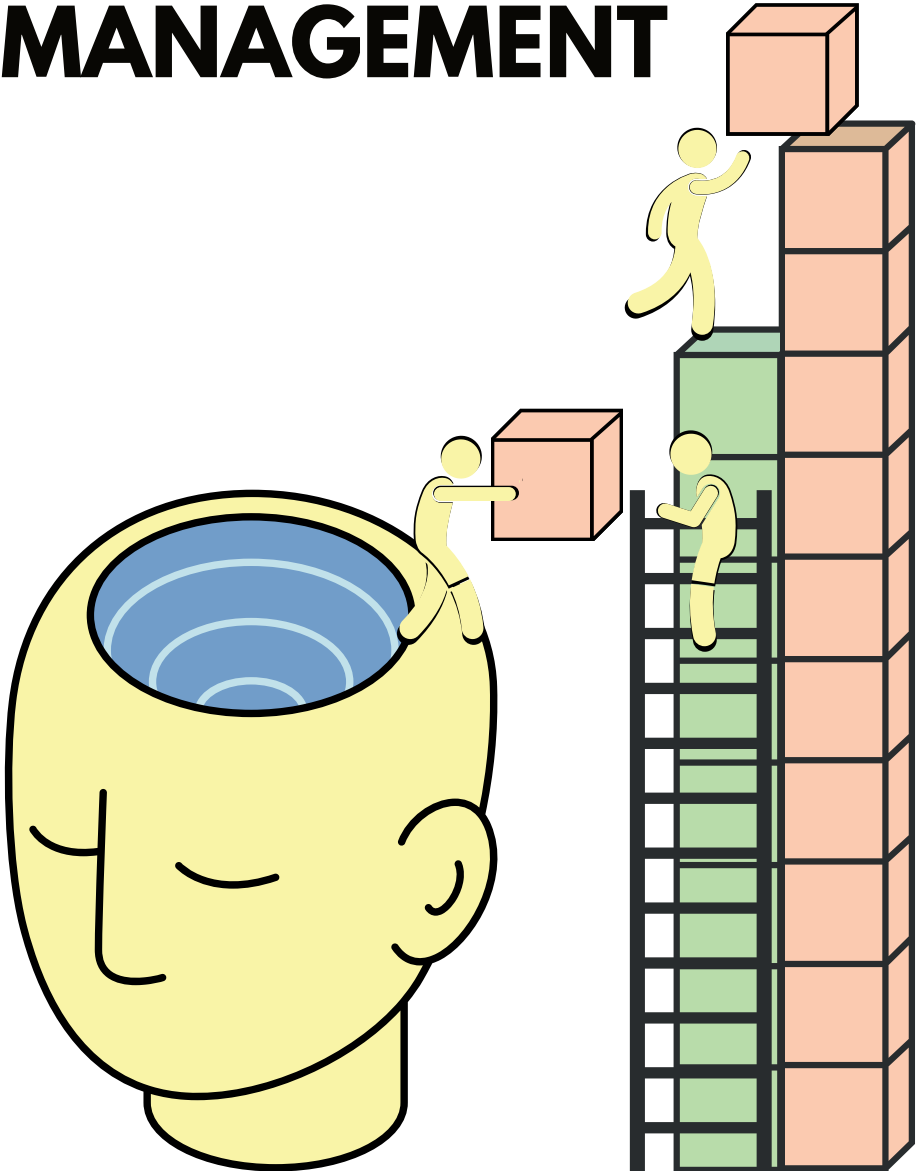


STRESS MANAGEMENT





Prologue

Welcome to this booklet on Stress Management — a comprehensive guide designed to help you in a layman language to navigate the challenges of stress in today's fast-paced world. Stress is an inevitable part of life, affecting individuals from all walks and stages of life. While it's natural to experience stress, understanding its mechanisms and how to manage it effectively is key to maintaining a balanced and healthy lifestyle.

In the following chapters, we aim to provide practical insights, strategies, and tools to assist you in recognizing, understanding, and coping with stress more effectively. Whether you're a student, a parent, or anyone seeking ways to alleviate stress, this booklet offers a wealth of information to help you on your journey to better well-being. The main idea of this booklet is to raise awareness in an easy language for layman people. This booklet is designed by a group of passionate students under my supervision for the course of Community Impact Project at Constructor University in Bremen, Germany. In this project, we aimed to provide valuable insights into stress and its management, offering a comprehensive understanding of its developmental aspects, impact, and ways to support individuals affected by it. Additionally, further information on these topics and much more can be found on our website (<https://awareness-cip.de>). This booklet is offered in five languages including German, English, Albanian, Portuguese and Russian.

We'll explore various aspects of stress, including its causes, the impact it has on our physical and mental health, and most importantly, proven techniques and practices to mitigate its effects. Our goal is to equip you with actionable strategies that can be easily incorporated into your daily routine. By fostering a deeper understanding of stress and its management, we aim to help you cultivate healthier habits, enhance your resilience, and ultimately improve your overall quality of life.



Remember, managing stress is not about eliminating all stressors but learning how to respond to them in healthier ways. We hope this booklet serves as a valuable resource on your journey towards a more balanced and stress-resilient life.

As a supervisor and head of this team, I would like to acknowledge the extensive efforts, hard work, and creativity of my students in production of this booklet. Names are listed in alphabetic order:

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Glossary

- **Amygdala-** the region of the brain associated with emotional processes ([Salzman, 2023](#)).
- **Blood-brain-barrier-** a highly selective barrier created by the brain capillaries (thin blood vessels), with the purpose to control transport of molecules in and out of the brain ([Blood-brain barrier definition & meaning](#))
- **Cerebral cortex-** the surface layer of the brain associated with coordination of sensory and motor information ([Cerebral cortex definition & meaning](#))
- **Endocrine glands-** parts of the endocrine system with the role of producing and releasing hormones, which in turn coordinate our body and act as messengers (Endocrine system: What is it, functions & organs 2020).
- **Hippocampus-** the region of the brain primarily associated with memory ([Yassa, 2023](#))
- **HPA-** stands for hypothalamic-pituitary-adrenal axis, the main stress response system, which serves as the link between experiencing stress and the body's reaction to stress ([Dunlavy, 2018](#))
- **Hypothalamus-** region of the brain that controls the autonomic nervous system, like controlling our organs, as well as the endocrine system due to interactions with the pituitary gland ([Utiger, 2023](#))
- **Prefrontal cortex-** the front part of the frontal lobe of the brain, associated with executive functions (planning, decision making, working memory) and linked to a person's personality, internal goals, and thought-to-action orchestration, as well as speech and language ([João & Filgueiras, 2018](#); [Gabrieli et al., 1998](#)).
- **Pituitary gland-** a gland in the brain that secretes hormones into the bloodstream. It interacts with the other endocrine glands via hormones ([Emerson, 2023](#))



Introduction

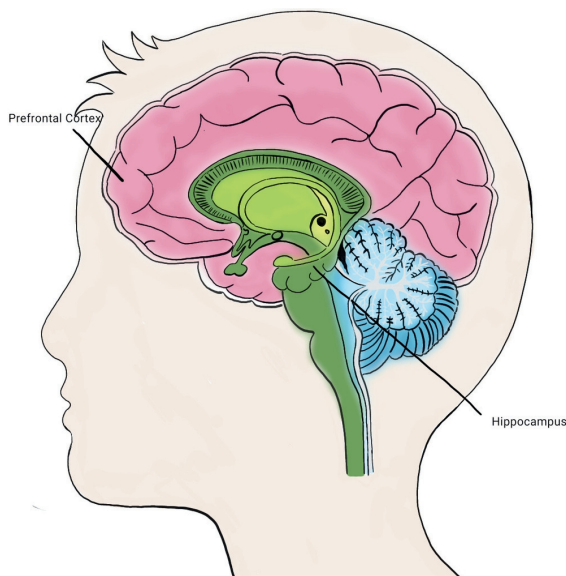
Our body and mind are heavily linked with each other, evident in how our emotional state affects our physical well-being and vice versa. Negative events like illness or pain can dampen our mood, while positive experiences, such as getting a compliment by someone, uplift it. These stressors significantly influence our mental and physical health; stress and worry can be literally experienced as tense muscles or elevated heart rate. Beyond the immediate impact of external events, long-term stress can lead to chronic health conditions, such as hypertension, depression, or even contribute to the exacerbation of existing illness or disorder. Moreover, our lifestyle choices, including diet, exercise, and sleep patterns, significantly influence both our mental and physical health. A lack of sleep, for instance, not only affects cognitive function but also weakens the body's immune system, making us more susceptible to illnesses. This intricate interaction emphasizes how important it is for one to understand and regulate how we feel and respond towards those stressors in order to maintain the best possible mental and physical health.

In today's fast-paced world, one could encounter different stressors including work pressure, societal expectations and the kind of stressors you face will also change as you grow up. It is crucial to acquire efficient techniques for handling and reducing stress if we want to protect our mental and physical well-being.

This booklet seeks to explain stress, its impact on the development of the brain and body, and the primary stressors that are likely to affect people in different age groups. It also provides exercises, useful advice, and insights to help people take control of their own health. People can develop resilience and achieve optimal health by learning efficient stress management skills and comprehending the interaction between the body and mind.

Chapter.1


Introduction to Stress and its effects on our brain development



1.1 What is stress?

Do you ever wonder why your stomach hurts before meeting someone new? Why do your hands get sweaty before important presentations? Stress is built up from external (dealing with your financial problems and meeting to the work deadlines etc.) and internal (negative self-talk, health issues, worrying about the future, self-doubt etc.) factors. When certain triggers happen, stress can cause your body to react in particular negative and inefficient ways, known as 'stress responses'.

Based on the type, timing, and severity of the trigger, stress can have different effects on your body. It can range from disturbing the body's balance to potentially being really harmful, or even leading to serious consequences such as heart disease, high blood pressure, anxiety, and depression (Yaribeygi et al, 2017). Every aspect of our lives is filled with stress, ranging from minor concerns like anxiety about meeting new people, running late, misplacing something to major ones like suicidal thoughts brought on by hopeless circumstances, job loss, natural disasters, or major changes like moving to a new city or country.

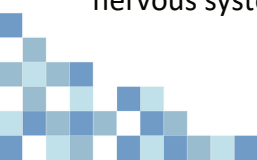


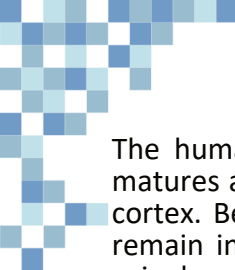
Stress can affect everything from your physical health to your emotional health; the more stress you accumulate, the more problems it can cause for your health, such as depression and psychological disorders (Schneiderman et al, 2005). Although the connection between stress and disease is complicated, stress related problems are caused by combinations of different things, with both genetic and environmental causes – it is crucial to know the latter in order to understand how to deal with them. In this booklet, we look at how stress affects the main systems in your body throughout different life stages and discuss some main stressors and coping strategies.

Our brains undergo intricate developmental changes throughout our lives, molding our cognitive and emotional skills. Nonetheless, stress can notably modify these developmental paths, impacting the brain's architecture and operations, and our psychological well-being. Grasping the vibrant interplay between stress and brain development is vital to understand how our experiences influence the ongoing evolution and metamorphosis of our brains.

1.2 How does our brain develop and how stress can negatively impact it

The brain is the central site of the body dealing with stress, yet it is also the most vulnerable to the effects of stress. Stress can alter the brain through various systems, like hormones, the autonomic nervous system (body's automatic control system, that manages heartbeat, breathing etc.), and the immune system (McEwen, 2007). Moreover, long-term stress can shrink your brain and make it smaller in volume (Sarahian et al., 2014); this can lead to changes in how you react to stress, how you think, and how your memory works (Lupien et al., 2009). The extent of these changes depends on how stressed you are and how long the stress lasts (Lupien et al., 2009). What's more, stress can make lasting changes to your brain that affect how your nervous system functions (Reznikov et al., 2007), for example, think of quickly moving your hand away from something hot without even thinking about it. That's your body's fast and automatic response to protect you, controlled by your nervous system. Thus, it's important to study all the ways in which stress can impact your central and peripheral nervous system (Yaribeyugu et al., 2017).





The human brain starts forming when you're in the womb, and it matures as you grow up. The brain's outer layer is called the cerebral cortex. Before the cerebral cortex is developed, some empty spaces remain in the brain, called ventricles. The ventricles connect to the spinal cord and create the building blocks used to then form the cerebral cortex. As your brain develops, special brain cells and support cells must migrate from the ventricles to their designated positions in the cortex (Ackerman S., 1992).

Brain plasticity refers to the brain's ability to change and adapt throughout life. Our brain remains flexible, continuously developing and adjusting, even into early adulthood. Studies, such as Smith *et al.*, (2009), using advanced imaging techniques, have revealed that specific brain regions continue to grow until a person reaches their mid-20s, indicating ongoing brain development during this period.

Normally, the brain undergoes changes naturally as we age. It adjusts, forms new connections, and refines existing ones. This adaptability allows us to learn, acquire new skills, and adapt to different situations. However, stress can affect this natural process. Excessive stress might impact the brain's flexibility and adaptability. It could interfere with the brain's usual growth and development, affecting learning, memory, and overall cognitive functions.

Understanding stress across different age groups involves recognizing their unique challenges. Throughout this booklet, we will explore the specific stressors for each age range, then provide practical lifestyle tips designed to manage these pressures effectively.

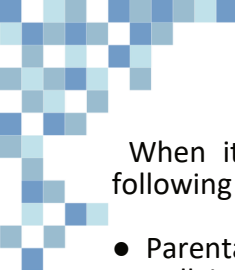
Chapter.2 Main stressors in different age ranges

2.1 Infancy and Early Childhood (0-12 Years)

In the early years of life, your brain grows super fast, making a large amount of neural connections, like brain wires. These connections become the basis of your actions (e.g. how you think and move) in the future. Neurons and supporting cells move from the fluid-filled spaces in the brain to their final places, forming the basis for brain functions. This time is also critical for developing your senses and language skills. As you grow a bit older, your brain does some housekeeping; it trims away extra connections to make things work more efficiently. This phase is marked by a burst in learning, as children absorb information and experiences like sponges. At the same time, children's language and thinking skills get better, making it easier for them to learn and understand things. This period is critical for shaping a child's capacity to learn and understand the world around them.

2.2 Children and their stressors

One of the most important periods in a person's life is childhood. During this time, individuals begin to learn the basic knowledge that enables them to become part of society. Due to its significance, the maintenance of a happy environment that provides proper physical and intellectual development is fundamental. Unfortunately, children are constantly exposed to numerous stressors as stated below. Depending on the severity of these stressors, they could lead to impairments in their growth and development. Because of their lack of experience and limited knowledge, kids are not emotionally intelligent, and that is closely associated with their underdeveloped ability to manage their feelings. Encountering unfamiliar scenarios might make them feel uncomfortable, unpredictable, and potentially frightened. Moreover, kids tend to associate events that happen in their routines without appropriate critical thinking. While this characteristic is not necessarily a negative trait, it can be harmful when children are exposed to toxic environments that can make them stressed, i.e. abusive and neglectful homes, poverty, and violent households (Pedersen, 2022).



When it comes to stressors to which children are exposed, the following is usually observed:

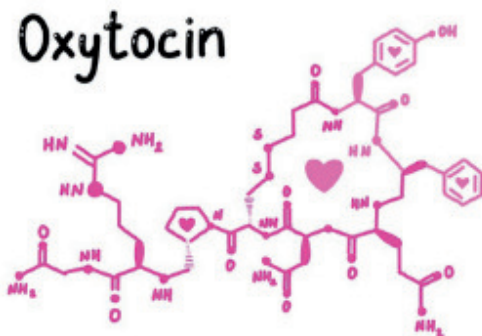
- Parental neglect
- Bullying
- Living in a conflicting environment
- Malnutrition
- Being away from home
- Social stressors, i.e., being picked last for a team
- Being asked to do too many things that are beyond their capacities.
- Perceived dangers, either real or imaginary.

Exposing kids to these stressors may culminate in the development of neurological disorders, including major depression, post-traumatic stress disorder (PTSD), and anxiety. Physiologically, experiencing chronic stress as a child can also lead to reduced volume in certain parts of the brain (Teichier, 2011). Hence, it is important for children to have a healthy environment throughout their development. Experiencing stress is not always negative for their development, however, chronic exposure should be avoided.

As mentioned above, parental affection has an impact on the development of children. Here in later paragraphs, we will go into detail about why parental support is important for children to develop and how parental neglect will affect children.

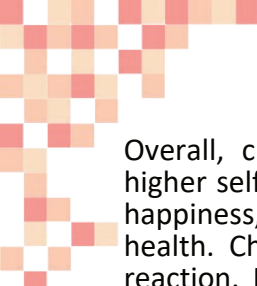
2.3 Correlation between lack of parental support and stress at a young age

Recent years have shown a trend of increasing issues in mental health, thought to be correlated to stress. With an increase in dual-income families and domestic violence, it has also become rare to see substantial parental support for most children, with many suffering a lack of affection, particularly from the mother's side, during childhood. Children's psychic and mental development is influenced by their relationships with their parents (Al'Uqdah, 2015). However, it is unclear whether affection could prevent mental health struggles from developing altogether and we have not established an exact list of neurological effects that could stem from a lack of affection.



2.4 Why will children be mentally healthy if parents give enough affection?

In a study by Maselko (2010), early parent-child relationships were found to significantly impact a child's mental wellbeing. They discovered that the more a mother shows affection to the infants, the less children get stressed when they grow up. The researchers hypothesized that this might be connected to oxytocin, the 'love hormone', as it is released during skin-to-skin contact such as hugs and cuddles. Many animal and human studies have shown that oxytocin plays a key role in fostering a strong bond between mothers and their children, while disruptions to this bond may alter the baby's brain chemistry and stress responses. For example, rats that received higher-quality grooming and nursing from their mothers have shown lower stress reactivity, which has also been linked with physical health (Maselko, 2010). Moreover, studies showed oxytocin promotes stress regulation, encourages positive social behaviors, and supports mental health (Scatliffe et al., 2019).



Overall, children with affectionate and accepting parents exhibit higher self-esteem, lower stress, fewer behavioral problems, greater happiness, academic achievement, and, in adulthood, better mental health. Children with unloving parents tend to have the opposite reaction. Krauss and Orth (2020) found that parent-child affection had a moderate influence on children's self-esteem approaching early adulthood, and affection shown as early as possible would yield the best long-term benefits.

McAdams (2018), Felson and Zielinski (1989) state that children will mirror their parents' affection if they receive encouragement and attention; they will develop an early understanding that they are valued and a positive self-esteem, resulting in more confidence and positivity, better results in their efforts, and in turn, creating a positive domino effect of success and confidence. Constructive criticism and support during challenges will enable children with a sense of achievability, often improving their efforts and yielding better results. Even when the effort yields poor results, parental encouragement and support could still preserve the positive downstream effects and keep the child self-motivated for future endeavors.

In addition to the positive effects of affection, there are also avoidable diseases that can occur from a lack of affection. It is said that low levels of love and affection and high levels of abuse in childhood have the highest disease risks in adulthood (Caroll, 2013). Children who do not receive affection from their parents or have experienced trauma are unable to produce oxytocin and tend to have higher stress levels, which can eventually lead to psychological problems (Maselko, 2010).

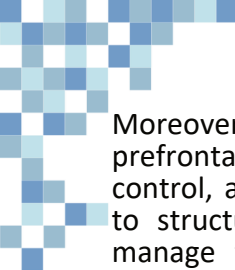
2.5 What challenges could less affection lead to in the future?

Many studies imply that positive parental support makes children feel more included, allowing them to easily fit into society, while negative support induces difficulties fostering intersocietal relationships or even depression, which inhibits all social interactions. Supporting this, an interview involving 80 delinquents and 80 non-delinquents revealed that criminals often lacked affection from their parents during youth, while most of the non-delinquent children indicated feeling enough love from both parents and even more so from their mothers (Andry, 2013). In addition to relieving them of some stress, the hormone oxytocin, which is released when people experience a lot of affection, helps children form a stronger bond with their parents and eventually makes it easier for them to communicate and trust others. This is because a strong bond with parents gives them a strong assurance that they are worthy people, and the feeling of confidence can lead to the prevention of psychological problems often coming from the feeling of loneliness that they are not worthy of being loved (Raheel et al., 2014).

2.6 Effects of stress on the children's brain development

Childhood is a period of remarkable brain development, marked by the growth and refinement of neural connections. However, when children are exposed to chronic stress, this can have profound and lasting effects on their brain development. One critical area affected is the hippocampus. Elevated levels of stress hormones, particularly cortisol, have been shown to impair the growth of new neurons in this area. This can result in memory deficits and difficulties in learning, potentially affecting a child's academic performance and cognitive abilities.





Moreover, chronic stress can disrupt the development of the prefrontal cortex, which is involved in higher-order thinking, impulse control, and decision-making. Prolonged exposure to stress can lead to structural changes in this region, affecting a child's ability to manage their emotions and make choices. Such disruptions can manifest as behavioral issues, impulsivity, and difficulties in regulating emotions.

Children exposed to prolonged stress are at a higher risk of experiencing anxiety and depression, conditions closely linked to alterations in brain structure and function (Lupien et al., 2013). Childhood maltreatment has also been observed to negatively impact the brain's development, which may lead to enduring changes in brain architecture and an increased susceptibility to mental health disorders (Teicher et al., 2016).

2.7 Adolescence (13-19 Years)

In adolescence, your brain changes significantly, especially in the prefrontal cortex, the part of the brain dealing with decision-making and emotions. During this period of time your brain is flexible, allowing you to learn and refine your thinking. Your prefrontal cortex matures, making you better at thinking in abstract ways, problem-solving, and planning. You also focus more on friendships, which helps you develop social skills, empathy, and self-awareness. A process that started in early childhood called synaptic pruning takes place as well, in which your brain gets rid of unnecessary connections, improving your thinking skills. Stress management skills such as problem-solving, efficient time planning, etc. could lead to better decision-making and reduced exposure to prolonged stressful situations. This could potentially keep the brain healthy during this time of growth and change and thus, reduce the extent of synaptic pruning in the brain. Additionally during this period, your emotional center, the limbic system, becomes more intense, making you more emotionally sensitive. Your brain's reward system becomes active, which can lead to taking more risks. Understanding these changes is important for teachers, parents, and policymakers alike (Fandakoa, 2020; Spear, 2013; University of College London).

2.8 Adolescents and their stressors

As seen in the introductory section of this booklet, adolescence is a period of significant personal growth and development, marked by physical, emotional, and psychological changes, as well as the pursuit of academic achievements, social acceptance, and the exploration of identity. It is a period when teens frequently encounter a wide array of stressors. Teenagers often find themselves exposed to different challenges that can lead to chronic stress. Understanding the nature of teenage stress, its causes, manifestations, and consequences, is crucial to address its impact on their overall well-being. Adolescents might experience different stressors, but the following are described as the most observed ones (Smith, 2019) :

- Academic responsibilities, choices regarding coursework, tests, and the drive to excel.
- Interactions with people, both platonic and romantic.
- Family-related disagreements
- Transitional phases, such as transitioning out of school or pursuing a higher education.
- Responsibility for making important life-changing choices
- Insufficient sleep.

Stress symptoms can resemble typical adolescent behavior. It is crucial for parents and guardians to be vigilant for signs of teen stress, which include emotional alterations such as agitation, anxiety, and depression, as well as shifts in behavior, including changes in eating and sleeping patterns, and avoidance of routine activities. Additionally, cognitive changes like reduced concentration, forgetfulness, and carelessness may become evident. Since stress triggers can vary widely among individuals, understanding how teenagers cope with stress and pinpointing its sources is fundamental to dealing with this problem.



2.9 Effects of stress on the adolescent's brain development

Stress can have a significant impact on the developing adolescent brain, potentially resulting in long-lasting consequences. Adolescence is a critical period characterized by substantial changes in the brain's structure and function, making it particularly vulnerable to the effects of stress. Chronic stress during adolescence can lead to structural changes in the brain, primarily affecting areas responsible for emotional regulation and memory, such as the prefrontal cortex and the hippocampus. The prefrontal cortex, which continues to develop into the early twenties, is crucial for decision-making and impulse control. Stress in adolescence can impair the maturation of this region, potentially leading to increased risk-taking behaviors and emotional dysregulation. The hippocampus, vital for learning and memory, can also be negatively affected by chronic stress. High levels of stress hormones, like cortisol, can disrupt the creation of new neurons in the hippocampus. Consequently, this may result in memory deficits and cognitive impairments (Hanson et al., 2019). Furthermore, stress can activate the amygdala, which is involved in emotional processing, leading to heightened emotional reactivity, anxiety, and mood disorders in adolescents (Lupien et al., 2013).

2.10 Adulthood (20-65 years old)

In young adults, the brain stabilizes and refines, with now-mature brain structures like the prefrontal cortex for decision-making. This period of time solidifies cognitive abilities and executive functions for handling complex tasks. Brain development continues into adulthood, enhancing information processing, decision-making, and emotional control. Social and emotional skills grow for better relationships, supporting education and career goals (The Teen Brain: 7 things to know 2023).

In middle aged adults, there's a gradual decline in fluid intelligence, affecting things like thinking speed and working memory, but crystallized intelligence, which accumulates knowledge, usually increases. However, they also tend to have developed emotional intelligence (EQ) over time.

As people age, they often become more skilled at understanding and managing their emotions and those of others. This emotional intelligence can aid in handling relationships, making thoughtful decisions, and navigating life's challenges more effectively. Brain volume peaks in early adulthood and then gradually decreases, with effects more pronounced in the prefrontal cortex, affecting decision-making. Genetics and lifestyle choices impact these changes, making a healthy lifestyle crucial for middle-aged brain health (Phillips, M.L. 2011).

2.11 Adults and their stressors

Stress during adult- and middle-ages can come from various sources, whether there is only one major stressful event or a combination of small stressors. Identifying stressors may be difficult as every person responds differently depending on the individual's comfort in specific situations, concurrent life circumstances, past experiences, resources, and support from others. Stress usually occurs when someone is feeling pressure, facing significant life changes, has concerns building up, lacks control over outcomes, deals with overwhelming responsibilities, experiences discrimination or abuse, or is uncertain about their future. Below we have a list of some challenges and stressors that usually impact this age group the most, keeping in mind overlap with other ages (Causes of stress 2022).

- Personal challenges: illness or injury, pregnancy or becoming a parent, infertility, grief over the loss of loved ones, experiencing abuse, experiencing crime and the justice system, housing issues, organizing a complicated event, and even everyday tasks, such as household chores or taking transport.
- Relationship challenges: getting married or civil partnered, going through a break-up or getting divorced, difficult relationships with parents, siblings, friends, or children, and being a carrier to parents and children.
- Employment challenges: losing a job, long-term unemployment, planning for retirement, tricky situations/colleagues at work and starting a new job.
- Financial issues: worries about money or benefits, living in poverty, and managing debt
- Social issues: having poor access to services such as medical care, green spaces, or transport, living through a stressful community-wide, national, or global event, like the COVID-19 pandemic and experiencing discrimination due to race, religious affiliation, sexuality, or gender expression.

Completing an education and being a part of the workforce are two major roles one may take to be a functional member of society, and at the same time, to gain personal growth. As mentioned in the main stressors of adolescents and adults section, these major commitments are not easy journeys, and often, lead to the formation of stress. While all these mentioned stressors are important, we will focus on academic and work stress, as they are the ones most students and working adults struggle with.

2. 12 What is academic and work stress?

One may have heard, or even said, statements like “I have so much homework to do and so little time” or “My project is due in an hour, yet my groupmate has not responded yet. What am I going to do?!” coupled with great emotions, usually panic or worry. Many would relate to this because it's a common sign of stress when it comes to academic responsibilities. Academic stress is the psychological state when students are under pressure and anxiety due to the fear of not meeting the high standard, or the high expectations.

Work stress, often correlated to a job or career environment, is highly similar to academic stress. Adults in the labor market typically experience this as a response to unreasonable demands and pressure at work. This can lead to the loss of confidence in their job, the lack of commitment and motivation in delivering one's tasks, difficulty in keeping concentrated with the job at hand, among others (Bupa, 2022).



2.13 Significance of addressing the concerns regarding Academic Stress and Work stress

Managing academic stress from a young age eventually reduces the possibilities of having mental health problems at an older age (e.g. at university level) since academic stress can cause a significant impact on progression of many mental health concerns.




On the other hand, work stress affects not only their behavior and work performance, but also their interpersonal relationships among their coworkers. Therefore, it is crucial to understand and manage the factors and causes of stress in a workplace in order to perform efficiently and maintain good health physically and interpersonally (The Chartered Institute of Personnel and Development, 2022).

2.14 Causes of Academic and Work Stress

-High workload and time management challenges-



Throughout one's education, a student experiences advanced material and training in their course of study. At higher levels of education, exams and quizzes become more complex and require extra preparation and an advanced degree of knowledge. At a certain point, a student would naturally have difficulty managing academic workload and consequently, would urgently require proper time management in order to deliver all the academic obligations. Studies have reported that unbearable academic workload and the urgency of time management are common academic-related stressors. Increased pressure and demands of school requirements lead to struggles in managing increased workload and maintaining a good management of one's time (Rahim et al., 2016).



As expected, the same could also be observed in work stress. A study shows that workload has a positive and significant impact on how one practices proper time management. Additionally, the workload also significantly affects the amount of stress a person feels at work. All together, both time management and work stress significantly affect the quality of one's performance at work (Ashar et. al., 2021).

2.15 Unrealistic expectations, performance pressure, and insufficient support from peers, mentors, or supervisors

The value of knowledge is instilled in a person as early as one could learn to speak words. From preschool to college, one could develop the fundamental skills and knowledge that would help them navigate the world as they age. Hence, having an education is given such high importance because it paves the path of one's future. The desire and commitment to maintain a good performance at school naturally becomes a student's goal. In a commitment entailing such high expectations, it is natural for academic stress to develop in school (Subramani & Venkachatalam, 2017). With society's natural influence on anyone's decisions and opinions, it is expected that family and peers may also pressure one's academic performance. Expectations and academic pressure coming from parents, teachers and peers impact a student's self-expectations in their academics (Subramani & Venkachatalam, 2017). Studies show that achieving one's personal standards in academic performance, usually of perfectionism, positively affects one's mental well-being, and that otherwise would likely cause the progression of academic stress and increased levels of anxiety (Fernández-García et al., 2022). The same applies to work stress. Unrealistic work expectations could arise because of unhealthy expectations placed by persons in charge of management, such as bosses. These could be due to lack of effective communication, and insufficiency of the reward gained from one's effort which was seen as a reflection of poor leadership (Sanfilippo, 2023; Bhui et al., 2016).

2.16 Financial pressure and job insecurity

Financial problems, such as managing expensive tuition and living expenses and receiving insufficient salary and rewards, are common amongst students and working adults, respectively. Previous studies have shown that the pressure to keep up with one's persisting financial problems could lead to the development of either academic or work stress. The results of a study assessing the impact of financial problems on the mental well-being of college students showed that financial problems like taking student loans for college tuition and the subsequent difficulty of repayment, and managing cost-of-living expenses cause students to have difficulty in performing well academically. This could be due to the fact that students who struggle financially are more likely to take part-time or side jobs, consequently affecting the hours that would be dedicated to studying or reviewing for exams (Bennett et. al., 2015).



A management's failure to recognize the financial value of an employee's efforts could also lead to financial struggles. This leads to discouragement and unhappiness in the workplace, causing stress levels to increase (Stranks, 2005). Struggles with meeting personal financial needs is also correlated to one's confidence in their job. Job insecurity as a cause of work stress includes the fear of losing one's source of income, which could eventually lead to being in a worse financial situation (Bhui et al., 2016).



2.17 Typical consequences/effects of stress triggers in an academic and work setting

The triggers of stress in both academia and the professional environment can have substantial impacts on one's mental and physical health. Various bodily and mental changes can be observed in people under high stress. In some cases, it can lead to Psychosomatic Disorder, a condition which presents physical symptoms without a clear explanation within the body. In these instances, the brain is interpreting physical symptoms – making one feel the symptoms as if they were real – even though the body has no noticeable issues. It is thought to be caused by stress, and doctors recommend reducing stressors (among other things) to relieve symptoms. This is just one extreme example of what can happen, and while stress affects every person differently, it is not something to be taken lightly. Stress can have serious consequences on health and performance. According to a study conducted on students in Pakistan, “academic and family stress leads to depression among students, negatively affecting their academic performance and learning outcomes.” (Deng, et al.). Usually, the impacts on health lead to drops in performance, and attempts to artificially increase one's ability to work would only suppress symptoms without addressing the root issue, instead prolonging suffering and illness. Depression and other ailments can linger chronically and may affect other aspects of life, which is why it is recommended to treat them at the source, by practicing healthy stress regulation mechanisms.

2.18 The Yerkes-Dodson experiment

- studying the impact of stress on one's performance -

To date, extensive research has been conducted to achieve a better understanding of stress regulation. In 1908, researchers Robert M. Yerkes and John Dillingham Dodson determined to understand the relationship between pressure and performance, in the context of stress. The Yerkes-Dodson experiment put mice under different levels of stress, simulated via weak, moderate, and strong electric shocks, and measured how long they took to complete a maze. They discovered that when the mice experienced moderate arousal they solved the maze fastest, however, under low or high stress their performance decreased. From this, they derived the Yerkes-Dodson law, which describes the best arousal level (stress level) to optimize physical performance, highlighting the importance of a balance, as being exposed to negligible or excessive stresses would harm performance. As the curve looks like an inverted U shape, it is also called the inverted-U arousal theory (Figure). When the body is understimulated, a person could perform poorly because they tend to feel sleepy and demotivated in low stressed environment. Similarly, in overstimulated states, our body experiences high pressure which can give you shaky-hands, difficulty concentrating, and high anxiety, leading to low performance. On the other hand, in a well-stimulated state, which is also called the 'zone of optimal functioning' (Z.O.F.), the body gives the best consistent performance (Sapolsky, 2015).

Although the inverted-U theory applies to most of the tasks, it is notable that the optimal performance might differ depending on different factors such as types of tasks, skill experiences, and different personalities. For instance, in the gross tasks (using large muscles for fast actions), or when people are dealing with familiar tasks (anything done regularly), there is a direct positive correlation between the arousal, while complex and unfamiliar tasks are better taken care of at a low arousal level. Extroverts are often looking for more stimuli and therefore perform better with higher arousal, meanwhile introverts are not motivated to seek arousal and often perform better under less stimuli (Yerkes and Donson, 1908).

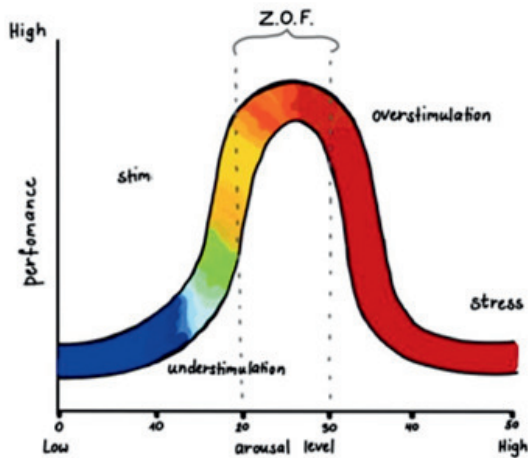


Figure: image of inverted-U model. Arousal level is showed on a scale of 0 (Low) to 50 (High) (Sapolsky, 2015).

Managing stress also involves recognizing and correcting cognitive distortions. Cognitive distortions are biases and irrational thoughts that lead to negative emotions and behaviors. These distortions often involve misinterpreting or magnifying situations, leading to a distorted perception of reality. Major examples of cognitive distortions are: Polarized thinking, which is a pattern of thinking of jumping into extreme conclusions such as “My friend didn’t say hi to me, she must hate me”. Another example of cognitive distortions is overgeneralization which is a tendency to determine everything only from the one experience which includes the thought “I failed the exam, I will never be able to pass the exam again”. Usually, cognitive distortion is caused by high levels of stress (Beck, 1963), so it is often possible to manage this using coping mechanisms to reduce stress and maintain an optimal level of arousal. Cognitive distortions may also influence stress levels by shaping perceptions of stressors, creating a sort of cycle between perceived stressors and misperceived situations. For example, catastrophizing, a major distortion in which you expect the worst in everything, may lead to excessive arousal as it will put you in high level of stress, but realizing and fixing the cognitive distortion may fix the stress level and eventually make your performance better (Leshem and Fuller, 2022).

In summary, learning how to regulate stress can allow you to improve your daily performance; stress regulation mechanisms play a crucial role in moderating arousal levels, ensuring that they are in an effective range of stress to optimal mental and physical performance.

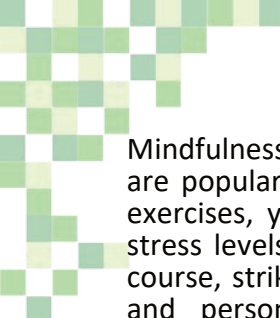
2.19 Prevention methods for academic and work stress

Preventing stress in academic and work environments necessitates the establishment of a supportive culture, fostering proactive measures to reduce stressors and promote well-being among individuals. By prioritizing preventive strategies, institutions and organizations can create a conducive environment that supports individuals in managing their responsibilities effectively while maintaining good mental health.

Building strong social support networks within academic and workplace settings fosters a sense of belonging and emotional security. Engaging in teamwork, open communication, and fostering positive relationships among peers and colleagues creates a conducive environment that aids in stress reduction. Just as well, adopting healthy lifestyle practices, including regular exercise, adequate sleep, and a balanced diet, is instrumental in preventing stress. Physical well-being plays a crucial role in bolstering mental resilience and combating the negative effects of stress.

2.20 Possible treatments

Treating stress that arises from academic and work environments requires a multifaceted approach encompassing self-awareness, mindfulness, social support, effective time management, and professional guidance. Incorporating these techniques in daily life can look wildly different from person-to-person. By implementing these strategies, individuals can cultivate resilience, enhance well-being, and navigate the challenges posed by demanding academic and professional endeavors. The initial step in managing stress is identifying its root causes. By recognizing specific stress triggers, individuals can effectively address them and build tolerance to stressful situations. Self-awareness and introspection are crucial in this process, enabling individuals to understand their limitations and implement necessary changes (Folkman & Moskowitz, 2000).



Mindfulness-based interventions, such as mindfulness meditation, are popular in stress management. Techniques like deep breathing exercises, yoga, and progressive muscle relaxation aid in lowering stress levels and promoting a sense of calm (Tang et al., 2018). Of course, striking a balance between academic or work commitments and personal life is essential in managing stress effectively. Implementing effective time management strategies, setting realistic goals, and establishing boundaries between work and personal life enable individuals to maintain equilibrium, preventing burnout and chronic stress (Hammer et al., 2019). However, despite the availability of various self-help strategies, seeking professional assistance remains crucial for individuals experiencing persistent stress. Consulting mental health professionals or counselors equipped with evidence-based interventions can provide tailored support and guidance (Aikens et al., 2014).

2.21 Effect of stressors on the adult brain

While knowing the stressors that adults face in their daily lives is important, as most people can easily remain unaware of what impact stress has on their minds. Just like in childhood and adolescence, stress exposure has impacts on the brain and behavior in adults. The effects of stress exposure during childhood and adolescence however, are reversible, unlike the ones that occur during adulthood (Lupien et al., 2009). Stress triggers a chain reaction in the brain, which starts in the amygdala, which signals the hypothalamus. This leads to a “flight-or-fight” response, with increased heart rate, heightened senses, increase in the size of the amygdala (increasing stress sensitivity), deeper breaths, and the release of neurotransmitters like adrenaline and cortisol. Cortisol is a hormone released by the amygdala, that has various functions such as blood sugar regulation. Typically, cortisol is released to restore the lost energy due to a stressful event and returns to a normal level when the stressful event ends. However, chronic stress means that this level of cortisol does not go back to normal and is instead overproduced. Overproduction of cortisol can lead to brain cell death and shrinking of the prefrontal cortex. Moreover, high, prolonged levels of cortisol have been associated with mood disorders as well as shrinkage of the hippocampus due to the weakening of the blood-brain barrier. The latter has a role in shielding the brain from potentially harmful chemicals in the blood. Stress causes this barrier to weaken, allowing inflammatory proteins to enter the brain, damage the hippocampus and consequently impact mental agility and motivation (Lupien et al., 2009, Sahakian et al., 2023). Mood disorders caused by prolonged levels of cortisol have been shown to also reduce the size of the hippocampus, lead to depression, sleep disruption and increased susceptibility to anxiety. In addition, as evident by the COVID-19 pandemic, stress can also cause irrational fears, which lead to hoarding behaviors since the balance between rational thinking and emotions is affected (Sahakian et al., 2023).



2.22 Elderly people (60+ Years)

As people age into elderly years, the brain undergoes significant changes. Brain size tends to decrease, particularly in the frontal cortex, affecting higher-level thinking. This shrinkage is linked to cognitive decline, impacting memory, attention, and problem-solving (Peters R. 2006).

Aging also affects the brain's blood vessels, potentially reducing blood flow and influencing cognitive function. These changes are associated with conditions like vascular dementia (problems with blood vessels in the brain causing memory and thinking issues). Moreover, the aging brain can accumulate abnormal proteins like beta-amyloid and tau (proteins that cause problems in the brain when they accumulate), which are connected to diseases like Alzheimer's (Cognitive aging " Mcknight brain institute").

2.23 The elderly and their stressors

We have briefly touched upon the elderly, as they are the ones that adults have to take care for. Some other common stressors for this age group include: chronic illness, caregiving responsibilities, loss and grief, loneliness or boredom, financial worries and major life changes, such as retirement (Stress and How to Reduce It: A Guide for Older Adults 2023).

2.24 Effect of stressors on the elderly brain

Stress has been shown to speed up the aging process (Seniors and stress 2019). Aging and constant stress are linked to altered brain plasticity (e.g., reduced ability to adapt to new situations), immune system dysregulation, and an elevated risk of brain illnesses, all of which have an impact on how people behave and think. Studies looked at how stress-affected behaviors (such as anxiety, depressive-like behavior, cognition, and sociability) are similar to behavioral changes that occur as people age. This is similar to the saying that stress “ages our brain” (Prenderville et al., 2014). One of the most significant causes of chronic stress among the elderly is perceived (as opposed to actual) social isolation, or 'loneliness' (i.e., you feel lonely, even if you are socially active). Perceived social isolation and loneliness is linked to unusual HPA (hypothalamic-pituitary-adrenal) axis activity and increased inflammation. Additionally, it has been demonstrated that social isolation speeds up age-related mental decline and depression (Prenderville et al., 2014), which is why care facilities for the elderly encourage visits. It has been shown that visits from family members improve the emotional health of the elderly in care facilities, which is helpful for those elderly patients who feel isolated and depressed (Why visiting your elderly loved ones regularly is important 2023).

To further highlight the importance of research on stress effects on older adults, we discuss the findings of a literature review on acute stress effects on cognition in older age. Research indicates that stress negatively impacts verbal fluency and discourages risk taking but has no effect on episodic memory (memories unique to the individual, life events). Most surprisingly, research suggests stress has an enhancing effect on working memory and response inhibition (the suppression of inappropriate actions in a given context).

We have been discussing the stressors and its effects on our brain and its development in different age groups. From the next chapters, we will focused on the effects of stress on our body and introduce some coping methods.



Chapter.3 Effects of stress on our body and How can we cope with it

3.1 Lifestyle and stress

“Just one more Tik Tok video, then I’ll start doing my assignment.”

“ I stress eat a lot of chips during my exams.”

“Oh no, why didn't I start my project earlier?:”

We’ve come across such statements either from ourselves or people around us in our daily lives. One common feeling towards these statements is stress which can be the reason (here, it is excessive unhealthy food consumption) or result (not starting/completing a task on time) of an action.

Why is that? What leads to such statements like the above?

Research has shown close associations between lifestyle habits and stress. (Wang et al., 2023) Various factors relating to school, home, university and other environments lead to the formation of good and bad habits in our daily living. (Omasu et al., 2022). Habits are defined as repeated actions and behaviors,, and repeated habits form a lifestyle. While one’s lifestyle is not expected to be perfect, taking steps toward achieving healthy habits and goals is important.

An unhealthy lifestyle is correlated with a high probability of being diagnosed with Alzheimer's, depression and anxiety, brain damage, gastrointestinal and accelerated aging etc.(Polsky et al., 2022).

In the awareness chart below, one can review habits that can develop due to stress, along with the reasons why one typically indulges in them and the harm it can cause us.

Note: While some of these habits (e.g. social isolation or scrolling through social media) are accepted in moderation, in excess, there is considerable harm that these activities might cause.

Habits	Reasons why one may indulge in the habits	Harm caused by these habits
Unhealthy diet consumption - junk food and fizzy drinks	Reduces cortisol levels temporarily, making one feel relaxed.	Digestion issues, overeating, obesity, mood disorders,
Bad sleep quality	Alcohol, smoking habits, Increased academic load, physical inactivity, stress	Weakened immune system, decreased alertness and low academic performance.
Time mismanagement	Inability to use time effectively for the set goals, stress	Overload of work, reduced performance.
Social Isolation	Lowers social anxiety, avoiding feelings of criticism and judgment, stress	Increased risk of depression and anxiety, cognitive decline eg. dementia
Social media	Escaping reality, relaxation, social validation, stress	Addiction, unrealistic body and/or lifestyle expectations, reduced attention span

Stress is commonly the cause of these habits, hence it is important to tackle it in order to improve one's lifestyle and lead a healthier life.



3.2 Impact of COVID-19 and lifestyle

The advent of the pandemic in 2020 due to the outbreak of the COVID-19 virus had a huge toll on the physical and the mental health of people across all ages globally (Gruber et al, 2020).

Due to the world-wide lockdown, quarantines have caused certain lifestyle changes. For example, hygiene and sanitation were better regulated in public places. At the same time, people's behavior towards outdoor inactivates and sedentary recreational activities (smoking, alcohol consumption) has proven to have a negative effect on the well-being of the people.

Social restriction triggered even more stress among individuals, due to the severity of the situation around the world, lack of hospital facilities being offered, increase in death toll, and the economic uncertainty of lives during and after the pandemic causing an adoption of unhealthy lifestyles (Sultana et al.,2022).

3.3 Stress Coping strategies

Coping with stress: healthy and unhealthy strategies

Coping is the alteration of behaviors and thoughts towards negative events e.g. stress while keeping an emotional equilibrium (Algorani et al., 2023). People cope in different ways with stress, ways that can be healthy or unhealthy.

Adopting good habits can lead you to healthy coping as it keeps your body physically and mentally fit, feeling fresh, relaxed, and productive in terms of self care.

Healthy ways include meditation, speaking self-affirming phrases, eating fresh food, speaking to loved ones which increases oxytocin ("feel-good hormone") levels and thus decreasing stress levels (Algoe et al., 2017)

3.4 How can we raise our self-esteem?

As discussed in previous sections, if you are repeatedly neglected by your parents, you are more likely to have low self-esteem than those who receive more affection. Self-esteem is the sum of a person's beliefs and feelings about their own value and worth; of course, you can try to improve your confidence by practicing, even in the absence of parental affection. Here are some tips which was proposed by the counseling team in London:

3.4 a. Be Kind to Yourself:

- Practicing to recognize your achievements and celebrate them by yourself will lead to improving your self-esteem.
- Positive Self-Talk: talk to yourself positively in front of a mirror; record your three achievements every day (e.g., you were able to eat three meals or you were able to go out and relax).
- Challenge Negative Thoughts: Question self-criticism and treat yourself as if you are your best friend. What would you tell your friend when they were in trouble?
- Assertiveness: Learn to say "no"; you can say "no" to invitations just because you booked time for yourself (e.g., you need self-care time, you want to go to the gym).

3.4 b. Try to recognize positives:

Let's take things step by step. Seemingly small things can be big enough to be recognized as achievements! Gradually, you can get bigger and bigger things done!

- Acknowledge success and compliments: write down even small achievements, such as waking up in the morning or taking a shower, as well as a compliment you got from others, so that you can review those.
- List Your Strengths: Create a list of qualities or skills you value in yourself.



3.4 c. Build a support network:

- Talk to trusted individuals: Share with someone who listens and cares about your well-being as this will give you some assurance that people accept you and understand you.
- Prioritize positive relationships: Spend more time with people who care for and support you. Don't be afraid to cut out those who miss you. You don't have to bear with people who don't care about you as much as you do.

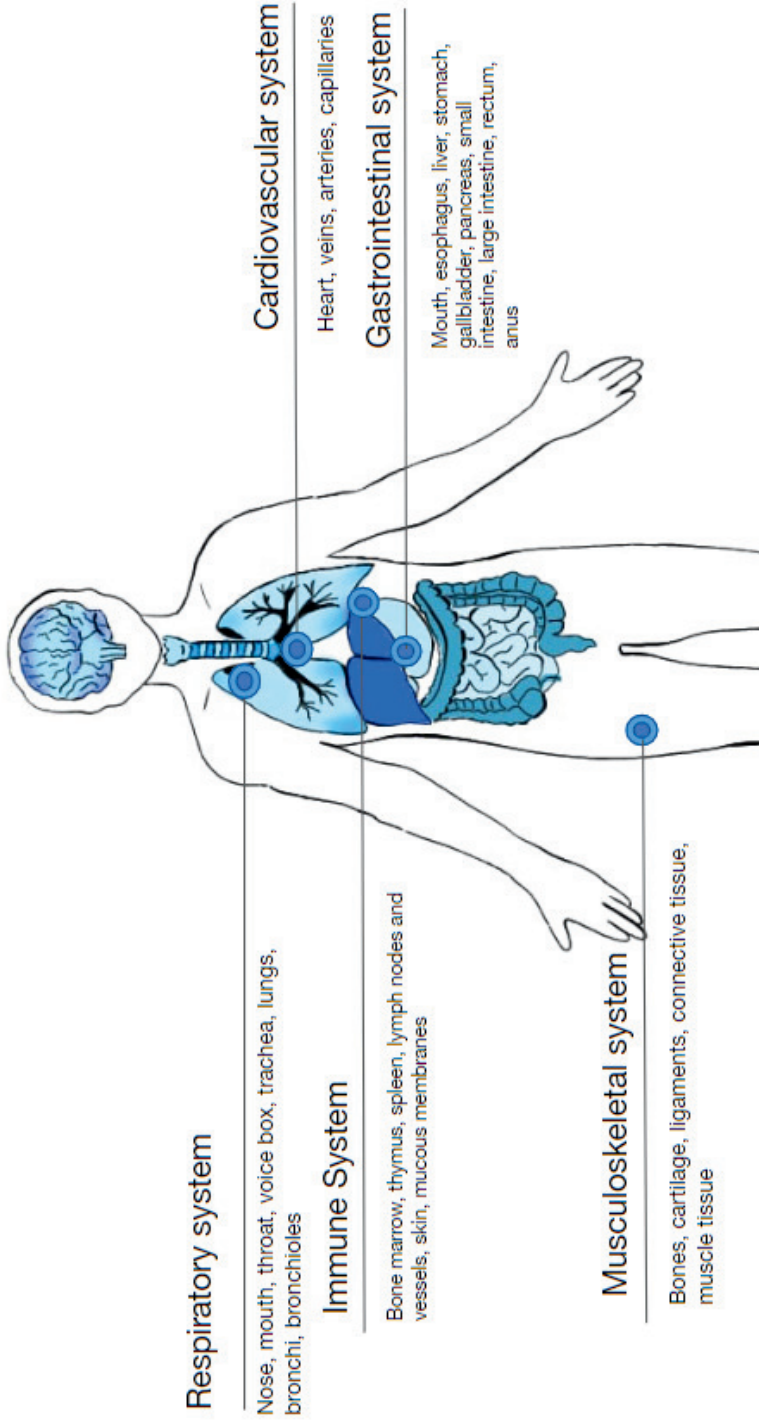
3.4 d. Seeking professional help:

You might find it hard to talk about yourself to others, but you can always call for help from professionals. If you are at school or in a company, check if they have a counselor exclusive to people who enrolled/ work there. You may also search for a counseling center, psychiatrist, or therapist directly, or call a hotline.

3.5 Stress effects on our bodies and how to cope with it

There have been multiple studies showcasing the effects of stress on the body. To have a better understanding of these effects, we have compiled a schematic and a table showcasing some of the most common and important effects of stress on the cardiovascular system, the respiratory system, the immune system, the musculoskeletal system and the gastrointestinal system (Stress effects on the body 2018).

3.6 a. How stress affects the systems of the body



3.6 b. How stress affects the systems of the body

Cardiovascular system	Respiratory system	Immune system	Musculoskeletal system	Gastrointestinal system
<p>Anger outbursts double the risk of heart attacks</p> <p>Reduced blood flow, narrowed blood vessels, increase in blood clotting and high blood pressure lead to arterial plaque buildup → increased risk of strokes and heart attacks</p>	<p>Shortness of breath and fast breathing</p> <p>Worsening of asthma and chronic obstructive pulmonary disease (like emphysema and chronic bronchitis)</p>	<p>Chronic stress can worsen or cause autoimmune diseases</p> <p>Worse immune system can also worsen physical and mental health issues</p>	<p>Chronic stress leads to constant tension</p> <p>Constant stress and tension is linked to tension-type and migraine headaches</p>	<p>Brain-gut connection is disrupted by stress → can heighten feelings of pain, bloating and digestive discomfort</p> <p>Changes in gut bacteria due to stress can impact mood and alter how food is digested</p>
<p>Causes or worsens arrhythmia (heartbeat problems)</p>	<p>Intense stress can cause asthma attacks</p>	<p>Increase in inflammation substances which have been linked to schizophrenia and similar changes</p>	<p>Pain in the low back and upper body is particularly related with work-related stress</p>	<p>Stress can result in esophageal spasms that resemble heart attacks and gut spasms</p>
<p>Severe stress can lead to a rare form of heart attacks called stress cardiomyopathy (broken heart syndrome), most common in people post menopause.</p>	<p>Rapid breathing from stress can also cause a panic attack to people with panic disorders.</p>	<p>Stress leads to constant immune activation and health problems similar to long term inflammatory diseases</p>	<p>Eventual muscle weakening</p>	<p>Stress can bring problems with swallowing food and air, leading to burping, gassiness and bloating</p>

3.7 Benefits of practicing good habits

Stress can affect the body as shown above. Practicing good habits, you can prevent bodily health problems, help build stronger goals, provide for the community and set good role models to people around.

Despite the negative effects unhealthy coping mechanisms have in the long run like feeling of laziness, unproductivity, tiredness, bouts of sadness, one tends to succumb to unhealthy coping strategies like smoking, drinking, for instant gratification, that is the intention to achieve short term desires with ease (here, reduction of stress levels), which leads to increased dopamine production- feeling of pleasure which we crave most of the times.

Below are effective and achievable steps that you can take to help reduce stress and improve your lifestyle

- Journal your thoughts, aspirations.
- Exercise 3-4 hours each week, including meditation like yoga, stretching, walking in nature, gym, or brisk runs.
- Have at least three whole meals a day as it lowers the risk of cholesterol levels and binge eating unhealthy food. Drink 4-5 liters of water per day.
- Plan the day the night before.
- Maintain a clean indoor environment around you.
- Reduce screen time (especially scrolling on social media) - avoid using your phone before 9am and after 9pm
- Avoid consuming external information and answering messages or emails 1 hour after waking up
- Divide tasks on the basis of urgency and priority, especially in case of deadlines.
- Participate in community events. Maintaining social connections and seeking help from friends, family, or support groups can help alleviate the negative effects of stress.
- Building intrinsic motivation to increase engagement to the outside world by encouraging self-care, self-help books, finding activities that regulate flow (continued state of relaxed mind), etc.
- Try out new hobbies, games, connect to nature, visit libraries.

Considering the large effects stress has on our well-being and daily functioning of activities, we must aim to seek help at all times, build coping mechanisms to de-stress in various aspects of life like from the examples mentioned above that would help improve quality of living (Seo et al., 2018)



Summary/Conclusion

In the end, we hope you have gained an understanding of the profound relationship between stress and life. Stress is all around us, impacting us in many ways and to varying degrees, thus knowing what are the main stressors in different ages, how those stressors can affect you physically and mentally, and how to regulate those are essential for you to have a healthy life. Most importantly, we hope that this booklet helped you to understand your own stresses and enable you to take action. For instance, if you realize that you are having a difficulty of low-self esteem, please try out some healthy coping methods like recording your achievements everyday or seek out professional help if it's necessary. Finally, we wish you that you spread awareness of the significance of stress regulation with your family, friends, and colleagues. We hope that whoever needs to know will receive that information.

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Reference list

