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## Paper I: Stress in adolescents

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### Abstract

It is well known that adolescents experience stress. In this article, sources of adolescent stress will be discussed as well as the physiological effects of stress on the body. Stress disorders will also be briefly reviewed. Mainly, research on stress management strategies that have been evaluated in adolescents will be presented. Many studies have a small number of participants and lack control groups. Therefore, there is a need for ongoing research in this important area.

### Methodology

This discussion paper is intended to highlight stress and stressors in children and adolescents, and to discuss a number of appropriate coping strategies. The discussion in this paper draws upon selected online resources and published articles. In this context, this article is not intended to be a literature review of stress in adolescent and the interested reader is referred to (Birmaher, et al., 1996; Gu, et al., 2015; Pfefferbaum, 1997; Roberts, et al.) for aspects of childhood and adolescents stress including intervention techniques.

The references for this article were compiled using a variety of on-line resources. Resources included PubMed, PubMed MESH searches, Google, and Google Scholar. Initially, the search phrase "stress management strategies and adolescents" was used. When that yielded few pertinent articles on PubMed, a MESH search was completed using the words "stress management" and "adolescents" as well as "teens" and "teenagers." In order to find as many relevant articles as possible, and also to utilize resources that a typical adolescent or parent could find easily, Google and Google Scholar were searched. A variety of terms that included "stress," "stress management techniques," "stress management strategies," "stress relief," "teens," "teenagers," and "adolescents" were used. Finally, as a number of stress management strategies are also considered part of complementary and alternative medicine (CAM), the term "CAM and stress management" was also searched.

### Stressors during Adolescence

All adolescents experience stressors. Adults may experience stress related to financial strain, marital relationships, meeting career goals, or finding a job. Adolescents also experience stress from similar stressors as well as from a variety of other sources. The stress adolescents experience may come from parents, friends, peers, within themselves, their school, their local community, or even from the global community. Specifically, home stressors may include watching parents argue, separation or divorce of parents, financial problems, unsafe living environment or neighborhood, chronic illness or severe problems in the family (American Academy of Child and Adolescent Psychiatry, 2005). Stressors from within the adolescent may include negative thoughts and feelings about themselves, feeling

guilty, dealing with sexual feelings, worry about how their body is changing, figuring out how to be independent, and thinking about the future (American Academy of Child and Adolescent Psychiatry, 2005; American Academy of Pediatrics, 2014). Stress from peers may include being pressured to do something that they know is bad for them (i.e., drugs, smoking, or having sex), being bullied, arguments with friends or peers, and initiating or ending romantic relationships. Stress from school may include a diagnosed or undiagnosed learning disability or ADHD, moving or changing schools, feeling unsafe at school, feeling pressure to get good grades, or worrying about not being good enough at sports or another extracurricular activity. Taking on too many activities or having too high of expectations may also contribute to a young person's stress level (American Academy of Child and Adolescent Psychiatry, 2005; American Academy of Pediatrics, 2014).

### **Physiologic stress response**

Stress can be defined as the body's physiologic response to "tough" situations. Changes in the body during a time of stress initially help us cope with the situation at hand. We become more focused, our strength improves, we have greater stamina, and we gain a heightened alertness (TeensHealth.org, 2010). The body's stress response is also called the "fight or flight response." Physiologically, the body's stress response is due to an activation of the nervous system and certain hormones. The hypothalamus signals the adrenal glands to produce more adrenaline and cortisol. When these hormones are released into the blood stream; the body's heart rate, breathing rate, blood pressure, and metabolism increase (TeensHealth.org, 2010). As a result, blood vessels dilate to improve blood flow to large muscles, thus the increase in strength and stamina. Our pupils dilate and our vision improves. The liver releases stored glucose which increases the energy available to our body. Sweat is produced to cool the body. All of these changes occur with the goal of helping the body and mind endure the stressful situation.

Interestingly, animal and human studies have shown that during early childhood and old age the brain is particularly sensitive to stress (Lupien, et al., 2009). In addition, studies in human adolescents suggest that adolescence is associated with heightened basal (base-line) and stress-induced activity of the hypothalamic-pituitary-adrenal axis (Gunnar, et al., 2009). The adolescent brain may be especially sensitive to elevated levels of glucocorticoids, and therefore also to stress (as glucocorticoids are elevated as part of the stress response). In other words, adolescents may be at increased susceptibility to stress. Often, periods of heightened stress precede the first episodes of psychopathological, often stress-induced disorders such as anxiety and depression. Adolescence is often the time when symptoms of these disorders first appear (Lupien, et al., 2009).

As mentioned previously, the body's stress response is useful at a moment of acute onset of stress. However, when the stress response overreacts or fails to turn off properly, the result can have a negative impact on a person's health (TeensHealth.org, 2010). Chronic or intense stressors may result in "stress overload." Signs of stress overload include: anxiety, panic attacks, a feeling of being constantly pressured and hurried, irritability and moodiness. Physical symptoms may occur such as abdominal pain, headaches, or chest pain (Dorn, et al., 2003; TeensHealth.org, 2010). Allergic reactions such as eczema, allergies, and asthma also tend to worsen during times of stress. A person may experience difficulty sleeping or seem sad or depressed. The person may turn to drinking too much alcohol, smoking, binge eating, or doing other drugs (TeensHealth.org, 2010). Also, of note, exposure to stressful life events and chronic stress, as well as how the stress is responded to and coped with, has been found to be an important predictor of the development of depressive symptoms (Compas, et al., 2004).

## Stress Disorders

Acute stress disorder, post-traumatic stress syndrome, and anxiety disorders may manifest as feeling “stressed” but the symptoms are more extreme. These disorders are diagnosed according to the Diagnostic and Statistical Manual (DSM) 5 and are best managed by a professional medical and/or mental health provider. Acute stress disorder is an acute stress reaction that may occur in the initial month after a person is exposed to a traumatic event. Someone with acute stress disorder usually has severe levels of re-experiencing the trauma and anxiety in response to reminders of the trauma. If symptoms of acute stress disorder continue to persist beyond four weeks, the disorder may be labeled as posttraumatic stress disorder. Anxiety disorders are another strong reaction to stress. People with anxiety disorders frequently feel tense, upset, worried, stressed, or anxious. Current research suggests that people with these disorders may benefit from the stress management strategies. In paper II we will discuss stress management strategies for adolescents.

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