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Influencing Factors of Memory Development among Children

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Abstract: The brain encodes, stores, and then retrieves information about objective things through the cognitive process of memory. Children's cognitive development includes memory development, which has an impact on their day-to-day activities, interpersonal interactions, and academic performance. Therefore, it's crucial to pay attention to how children's memories grow. The current article focused more on racial and socioeconomic issues, as well as the environmental factors of education, parenting styles, interparental conflict, and culture. The biological variables, like genetic factors, that affect how effectively children's memories grow have been discussed further in previous articles. Additionally, the current review discussed some individual differences like the connection among stress, exercise, and the growth of children's memory, which had previously received little attention. The article also highlights some inspirations that were provided by these influential circumstances such as create a good family environment school environment, a harmonious parent-child relationship and close teacher-student relationship for children. The present article also put forward some advice with an innovative perspective like exercise more and received proper stress.

Keywords: memory development, prospective memory, working memory, children

1. Introduction

Memory is a cognitive process including information encoding, storing and retrieving about objective things. Memory is an important part of children's cognitive development that affects their daily life, interpersonal communication and study. The capacity of working memory, which is the capacity to store and manipulate information, is crucial for children's academic success [1].

Therefore, it's critical to pay attention to the memory development in children, especially when there are problems with their memory development. For example, working memory exercises may help kids with developmental language disorders in a recent study [2]. Both patients with Attention Deficit Hyperactivity Disorder (ADHD) and patients with mild to borderline intellectual disabilities have shown to benefit therapeutically from working memory training [3]. Therefore, it is significant to pay attention to the factors that influence children's memory development to create a suitable environment for their growth.

The biological variables like genetic factors that influence how effectively children's memories grow have been discussed further in previous studies, which said that genetic inheritance and the development of brain function would affect children's memory to some extent. However, the factors

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they concern about are not comprehensive enough. The current article concentrated more on the racial and socioeconomic issues, as well as the environmental factors of education, parenting styles, interparental conflict, and culture. In addition, it also talked about some individual differences, such as the associations with stress, exercise and the children's memory development, which have received little attention before.

So how to view the development of children's memory objectively? How to bring the positive side of these factors into play? What do these influences tell people about memory development in children? The answers to these concerns will be crucial to the research on how children's memories grow, and the goal of this review is to address these issues from a fresh angle and offer some advice with an innovative perspective.

2. Methods

Using the Google Scholar databases, a thorough search of the literature was conducted. The subjects were children, and the research is focused on memory development in children. The literature must include at least a factor affecting the development of memory in children. In addition, the literature must be published after 2018 to reflect the latest advances in the research field. "children's memory," "memory development," "memory," and "working memory" were among the search phrases (and their variations) entered in relation to this topic. In order to create a more thorough literature analysis, more research was also found in supplemental sources like Web of Science, and according to these inclusion criteria, studies were chosen.

3. Literature Review

A number of studies have found that there were a lot of factors that would influence children's memory. At first, there will talk about the relationship among working memory, prospective memory and children's memory development. The ability to temporarily store and process information that is relevant to a task is known as working memory [4]. Working memory is the base of new knowledge learning, a mechanism with a small storage capacity that processes information quickly [5].

The short-term storing of recent memories or memories that have been retrieved from long-term memory is known as working memory. These internal representations are temporary, but they can be actively maintained or trained to store information for long periods of time, and they can be exposed to a variety of operations that alter the information in a way that makes it useful for goal-directed behavior [6].

Prospective memory is the procedure involved in carrying out postponed intentions in the future [7]. Prospective memory is the skill that allows a person to recall what they want to do in the future. After coming across the planned event (event-based prospective memory), or after some time has passed and one is occupied with other continuing activities (time-based prospective memory), the intended action should be started. Since it is frequently necessary in daily life to properly carry out specified acts, prospective memory is essential for the growth and maintenance of independence over the course of lifetime [8].

3.1. Demographic Difference in Children's Working Memory

Numerous studies have linked social determinants of health, including race, parental education, and family wealth, to academic achievement, and these connections may be partially be explained by children's memory, particularly working memory, but these relationships may be complex.

The Adolescent Brain Cognitive Development (ABCD) study data were used in a study [9]. There were 10,418 children aged from 9 to 10 years old in the sample overall. The independent factors were household income, parental education, and race. Working memory was the main result, as determined

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by the NIH Toolbox Card Sorting Test. The confounders included age, sex, ethnicity, and parent's state of marriage. Mixed-effect regression models were employed to evaluate the data.

Working memory was different according to different parental education, household income, and race. When Black children are in comparison with White children, there was a weaker correlation between high parental education but not household income. Household income accounted for this varied parental education's effect on working memory. Working memory is generated differently based on race for American children depending on parental education. As a result, some of the anticipated benefits of parental education for Black families are lost. Also, it appears that Black children report having weaker working memory than White children, independent of how educated their parents are. The main reason for this inequality is the disparity in income between White and Black households with high levels of education. On the whole, although having more educated parents and affluent households was linked to having better working memory, they had less of an impact on Black children's working memory than on White children's. Parental education has a smaller impact on Black children's working memory than it does on White children due to income variations [9].

3.2. The Impact of Stress on Children's Working Memory

In another study, the researcher talked about the relationships between acute stress and working memory in children aged 8 to 15. Stress levels when performing a working memory activity have been extensively examined as a potential indicator of working memory in adults.

Researchers have used psychological stressors like the Trier Social Stress Test to manipulate stress [10]. This test refers to give a speech and completing mental arithmetic before objective judges. Saliva samples are frequently used in this research to quantify behavioral and physiological arousal levels. Research on stress and working memory in kids is also available. In contrast to acute stress, the majority of this study has concentrated on the connections between chronic stress, like prolonged hardship.

The study by Tsai et al.' explored the relationships between acute stress and working memory in young people at various developmental stages. The researchers investigated whether relationships between stress and working memory varied when only the inhibitory control aspect of working memory processes was taken into account. The results revealed subtle patterns that partially corroborated expectations but also suggested that young people have more nuance relationships between acute stress and working memory than adults.

In conclusion, the goal of Tsai et al.'s study was to discuss the connections between young people's acute stress and working memory and the results showed a number of fascinating trends, according to the findings. Several physiological systems that respond to stress were linked to changes in working memory processes, and both working memory enhancement and impairment emerged as a function of arousal. Their findings refute the conventional wisdom that stress affects working memory invariably negatively. Instead, the impacts can be age- and system-specific, depending on what drives arousal. More study is required to understand the complex and subtle relationships between stress and working memory in developmental contexts [10].

3.3. Environment, Prospective Memory and Memory Performance of Children

Another study found links between preschoolers' prospective memories and their first year of primary school, as well as between their parents' prospectives and those memories. Prospective memory is the skill that allows a person to remember to implement an intended activity at a specific future time [8].

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3.3.1. Schooling and Children's Prospective Memory and Working Memory

A study conducted with a event-based prospective memory task found that school participants performed better than preschool participants. The association between episodic memory and prospective memory performance was strong, and if the sample size had been larger, it is possible that fluid intelligence would also show a relationship. However, differences in event-based prospective memory between groups were not explained by episodic memory or fluid intelligence. The pattern of data disproves the alternative argument, according to which schooling rather than group differences in episodic memory and fluid intelligence account for the advantage of the school group, and instead shows how educational status affects event-based prospective memory. It is important to note that education was linked to greater performance on a particular activity that was not like the schoolwork that requires remembering to carry out a planned action, like taking all the possessions when the class is over and bringing the exercise books to school the next day. This shows that a school group benefit was linked to higher prospective memory skills as well as being more familiar with a particular sort of memory assignment [8].

School-related factors such as the teacher-student relationships not only have a relationship with children's prospective memory, but they also have a relationship with children's working memory. Recent study demonstrates that variables in the learning environment, such as the teacher-student connection, affect how well working memory tasks are performed [11]. Working memory issues can be explained by the attachment viewpoint, which is frequently used in studies of the interaction between teachers and students. This point of view contends that students who have positive affective relationships with their teachers, use the teacher as a safe anchor to explore the school setting. As a result, kids who have good teacher-student relationships are more likely to participate in engaging learning activities that will help the prefrontal cortex and some parts of working memory develop. Also, students who see the instructor as a safe haven will go to the teacher when they are in trouble, resulting in more effective stress management [11].

According to Ahnert et al.'s study, students who have positive relationships with their teachers exhibit more effective stress-regulatory behaviors. Stress has also been shown to have a deleterious impact on working memory, executive function, and prefrontal cortex growth and function. A good teacher-student relationship can have an impact on each of the three working memory components. Even though their underlying brain regions undergo significant changes and are most responsive to environmental stimulation, rapidly developing brain regions are more likely to be influenced, such as the central executive during the transition to the first grade.

A recent study by de Wilde et al. discovered a bidirectional association between children's performance on a task assessing the central executive at the age of 5-8 and the quality of the teacher-child interaction as assessed by the children. Cross-lagged models reveal that while warmth between the teacher and the student had a modestly favorable effect, disagreement in the relationship appeared to be especially damaging. The central executive component of working memory was found to correlate positively with observed responsive instruction and classroom management by Hamre et al. [12]. Working memory can therefore be enhanced by a conducive learning environment as well as by the teacher and particular students' favorable interpersonal interactions.

3.3.2. Parental Attitudes and Children's Prospective Memory

Also, the study found a distinct pattern of associations between parents' over-protectiveness and children's weaker prospective memory abilities for parents. The event-based prospective memory task performance was most consistently correlated with parental attitudes. The conclusion that fathers' high expectations for obedience were negatively correlated with prospective memory ability was not entirely unexpected because there is some evidence to suggest that such demands may impede

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children's abilities like self-regulatory strength. However, it came as a major shock because children with more tolerant fathers also had weaker prospective memories. If the sample size had been larger, moms might have revealed the same association. It is possible that very accepting parents steer clear of situations that can damage their relationship with their kids and are consequently less inclined to assign them difficult assignments that could lead to failure. Also, parents may over-assist in numerous daily chores while placing too little pressure on their kids out of a desire to encourage them and look out for their well-being. Children may thus have fewer opportunities to develop their cognitive skills, especially prospective memory.

For the first time, they discovered in the two studies the connection between early childhood prospective memory and schooling and parental attitudes. A well-controlled, lab-like prospective memory activity that explicitly measured prospective memory ability was found to favor school participants. Also, and once more in line with the assumptions, children of more excessively protective parents had worse event-based prospective memory than children of less excessively protective parents. These are all incredibly new discoveries that show how prospective memory is influenced by the environment on a regular basis. They contribute to the understanding of the elements influencing young children's potential memory, which has hitherto centered on the child's features and the prospective memory task. In particular, previous research's results may point to both a positive effect of practice for prospective memory development in early childhood and a negative effect of not receiving enough cognitive tasks [8].

3.3.3. Interparental Conflict and Children's Memory Performance

The idea that exposure to negative interparental conflict increases children's risk for a variety of adjustment issues, such as externalizing and internalizing symptoms or impaired social behavior, is supported by a sizable body of research. Previous studies have shown that children's protracted reaction to repeated interparental conflict disrupted a number of bodily functions (such as the respiratory sinus arrhythmia and the hypothalamic-pituitary-adrenal axis), which helped to explain the impacts on cognitive abilities [13].

Models of resource allocation used in cognitive neuroscience that contend that a single pool of resources limits human cognitive processing can also be used to explain why children exposed to interparental conflict have reduced cognitive function. Cognitive performance declines when there are too many distracting stimuli demanding resources. Threats to emotional security in the midst of destructive parent-child conflict may deplete a child's supply of cognitive resources, according to the EST framework, because increased reactivity brought on by emotional insecurity necessitates significant effort to control attention, affect, and behavior. Hence, the effort needed to reestablish security could come at the expense of kids' healthy cognitive development, such as their memory skills [14].

Through experimental experiments utilizing analogue designs, the author examines the allocation of cognitive resources in the context of interparental conflict. They discovered that children from homes with higher levels of conflict exhibited a larger propensity for false-positive memory errors using hostile language. Children from low-conflict homes distinguished between helpful and aggressive words more accurately. The purpose of the present review was to explore whether interparental conflict negatively affects children's performance in content- and modality-unrelated memory tasks, specifically the effect of verbal conflict on children's nonverbal memory of content unrelated to the conflict. In short, earlier research provides credence to the idea that kids who experience negative interparental conflict at home grow emotionally insecure, which, after being experimentally stimulated by simulated conflicts, may affect how well they remember things [15].

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3.3.4. Culture and Children's Memory Development

Social constructs influence memory. Depending on one's sociocultural background, a youngster may pay attention to and retain different information. They may also organize and recall their memories in different ways. The development of children's memories in a cultural setting was then emphasized [15]. One's ability to create and form memories is intrinsically linked to one's active self. Multidirectional, complex, and dynamic relationships are thought to exist between culture, self, and memory. In particular, Cooley's initial hypothesis that self-constructs depend on social context is true. People who live in mostly collectivist societies are more prone to create an interdependent self-view, while those who do so frequently do so by creating an independent self-view. Therefore, it makes sense to assume that young people from East Asia [15].

These studies have consistently revealed that the content, style, and specificity of children's autobiographical memories are significantly influenced by whether they are raised in a mostly collectivist or individualist culture. For instance, Han et al. asked Chinese, American, and Korean youngsters between the ages of 4-6 to describe recent and personal events that they had directly experienced. They discovered that compared to American children, children from China and Korea provided fewer temporal markers, descriptive and particular information. In addition, compared to their American counterparts, Asian participants' responses featured more details about other people and less about their interior states. Peterson et al. studied the memory of early memories of older Chinese and Canadian youngsters. In comparison to Chinese children, the results showed that Canadian children recounted early memories substantially more frequently and dated them earlier. In terms of memory content, Han et al. findings are consistent with the fact that Chinese children's memories are dominated by social-centered events, whereas Canadian children's reports are more predominately self-centered [7].

3.4. Exercise and Children's Memory Performance

Current research reveals that young children's memory function improves after just one physical activity session [16]. On several days, word recognition memory ability was tested before and after a 20-minute period of moderate walking (the maximum heart rate of 60%) or seated rest. When compared to sat rest, the study indicated that children's word recall performance was unaffected during walking. Besides, after walkin, a performance is given significant improvements in primary accuracy, compared to performance while walking and after a sat rest. Combined, these results show that short bouts of walking are more beneficial for memory enhancement than longer non-active rest intervals.

In the limited trials they have conducted in youngsters, researchers have demonstrated that a brief burst of physical activity had a positive impact on short-term memory performance.For instance, Pesce and colleagues compared children's word-list free-recall memory performance after aerobic circuit training and team sports in regular physical education classes to that of a third session that did not take place after a physical education class. They looked at immediate and delayed recall. Following the conclusion of team games, results for the first and last five words (e.g., primacy and recency items) demonstrated increased instantaneous free-recall ability in comparison to circuit training and the control condition.

4. Implications

Previous articles have talked more about the biological causes that influence the development of children's memory, but the present article focused more on demographic factors like race, parental education, and family wealth, as well as environmental factors like schooling, parental attitudes, interparental conflict and culture. In addition, it also talked about some individual differences, such

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as the relationship among stress, exercise and the development of children's memory. Therefore, prevent articles provide a more innovative and holistic perspective for people when it comes to children's memory development.

It also gives people many implications. Firstly, children's memory is influenced by many external factors like race, parental education, and family wealth. However, these factors cannot be changed by the children themselves. Therefore, people should take a more open and inclusive view of students' memory development. Secondly, some environmental factors like schooling, parental attitudes, interparental conflict and culture have an impact on the development of children's memory. This tells people that a patient, approachable and easy-going teacher can not only let the relationship between teachers and students become closer but also promote children's memory development. Furthermore, this suggests that teachers should pay attention to the teacher-student relationship. As parents, they should create a good family atmosphere and not argue in front of the children. In addition, cultural factors also play a big role. The article covered general distinctions between East Asian and Western society in terms of values and beliefs, and the culture of society is not determined by people, so people cannot control this variation. This inspires teachers to teach students according to their aptitude and the cultural environment they grow up. Thirdly, stress is also an important factor when it comes to memory. It suggests that proper and moderate stress can promote children's memory development. For example, when children are memorizing texts or knowledge points, they should do it in a limited time and give the right amount of pressure. Finally, it suggest that physical activity has a good impact on short-term memory function. Therefore, students should be given enough time to do some exercise or exercise the day before the test moderately.

5. Conclusion

The biological factors that influence children's memory development have received more attention in previous articles, but the current article placed more emphasis on racial and economic demographic factors, as well as environmental factors like parenting styles, culture, and interparental conflict. Additionally, it discussed how stress, exercise, and children's memory development are related. The current article implies that people should pay attention to a comprehensive perspective of children's memory development, for it is influenced by many factors, including demographic factors, environmental factors and some individual differences like how they react in stressful situations and their exercise situation. Therefore, schools, parents and children themselves should work together to create a good environment for children to achieve growth. Meanwhile, there is no single measure of memory development in children.

The advantages of the current article are that it summarizes some classical views and research ideas from existing research results, and the factors that affect the development of children's memory are discussed roundly and systematically. Moreover, based on the future development trend, innovative reviews and improvement measures are extracted. As a result, the prevent essay offers a more creative and all-encompassing viewpoint for people when it comes to the memory formation of children. The drawbacks of the current article are as follows. Firstly, the range of subjects needs to be expanded, it only talked about prospective memory and working memory in children, and other types of memory are not taken into account. Secondly, the age range of the subjects is not uniform. Some are elementary school students, some are middle school students, and some do not say clearly how old the children are. Thirdly, the factors that influence children's memory have not been fully discussed, so the mining of influencing factors needs to be further explored.

It is hoped that later scholars can explore a wider variety of children's memory types, like long-term, short-term, declarative, program, explicit and implicit memory. In addition, the age of children should be in the same range. So that it can circumvent some differences in memory development as children grow up. Furthermore, later scholars should deepen the excavation of influencing factors

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like genetic factors and biological factors, this will make the review more comprehensive and systematic.

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