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A Cross-Sectional Study on the Effect of Yoga on Visual Perception amongst University Students

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ABSTRACT: The present study aims to investigate the effects of yoga on Visual Perception (VP) in university students. VP is essential in our lives, particularly for students, as it plays an important role in learning. If yoga can improve VP, it could benefit not only students' education but also multiple dimensions of life. This paper examines how VP impacts both yoga group and control group and whether yoga practice enhances VP in university students.

In this study, we enrolled 100 yoga group and 100 control group, resulting in a total sample size of 200 participants (n=200). The yoga group consisted of 50 females and 50 males who had practiced yoga for at least one year. The control group included 100 control group, consisting of 50 females and 50 males. We assessed VP using the Motor-Free Visual Perception Test-4 (MVPT-4). The data was analyzed using an independent t-test.

The yoga group showed significant improvements in Visual Discrimination, Spatial Relationships, Visual Memory, Figure Ground, and Visual Closure compared to the control group.

This study shows that the participants who practiced yoga for a minimum of 1 year had better VP ability than the control group.

Keywords: Visual perception, perception, yoga, learning, cognition, mvpt-4

INTRODUCTION

VP is the cognitive process that enables individuals to understand and interpret external information through sensory organs, aiming to create a symbolic system of the external world and use an appropriate cognitive process, where nonverbal functions such as imagination, color, music, shape, and planning are managed by the right hemisphere and language, mathematics, thought classification, writing, and logic are controlled by the left hemisphere (Aral, 2021). Perception, a complex process involving sensory, attentional, semantic, and mental characteristics, is based on seven factors: Visual Memory (VM), Visual Discrimination (VD), visual sequential memory, visual space relationship, visual numerical, visual form constancy, and Visual Closure (VC) (Girishbala, 2015; Orloff, 2004). The brain's principles of perception shape the process of vision, which involves identifying foreground objects and contextual backgrounds to form a meaning of the visual world, grouping objects into a single category based on visual parameters, and filling in incomplete information to create a cohesive whole (Kaur, 2020). Difficulties in reading, writing, finding objects, eating, driving, and mathematical tasks may arise due to VP issues (Pieters *et al.*, 2012; Schneck, 2009). A study by Telles *et al.* (1995) found that yoga practice led to a significant improvement in visual cognitive performance, and another study by Rangan *et al.* (2009) observed that yoga enhances VM. VP enables individuals to recognize and identify objects, shapes, colors, and other qualities, allowing them to make precise judgments about an object's composition, size, and Spatial Relationship (SR) (Case-Smith & O'Brien, 2013). Diggory's experiments demonstrated that children from impoverished areas often experience learning difficulties due to a deficiency in their ability to simultaneously synthesize VP and stimuli. Programs combining language, behavioral, and perceptual training can be beneficial for these children (Marianne, 1972). Individuals with mathematical learning disabilities showed significantly poorer performance in VP (Pieters *et al.*, 2012), and visual awareness plays a crucial role in enhancing students' reading skills (Çayir, 2017), while fast reaction time can improve academic performance (Prabu Kumar *et al.*, 2020). Yoga, derived from the Sanskrit word "yug", which means "to unite" or "to yoke," encompasses self-awareness, mindfulness, and a transcendent state of consciousness, seeking to unify the mind, body, and spirit, and cultivate greater awareness and consciousness (Vivekananda, 2005). According to Patanjali's Yoga Sutra, yoga is "mind

control," or "Yogascittavrttinirodhah," where "chita" means being conscious, "vritti" refers to both the conscious and unconscious mind, and "nirodhah" means blocking, thus "blocking the patterns of consciousness" (Iyengar, 2005; Sarasvati, 2013). The Yoga Vasistha defines yoga as "a mind-stabilizing technique," and The Bhagavad Gita describes it as "karmasukausalam", maintaining relaxation and awareness in action (Varma, 2013; Nagendra, 2014). Hatha yoga, known for its ancient yoga books, involves practicing Asana, Shatkarma, Pranayama, Mudra, and Banda, with purification consisting of dauti, basti, neti, nauli, trakata, and kapalabhati (Muktibodhananda, 1998). Telles *et al.* (2012) found Kapalabhati improved fine motor skills and visual discrimination.

As trataka is related to eye fatigue and VP, practicing it can be helpful for eye health and improved VP. Trataka involves gazing at a small point and has two types of practices: antaranga (internal Trataka) and bahiranga (external Trataka). It can help not only the eyes but also mental and physical functions, making it therapeutic for poor concentration and memory. The Gherand Samhita mentions that it can help accelerate clairvoyance by enabling the perception of subtle manifestations (Telles *et al.*, 2012). Asana and Pranayama exercises help integrate breathing, body, mind, and intelligence. Breathing slowly and effortlessly during Asana practice can relieve tension from the perception organs (eyes, nose, ears, skin, and tongue) (Iyengar, 2008). Our bodies carry not only blood-flowing channels, but also vital Prana to each part. Through yoga asana training, the energy of this prana can be balanced, which eventually affects the behavior of the human brain with the left hemisphere and the right hemisphere. In the classic yoga text, asana is defined as creating a stable and comfortable physical condition without blockage (Saraswati, 2009).

MATERIALS AND METHODS

Participants. In this study, a total of 200 students from one university in India, aged between 18 and 28 years, all of whom were enrolled in the yoga program, participated as practitioners of yoga in the experimental group. The participants had a minimum of one year of yoga experience. The control group, on the other hand, who are not regular practitioners. All participants were proficient in English, with the ability to read, write, and speak the language. Additionally, they were free from neurological, chronic, or psychological disorders, with those under medication or suffering from mental inefficiencies being excluded. The participants were provided with socio-demographic questions and details regarding their yoga practice to explain the study's aim, procedures, inclusion, and exclusion criteria. The demographic details of the participants are presented in Table 1, providing information on their mean age, standard deviations, gender, yoga experience, practice time, and education details. This study was approved by the Institutional Ethics Committee.

Table 1: Demographic details of participants.

	Yoga Group (n = 100)		Control Group (n = 100)	
	Male	**Female**	**Male**	**Female**
Age(M±SD)	20.8±2.81	20.12±2.35	20.28±1.77	20.28±1.77
Gender (n)	50	50	50	50
Duration of Yoga Experience (M±SD)	2.65±1.9	2.72±1.41	-	-
Practice Yoga time (M±SD)	52.2±16.93	45.6±16.8	-	-
Education UG	30	28	50	50
Education PG	20	22	-	-

Note: n=sample, M = Mean, SD = Standard Deviation, UG= under graduate, PG= Post graduate Statistical analysis

MATERIALS

The MVPT-4 is a widely used assessment tool for VP abilities, designed to evaluate individuals between the ages of 4 to 80. The test typically takes 20-25 minutes to administer and assesses five key areas of VP, including VC, VD, VM, Figure-Ground (FG), and SR. The test comprises 45 items, and its reliability, or internal consistency, is determined by how accurately the test measures the intended construct. Values between 0.70 and 0.95 are generally accepted as reliable. It is worth noting that when multiple tasks are employed to produce a single test score, the Pearson coefficient value tends to be lower. With an average Cronbach's alpha value of 0.80, the VP test demonstrates high internal consistency, indicating that it is a reliable assessment tool. Though the Cronbach's alpha coefficients for different age groups range from 0.70 to 0.87, all age groups meet or exceed the desired cutoff of 0.70. To ensure the validity of the VP test, the scale's items must possess appropriate levels of difficulty and meet rigorous benchmarks for item value, which have been set at a minimum threshold of 0.6 (Ronald and Donald 2015), to comprehensively assess a wide spectrum of visual-perceptual abilities.

Procedures: In this study, the participants underwent an assessment of VP based on the manual by Colarusso and Hammill. Prior to the test, each participant received instructions to sit calmly and quietly while the examiner recorded their VP details using a MVPT-4 comprising of 45 items. Chalfant and Scheffelin (1969) categorized visual-perceptual skills into five types, which are as follows:

-**VC** is a type of VD that involves perceiving a complete figure from fragmented parts.

-**VD** refers to the skill of distinguishing the dominant features of objects, such as their positions, letter-like forms, shapes, colors, forms.

-**FG** involves the capacity to discern an object from its surrounding objects or background.

-**SR** involve orienting oneself in space and perceiving

the positions of objects relative to other objects and oneself.

-VM involves the ability to retrieve and recognize a specific stimulus item after a short time interval.

These five skill categories remain the most prominent theoretical constructs of VP and continue to provide the basis for newly published theories that explore specific aspects of (or disruptions to) visual-perceptual processes. Although visual-perceptual skills may be theoretically discrete entities, from a practical point of view, they are likely to be inseparably intertwined. The various types of perceptual skills are not truly independent of each other, and most real-world visual-perceptual tasks use a number of these processes simultaneously. For example, FG and visual recognition skills are closely intertwined and are not distinctly separate skills. However, the term "types of visual perceptual skills" is functionally descriptive and is the basis for clinical observations that are currently used to describe a person's abilities and/or difficulties. This type of operational categorization is artificial in terms of how VP actually operates. Although this procedure does not provide "subarea" scores, it is assessed as a unitary construct. The participants were made to feel comfortable in the testing environment, and the examiner briefly explained the test procedure. Testing began once the participant indicated their understanding of the testing procedure to ensure accurate data collection (Chalfant and Scheffelin 1969; Ronald and Donald 2015).

Statistical analysis: In this study, utilizing a cross-sectional design, we opted for an independent t-test as our statistical analysis method to compare the yoga group with the control group, employing the SPSS 29 version.

RESULTS

Table 2 provides descriptive statistics for various variables measured in a study comparing individuals who practice yoga and those who do not practice yoga regularly. Overall, it appears that individuals in the yoga group had higher scores across several measures compared to the control group. For example, the mean score for VD was 2.74 in the yoga group compared to 1.86 in the control group. Similar trends were observed for SR, VM, FG and VC, with higher mean scores in the yoga group. Interestingly, the largest difference between the two groups was observed for VP, with a mean score of 37.07 in the yoga group compared to 29.95 in the control group. This suggests that practicing yoga may have a particularly positive impact on how individuals perceive their own vitality. Overall, these results provide evidence that practicing yoga may have beneficial effects on various aspects of physical and mental health, compared to individuals who do not practice yoga regularly. However, further research is needed to establish causality and identify the underlying mechanisms.

In the Table 3 shows that the analysis compares six different variables (VD, SR, VM, FG, VC, and VP) between two groups: yoga group and control group. Levene's test is used to assess the equality of variances between the two groups for each variable. In this analysis, the results show that for all variables except VM, the variances are significantly different between the two groups ($p < .05$). Next, t-tests are used to determine whether the mean scores on each variable differ significantly between the two groups. The t-test results show that for all variables, the mean scores for yoga group are significantly higher than those for control group ($p < .001$). Overall, the analysis suggests that there are significant differences between yoga group and control group on all six variables, with yoga practitioners generally having higher scores.

Table 2: Comparison of Various Variables between Yoga and Control group.

Variable	Group	N	M	SD	SE
VD	Yoga	100	2.74	0.44	0.04
	Control	100	1.86	0.71	0.07
SR	Yoga	100	12.03	1.75	0.18
	Control	100	10.19	1.99	0.20
VM	Yoga	100	7.39	0.92	0.09
	Control	100	6.14	1.01	0.10
FG	Yoga	100	7.50	0.93	0.09
	Control	100	5.91	1.23	0.12
VC	Yoga	100	7.41	0.84	0.08
	Control	100	5.85	1.15	0.11
VP	Yoga	100	37.07	3.21	0.32
	Control	100	29.95	4.91	0.49

Note: M=Mean; SD=Standard Deviation; SE=Standard Error

Table 3: Comparison of Variables between Yoga and Control group including Levene's Test for Equality of Variances and t-test for Equality of Means.

	Levene's Test		t-test for Equality of Means						
Variable	**F**	**Sig.**	**t**	**df**	**Sig.**	**MD**	**SED**	**95% C.I.D**	
VD	14.86	<.001	10.52	198	<.001	0.88	0.08	0.72	1.04
SR	5.51	0	6.938	198	<.001	1.84	0.27	1.32	2.36
VM	0.07	0.79	9.173	198	<.001	1.25	0.14	0.98	1.52
FG	6.58	0	10.32	198	<.001	1.59	0.15	1.29	1.89
VC	9.57	0	10.95	198	<.001	1.56	0.14	1.28	1.84
VP	27.89	<.001	12.14	198	<.001	7.12	0.59	5.96	8.28

Note: Sig.=Significance; MD=Mean difference; SED=Standard error difference; C.I.D=Confidence interval difference

DISCUSSION

The present study demonstrates that individuals who regularly practice yoga for more than one year experience several positive outcomes. These outcomes are significantly different from those observed in a control group, particularly with respect to VP. Importantly, long-term yoga practitioners exhibit higher levels of VC, VM, VD, FG, and SR compared to control group. Our findings are found to be reasonably matching well with previous research works (Baklouti *et al.*, 2022; Karmakar and Pant 2017; Parkinson, 2022; Borman, 2016). Our study's findings are consistent with previous research that has shown improvements in cognitive function and perception following long-term experiences with Hatha Yoga (Baklouti *et al.,* 2022), three months of intensive meditation (Braboszcz *et al*., 2013), and two weeks of Trataka practice (Swathi *et al.*, 2021). As many of these earlier studies have reported improvements arising from yoga practices, it is likely that the group differences we observed in our current research represent the benefits of long-term, regular yoga practice for university students. Significantly, our data additionally substantiate experimental investigations where study participants were randomly assigned to either an yoga group or a control group. Specifically, our study suggests that long-term yoga practice may provide cognitive benefits that improve perception and mental function. Long-term yoga practice, for at least one year, is a more reliable intervention compared to other short-term studies. This result could be seen as a more accurate study results than other studies that gave 1 to 6 months of short intervention. In this study, role of yoga VP of yoga university students are done in manual of VP test. A comparison is carried out between yoga group and control group using VP test. The results suggest that the group practicing yoga had significant improvement in VP in comparison to that of the control group. As a result, it was found that the group practicing yoga significantly improved VP compared to the control group. Vision is our dominant sense. We get most of our information about where things are, how they move, and what they are from the light that comes into our eyes and the processing of our brains (Wade and Swanston 2013). So, right posture, breathing, and especially trataka helps to improve the eyesight. Applied studies have shown that yoga promotes and maintains healthy physical and mental conditions and prevents disease (Ghore, 2017). So, yoga group could get high score for VP compared to control group.

CONCLUSIONS

The present study results indicate that the yoga group has significantly better VP than the control group. However, in this method, unitary construct as dominant item does not consider the other sub area parameters with regard to VC, VM, VC, FG, and SR. Further, there is a scope for further research and development of subarea scores with a separate scale.

FUTURE SCOPE

This study recommends using larger sample sizes in the next study and comparing the effects of yoga practice on VP with other countries as well as India, to provide more conclusive evidence due to the limited sample size of this study.

REFERENCES

Aral, N. (2021). Visual Perception in Specific Learning Difficulties. *Theory and Practice in Child Development*, *1*(1), 25–40.

Baklouti, S., Aloui, A., Baklouti, H., Souissi, N. and Jarraya, M. (2022). Effects of Hatha yoga on cognitive functions in the elderly: a cross-sectional study. *The Libyan Journal of Medicine*, *17*(1).

Borman, A. (2016). Effect of yogic asana on hand eye coordination. *International Journal of Physiology*, *1*(2), 101–103.

Braboszcz, C., Cahn, B. R., Balakrishnan, B., Maturi, R. K., Grandchamp, R. and Delorme, A. (2013). Plasticity of visual attention in Isha yoga meditation practitioners before and after a 3-month retreat. *Frontiers in Psychology*, *4*(DEC), 914.

Case-Smith, J. and O'Brien, J. C. (2013). *Occupational therapy for children -E-Book*. Mosby/Elsevier.

Çayir, A. (2017). Analyzing the Reading Skills and Visual Perception Levels of First Grade Students. *Universal Journal of Educational Research*, *5*(7), 1113–1116.

Chalfant, J. C. and Scheffelin, M. A. (1969). *Central Processing Dysfunctions in Children: A Review of Research.* Illinois Univ., Urbana.

Ghore, M. M. (2017). *Anatomy and Physiology of Yogic Practices: Understanding of the Yogic concepts and physiological mechanism of the yogic practices*. 264.

Girishbala, M. (2015). *A Textbook Of General Psychology*. Kalyani.

Iyengar, B. K. S. (2005). *Light on the Yoga Sutras of Patanjali*.

Iyengar, B. K. S. (2008). *Yoga: the path to holistic health*. 432.

Karmakar, K., and Pant, G. (2017). Effect of trataka kriya session on the visual perception of elderly people.

International Journal of Yoga, Physiotherapy and Physical Education, *2*(2), 45–488.
Kaur, M. (2020). Evolving cultural values and its manifestation in visual art. *European Journal of Molecular & Clinical Medicine*.
Marianne, F. (1972). Visual Perception, Integrative Functions and Academic Learning. *Journal of Learning Disabilities*, *1*(5), 5–19.
Muktibodhananda, S. (1998). *Hatha Yoga Pradipika* (3rd editio). Yoga Publications trust, Munger, Bihar, India.
Nagendra, H. (2014). *Yoga Instructor's Course*. Swami Vivekananda Yoga Prakashana.
Orloff, Susan (2004). *Learning re-enabled: a practical guide to helping children with learning disabilities*. 154.
Parkinson, T. D. (2022). *A Comprehensive Investigation of Yoga, Attention, and Self-Perception* [Manitoba].
Pieters, S., Desoete, A., Roeyers, H., Vanderswalmen, R. and van Waelvelde, H. (2012). Behind mathematical learning disabilities: What about visual perception and motor skills? *Learning and Individual Differences*, *22*(4), 498–504.
Prabu Kumar, A., Omprakash, A., Kuppusamy, M., K.N, M., B.W.C, S., P.V, V. and Ramaswamy, P. (2020). How does cognitive function measured by the reaction time and critical flicker fusion frequency correlate with the academic performance of students? *BMC Medical Education*, *20*(1).
Rangan, R., Nagendra, H. and Bhat, G. R. (2009). Effect of yogic education system and modern education system on memory. *International Journal of Yoga*, *2*(2), 55.
Ronald, P. C. and Donald, D. H. (2015). *Motor-Free Visual Perception Test-4 (MVPT-4)*.
Sarasvati, Satyananda. (2013). *Four Chapter on Freedom* (2nd editio). Yoga publications trust, Munger, Bihar, India.
Saraswati, N. (2009). *Yoga Sadhana Panorama*. Yoga Publications Trust.
Schneck, C. M. (2009). *Occupational Therapy Intervention: Performance Areas*.
Swathi, P. S., Bhat, R. and Saoji, A. A. (2021). Effect of Trataka (Yogic Visual Concentration) on the Performance in the Corsi-Block Tapping Task: A Repeated Measures Study. *Frontiers in Psychology*, *12*.
Telles, S., Balkrishna, A. and Singh, N. (2012). Finger dexterity and visual discrimination following two yoga breathing practices. *International Journal of Yoga*, *5*(1), 37.
Telles, S., Nagarathna, R. and Nagendra, H. (1995). Improvement in visual perception followed yoga training. *Journal of Indian Psychology*, *13*, 30-32.
Varma, R. R. (2013). *The Bhagwat Gita*. Fingerprint! Belief.
Vivekananda, Rishi (2005). *Practical yoga psychology*. 307.
Wade, N. J. and Swanston, M. T. (2013). Visual perception: An introduction, third edition. *Visual Perception: An Introduction, Third Edition*, 1–322.

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