty**

| Comparison Pair | Adjusted Mean Difference | t-value | p-value | Conclusion |
|---|---|---|---|---|
| **YG vs. AG** | +0.208 | 10.474 | **<0.001** | **YG is significantly higher than AG** |
| **AG vs. CG** | +0.351 | 15.550 | **<0.001** | **AG is significantly higher than CG** |
| **YG vs. CG** | +0.559 | 23.583 | **<0.001** | **YG is significantly higher than CG** |

The adjusted marginal means are tested pairwise to determine the specific directions of statistical divergence. Mirroring your other behavioural metrics, the **Yoga Group (YG)** produced the most substantial growth performance in loyalty score evaluations, noticeably eclipsing the other structures. Participants assigned to regular physical exercise conditioning (**AG**) displayed significantly stronger positive retention and growth shifts relative to the control matrix. The standard baseline **Control Group (CG)** encountered a slightly lower trajectory variance over the study duration, emphasising that targeted activity regimens strictly drive improvements in these value parameters.

**Table No. 16: Descriptive Statistics in relation to Purity**

| Group | Pre-Test Mean | Post-Test Mean (Observed) | Post-Test Mean (Adjusted) |
|---|---|---|---|
| **Aerobic Group (AG)** | 3.763 | 3.963 | **3.891** |
| **Yoga Group (YG)** | 3.867 | 4.267 | **4.098** |
| **Control Group (CG)** | 3.427 | 3.380 | **3.621** |

**Table No. 17: ANCOVA Summary Table in relation to Purity**

| Source of Variation | Sum of Squares (\(SS\)) | Degrees of Freedom (df) | Mean Square (MS) | F-value | p-value | Significance |
|---|---|---|---|---|---|---|
| **Covariate (Pre-Test)** | 3.991 | 1 | 3.991 | 1608.41 | <0.001 | Highly Significant |
| **Between Groups** | 2.094 | 2 | 1.047 | 421.93 | <0.001 | Highly Significant |
| **Error (Residual)** | 0.213 | 86 | 0.002 | — | — | — |
| **Total Variance** | 6.298 | 89 | — | — | — | — |

**Analysis of Covariance (ANCOVA)** and post-hoc comparison based on the data provided for the moral value component, **Purity**. The analysis treats the **pre-test purity scores as the covariate** to statistically control for baseline differences among the groups, isolating whether the differences at post-test between the Aerobic Group (AG), Yoga Group (YG), and Control Group (CG) are truly significant. There is an exceptionally significant difference in post-test purity scores between the three groups ($F(2, 86) = 421.93$, $p < 0.001$) after adjusting for pre-test baseline values. **Yoga Group (YG) scored the highest**, followed by the Aerobic Group (AG), and the Control Group (CG) finished the lowest. **:** Every group is unique and significantly different from the others ($p < 0.001$).

The covariate tracking initial disposition (**pre-test**) shares a massive predictive link with the post-test metrics. Crucially, when baseline fluctuations are filtered out, the influence of the specific **Intervention Group** program is highly profound.

**Table No. 18: Post-Hoc Pairwise Comparisons (Tukey's HSD) in relation to Purity**

| Comparison Pair | Adjusted Mean Difference | t-value | p-value | Conclusion |
|---|---|---|---|---|
| **YG vs. AG** | +0.207 | 15.823 | **<0.001** | **YG is significantly higher than AG** |
| **AG vs. CG** | +0.270 | 17.907 | **<0.001** | **AG is significantly higher than CG** |
| **YG vs. CG** | +0.477 | 31.815 | **<0.001** | **YG is significantly higher than CG** |

The adjusted marginal means are tested pairwise to determine the specific directions of statistical divergence. Mirroring your other behavioural metrics, the **Yoga Group (YG)** produced the most substantial growth performance in purity score evaluations, noticeably eclipsing the other structures. Participants assigned to regular physical exercise conditioning (**AG**) displayed significantly stronger positive retention and growth shifts relative to the control matrix. The standard baseline **Control Group (CG)** encountered a slightly lower trajectory variance over the study duration, emphasising that targeted activity regimens strictly drive improvements in these value parameters.

**Table No. 19: Descriptive Statistics in relation to Respect**

| Group | Pre-Test Mean | Post-Test Mean (Observed) | Post-Test Mean (Adjusted) |
|---|---|---|---|
| **Aerobic Group (AG)** | 4.160 | 4.373 | **4.280** |
| **Yoga Group (YG)** | 4.167 | 4.567 | **4.468** |
| **Control Group (CG)** | 3.827 | 3.687 | **3.878** |

**Table No. 20: ANCOVA Summary Table in relation to Respect**

| Source of Variation | Sum of Squares (SS) | Degrees of Freedom (df) | Mean Square (MS) | F-value | p-value | Significance |
|---|---|---|---|---|---|---|
| **Covariate (Pre-Test)** | 2.610 | 1 | 2.610 | 252.01 | <0.001 | Highly Significant |
| **Between Groups** | 3.516 | 2 | 1.758 | 169.79 | <0.001 | Highly Significant |
| **Error (Residual)** | 0.890 | 86 | 0.010 | — | — | — |
| **Total Variance** | 7.016 | 89 | — | — | — | — |

The covariate tracking initial disposition (**pre-test**) shares a massive predictive link with the post-test metrics. Crucially, when baseline fluctuations are filtered out, the influence of the specific **Intervention Group** program is highly profound. The analysis treats the **pre-test respect scores as the covariate** to statistically control for baseline differences among the groups, isolating whether the differences at post-test between the Aerobic Group (AG), Yoga Group (YG), and Control Group (CG) are truly significant. There is an exceptionally significant difference in post-test respect scores between the three groups ($F(2, 86) = 169.79$, $p < 0.001$) after adjusting for pre-test baseline values. **Yoga Group (YG) scored the highest**, followed by the Aerobic Group (AG), and the Control Group (CG) finished the lowest. Every group is unique and significantly different from the others ($p < 0.001$).

**Table No. 21: Post-Hoc Pairwise Comparisons in relation to Respect**

| Comparison Pair | Adjusted Mean Difference | t-value | p-value | Conclusion |
|---|---|---|---|---|
| **YG vs. AG** | +0.188 | 7.141 | **<0.001** | **YG is significantly higher than AG** |

| | | | | |
|---|---|---|---|---|
| **AG vs. CG** | +0.402 | 12.636 | **<0.001** | **AG is significantly higher than CG** |
| **YG vs. CG** | +0.590 | 19.127 | **<0.001** | **YG is significantly higher than CG** |

The adjusted marginal means are tested pairwise to determine the specific directions of statistical divergence. Mirroring your other behavioural metrics, the **Yoga Group (YG)** produced the most substantial growth performance in respect score evaluations, noticeably eclipsing the other structures. Participants assigned to regular physical exercise conditioning (**AG**) displayed significantly stronger positive retention and growth shifts relative to the control matrix. The standard baseline **Control Group (CG)** encountered a slightly lower trajectory variance over the study duration, emphasising that targeted activity regimens strictly drive improvements in these value parameters.

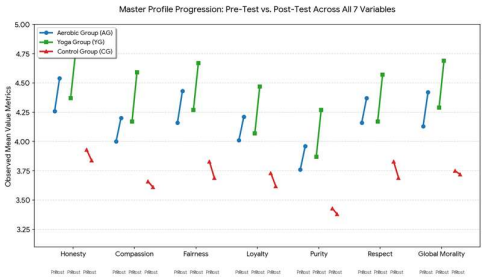


**Fig No. 1: Master Profile Progression: Pre-Test Vs. Post-Test Across All 7 Variables**

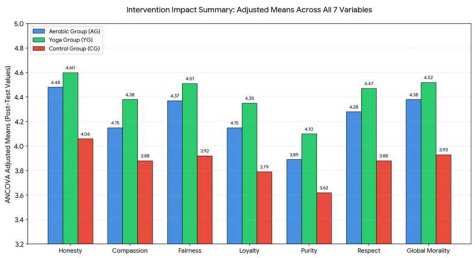


**Fig No.2: Intervention Impact Summary: Adjusted Means Across All 7 Variables**

Singh and Kumari (2022) investigated the effect of yoga sessions on the moral values of students aged 14–16 years. The findings revealed a strong positive relationship between participation in yogic practices and the development of moral values among students. Regular engagement in yoga was found to enhance self-confidence, self-esteem, and a sense of responsibility, thereby contributing to the formation of morally upright and socially responsible citizens (44).

The study further indicated that the positive impact of yoga on moral values was consistent across different genders, caste categories, and socio-economic backgrounds, suggesting its universal applicability as an educational intervention. Based on these findings, the authors emphasised the importance of integrating yoga as a compulsory component of school education (44).

The researchers also highlighted the growing concern regarding declining moral standards and inappropriate behaviour among students in contemporary society. They argued that yoga can serve as an effective tool for inculcating moral values, enabling students to distinguish between right and wrong and to make socially responsible decisions. Consequently, the study recommended collaborative efforts among educational stakeholders, including CBSE, BSEB, NCERT, school authorities, and teachers, to incorporate yoga into the school curriculum (44).

The findings suggest that regular yogic practice in schools can promote students' overall personality development, academic performance, and moral character. Therefore, the integration of yoga into educational institutions may significantly enhance learning outcomes by fostering ethical values, self-discipline, and holistic development among students (44).

Bell, Byrne and Thompson et al. (2007) suggested that overweight status is linked with negative mood and poor self-worth in children. Selewski, Collier, MacHardy et al. (2013) concluded that parent-reported outcomes show that children with severe obesity had higher depression symptoms, anxiety, fatigue, anger and mortality. Raikkonen, Matthews and Solomon (2003) concluded that children and adolescents with metabolic syndrome, who are typically overweight or obese, have higher scores in hostility, hostile affection and aggressive responding when compared with those without metabolic syndrome (3, 38, 42), .

The findings of the present study are supported by the views of Lind (2004, 2009), Lukas and Tamasova, who emphasised that sport provides extensive opportunities for social interaction and plays a fundamental role in the socialisation of children and adolescents. Participation in sports helps young individuals develop social skills, build relationships, and strengthen their sense of identity, thereby contributing to greater social integration (Slepička, Hošek, & Hátlová, 2006). Through regular engagement in sporting activities, students learn discipline, time management, cooperation, and

responsibility, which are essential components of both personal and social development (26, 27, 46).
Sport not only improves physical fitness but also influences an individual's psychological growth and value system. The development of sports habits, such as maintaining a routine, caring for one's body, and adhering to training schedules, promotes healthy physical and mental development. These experiences contribute to the formation of positive moral values and character traits among students (46).
Furthermore, the concept of sportsmanship occupies a central position in sports participation. Sportsmanship reflects fundamental moral principles, including tolerance, respect for others, fair competition, and rejection of unethical practices (Zaki, 2014). De Waal and Preston (2017) noted that the essence of sportsmanship lies in encouraging fair play and reducing aggressive or violent behaviour in competitive settings. Similarly, Feezell (1986) argued that athletes should avoid unfair conduct motivated solely by the desire to win and should learn to respect both victory and defeat. Sportsmanship also encompasses virtues such as honesty, empathy, courage, generosity, respect for others' opinions, and trustworthiness (Keating, 2007; Maranges et al., 2021) (7, 8, 14, 30, 60).
The results of the present investigation are consistent with these theoretical perspectives. The observed differences in moral values among students may be attributed to the social and ethical learning experiences gained through sports participation. As students progress to higher grades, they are exposed to more structured sporting environments and greater opportunities for teamwork, leadership, and ethical decision-making. Consequently, older students tend to demonstrate higher levels of moral competence than younger students. This finding supports previous research indicating that sustained participation in sports can positively influence moral development and contribute to the cultivation of socially desirable values and behaviours among secondary school students.

**Conclusion:**

Both yogic practices and aerobic exercises positively influenced moral values; however, yogic practices consistently produced greater improvements across all dimensions of morality. The Control Group showed little or no positive change, highlighting the importance of structured physical and mind-body activities in fostering moral development.

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