LITERATURE REVIEW

Background:
Educators, researchers, and health care providers working with children have long been interested in understanding what causes children with average intelligence to suffer from academic underachievement, particularly when these academic difficulties are not the result of physical, social and environmental factors. Behavioural problems in children including mood disorders, emotional distress, peer pressures and adjustment problems are all said to contribute towards academic underachievement. For example emotional distress, disrupted cognitive functioning, and deterioration in academic performance have all been theorized to be possible results of depressive moods. Specific clinical features of depression such as reduced attention span, lethargy, poor concentration and memory, as well as abridged task perseverance are all factors that have emerged as obstacles to effective learning. Furthermore, poor academic performance has been associated with an increase in adolescents. The stress to perform and its accompanying physiological and behavioural stress response can result in mood swings, emotional distress, loss of sleep and cognitive impairment. Poor classroom performance is consistently demonstrated in children with depressive symptoms when no other intervening learning disability is present [2]. Negative correlation between severity of depressive symptoms and intelligence scores, particularly by adolescence, have also been reported [3,4]. Similarly, a weaker performance on a variety of measures assessing cognitive functioning has been observed in cohorts of children with
symptoms of depression including visual spatial perception [4] and problemsolving tasks [5] as well as various aspects of memory such as verbal memory [6] and list learning tasks [7,8], working memory [9], short-term memory processing and immediate recall [6,10], and metamemory [8]. Likewise, slowed cognitive response time [11], decreased motor speed [2,9,12], and poor coordination [4,13] have been reported. These children have also exhibited a weaker performance on academic achievement measures including mathematics and knowledge clusters [14] and reading abilities [15]. In addition, behavioral manifestations of depression including attention difficulties [4,16-19].

It has been reported that student fatigue also markedly increases from elementary school to junior high school [20]. Identifying fatigue-related factors is thus important for preventing increased levels of fatigue during this transition period. Executive function is defined as a set of cognitive control processes that permit goal-directed behavior and that develop dramatically between childhood and adolescence [21]. In studies on the development of executive function, for example, age-related gain has been reported in working memory [22,23], inhibitory control [24,10], task switching [11], control of attention [25], adaptive problem solving [26], and various other planning and problem-solving tasks [27]. An earlier study has shown improvement in executive functions in adolescent children during their transition from childhood to adolescence [28].
The development of executive function is observed in association with structural changes in the brain. Morphological analyses in children and adolescents have shown that brain maturation occurs at different rates in different brain regions: the primary sensory and motor areas are the first to complete development, while the association areas, especially in the frontal and parietal regions, are the last to mature [29,30]. Maturation of the frontal and parietal regions is of great importance for adequate processing of executive function. Executive function is also related to control of attention [31], an important element of information processing that is embodied in the central executive component in theoretical conceptions of working memory [32]. Attentional competency develops steadily through early and late childhood, perhaps due in part to the development of core processing resources [33,34]. In the literature on normal cognitive development, there are two general hypotheses: that as children grow older, they have more resources [35], or that they are able to utilize their existing resources more efficiently [36]. With more resources or increasing control over resources, children become able to pay attention to more stimuli, allocate their attention more efficiently in accordance with task demands, and generally use and benefit from more sophisticated strategies in complex activities such as dual tasks [37]. Studies have also shown yoga to improve attention, memory and physical performance in socially disadvantaged children when compared to dance [38, 39]. Studies have also shown that yoga practices that involve asanas, breathing and meditation
improve spatial memory scores and shown improvement in letter cancellation task and aerobic capacity. However these finding have limitations as they are from a small cohort of population and different approaches have been used in different studies [38-41]. Even studies with exercise training have shown improvement in cognitive performance in children [42].

In this study we will evaluate the effects of three months of yoga vs. exercise in adolescent school children studying in higher primary and high school in rural districts of Karnataka on executive functions and physical performance.


39. Naveen KV, Nagarathna R, Nagendra HR, Telles S, Yoga breathing through a particular nostril increases spatial memory scores without


