

Executive Function and the Brain

Introduction

The brain performs different functions that coordinate integral processes in the human body (Goldstein, 2014). The psychological tasks entail receiving essential information from varied body parts, undertaking interpretation of the information, and offering guidance to the body on how to use or respond to it (Wilkinson, 2013). The brain further entails interpretation of different inputs in the form of pain, sound, odor, and lights, which help to perform essential operations such as breathing, releasing hormones, sustaining blood pressure, and overall control of the body organs. Consequently, the brain is the command center of the body's nervous system. Among all the purposes of the brain, Goldstein (2014) notes the executive function is paramount. The following excerpt provides a definition of an executive function, how it works, the impact of damage, and strategies for strengthening it.

Definition of Executive Function

Goldstein (2014) refers to executive function as the mental processes that enable human beings to focus attention, plan, recall instructions, and perform multiple functions. The definition further entails a set of high-order processes including inhibitory control and working memory. The processes control human goal-directed actions while governing the responses to ambiguous, novel, and complex circumstances. Although Goldstein (2014) contends lack of consensus on the definition of the executive function (EF) among medical researchers, he perceives the function as the element needed to help the brain process distractions, prioritize tasks, and control the impulses. The processes are prone to improvement following growth and

development (Zelazo, 2015). Hence, the brain governs actions among children and adults in varied ways. Di. Rypma, and Biswal (2014) view EF as the center of the working memory, cognitive flexibility, and self-control. The working memory and inhibitory seeks to help individuals maintain important information and developing the ability to resist temptations or ignoring distractions. On the other hand, the cognitive flexibility enables human beings to think about the situation or things in more than a single way. The cognitive capability through the EF underlines individual ability to regulate emotions, initiate tasks, and undertake comprehensive self-monitoring. According to Friedman et al. (2008), the execution functions entail diverse thought and action processes, which are correlated but independent. Therefore, inhibiting overriding responses, apprising memory representations, and performing different tasks understand the EF control capabilities.

The executive function of the brain takes charge of the brain processes (Zelazo, 2015; Goldstein, 2014). An individual can link present and past experiences due to the EF control on the working memory and inhibition of the dominant responses. The ability to remember details, plan, organize, switch focus, and manage time emanates from the well-coordinated mental processes. Miyake and Friedman (2012) argue that EF entails a set of general-purposes but control processes, which regulate the thoughts and behaviors of individuals. The thoughts and behaviors vary from one individual to another because of the individual differences in EFs. The differences in the responses or emotional stability exist due to the cognitive as well as the biological underpinnings of individuals. Moreover, EF works in a unique way.

How Executive Function Works

EF works by executing three essential functions namely working memory, mental flexibility, and self-control (Center on the Developing Child at Harvard University. 2018). The working memory oversees the retention and manipulation of distinct quantities of information over different periods. The process enables an individual to create a clear link between the past behaviors and present situations. On the other hand, mental flexibility assists in sustaining or shifting attention based on the emerging demands. The mental flexibility aspect governs the application of different rules in varied settings. Additionally, the role of the self-control element is to facilitate prioritization of activities while enabling individuals to repel impulsive actions as well as responses (Miyake & Friedman, 2012). EFS controls the working memory, mental flexibility, and self-control but the functions remain coordinated as well as interrelated in the execution of skills.

EF further works by overseeing effective adaptation and performance of individuals in real-life settings (Miyake & Friedman, 2012). The brain initiates the responses or goal oriented behavior because the EF allows an individual to initiate and complete tasks despite challenges. EFs, help the brain to anticipate challenges from the unpredictable environment. Hence, the human brain conceptualizes situations by defining situations and governing the development of alternative plans. Consequently, Friedman et al. (2008) note the EFs functions are flexible because they enable an individual to digress from normal routines in real life. For example, a person can divert from a path guided by fear of attacks. Additionally, the inhibition of inappropriate behaviors offers the basis for interactions, suppressing unwanted desires or resisting temptations.

EFs control logical, hypothetical, deductive, and problem-solving reasons (Goldstein, 2014). The reasoning aspect is part of the priority-making function of the brain. The logical or actual reasoning enables the brain to familiarize with situations. An individual applies the knowledge

stored in the procedural memory to familiarize with a given setting (Zelazo, 2015). The development of hypotheses, inferences, or deductions creates a platform for developing solutions. EFS, enable the brain to deduce a solution to a problem guided by the situation at hand. The execution function may require the brain to adopt analogical reasoning so that an individual recycles a solution used to deal with a past problem (Miyake & Friedman, 2012). However, any damage to the EF to varied impairments.

Impact of Damage on Executive Function

The damage to the EF may occur in the form of the chronic user of drugs, alcohol, injury, and impairments after suffering from chronic illnesses. Alzheimer's disease impairs damage the EF among old people. The effects of the disease create EF deficits where the brain cannot develop memory., judgment, and thinking (Miyake & Friedman, 2012). The memory loss progresses with the advancement of Alzheimer's disease, which leads to dementia. Although the executive function could decline with age, the onset of Alzheimer's disease could initiate problems in the brain so that an individual cannot develop thoughts, memories, and abilities to perform the most basic functions (Baars & Gage. 2010). Individuals feel disoriented, frustrated, and confused.

Psychological interference of the EF leads to learning disability particularly among children (Miyake & Friedman, 2012). Learning disabilities entail individuals' inability to receive and process basic information. Children who develop learning disability due to EF deficits manifest reading, writing, solving math, and understanding directions. The damage on the EF could lead to dyspraxia, which is a learning disability that impedes the motor skills of a person (Baars & Gage, 2010). Conversely, individual develop writing difficulties due to the onset of dysgraphia. A

person shows difficulties in grammar and reading comprehension as well as using the verbal expression. Inability to perform verbal expression translates into antisocial behavior among children. Although Zelazo (2015) argues the psychological basis of EF deficits is contentious, learning disabilities remain common problems among children in the United States.

A person develops Attention Deficit Hyperactivity Disorder (ADHD) following the damage of the EF (Nimh.nih.gov, 2018). The brain cannot processes responses require attention, impulses, and activities. ADHD affects both children and adults, but sometimes the symptoms may manifest themselves during childhood. Individuals develop the problem of organization, creating goals, and completing a task. The inability to control impulses and subsequent hyperactivity interferes with the normal home and school lives of the children or teens (Miyake & Friedman, 2012). Children and teens develop the problem of initiating relationships, which interferes with their self-esteem. Inability to control impulses could lead to addictions. Additionally, adults develop low self-esteem, problems at work, anxiety, and inability to control their anger irrespective of the setting (Nimh.nih.gov, 2018). However, there are strategies for strengthening the EF of the brain.

Strengthening Executive Function

Establishing fixed daily routines could help in controlling the immediate impulses. The volitional proficiency assists individuals in reducing the reduced impulse control of EF by enabling them to develop new habits (Zhang et al., 2017). Although the process requires hard work, individuals with effective time management learn to concentrate on specific leisure and learning activities. The activities inhibit the addiction or temptation to adopt unwanted actions. Additionally, the routine should include removal of distractions such as social media among teens and children so

that they avoid the short-term temptations (Meltzer, 2013). Fixed daily routines ensure a person avoids short-term desires that complicate organization or planning among other EF skills.

Execution of intentions oversees action control (Diamond, 2015). The strategy expedites distraction-inhibiting actions that enable individuals to avoid intrusive negative intentions. An individual can redevelop the ability to make different choices due to the self-awareness. Execution of intentions focuses on the dysfunctions that affect inhibition, working memory, task monitoring, and self-monitoring aspects of EFs. According to Diamond (2013), the process reduces predisposition to procrastination so that an individual can retain the common problems of maintaining goal-oriented behaviors. Consequently, implementations of intentions shape the pre-decision period where a person can abandon aversive behaviors.

The EF education further includes the memorization, cognitive flexibility, note-taking, and creating checklists (Zhang et al., 2017). Memorization boosts the working memory by enabling persons to relate past and present situations. Non-Verbal memorization might a symbolic activity so that the learners associate situations with specific symbols. Improving cognitive flexibility of EF requires individuals to engage in the exchange of riddles, jokes, and word meanings so that they can create solutions based on the experiences. Additionally, note taking boosts the memories of the learners by enabling the creation of reference material (Meltzer, 2013). Personalized checklists develop awareness and realization of common errors.

Conclusion

Executive function and the brain are interlinked. EF is the chief role of the brain, which

governs the executive of the essential processes in the body. The function underlines brain ability to sustain a working memory, cognitive flexibility, and self-control. The processes coordinate key functions including response to situations and execution of actions. However, the damage to EF could lead to ADHD, learning disabilities, antisocial behavior, and dementia. Strategies such as execution of intentions, memorization, cognitive flexibility, note-taking, creating checklists, and the establishment of daily routines could restore the EF.