

Article

Effect of *Surat-Shabd-Yoga* Meditation on Mind Wandering & Metacognition

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Abstract

Mind-wandering often leaves few working memory resources as off-task thoughts additionally acquire the resources. These self-generated and task unrelated thoughts are linked to cognitive deficits. In order to examine and control cognitive processes, one must possess a meta-cognitive plan. Meta-cognitive skills enable access and control of mental content. Once the meta-awareness of mind-wandering is achieved, the attention can be regulated. Meditationists practice selected form of meditation to relax the mind. To what extent it enables them to have conscious cognizance of their thoughts and how far they can regulate their thoughts or clear the internal clutter to reduce mind-wandering optimally and achieve the stage of experiencing inner stillness? Can the practice of yoga meditation alter meta-cognition and mind-wandering? The present study is an attempt to seek answers to these questions. In an experimental set-up, the participants practiced *Surat-Shabd-Yoga* meditation based on Oriental Philosophy of Saints (Radhasoami Santmat), for 20 weeks. Mind-wandering and metacognition of naïve meditators, intermediate meditators and advanced meditators was compared in experimental and control situation. The retrospective measures were used to study mind-wandering. Metacognition was studied through self-reporting. The results reveal that there is significant difference in metacognition of novice, intermediate and advanced meditators, both at pre-test and post-test. The practice of *Surat-Shabd-Yoga* meditation increased the meta-awareness and regulation of thoughts with variation in gain for three different groups. There was also significant difference in mind-wandering of three groups at pre-test. The advanced meditators had lesser task unrelated thoughts before intervention in comparison to other groups. Post intervention, the mind-wandering of intermediate meditators was reduced to the level of advanced meditators.

Keywords: Metacognition, mind wandering, Surat-Shabd-Yoga, Meditation.

Introduction

The phenomenon of spontaneous thoughts emerging unrelated to the task at hand is referred to as mind wandering (Deng *et al.*, 2019). Mind wandering is a common experience that every individual undergoes. It occurs in daily life, especially when one is dealing with such tasks that are not demanded at a particular time. For instance, sometimes while writing a paper researcher may start thinking about other aspects that are not relevant at a particular time. Mind wandering as a drift away from an activity towards unrelated inner thoughts and feelings, has been defined as the default mode of operation of our brain (Mason *et al.*, 2017). It has been found that

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individuals may experience mind wandering thoughts 46.9 % of the time spend on daily activities (Killingsworth & Gilbert, 2010). Mind wandering is thought to be both negative and positive aspect of an individual's life.

On one hand mind wandering might be useful to maintain an optimal level of arousal and to assimilate past, present and future experiences into a coherent frame (Baars, 2010). On the other hand it has been found to be associated with negative mood (Smallwood, Nind, & Connor, 2009). The results that mind wandering is considered to be the positive aspect of individual personality may be due to the fact that when mind wanders with awareness to an individual, it may lead to the creation of new ideas. And on the contrary when the individual is unknowingly in the state of wandering of mind it may lead to the destruction of ideas, and capacity to work. The ability to detect a wandering mind is related to metacognitive facilities (Deng et al., 2019). Mind-wandering and metacognition can be considered as opposite ends of human cognition (Fox & Christoff, 2014).

Metacognition may be defined as the cognition about cognitive phenomena. It is the ability to regulate cognitive processes, as well as the ability to manage and govern learning activities (Flavell, 1979). As metacognition is being aware about one's own cognitive process it may regulate the mind wandering thoughts and an individual can alter the wandering thoughts that would lead to higher self-control and better efficiency to perform a task. How then metacognition of an individual be enhanced? The prefrontal cortex area of the brain is considered as the main area of metacognition (Wilson, 2015). These areas of brain are likely to be trained through various techniques and meditation is shown to be one of the most influential technique (Cromie, 2006; Holzel, Carmody, Vangel, Congleton, Yerramsetti, Gard & Lazar, 2011). To what extent meditation enables them to have conscious awareness of their thoughts and how far they can regulate their thoughts or clear the inner confusion to reduce mind-wandering optimally? Can the practice of yoga and meditation alter meta-cognition?

Yoga was originated in India as an ancient art (Nichols, 2018). In the ancient era yoga was practiced by the yogis to contemplate (Basavaraddi, 2015). The term "yoga" is originated from a Sanskrit root word "yuj" which means union, to join, to direct and concentrate attention of a person (Lasater, 1997; Raub, 2002). The disciplines (physical, mental, and spiritual) which were originated in ancient India consider yoga as a generic term (Ahuja, 2014). With the origin of Yoga, in ancient India, it is recognized as a form of alternative medicine that include mind-body practices (Bridges & Sharma, 2017). Yoga is the practice of an art which balances the body, mind and soul of a person (Stuckey & Nobel, 2010). The UNESCO has considered yoga as an intangible cultural heritage in 2016 by recognizing its influence on the Indian society, "from health and medicine to education and the arts" (Turrin, 2016). Yoga and meditation have a positive effect on the central nervous system, immune system and it also improves the individual's overall sense of well-being (Cahn, Goodman, Peterson, Maturi & Mills, 2017). One can reach to higher chakras and higher consciousness with the help of Yoga as it allows the energy to flow upward (Lacour, 2015).

Meditation is the control of fluctuations of the mind that aim to still the instabilities of the mind (Barentsen et al., 2010). Meditation is found to be useful to enhance the ability to pay attention over extended periods of time (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010).

Mindfulness meditation is shown to have positive benefits even for novice practitioners, including improving performance on cognitive tasks and the ability to pay attention over extended periods of time (Chambers, Lo, & Allen, 2008; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010).

Along with yoga, meditation has also proved to play a vital role in improving consciousness, memory and overall psychological well-being of individual (Ahuja, 2014; Hassed, 1996). All across the world a lot of research has already been done; equipments are used in recording the electrical activities of the brain and heart of novice, moderate and expert practitioners to help in finding out the consequences of meditation (Hassed, 1996). Meditation is helpful for both young students and elderly person as it improves the memory power and learning ability of the students while on the other hand it improves the brain plasticity of the person (Wilson, 2015). The two terms yoga and meditation are integrally correlated which leads to physical and mental wellness of a person hence, meditation is a forthwith part of yoga (Kusuma, 2016).

According to Jennings (2009), the yoga and meditation are major components of contemplation which helps a person to understand the working mechanism of their mind and the impact of their own thoughts and feelings on their behavior. Since, attention is the key feature of meditation, it may improve the cognizance of one's awareness and hence its regulation also. The regulation of cognition may reduce the inflow of thoughts which are not relevant to task at hand thus decreasing the mind wandering without awareness. The present study tests this hypothesis of correlation of metacognition, mind wandering and meditation.

This study was conducted on practitioners of Surat-Shabd-Yoga Meditation which is based on Oriental philosophy of Saints (Radhasoami Philosophy). It is practiced sequentially at three stages. The novice meditators (also called pre-initiates) are trained for practice of sound Ra-dha-soa-mi at four chakras- naval, heart, throat and eye-centre respectively. The intermediate meditators (first initiates) practice contemplation of form at eye centre after minimum of two years of practice as pre-initiates. The advanced meditators (second initiates) are further trained for sound practice at higher chakras after minimum 2 years of practice as first initiates.

Method

Participants

Sixty participants took part in the experiment. The participants were applicants of yoga and meditation program offered for twenty weeks. The protocols of the experiment were shared with the participants before the experiment and consent was sought from the participants to observe the protocols i.e. abstinence from alcohol and non-vegetarian food for duration of experiment. The protocols were based on the Oriental Philosophy of Saints (Radhasoami Philosophy) for practice of *Surat-Shabd-Yoga* Meditation. The applications were invited from three strata (i) pre-initiates (beginners) - those who were not trained for any meditational practices prior to experiment (ii) first initiates (intermediate meditators) - those who were trained for contemplation of divine form at sixth *chakra* (between two eyes) (iii) second initiates (advanced meditators) - those who were trained for sound practice along with the contemplation of form. Since the training of practice of *Surat-Shabd-Yoga* meditation begins from the age of 15 years,

the minimum age for first strata was fixed i.e. 15 years. The first 20 applicants in each group who gave their consent to participate in experiment were exposed to intervention. The control group included participants who voluntarily agreed to participate in the experiment. The age-range of the participants was 15 to 50 years. Thus the participants were divided into four groups of 20 each - 3 experimental groups and one control. The groups did not differ with respect to gender (11males and 9 females in each group).

Materials

The materials included: the Five Facet Mindfulness Questionnaire (FFMQ: Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), the *Metacognitive Awareness Inventory (MAI)*: Schraw and Dennison (1994) and the Mind-Wandering Questionnaire (MWQ) (Mrazek, 2013).

Five Facet Mindfulness Questionnaire (FFMQ: Baer et al., 2006): The 39-item FFMQ (Baer et al., 2006) was used to measure the self-report trait of mind-wandering. It comprises five related facets: observing, describing, acting with awareness, non-judging of inner experience and non-reactivity to inner experience. Only ‘acting with awareness (AWA)’ subscale was administered in the present study. Here, acting with awareness involves attending to one’s present moment activity, rather than being on “autopilot,” or behaving automatically, while attention is focused elsewhere (Gu, Strauss, Crane, Barnhofer, Karl, Cavanagh, & Kuyken, 2016). The participants responded on a Likert scale with a range from 1 (never or very rarely) to 5 (very often or always true). The scores were computed by summing the scores on the individual items. All the items are reverse-scored. FFMQ has moderate to high internal reliability, Cronbach’s $\alpha=75$ to 0.91(Baer et al., 2006).

Metacognitive Awareness Inventory (MAI) (Schraw and Dennison, 1994): The metacognitive awareness inventory (MAI) developed by Schraw and Dennison (1994) was used for the study. MAI instrument has 52 items and it assesses two components – knowledge of cognition and regulation of cognition. The responses were sought on five point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Baker and Cerro (2000) found that MAI has adequate internal consistency that supported the reliability of the knowledge scale ($\alpha = 0.88$) and regulation scale ($\alpha = 0.91$). The score was calculated by summing the rating of each item.

Mind-Wandering Questionnaire (MWQ) (Mrazek, 2013): Mind-wandering Questionnaire (MWQ) was used to measure the frequency of mind-wandering. Mrazek, Phillips, Franklin, Broadway & Schooler (2013) found that the trait levels of mind-wandering measured using MWQ were correlated with task-unrelated thought measured by thought sampling during a test of reading comprehension. The moderate inter-item correlation (0.540) was found for MWQ (Mrazek, et.al. 2013). MWQ is a self-report 5-item questionnaire. The responses were sought on 6-point Likert-type scale ranging from 1 (almost never) to 6 (almost always). The total MWQ score is the sum of the five items within a 5–30 range.

Procedure

The consent to participate in the experiment was obtained from the participants after sharing the protocols of the experiment. The practice sessions (one hour) were held on weekdays in the evening for three days a week. The yoga instructor had 10 years of experience of training on

yoga and the meditator having 30 years of practice of *Surat-Shabd-Yoga* guided participants for meditation at three stages. On each day, the intervention commenced with a brief 15 minutes lecture covering different topics to reinforce the participants for meditation. The topics covered include body, mind, nerve centres, *chakras*, *kamals*, *padmas* and meditation. This was followed by yoga for 15 minutes to prepare body for meditation. Seven yogasanas were included in the intervention programme for relaxation Siddhasan, Sarvangasan, Bhujangasan, Paschimottanasan, Padahastasan, Ardhamatsyendrasan and Shavasana. These asanas were selected for relaxation and preparation of body to meditate. After doing yoga, the practice of meditation was modeled on practices of oriental philosophy of Saints (Radhasoami Philosophy). These meditational practices are grounded on Hierarchical Order Theory of Consciousness (Satsangi, 2013).

Statistical Analysis

Mediation analysis technique was used and it was investigated whether the yoga and meditation training induces any difference in the metacognitive ability and mind wandering. To test the hypothesis, it is essential that metacognitive ability and mind wandering does not originate from differences in the first-order performance across sessions. For all effects the p values and partial eta-squared for F-value are reported.

Results & Discussion

The psychological states as measured through the three questionnaires were overall improved after the yoga and meditation training protocols. Results showed a significant effect of two sessions on the three questionnaires, Table 1 summarizes these results. The significant interaction between session and meditation group was found for FFMQ ($F(4, 24) = .47, p=0.03, \eta_p^2=.748$), MWQ ($F(4, 24) = .89, p=0.04, \eta_p^2=.704$) and MAI ($F(4, 24) = .38, p=.009, \eta_p^2=.959$). Regarding the MWQ the control group ($MWQ_{pre-test}=12.29$ vs. $MWQ_{post-test}=11.95$) has no significant decrease in mind wandering level while experimental group ($MWQ_{pre-test}=13.54$ vs. $MWQ_{post-test}=9.56$) presented a significant decrease in mind wandering level. Regarding the intervention, while the control group did not significantly differ from pre-test to post-test on the (MAI $_{pre-test}=210.58$ vs. MAI $_{post-test}=212$), the experimental group presented a significant increase (MAI $_{pre-test}=187$ vs. MAI $_{post-test}=211.7$), suggesting that the group that received training in yoga and meditation, not only had a greater reduction in mind wandering, but also a greater increase in the metacognition level.

The researcher hypothesized that mindfulness and metacognitive efficiency should increase when the individuals are trained to monitor their own thoughts. In addition, it was also hypothesized a reduction in mindfulness and metacognitive efficiency in the control group, or at least this should be less than that observed in the experimental group, given the specific attentional training in these yoga and meditation interventions. First, for each practitioner and session, the researcher calculated the mindfulness and metacognitive efficiency. Then yoga and meditation training program was organized for the experimental group. Results drawn from the questionnaires denoted that there is interaction between meditative groups and metacognitive efficiency along with mindfulness.

Table 1. Mind wandering and Metacognition scores over repeated measures

Measurement	Pre-test M (SE)		Post-test M (SE)		F	p	Partial eta squared
	Experimental	Control	Experimental	Control			
AAS-FFMQ	13.79 (1.05)	16.33	19.53 (1.053)	17.58	0.47	0.03	.748
MWQ	13.54 (.69)	12.29	9.56 (.69)	11.95	0.89	0.04	.704
MAI	187 (4.83)	210.58	211.7 (4.83)	212	0.38	0.009	.959

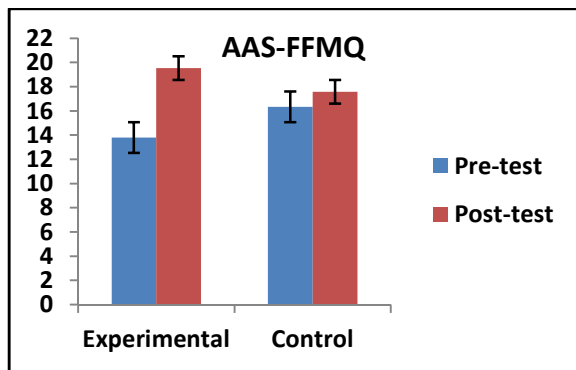


Figure A

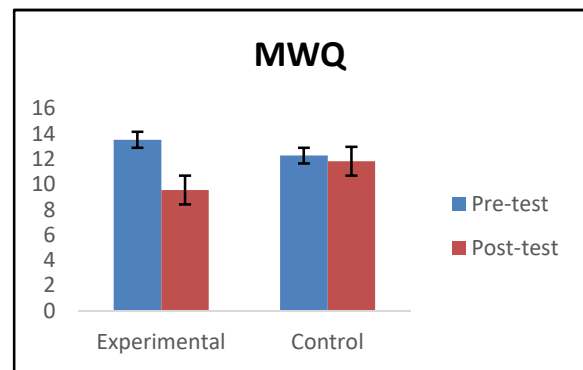


Figure B

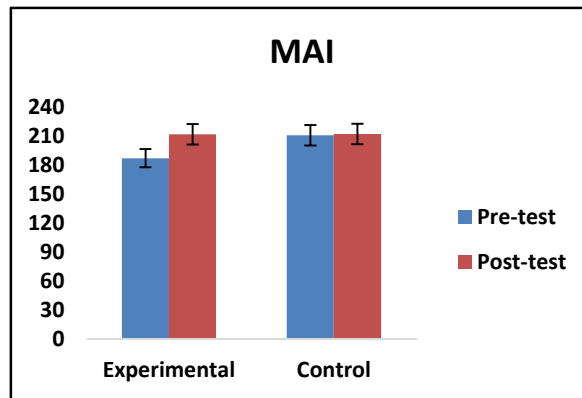


Figure C

Fig. A, B & C. A) Figure depicting Mean value of the scores in FFMQ questionnaire, B) Figure depicting Mean value of the scores in MWQ questionnaire, C) Figure depicting Mean value of the scores in MAI questionnaire.

Experiment 1

Effect of metacognition on mind-wandering without considering mediation

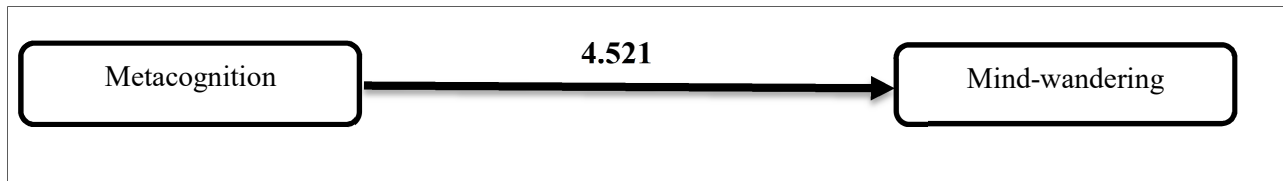


Fig. D. Figure depicting Effect of Metacognition on Mind-Wandering without considering Mediation

For serial mediation analysis, metacognition is considered as independent variable, mind-wandering as dependent variable and meditation as mediation factor. In the above experiment the effect of metacognition is seen on mind-wandering without considering the mediation factor. It was found that a person's thinking can lead him to wander up to 4.52% in any circumstances. Therefore, in the next experiment the mediating factor is considered.

Experiment 2

Effect of metacognition on mind-wandering including mediation

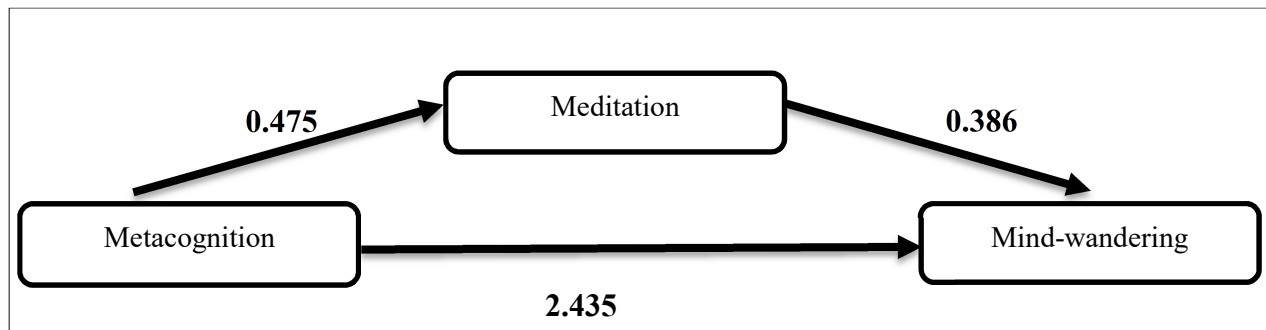


Fig. E. Figure depicting Effect of Metacognition on Mind-Wandering including Mediation

In the experiment 2, meditation is considered as the mediating factor. It was found that the effect of metacognition on mind-wandering by including the mediation factor, it has reduced the level of mind-wandering by 2.43%. That indicates, if one want to control his/her mind than it is useful for the person to do meditation as it not only helps us in controlling our mind but also helps us in concentration on a particular thing.

Conclusion

The aim in this study was to investigate whether metacognition and mind-wandering is a fixed capacity or whether it is malleable and subject to practice-based yoga and meditation. The researcher hypothesized that training of yoga and meditation will lead towards improved metacognition and reduced mind wandering. The results drawn confirm that the intervention achieved its objectives. It was found that the experimental group showed greater metacognitive

efficiency and reduced mind-wandering when compared to control group. The results show that *Surat-Shabd-Yoga* and meditation training had a specific impact on mindfulness and metacognition of the experimental group in comparison to the control group. The findings of the study corroborate the results of previous studies that report yoga and meditation promotes concentration and memory (Srinisha, Priya & Devi 2018). These techniques are found to be helpful in improving cognitive functions (Uthaman & Uthaman, 2017). The findings are progressive in the way that yoga and meditation helps an individual in improving their thinking pattern and also helps them in improving their concentration as a result of which they are able to regulate their cognition and limit the wandering mind. Although the further investigation is required separating out and comparing the effect of different forms of meditation on metacognition and mind wandering.

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Reference

- Ahuja, S. (2014). Effect of Yoga & Meditation on Consciousness & Mindfulness. *Journal of Consciousness Exploration & Research* 5 (5) pp. 434-447
- Baars B. J. (2010). Spontaneous repetitive thoughts can be adaptive: postscript on "mind wandering. *Psychol Bull.* 136(2):208-210. doi: 10.1037/a0018726.
- Baer R. A., Smith G. T., Hopkins J., Krietemeyer J., & Toney L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13, 27–45. 10.1177/1073191105283504
- Baker, L., & Cerro, L. C. (2000). Assessing metacognition in children and adults. In G. Schraw & J. C. Impara (Eds.), *Issues in the measurement of metacognition* (pp. 99- 146). Lincoln, NE: Buros Institute of Mental Measurements.
- Basavaraddi IV. *Yoga: Its Origin, History and Development*. Available at: <http://www.mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development>, 2015.
- Cahn, B.R., Goodman, M.S., Peterson, C.T., Maturi, R., & Mills P.J. (2017). Yoga, Meditation and Mind-Body Health: Increased BDNF, Cortisol Awakening Response, and Altered Inflammatory Marker Expression after a 3-Month Yoga and Meditation Retreat. *Frontiers in Human Neuroscience*. 2017; 11: 315. doi: 10.3389/fnhum.2017.00315
- Deng, Y. Q., Zhang, B., Zheng, X., Liu, Y. & Zhou, C. (2019). The role of mindfulness and self-control in the relationship between mind-wandering and metacognition. *Personality and Individual Differences* 141:51-56 DOI: 10.1016/j.paid.2018.12.020
- Fox, K. & Christoff, K. (2014). Metacognitive Facilitation of Spontaneous Thought Processes: When Metacognition Helps the Wandering Mind Find Its Way. In book: *The Cognitive Neuroscience of*

Metacognition Publisher: Springer Editors: S.M. Fleming & C.D. Frith. DOI: 10.1007/978-3-642-45190-4_12

- Gu, J., Strauss, C., Crane, C., Barnhofer, T., Karl, A., Cavanagh, K., & Kuyken, W. (2016). Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after mindfulness-based cognitive therapy for people with recurrent depression. *Psychological assessment, 28*(7), 791–802. doi:10.1037/pas0000263.
- Hölzel B.K., Carmody J., Vangel M., Congleton C., Yerramsetti S.M., Gard T. & Lazar S.W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research 191*(1):36-43. doi: 10.1016/j.psychresns.2010.08.006
- Killingsworth, M. A. & Gilbert, D. T. (2010). A Wandering Mind is an Unhappy Mind *Science 330*(6006):932 DOI: 10.1126/science.1192439
- Mason, M. F., Norton, M. I., Van Horn, J. D., Wegner, D. M., Grafton, S. T., & Macrae, C. N. (2007). Wandering minds: The default network and stimulus-independent thought. *Science, 315*(5810), 393–395. doi: 10.1126/science.1131295
- Mrazek, M. D., Phillips, D. T., Franklin, M. S., Broadway, J. M., & Schooler, J. W. (2013). Young and restless: validation of the Mind-Wandering Questionnaire (MWQ) reveals disruptive impact of mind-wandering for youth. *Frontiers in psychology, 4*, 560. doi:10.3389/fpsyg.2013.00560
- Oz, H. (2016). Metacognitive Awareness and Academic Motivation: A Cross Sectional Study in Teacher Education Context of Turkey *Procedia - Social and Behavioral Sciences 232* (2016) 109 – 121
- Satsangi, P. S. (2013). Cosmology from the Twin Vantage Points of Radhasoami Faith and Systems Science In P. Sriramamurti, P.Prashant &A. Mohan (Eds.) *Spiritual Consciousness pp.21 38*New Delhi, India: DK Agencies
- Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*(4), 460–475. <https://doi.org/10.1006/ceps.1994.1033>
- Smallwood, J., Nind, L. & Connor, R. (2009). When is your head at? An exploration of the factors associated with the temporal focus of mind-wandering. *Consciousness and Cognition 18*(1):118-25 DOI: 10.1016/j.concog.2008.11.004
- Srinisha, M., Priya, J. A., & Devi, G. (2018). Survey on effects of yoga on memory. *Drug Invention Today 10*(11)
- Stuckey, H. L. & Nobel, J. (2010). The Connection between Art, Healing, and Public Health: A Review of Current Literature. *Journal of Public Health 100*(2): 254–263. doi: 10.2105/AJPH.2008.156497
- Uthaman, S. & Uthaman, S. (2017). Impact of Yoga and Meditation on Cognitive Functions of Students. *Journal of Social Work Education and Practice 2*(2) 53-57