








Review Article

Narrative review on the relationship between toxic stress and occupational performance in early childhood

Revisión narrativa sobre la relación entre estrés tóxico y desempeño ocupacional en la primera infancia

Revisão narrativa sobre a relação entre estresse tóxico e desempenho ocupacional na primeira infância

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Abstract

Introduction: Early childhood is a crucial stage for human development during which the environment significantly influences brain formation and functioning. Adverse experiences during this period can trigger toxic stress, which in turn may hinder the achievement of developmental milestones. **Objective:** This study aims to describe the main adverse childhood experiences that lead to toxic stress in children aged 0 to 6 years, also considering their implications for mental health and occupational performance. **Method:** A narrative review was conducted using the databases Web of Science, EBSCO, Scopus, and Psychology Database. Ten relevant articles were selected for analysis. **Results:** The search revealed that poverty, child violence, and discrimination are the three most common adverse experiences generating toxic stress. Additionally, protective factors that can mitigate the impact of these adverse experiences, thereby strengthening childhood resilience, were identified. Among these factors, positive parenting characteristics stand out as the primary protective element. **Conclusion:** Although a direct relationship between toxic stress and occupational performance was not found in the reviewed literature, it is concluded that the latter is indirectly affected because of its connection with mental health and child development – key aspects of participation in daily activities. This underscores the importance of expanding

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research in the field of occupational therapy, as it can significantly contribute to the promotion and prevention of mental health in childhood.

Keywords: Stress, Psychological, Mental Health, Occupational Therapy.

Resumo

Introdução: A primeira infância é uma etapa crucial para o desenvolvimento humano durante a qual o ambiente influencia significativamente a formação e o funcionamento cerebral. Experiências adversas durante esse período podem desencadear estresse tóxico, o que por sua vez pode dificultar a realização dos marcos do desenvolvimento. **Objetivo:** O objetivo deste estudo é descrever as principais experiências adversas na infância que levam ao estresse tóxico em crianças de 0 a 6 anos, considerando também suas implicações na saúde mental e desempenho ocupacional. **Método:** Revisão narrativa utilizando as bases de dados Web of Science, EBSCO, Scopus e Psychology Database. Dez artigos relevantes foram selecionados para análise. **Resultados:** A pesquisa revelou que a pobreza, a violência infantil e a discriminação são as três experiências adversas mais comuns que geram estresse tóxico. Além disso, foram identificados fatores de proteção que podem mitigar o impacto dessas experiências adversas, fortalecendo a resiliência infantil. Entre esses fatores, as características positivas da parentalidade destacam-se como o principal elemento protetor. **Conclusão:** Embora não tenha sido encontrada uma relação direta entre estresse tóxico e desempenho ocupacional na literatura revisada, conclui-se que este último é afetado indiretamente por causa de sua conexão com a saúde mental e o desenvolvimento infantil – aspectos relevantes da participação em atividades diárias. Isso destaca a importância de expandir a pesquisa no campo da terapia ocupacional, pois pode contribuir significativamente para a promoção e prevenção da saúde mental na infância.

Palavras-chave: Estresse Emocional, Saúde Mental, Terapia Ocupacional.

Resumen

Introducción: La primera infancia es una etapa crucial para el desarrollo humano, donde el ambiente ejerce una influencia significativa en la formación y funcionamiento cerebral. La presencia de experiencias adversas puede desencadenar estrés tóxico, lo que a su vez puede obstaculizar de los hitos propios del desarrollo infantil. **Objetivo:** El presente estudio tiene como objetivo describir las principales experiencias adversas en la infancia que provocan estrés tóxico en niños y niñas de 0 a 6 años, considerando también sus implicancias en la salud mental y el desempeño ocupacional. **Método:** Se realizó una revisión narrativa utilizando bases de datos como Web of Science, EBSCO, Scopus y Psychology Database. Se seleccionaron diez artículos relevantes para el análisis. **Resultados:** La búsqueda reveló que la pobreza, la violencia infantil y la discriminación, son las tres experiencias adversas más comunes que generan estrés tóxico. Además, se identificaron factores protectores que pueden mitigar el impacto de estas experiencias adversas, fortaleciendo la resiliencia infantil. Entre estos factores las características positivas de la crianza destacan como el principal elemento protector. **Conclusión:** Aunque no se encontró una relación directa entre el estrés tóxico y el desempeño ocupacional en la literatura revisada, se concluye que este último se ve afectado indirectamente debido a su conexión con la salud mental y el desarrollo

infantil, aspectos relevantes de la participación en actividades de la vida diaria. Lo anterior destaca la importancia de ampliar la investigación en el campo de la terapia ocupacional, ya que puede contribuir significativamente a la promoción y prevención de la salud mental en la infancia.

Palabras clave: Estrés Psicológico, Salud Mental, Terapia Ocupacional.

Introduction

“Early childhood is the stage of life that covers the period from gestation to 6 years of age” (Ortiz et al., 2010), it is here where relevant developmental events take place, such as physical growth and cognitive, psychosocial, emotional, behavioral and psychological development. These changes, according to Zeanah et al. (2018) are directed by genetics and brain development, with synaptogenesis (formation of neural connections) occurring during the first years of life, allowing communication and coordination of neural functions. Thus, the brain undergoes accelerated development, particularly in the cerebral cortex and, although these synaptic connections proliferate rapidly during childhood, the creation and maintenance of connections depend on experiences, the living environment, the physical and social substrate (Manrique & Henny, 2017). In this way, the brain can be modified in its structure through social, family, cultural, school environments, etc. That is, “[...] social circumstances, experiences, and relationships shape and reshape brain and body development, especially in early childhood, with resulting effects on later educational and occupational achievement, as well as health” (McEwen & McEwen, 2017).

During early childhood, boys and girls develop the ability to adapt to the demands of each environment, also known as plasticity. Regarding the above, McEwen & McEwen (2017) mention that “recent neuroscientific research on brain development and plasticity makes it clear that social environments play an important role in the formation and development of the brain,” therefore, the environments in which plasticity takes place can be both favorable and unfavorable for it. There are determinants in the environment that influence the development of boys and girls, which can generate experiences that trigger different types of stress. First, it is possible to find “*positive stress*”, which in the right amount and with the adequate support of an adult can be beneficial. According to Carballo (2017), specific stressors help children to generate the necessary tools to solve problems, focus attention and face different circumstances and challenges.

On the contrary, if there is constant exposure to one or more adverse childhood experiences (ACEs), that is, persistent exposure to stressors such as abuse or domestic violence, without adequate support from an adult, these experiences become harmful and hostile, developing a “*toxic stress*” response, which occurs continuously and sustained, since it is caused by chronic, repeated or accumulated social conditions (Carballo, 2017). In this way, boys and girls have difficulties both in reaching developmental milestones and in shaping brain structure; “[...] if the presence of chronic positive behavior, such as parenting, can affect children's brains, it is reasonable

to expect that chronic negative parental behavior, such as physical punishment, can also affect the brain” (Gershoff, 2016).

The first 6 years of life are “[...] a significant period for development, [as] the brain shows greater sensitivity to environmental factors, including ‘stressors’” (Bright & Thompson, 2017). It is at this stage where autonomy, language, play, along with significant learning for occupational performance (OP) are established, so “[...] early intervention, enriched environments, contexts that provide positive experiences, will nourish the child's brain and benefit its development” (Acuña, 2021). From occupational therapy, evaluating occupational performance in a comprehensive way allows establishing a framework for action in which the prevention and intervention of occupational disorders that can last throughout life can be favored (Manrique & Henny, 2017).

Therefore, early intervention is key to addressing the challenges that arise in development and even identifying childhood pathologies to give them early and therefore more effective treatment (Acuña et al., 2020, as cited in Acuña, 2021). However, there is no clarity about how factors that generate adverse experiences and determine a toxic stress response affect children’s OP, so it is relevant to carry out a literature review, with the aim of understanding and establishing the relationship between ACEs, the toxic stress response that they generate in mental health and OP during childhood, given the impact that intervening at this stage from occupational therapy would have. Thus, the question that guided the narrative review is how does toxic stress affect the occupational performance of children between 0 and 6 years old?

Methodology

To achieve the proposed objectives, a narrative review was carried out which obtains specific conclusions around a research question, resulting in a novel contribution by the authors (Vanwee & Banister, 2016, as cited in Salinas, 2020). This research was carried out between the months of October and November 2021. A search for academic articles was carried out in the following databases: Web of Science, EBSCO, Scopus and Pshycology basa data. The search engines were: Toxic stress, childhood, children, child, violence, abuse, adverse experience.

The inclusion criteria for the text themes were:

- Parenting styles;
- Parental stress that impacts child development;
- Physiological response of toxic stress on the child's central nervous system;
- Adverse experiences experienced in childhood;
- Toxic stress associated with domestic violence and child abuse;
- Toxic stress and its relationship with socioeconomically disadvantaged environments.

Therefore, the exclusion criteria used were articles on toxic stress focused on pharmacology, chemistry or biology, Covid-19, pregnancy, breastfeeding, armed conflicts, war and politics. Articles published between 2016 and 2021 were considered, and in two searches the search was limited to Spanish and English.

In the first instance, a bibliographic search was carried out individually, yielding a total of 78 texts, of which each member of the research team reviewed the titles, keywords and summaries of the corresponding individual searches. Considering the inclusion criteria, a pre-selection was made and a total of 19 texts were obtained, which were distributed for full reading. Finally, 10 were used to write this article. Most of the articles that met the search criteria are in English (Table 1).

Table 1. Selection of texts.

Searching engine	Results found	Revised texts	Selected texts
Web of Science (WOS)	15	6	3
SCOPUS	8	2	2
EBSCO	43	6	1
Digital Library of the University of Chile	4	2	2
Psychology Data Base	8	3	2
Totals	78	19	10

Results

Three categories were constructed based on the selection of the 10 articles for the presentation of results: a) Main adverse experiences in early childhood b) Toxic stress, mental health and protective factors c) Effects of toxic stress and child development; which are discussed in more detail below.

Main adverse experiences in early childhood

Based on the developed review, it is defined that the main adverse experiences that generate toxic stress in children from 0 to 6 years old are poverty, child violence and discrimination.

Poverty

Poverty is a multidimensional phenomenon that can be translated into objective factors, such as the lack of resources to satisfy basic needs for survival, or subjective factors, [such as] deprivation of social participation due to gender-related issues (Caus, 2021).

In this way, according to Zeanah et al. (2018) poverty is included within the social and environmental conditions that contribute to toxic stress.

The relationship between poverty and toxic stress, as Jani (2013) points out, is mainly due to the priorities that fathers, mothers, male or female caregivers have in relation to the basic needs of the child, giving more importance to economic obligations, such as work and money for food than to health care and education, because in an unfavorable context, subsistence is prioritized. This creates little or no buffering protection, provided by stable and responsive relationships between parents and caregivers towards children, which promotes “poor parenting practices” (Gómez, 2019).

Therefore, “[...] poverty itself does not cause physical neglect. Instead, it is the caregiver’s stressful reaction to poverty that causes physical neglect” (McEwen & McEwen, 2017).

Childhood violence

According to Hillis et al. (2017), childhood violence is “[...] a range of humiliations suffered by children, including physical, sexual and emotional forms of abuse, neglect or negligent treatment, exploitation or maltreatment, as well as witnessing violence between adults, often between their own parents”. For the purposes of this article, violence against children was subdivided into direct and indirect violence.

a) Direct violence

It is characterized by direct and constant violence against children, which according to Fernández et al. (2019) can be classified into physical abuse, sexual abuse, emotional abuse and negligent treatment, which ends up causing serious harm to children. For the purposes of this article, the concept of child abuse will be used as a synonym for direct violence. Fernández et al. (2019) defines abuse as follows. First, “*physical abuse*” is conceptualized as the aggression intentionally caused by parents, mothers, or caregivers, causing injuries to the children’s body. Second, “*emotional abuse*” is the aggression towards the emotional development of the child, generating conflicts, which can be internal or with others, and emotional frustrations/traumas, which can be short or long term. As a third definition, “*negligent treatment*” is any privatization of essential and basic elements necessary for harmonious and full development. Lastly, “*sexual abuse*” is considered a moment of trauma for children who are victims, therefore, it can cause high levels of post-traumatic stress disorders, behavioral problems, and dissociation problems, placing them in a situation of victimization among their peers in the future.

b) Indirect violence

Understood as *domestic violence*, which is understood as any type of abuse that is exercised between adults in the family relationship, being physical, sexual or psychological (Fernández et al., 2019). For Fernández et al. (2019), this type of violence is an ACE that alters the intra-family relationship generating trauma in children, since seeing violence between adults implies an imbalance of power between the strongest and the weakest, with women, children and older people being the main victims. Therefore, violence exercised towards children can coexist and contribute to other forms of violence, such as, for example, gender violence⁽¹⁾. That is why, “domestic violence and child abuse are important social, public health and human rights problems” (Fernández et al., 2019). It should be noted that both types of violence do not only occur at home, but also in other environments such as school and the street (Hillis et al., 2017).

Racial-ethnic discrimination

Discrimination is a rather broad concept that is usually present in various aspects of life. The Royal Spanish Academy (Real Academia Española, 2023) defines it as the act of intentionally excluding individuals or groups, along with unequal treatment for racial, religious, political, sex, age, physical or mental condition, etc. reasons. In accordance

with the above and based on the results of the bibliographic search, different types of discrimination to which boys and girls are exposed are distinguished, within which the most common is racism due to ethnic origin, which, if maintained for long periods of time, can be related to a poor mental health status (Condon et al., 2019).

Toxic stress, mental health and protective factors

The literature that addresses the response to toxic stress in relation to pathologies in the area of mental health, mentions that changes are generated in the structure of the brain, such as; the “[...] loss of neurons and neural connections both in the hippocampus - a structure especially related to learning and memory processes - and in the prefrontal cortex, the neurological center of the main executive functions” (Carballo, 2017). These negative effects affect “[...] the neurobiological functioning of the brain, interrupting the development of brain circuits and increasing the levels of stress hormones, which affect the mental health [...] of the child” (Fernández et al., 2019).

ACEs and associated toxic stress predispose to risk of diseases and psychosocial problems, as they are directly related to the development of psychological problems and may lead to behavioral disorders, self-destructive behaviors, and mental health disorders. Gershoff (2016) mentions that exposure to stressful events such as physical punishment generates mental health disorders such as depression, anxiety, post-traumatic stress disorder, and addiction. With the above, it is determined that exposure to toxic stress during early childhood sets the stage for poor mental health outcomes throughout life (Condon et al., 2018), since structural changes in the brain of the prefrontal cortex in particular, as a result of toxic stress and its disorders associated with the harmful effects of the environment, have functional consequences. Such as; hyper activation of the amygdala, reduced emotional control and possible deficits, both executive and relational memory, establishing a relationship between response to toxic stress and poor mental health, given the wearing effect produced in the central nervous system (Carballo, 2017).

On the other hand, although there is a diversity of stressors, it is important to highlight the existence of protective factors, which consist of characteristics and behaviors that safeguard the mental health of children, since they are relevant to prevent and dampen toxic stress. Thus, types of positive behaviors from the parents, mothers, caregivers, such as giving words of encouragement, providing support and participating in play, are crucial aspects in the development of children when dealing with stressors (Condon et al., 2018). Thus, the characteristics of parenting are closely related to the strengthening of resilience (ability) in children, since the provision of emotional support and strong family cohesion make it easier to face various adversities (Garner & Yogman, 2021). The same authors point out that having stable, safe and enriching relationships can reverse the negative impact triggered in children (Garner & Yogman, 2021).

The facilitating or hindering behaviors and characteristics in raising children are influenced by the experiences of parents and caregivers, since “[...] it is likely that the different parenting approaches are significantly influenced by parents' experience with toxic stress, as a result of their own childhood adversities” (McEwen & McEwen, 2017). Therefore, in more stressful environments for them, there is less protection for children from stressful environmental factors (McEwen & McEwen, 2017). Therefore, “[...] social structures, networks, and relationships are not only sources of adversities and

stressors, but can also help dampen the impact of stress or reverse its effects” (McEwen & McEwen, 2017).

Effects of toxic stress and child development

Since early childhood is the time for physical growth and the development of different skills that will allow the child to function in different environments (family, school, social, etc.), stimulation is a crucial aspect for the establishment of the different areas of development, such as cognition, motor skills, emotional development, language or the social area. Thus, the delivery and facilitation of stimulating activities and games during early childhood have been considered enriching for school success and early cognitive growth (McEwen & McEwen, 2017).

At the same time, child development is impacted and influenced by exposure to different ACEs, as mentioned by Zeanah et al. (2018), if “[...] the young developing brain experiences chronic threats, stress or adversity without ways to protect or buffer those effects, the mechanisms for building the brain can be affected with lifelong consequences for development”. It is also noted that the deterioration of children's development, particularly in the first three years of life, has a negative impact on the cognition and learning of approximately one in four children under five years of age worldwide (Zeanah et al., 2018).

On the other hand, “*poverty*”, and the living conditions that arise around it have an unfavorable impact, as it is detailed that the physical consequences of possible malnutrition in children cause them to be more irritable, have less energy, and be less responsive (Zeanah et al., 2018). Likewise, it is likely that if parents, mothers, or caregivers are malnourished, they will be unable to respond to the needs of the child in a sensitive, safe, and effective way. The authors point out that “[...] it is difficult, at best, to work with full productivity, raise a family, study, learn, or develop normally in the face of constant hunger” (Zeanah et al., 2018).

Furthermore, “*violence*” has repercussions on the mental health of children who are victims of it, as they are affected in various areas, such as the cognitive area, since it is evident that experiencing violence leads to a smaller brain volume (Gómez, 2019). Along the same lines, Fernández et al. (2019) indicate that domestic violence disrupts the brain development and brain circuits of children, generating immediate, deep and long-lasting negative effects. In this way, various authors affirm that such violence leads to alterations at the cognitive, language, emotional, physical and behavioral level, as well as consequences and alterations in mental health in the long term (Zeanah et al., 2018; Gómez, 2019; Fernández et al., 2019). Finally, “*discrimination*”, like the previous ACEs, generates serious repercussions on the development of children, as Condon et al. (2019) mention that racial discrimination can be a mechanism that impacts the health of the child population.

Discussion

From an occupational therapy perspective, OP is defined as “the achievement of the selected occupation as a result of the dynamic transaction between the client, his or her contexts, and the occupation” (Asociación Americana de Terapia Ocupacional, 2020).

In this sense, for children to achieve optimal OP, this transaction must be carried out in an environment that facilitates skills and opportunities for the exploration of various occupations that make it possible to achieve maximum potential, which would not be possible to find in a context permeated by ACEs. To achieve the performance of an occupation, not only environmental opportunities are required, but also certain skills that are configured in goal-directed actions and in a constant driver of new skills, skill processing, and interaction between skills (Fisher & Griswold, 2019). Under conditions where toxic stress occurs, according to the results of this review, the development of executive functions is particularly interfered with, which have mechanisms that are related to the functioning and coordination of mental processes involved in solving problems of social interaction, communication, affectivity and motivation (Becerra-García, 2015, as cited in Rodríguez-Martínez et al., 2021), enabling the development of social roles and participation in basic activities such as brushing teeth, instrumental activities such as order and cleanliness, to more advanced ones such as school (Luna et al., 2021).

Occupational performance (OP) refers to a dynamic and integrative state where the person is immersed in a set of activities and processes that make them capable of participating in their daily occupations (Luna et al., 2021). When analyzing the results from an occupational therapy perspective, it is possible to deduce that, due to toxic stress, the OP of boys and girls is affected in the different areas of occupation proposed by the American Occupational Therapy Association Framework (Asociación Americana de Terapia Ocupacional, 2020), such as; activities of daily living (ADL), instrumental activities of daily living (IADL), rest and sleep, education, play, leisure and social participation.

Going deeper into the areas mainly affected by toxic stress, rest and sleep are essential for growth and good development in childhood, since it is where the learning they acquire is consolidated, however, by being under a constant stressful situation, the child remains on continuous alert, since their immune pathways and brain signals are altered. Likewise, rest and restful sleep are crucial to support the healthy and active participation of children in other occupations (Asociación Americana de Terapia Ocupacional, 2020), so the approach is crucial and should prioritize the caregiver's perspective, considering changes in sleep routines and rituals considering the family's strengths and difficulties (Leive et al., 2024).

Along the same lines, play is one of the fundamental occupations for the development of boys and girls, through which not only is fun experienced, but, being stimulating, various skills and socio-cultural learning are acquired, providing enriching experiences in childhood. From this perspective, we can link the perception of health and well-being with the creation of routines, daily activities and the satisfaction experienced through play (Oyarzún et al., 2021) and playful experiences in daily dynamics at home. However, if these occupations are impaired and these facilitators are not available, for example, due to a lack of economic resources, prolonged exposure to stressors will negatively impact the development of skills and performance in daily activities.

In the first years of life, the brain is designed to receive attachment, this is how mothers, fathers or caregivers are configured as the main agents of socialization, in charge of providing the emotional bases for girls and boys to acquire skills and

competencies that allow them to function in society and face the various situations that may arise on a daily basis (Gallego et al., 2019). Therefore, the relationship between toxic stress and attachment is inevitable, since when the interactions between parents or caregivers, boys and girls are deficient, a parenting style is generated that cannot cover some of the physical, affective and emotional needs (Carballo, 2017), generating a greater risk factor for toxic stress. Given this, it is essential to promote protective factors in parenting styles in favor of full and healthy child development, where occupational therapy would be well positioned to help manage the daily lives of people with parenting problems (Germaine et al., 2021).

Conclusions

During the research, it was found that there is a small number of scientific articles that include occupational therapy concepts with the chosen topic, such as occupational performance and consequences due to toxic stress. Both ACEs and the lack of support and containment from parents, mothers, caregivers, and an unfavorable environment generate a toxic stress response. From this, it is concluded that OP in early childhood is affected, since the mental health and development of boys and girls are involved, aspects that are relevant for effective participation in daily life activities. Given this, it is possible to project occupational therapy actions from a preventive level to prevent boys and girls from experiencing some of the three ACEs described in the article. For example, at a national level, through public policies that promote respectful relationships, in order to avoid both social segregation, in the case of discrimination and poverty, and the daily representation of violence, both direct and indirect.

At the individual level, interventions should be carried out with families to reverse these difficulties in OP, addressing through education the different ACEs that trigger toxic stress and how these impact the development and respective OP of boys and girls, to achieve a promotion of positive parenting styles, as well as educating the family about the possible long-term consequences that are unfavorable for mental health and that can be reflected in adulthood. At this same level, as occupational therapists, it is possible to promote positive relationships within schools, to generate transversal support networks in the lives of boys and girls and then feel supported and integrated into society.

In relation to the consequences for research, this review shows the need to continue expanding spaces and fields of research on the consequences of toxic stress on children's OP, given that the first lines of said performance are drawn during early childhood. It is for this reason that continuing to address this issue from the profession will help it to continue to position itself with the potential to contribute to prevention and health promotion with a rights-based approach.

To conclude, as a work team, we highlight the importance of addressing toxic stress and mental health during early childhood from occupational therapy, in order to make visible the fact that there are everyday situations that can become adverse. Likewise, it is essential to work on this issue from a non-adult-centric perspective, understanding that children are subjects of rights and their integrity must be respected. In this sense, promoting parenting based on respect for their neurodevelopment is necessary for the mental health and well-being of children.

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Author's Contributions

Catalina Contreras Vergara, Belén Díaz Vargas, Belén Martínez Muñoz, Sebastián Pino Hueche and Nadia Urzúa Riveros participated in the study design, data collection, analysis of results and writing of the manuscript. María José Poblete Almendras and Pablo Olivares Araya participated in the design of the study and in the analysis of results. All authors approved the final version of the text.

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