

Meditative and asynchronous music intervention boosts shooters' flow state and related domain: A pilot study

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Abstract:

The goal of the current pilot research is to explore the influence of meditation and asynchronous music on overall flow and its related characteristics on performing shooters. To fulfill the goal of the research, forty-five performing shooters (minimum two years of shooting experience) within the age range of 15-45 years from Chandigarh city and neighbouring areas were taken. The shooting players were split into three equal groups i.e. Control group (n=15), Yoga & Meditation group (n=15) and asynchronous music (n=15) group. The changes in the flow state and its related domains were noticed at pre level and after 3 months. The conclusion of the investigation indicated that no significant alterations were found in control group. In asynchronous music the statistically significant changes were seen on balance (p=0.013), Goals (p=0.036) and control (p=0.052) domains of flow states whereas in Yoga & Meditation group in Merging (p=0.001), Goals (p=0.051), Concentration (p=0.032), Autotelic (p=0.028) and overall flow (p=0.005).

Keywords: Yoga, Meditation, asynchronous music, Shooters and flow.

1. Introduction:

In the present context, the usages of numerous psychological therapies have grown profoundly in the sports sector. The sport is a highly competitive sector where the application of psychological therapies assists in minimising the numerous stress and anxiety circumstances pre, post and during tournaments. Meditation and Music are such activity may be increases the shooting performance by strongly acting with the psychological features. Meditation is a sort of practice, where the practitioner indulges in techniques such as mindfulness, or concentrating their energies on a single object, in order to train their mind, for developing attention and awareness, and to obtain a mental explicit and emotional serenity and balanced condition. Practicing meditation, helps strengthens coping capacity from anterior to posterior region of brain, to cope with stress stimuli, anxiety, sadness and antipathy emotions and consequently, promotes serenity, perception, introspection and wellbeing. Meditation is under research; helps identify its potential health (psychological, neurological, and cardiovascular) dimensions.

On the other hand, playing and listening to the music, while completing any physical activity or exercise is usual behaviour, for most of athletes and indulge participants. A substantial number of existential evidences have proved that, the music has the ability to cause a broad range of good impacts in the sports and the exercise sphere (1). The music with the rapid and slow speed may be utilised to maximise the degree of arousal, which is required for the best level of performance. Music has the capacity to captivate attention, improve the morale, stimulate emotions, aids in overcoming changes in mood, recall memories, increase result and work productivity, decrease diffidence and promote metronomic movements (1).

In psychological aspect, flow state portrays the ideal level, when the individual is hypo-focused, every moment comes together for the performance and the performer leads to the automatized stage of being inside one's zone. Flow is often associated to greatest level of performance and a really unique and enjoyable interaction. Flow is the mental state of operation, in which the individual is entirely engaged in what he or she is doing, by a sensation of energetic attention, full engagement, and achievement in the process of the activity (2). When the focus is switched on and off, and it becomes a barrier in getting into a flow, which leads in losing the full potential of an athlete, at the moment of performance. The top performance athletes, however, have perfected the art of concentration. They have learned to optimise their performance, with highest attention

level. This notably happens, when an athlete is entirely immersed in the sport and has the feeling of being a part of environment itself, with regard to time.

Yoga and meditation have resulted in providing health aiding impacts and equilibrium in emotions. Solberg et. al (3), proved that meditation elevates the performance level of shooters, after meditation, however, comparative effects of synchronous and asynchronous music intervention has never been analysed although the impacts of a various meditative methods and techniques, has been analysed in variety of sports, such as postural equilibrium, sleeping with specialised focus for calculating the heart rate variability etc. The 4 objects of thought and awareness while meditation are- the body, emotions, condition of the mind and the mind's content. Body placement, while meditation has practical and historic foundations. It brings in the connection of mind, body and senses all together, so that harmony and awareness may be reached (3). In shooting, good psychological conditioning, alongside technical proficiency is extremely necessary. Implementation of meditation for shooting, leads to reimbursement, via sub-conscious postural contraption, based on proprioceptive and vestibular knowledge, such as reduction in an elevation of pre-shot shooting a static activity, that require a stern control of bodily segments and posture, to organise the rear and the foresight interstice, through proprioceptive feedback and gaze fixation on the target directly or between, required intense mental concentration and movement accuracy for achievement.

There are number of researches that have investigated both psychological and physiological elements related with shooting performance, which are known. Whereas, Asynchronous music employed, when there is no conscious or sub-conscious coordination between music pace and motions. With the asynchronous music applications, tempo is surmised, to be the most essential determinant of reaction to music (4-5) and desire for varieties of tempi may certainly be affected by the physiological arousal, of the listener and the context in which the music is being listened (6). Thus, this shows that, there may be a higher propensity, for rapid tempo music at the time of physical activity, while other investigations have indicated that, slower tempi may boost physiological capacities and thus, expand exercise performance (7). In the current research authors wanted to evaluate the influence of asynchronous music and meditation upon overall flow states and its related domains in shooters.

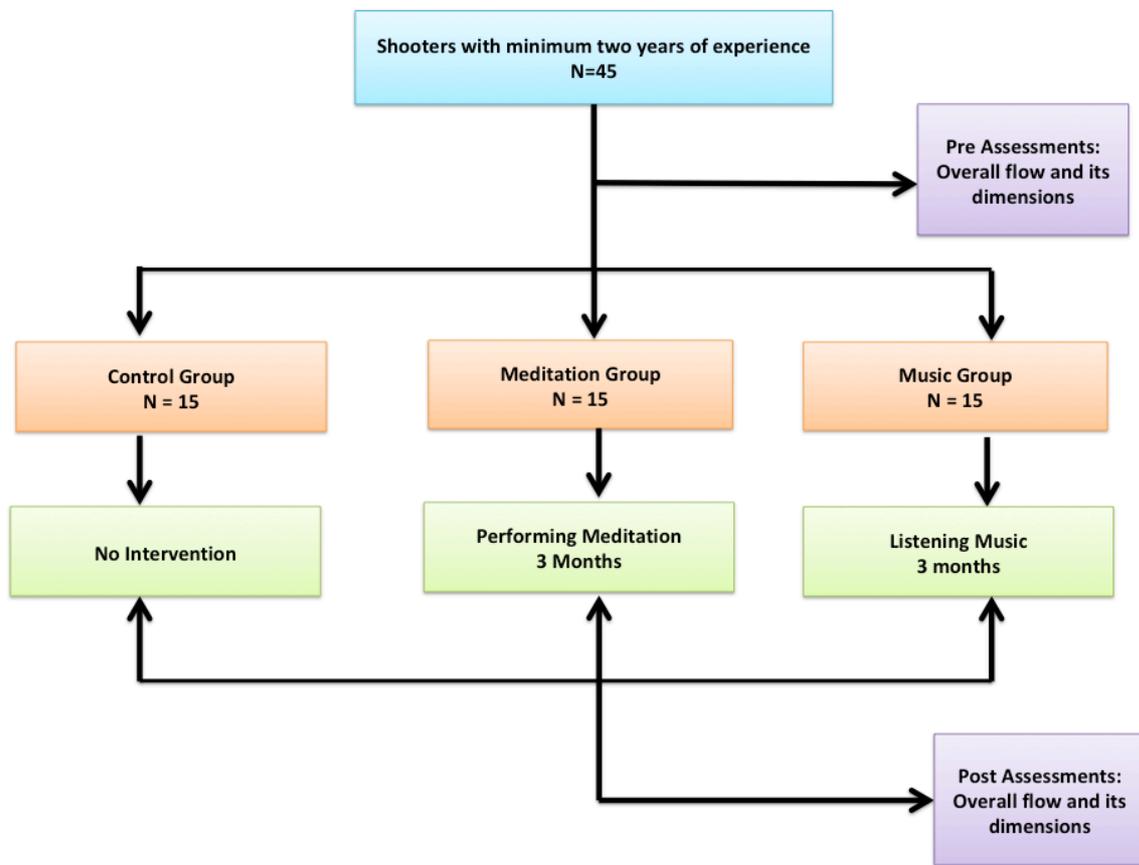
Method & Procedure:

2.1 Study Design:

An experimental design would be implemented, to evaluate the effects of asynchronous music and meditation exert upon flow states, for this purpose, one group, with N=15, would be subjected to Asynchronous music for a period of 8-12 weeks and another group, with N=15, would be subjected to participate in cyclic meditation, for the period of 12 weeks and the third group, with N=15, would be controlled. The complete flow chart of research design is illustrated in Figure 1.

2.2 Selection of subjects:

To serve the purpose, forty five shooters were recruited with the age range between 15-40 years, who are engaged in regular training, at different centres of shooting, in and around the geographical area of Chandigarh city, with minimum of two years of competitive experience in shooting and have at least represented their states, at national level tournaments. The purposive sample approach was utilised for selection criteria; age and sex are matched to those of the controls.

Figure 1: Flow chart of Study design.

2.3 Interventions:

2.3.1 Selection of Asynchronous Music

Each subject would be escorted to a separate room where the music would be playing at the same time and given the opportunity to choose a track that they found pleasing. Only when the person is certain that he or she will experience flow while listening to the preferred music will the decision be declared settled. It's important to note that all participants agree that peak performance would be characterized by the presence of flow's features and characteristics. After making their music choices, they would listen to that music as they practiced.

2.3.2 Yogic Meditation

In this course, we will use the following yogic meditation practices. In the first few weeks, the whole procedure takes around 30 minutes, but towards the end of the process, it may take up to an hour. Participants have been instructed to practice in the morning or evening following a shooting training session, and to wear relaxed clothing. Participants have been given directions such as "Sit straight; maintain the neck and head totally

straight" prior to the beginning of the session. Maintaining a steady stance and a straight spine is essential. This seven-part pranayama set to be practiced every other day, according to the schedule provided in the supplementary data.

2.4: Measures:

The Flow State Scale (FSS) has been used to assess the extent to which an individual is immersed in a state of flow (8). The nine aspects of flow are represented quantitatively over the instrument's 36 items. In order to quantify flow characteristics, a questionnaire was devised. During a competition, the subject's FSS scores would be used to pinpoint the level of immersion they are experiencing. The whole detailed procedure for administering the test on the subjects was given in supplementary data.

2.5 Statistical Procedure:

The collected information has been tallied and examined in light of the study's original aims. Kolmogorov-test Smirnov's would be used to check the data for normality. In order to determine the efficacy of treatments, a paired sample t-test was used to examine the significance of the change in score between the pre- and post-tests. All disclosed hypotheses would be evaluated at the 5% level of significance.

Table 1 shows the pre-post test mean comparison in the Control group for the chosen variable (Flow state and its related domains) in terms of mean, standard deviation, mean difference, and t-values with associated probability values.

Control group									
Parameters	Mean		S.D		Mean diff	95% CI of difference		t	P-value
	Pre	Post	Pre	Post		Lower	Upper		
Balance	15.73	15.73	2.154	1.907	0.00	-0.63	0.63	0.00	1.000
Merging	13.40	13.07	2.444	2.520	-0.33	-2.29	1.63	-0.36	0.721
Goals	17.80	17.13	1.781	1.995	-0.67	-1.81	0.47	-1.25	0.230
Feedback	16.73	16.60	2.631	2.028	-0.13	-1.57	1.30	-0.20	0.845
Concentration	15.40	15.33	1.805	1.952	-0.07	-1.16	1.03	-0.13	0.898
Control	15.40	16.27	2.131	2.314	0.87	-0.16	1.89	1.82	0.091
Consciousness	14.13	13.27	3.204	3.105	-0.87	-2.91	1.17	-0.91	0.377
Time	13.53	13.40	1.598	2.586	-0.13	-1.67	1.40	-0.19	0.855
Autotelic	17.60	17.33	1.765	1.915	-0.27	-1.03	0.50	-0.74	0.469
Overall flow	138.92	139.9	13.118	13.208	1.00	-5.03	7.03	0.36	0.722

Data is expressed in mean, SD, mean difference and statistical significance, SD= Standard Deviation, CI- Confidence Interval.

Table 2: Pre-Post test mean comparison in Music group on selected variable i.e. Flow state and its associated domains in mean, SD, mean difference, and t- value with p-values.

Music group									
Parameters	Mean		S.D		Mean diff	95% CI of Difference		t	P-Value
	Pre	Post	Pre	Post		Lower	Upper		
Balance	14.64	15.57	1.336	1.910	0.93	0.23	1.63	2.88	0.013
Merging	13.64	14.00	1.823	2.253	0.36	-1.07	1.78	0.54	0.597
Goals	17.21	15.86	1.929	2.656	-1.36	-2.61	-0.10	-2.34	0.036
Feedback	15.00	16.43	3.464	2.102	1.43	-0.82	3.68	1.37	0.193
Concentration	15.50	14.86	2.739	2.107	-0.64	-2.12	0.84	-0.94	0.365
Control	14.79	15.93	1.672	1.592	1.14	-0.01	2.29	2.14	0.052
Consciousness	15.79	15.21	2.517	3.332	-0.57	-2.44	1.29	-0.66	0.519
Time	14.00	14.43	1.468	2.738	0.43	-1.03	1.89	0.63	0.538
Autotelic	16.57	16.36	2.065	2.274	-0.21	-1.26	0.83	-0.44	0.664
Overall flow	137.14	138.64	10.332	14.329	1.50	-4.47	7.47	0.54	0.596

Data is expressed in mean, SD, mean difference and statistical significance ($p=0.013$, $p=0.036$, $p=0.052$), SD= Standard Deviation, CI- Confidence Interval.

Table 3: Pre-Post test mean comparison in Meditation group on selected variable i.e. Flow state and its associated domains in mean, SD, mean difference, and t- value with p-values.

Yoga group									
Parameters	Mean		S.D		Mean diff	95% CI of Difference		t	P-Value
	Pre	Post	Pre	Post		Lower	Upper		
Balance	13.94	15.18	1.713	1.912	1.24	-0.04	2.51	2.05	0.057
Merging	11.41	13.47	1.938	1.736	2.06	0.99	3.13	4.09	0.001
Goals	16.06	17.29	1.784	2.085	1.24	0.00	2.48	2.11	0.051
Feedback	15.24	16.29	2.513	2.054	1.06	-0.08	2.20	1.97	0.067
Concentration	13.41	14.59	1.372	1.839	1.18	0.11	2.24	2.34	0.032
Control	13.88	14.94	1.799	2.221	1.06	-0.07	2.19	1.99	0.064
Consciousness	12.94	14.18	1.819	3.377	1.24	-0.62	3.09	1.41	0.178
Time	12.24	12.71	2.463	3.216	.47	-1.69	2.63	0.46	0.650

Autotelic	15.12	16.88	1.495	2.088	1.76	0.22	3.31	2.42	0.028
Overall flow	124.44	135.06	7.924	12.146	10.63	3.82	17.43	3.33	0.005

Data is expressed in mean, SD, mean difference and statistical significance

($p=0.001, p=0.051, p=0.032, p=0.028, p=0.005$), SD= Standard Deviation, CI- Confidence Interval.

In **Table 1**, we can see that when comparing the pre- and post-test levels of the control group across all parameters of flow, there was no statistically significant difference. In addition, **Table 2** shows that the musical group had changes in most of the flow state dimensions; specifically, the dimensions of equilibrium ($p=0.013, t=2.88$), goals ($p=0.036, t=2.34$), and regulation ($p=0.052, t=2.14$). However, the results showed that the other dimensions were not significant. In Table 3, we can see a comparison of the pre- and post-yoga-meditation group on overall flow state and its related domains. The statistically significant improvements were seen in the yoga & meditation group in Merging ($p=0.001, t=4.09$), Goals ($p=0.051, t=2.11$), Concentration ($p=0.032, t=2.34$), Autotelic ($p=0.028, t=2.42$) and overall flow ($p=0.005, t=3.33$) state. Interestingly, the mean improvements was also observed in Balance, Feedback, Control, Consciousness and time but not at significant level.

4. Discussion:

Countless studies have looked at both the mental and physical components of shooting ability. The practise of yoga and meditation has been shown to have positive effects on physical health and mental equilibrium. Although the effects of various meditative methods and techniques have been studied in numerous sports, including postural equilibrium, sleeping with a specialised focus for calculating heart rate variability, etc., The practise of meditative body placement stems from both modern science and ancient practise. Harmony and enlightenment are attained via the integration of thought, feeling, and perception. As a result, playing music to shooters during practise and competition may be a useful intervention technique for improving their visuo-motor coordination, motor persistence, sustained attention, and reaction speed. Music's unique influence on the brain is due to the fact that it causes the production of brain waves similar to those seen during deep meditation. With their brains in a more relaxed and calm condition, shooters are better able to coordinate their movements and aim more accurately thanks

to the positive effects of music. Listening to music while shooting improves focus and accuracy. It calms down almost every brain function to their most fundamental states, and it only aids in peaking out one region of attention and focus that originates in the dorso-lateral prefrontal cortex and is responsible for optimal performance. This zone aids shooters in executing their shots with heightened focus and concentration by calming down any undue agitation in the brain (9-10).

Those who experience flow report feeling a profound sense of fulfilment thereafter. Any activity, from a simple game of tossing and catching to a sophisticated and perilous gymnastics routine, might be considered to be in a state of flow. Csikszentmihalyi (1975) describes two different types of flow experiences: micro flow and macro flow. In a state of flow, an artist is immersed in a sea of good emotions and loses all sense of time or space, as well as any fear of failure or criticism (11,2). When an athlete is in a state of flow, they are able to perform at their peak level (12-13). None of the aspects of shooters' flow state improved significantly during the before and post-test periods of our research (Pre & Post of control group on various flow dimensions). Changes in most of the flow state characteristics (balance, Goals, and control) were statistically significant, hence it was also established that the 12-week asynchronous music intervention had an effect on the pre- and post-scores of the music group on a variety of neuropsychological variables. The remaining dimensions, however, were determined to be insignificant. Results from a study comparing the pre- and post-intervention states of a yoga meditation group on many neuropsychological variables showed that the intervention had a significant effect on several characteristics of the flow state, including (Balance), At the .01 level of significance, the following variables (Merging, Goals Autotelic, and Overall Flow) .

Colzato et al. found that regular meditators report higher states of flow and lower levels of fear and pessimism, both of which contribute to peak performance. They arrived to the conclusion that a theoretically guided selection approach of the most appropriate techniques that are sport specific is necessary for a meditation-based intervention to effectively boost athletic performance (14). The results of the current research are consistent with those of an earlier studies (15,10). Karageorghis, et al. who looked at how listening to asynchronous (background) music influences players' states of flow and their ability to shoot goals in a game of netball (16). The players' flow state and

subjective experience were assessed using the Flow State Scale FFS-2 (Jackson & Marsh, 1996) (8) and the Practical Assessment Questionnaire after the experiment concluded. The duration of the pre-intervention baseline was lengthened and an asynchronous music intervention was administered to the subjects. Two of the participants reported an increase in their impression of flow, while the other three improved their netball shooting performance, as found by the study by Karageorghis et al (17). Furthermore, it was assessed that the interventions with self-selected music and images may result in improvement of performance level by instilling emotional and cognitive notions associated to flow. This research sheds light on how contemplative and asynchronous music affects shooters' flow state. The flow condition and its dimensions showed no significant changes in control group. Improvements in flow states may be seen after both meditative and musical treatments. A smaller sample size is one of the limitations of the current study; findings from this study might be confirmed by future research with a bigger sample size. Based on the results of the current research, it is recommended that shooters include periods of meditation and music listening as part of their regular training regimen in order to improve their performance.

5. Conclusion:

This preliminary research indicates that a shooter's flow state and its related dimensions may be positively affected by listening to music that is either contemplative or asynchronous. It's possible that the calming effects of meditative and asynchronous music sessions had a good role on the overall performance of the shooters.

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