



Stress and Yoga in Children

Francine C Jellesma*

Research Institute Child Development and Education, University of Amsterdam, Netherlands

Abstract

Many children experience stress-related physical symptoms, such as fatigue, headache or abdominal complaints. This paper deals with the physical consequences of psychological stress and the possibility of reducing stress by yoga in childhood. The literature on this topic is presented. It is concluded that the usefulness of yoga is theoretically supported. Some empirical support is also listed, but available research on this topic is still limited. The need for studies that take social and cultural factors into consideration is stressed.

Keywords: Stress; Physical; Somatic; Yoga; Children; Adolescents

Introduction

Children suffer from stress, just like adults. Yet, their psychological response to stress depends on their developmental stage. Young children mainly seek support from adults or use distraction whereas older children can try to put things into perspective or search for solutions when there is a problem [1]. In all developmental stages however, there are inter-individual differences between children in how they respond to negative events: some children find adaptive ways of coping whereas others fail to reduce their stress or even worsen it (for example by worrying). For some children, coping with stress proves to be such a difficulty that physical symptoms arise. For example, up to twenty-five percent of the children regular experiences symptoms of fatigue, headache or abdominal complaints [2]. How can these physical consequences of psychological stress be explained and reduced?

Responses of the Brain and the Body to Stress

The brain adapts in response to events. The amygdala is essential in detecting stress as well as in stress-related memory processes and it is central to manifesting stress-related behavior [3]. These functions are achieved partly by affecting changes in hippocampal functioning. The hippocampus is required for the formation of stable, explicit memory. It is also involved in the so called 'hypothalamus-pituitary-adrenal' (HPA) axis activation by the secretion of ACTH from the anterior pituitary, which, in turn, stimulates the secretion by the adrenal cortex of glucocorticoid hormones, (mainly cortisol). This axis has a looping system: inhibitory glucocorticoid feedback on the ACTH secretory response acts to limit the duration of the total tissue exposure to glucocorticoids [4]. Glucocorticoids are the final effectors of the HPA axis and participate in the control of whole body homeostasis and the organism's response to stress. The hypothalamus also activates the adrenal medulla (a somewhat more immediate, short response), which is part of the autonomic nervous system. This path is referred to as the 'sympathomedullary pathway' that primarily works through adrenaline. Together, these neurological responses serve to prepare a person for the so called 'flight or fight response', or in other words: help activate the body for a reaction to what evokes the stress [5].

In response to these neurological mechanisms, the cardiovascular system, metabolic machinery, and immune system all show functional changes in response to stress to make this fight or flight response. In time the body usually returns to a calmer state [6,7]. Sometimes, however, for some people, problems arise because of chronic activity or inactivity of the central nervous system, metabolic, cardiovascular and/or immune system [6,7]. This is especially likely to happen when stress

is prolonged, for example, because a person worries and frequently anticipates negative events and/or ruminates. In the short term, physical symptoms arise and in the long term, the risk of serious medical conditions is increased. For example, it has been found that people with personality type D (a joint tendency toward negative affectivity and social inhibition) are at an increased risk for cardiac events [8].

Stress and Physical Symptoms in Childhood

When we return to the consequences of stress for children, they seem of smaller impact. Still, in one study, we showed that the characteristics of personality type D in middle childhood are already associated with a higher frequency of physical symptoms [9]. In addition, stress can trigger symptoms in children with existing, chronic conditions, such as asthma [10]. This indicates that there may be precursors for more serious medical problems later in life and in the short run children may miss school or developmentally important social interactions with peers. It therefore seems worthwhile to reduce the stress that children experience.

Yoga might help achieve this. It is suggested that yoga improves attention and emotional control [11] as well as affects the nervous system, making the parasympathetic nervous system more dominant and stabilizing the autonomic nervous system to enhance resistance to the effects of stress [12]. Research in adults shows individuals who practice yoga indeed become more resilient to stress and have a decreased risk for various diseases, such as cardiorespiratory diseases [12]. The research on the effects of yoga for children with respect to stress-associated physical symptoms is limited in quantity and quality [13]. Further, a lot of research focused on yoga-effects in childhood has been carried out in India [14]. For example, in support of the assumed balance towards the parasympathetic nervous system, it was found that yoga improved respiratory capacity in adolescents [15], decreased heart rate as well as respiratory rate in adolescent girls living in community homes [16], and decreased respiratory rate in adolescents with vision impairment [17].

*Corresponding author: Jellesma FC, Research Institute Child Development and Education, University of Amsterdam, Nieuwe Prinsengracht 130, 1018 VZ Amsterdam, Netherlands, Tel: +31205251529; E-mail: F.C.Jellesma@uva.nl

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The results of these studies have to be replicated in western countries in order to rule out the possibility that the cultural mindset is important. Moreover, yoga practiced in western countries might deviate from the way it is practiced in India. Nevertheless, the results of established research are promising. For example, one Canadian study showed that yoga has beneficial effects for adolescents with irritable bowel syndrome [18]. In this study, 20 girls and 8 boys who received four weeks of video-instructed yoga (after one instruction session) reported lower levels of functional disability, fewer emotion-focused avoidance pain coping strategies, and less anxiety compared to a waiting list control group. Similarly, in a Dutch study among 8 to 18 year-old children ($N=20$) with irritable bowel syndrome or functional abdominal pain, pain intensity and frequency were reduced after ten yoga sessions compared to baseline [19]. In addition, Dutch primary school (aged 8-13) children reported reduced levels of stress and fewer somatic complaints (e.g., headaches, abdominal pain, fatigue) during a period in which they received a yoga program that was given instead of gymnastics or art for five weeks ($n=30$) compared to a control group [20]. In a German study among 11-12 year-old children with test anxiety ($n=21$ experimental, $n=27$ control group) children reported fewer physical complaints symptoms after a training with 15 yoga sessions and less stress during the yoga sessions as indicated by their subjective reports as well as electro dermal activity – although the training did not solve their test anxiety [21]. Yet, in a study among 6th grade students in New York, a 15-week yoga program did not provide significant differences in stress reactivity in response to a behavioral stressor task ($n=15$) as measured by blood pressure and heart rate compared to a physical education class ($n=15$) [22].

One problem that potentially limits the amount of implication and research with respect to yoga is that it has a philosophical and even spiritual background. Clinical experience learns that some people find this appealing, but others think it is too mysterious or magical. These thoughts lead to ambivalence about yoga [23]. This also might be a reason why researchers outside India sometimes find fewer or no results. After all, for youngsters yoga can be an unpopular activity. Indeed, in the study of Hagins and colleagues, it was noted that children in the experimental group regretted not being in the control group who played various games that are typically positively valued in the States, such as basketball [22]. A qualitative study in the USA (Western Massachusetts) further showed that especially for boys, the social norms can pressure youngsters to dislike yoga [24]. In other words: for some (sub) cultures yoga may have a negative connotation.

With respect to practice, the introduction of yoga programs should probably be taken into careful consideration. One solution for the potential negative status of yoga with respect to research might be to focus more on the elements of yoga, for example, what are the exclusive effects of posture, breathing and focus of attention [25] and how important is the combination of these elements for an optimal effect? For each of the elements, there is already groundwork of scientific explanation. For example: temporarily taking an upright position seems to help stop a process of perseverative cognition at night. This suggests that posture affects the cognitive processing of emotion. Without speculating about the presence or absence of spiritual explanations, research is essential for further information about these explanations and the effectiveness of yoga in reducing stress related physical symptoms in children. Given the above stated findings, it seems essential that future studies take into account gender and cultural effects.

Conclusion

In conclusion, there is an association between stress and physical symptoms in children and theoretically yoga could be an effective intervention. Even though the available literature mainly supports this assumption, evidence is still very limited and future research is necessary before we can make more definite conclusions.

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