

Family factors related to executive functioning in children with ADHD: a systematic review protocol

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Protocol

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Abstract

Background

Attention-deficit/hyperactivity disorder (ADHD) is the most common neurodevelopmental disorder diagnosed among children and adolescents. The axial symptom is a deficit in cognitive functioning, including executive functioning. Some studies have shown that the quality of executive functioning in children and adolescents with ADHD is modified by some characteristics of the family environment.

Methods

The authors plan to conduct a systematic review in accordance with the PRISMA guidelines. Searches will be carried out in electronic databases (PsycINFO, PsycARTICLES, and PubMed) and in the bibliography of identified publications. Relevant studies will be selected by using keywords and taking into account the inclusion and exclusion criteria. The analysis will be performed using a specially design data spreadsheet. These activities will be carried out under appropriate methodological rigor to minimize the risk of bias.

Discussion

Conducting a systematic review will provide an opportunity to describe the current research on the topic. This action will allow us to summarize the knowledge from the published results. Possible gaps will be identified, and future directions for research projects in this field will be proposed.

Systematic review registration

PROSPERO CRD42021246496

Background

Attention-deficit/hyperactivity disorder (ADHD) is the most common neurodevelopmental disorder. The axial symptom is cognitive difficulties, manifested by the occurrence of pervasive and impairing hyperactivity, impulsivity or inattention (American Psychiatric Association, 2013). Children with ADHD are easily distracted and have problems with concentration and patience (Barkley, 2015; Brown, 2009; Millichap, 2010). Therefore, it is relevant to note that the disorder manifests mainly in impaired cognitive functioning.

One of the areas of impaired cognition in children with ADHD is deficits in executive functioning, which are mental processes responsible for the organization and course of the sequence of complex cognitive activities, e.g., strategic planning, maintaining commitment to action, resisting distractors, and flexible management of the course of activity (Barkley, 2002, 2013). In contrast to simple functions, such as attention and memory, the complex processes of executive functioning require coordinating many activities, which allow the successful completion of the action (Pennington, Ozonoff, 1996). Therefore, it

seems that having a set of skills to properly conduct the activity is useful, and these skills are helpful in overcoming the limitations in the effectiveness in the performance during activities that involve executive functioning.

Many researchers point to the relationships between the features of relatives and the subsequent effects on the quality of functioning in children (Baker, Wise, Kelley & Skiba, 2016; Gerstein, Crnic, 2018; Gottfried, 2013). Family factors are especially important in children with various disorders, such as ADHD (Foley, 2011; Forssman, Eninger, Tillman, & Rodriguez & Bohlin, 2012; Pheula, Rohde & Schmitz, 2011). The aetiology of this disorder is multifactorial; it is believed that ADHD is primarily caused by genes (Barkley, Fischer, Smallish & Fletcher, 2002; Biederman, 2005), but the course can be modified by the environment (Breux, Brown & Harvey, 2017; Martel, Nikolas, Jernigan, Friderici & Nigg, 2012). Although it is clear that parents' behaviour does not directly cause ADHD, many factors may shape a specific way of coping with deficits connected with neurodevelopmental disorders (Paidipati, Deatrck, 2015; Mikami, Jack, Emeh & Stephens, 2010). It seems interesting to consider what family factors could correspond to adaptation or maladaptation in fulfilling various life roles in children with ADHD.

It is quite important to define the limit of the environmental impact on a child who has a genetic predisposition to worse performance in activities requiring efficiency in cognitive processes. While some limitations are innate, others may be significantly modified under the influence of family factors (Pennington et al., 2009). The social environment may help compensate for deficits by encouraging individuals to learn to control themselves in moments of lost concentration, to develop coping strategies related to impulsiveness and to appropriately target hyperactivity to minimize its negative impact on key areas of life (Dale et al., 2021). These competences are acquired by the child not only through the intentional actions of the parents. The overall picture of the domestic situation may be important, and the parents' mental health, parenting stress, parenting behaviours towards children and between spouses, attachment style in the family, organization of life and other conditions of the family environment should be taken into account (Martin, Papadopoulos, Chellew, Rinehart, Sciberras, 2019).

The authors did not find an up-to-date systematic review that provides a comprehensive evaluation of the research on this topic. Many publications are focused on the interaction of family factors and the general quality of functioning in children and adolescents with attention-deficit/hyperactivity disorder. The examined variables are therefore very general and concern the overall characteristics of life with the disorder (Paidipati, Deatrck, 2015). It is worth paying attention to the systematic review focused on parental coping strategies in dealing with ADHD symptoms in a child (Craig et al., 2020). The publication provides information on the feedback reaction of parents in response to the problematic behaviour of children. A meta-analysis of research on the effect of a parental intervention directed at a child with ADHD on parenting stress was also noted (Theule, Cheung & Aberdeen, 2018).

These publications have provided knowledge regarding the interrelationships between environmental factors and the intensity of all symptoms associated with attention-deficit/hyperactivity disorder. However, none of the systematic reviews emphasized the essence of executive functioning as a specific

area of functioning in children with the disorder. The authors believe that this is a key sphere in the functioning of people with ADHD, and it has not been comprehensively described in the abovementioned scientific reports.

The aim of this systematic review is to determine in what context researchers have studied the interactions of family factors with the quality of executive functioning in children with attention-deficit/hyperactivity disorder.

The activities of the authors will focus on the following research question: 'What is known about the family factors influencing executive functioning in children with attention-deficit/hyperactivity disorder (ADHD)?' The following detailed research questions will be asked:

1. Which family factors have been explored by researchers as relevant conditions regarding executive functioning in children with attention-deficit/hyperactivity disorder (ADHD)?
2. What are the methods of diagnosing attention-deficit/hyperactivity disorder (ADHD) in children used by researchers in the context of exploration of family factors and executive functioning?
3. What are the measurement methods of executive functioning in children with attention-deficit/hyperactivity disorder (ADHD) used by researchers in the context of an exploration of family factors?

Objectives

The first objective of this systematic review is to present family factors related to the quality of executive functioning in children with ADHD. This task will be performed in a systematic way, enabling the collection of reliable data and minimizing the risk of bias. The value of this action will be identifying the characteristics of factors that coexist with a quality of cognitive performance in tasks involving executive functioning.

The secondary objective is to provide a synthetic summary and formulate conclusions about the interactions between the features of the home environment and the selected area of cognition in children with ADHD. Answering research questions would highlight potential spheres for therapeutic work that have psychological impact on the families addressing these issues.

Methods

The systematic review will be performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021). This protocol was written in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) principles (Shamseer et al., 2015). The authors have registered the protocol in the International Prospective Register of Systematic Reviews (PROSPERO) database (CRD42021246496).

Criteria for selecting studies for this review

Types of studies

Publications that will be included in the systematic review must comply with the eligibility criteria.

The authors will analyse studies that meet specific inclusion criteria. We will be identifying original empirical research papers published without time limits. We will consider studies in all languages, provided that the basic information (title, keywords or abstract) is in English. These studies must be about the relationship between family factors and executive functioning in children and adolescents aged 3–18 with ADHD symptoms assessed by a professional, teacher or caregiver.

Exclusion criteria have also been established. The authors of the systematic review will not consider any secondary research, meta-analyses or case studies. Review articles and letters to the editorial office that do not raise new scientific issues will be excluded. Publications with descriptions of children under 3 years of age with other neurodevelopmental disorders will be rejected. Environmental impacts cannot focus on conditions other than family factors.

Types of participants

The participants of the study will be children from 3 to 18 years old who develop symptoms of attention-deficit/hyperactivity disorder (ADHD) based on medical diagnosis from a specialist or an assessment of the severity of symptoms using standardized tests completed by parents, caregivers or teachers. A preliminary review of relevant publications has shown that researchers are interested in the occurrence of symptoms of this disorder from the age of 3. For this reason, the authors decided to include children younger than the suggested age of diagnosis of the disorder according to the diagnostic classifications DSM-5, ICD-10 and DC: 0–5, which is the age of 4 (Lipowska, 2019).

In addition to the children and adolescents, the participants of the studies will also be their families. The features of relatives and people playing an important role in the process of raising a young person are of interest to us. It is therefore worth noting that they will also be participants in the studies.

Types of exposure

In the collected scientific articles, the authors will search for data on specifics of the family environment. It is assumed that family factors can be considered risk factors or protective factors in an individual's development. Family factors may be measured with standardized psychological tools or may result from the group qualification in the presented study (e.g., SES).

Types of outcome measures

The main outcomes will be family factors that shape the children's or teenagers' upbringing environment, which creates the conditions for development and teaching them to cope with developmental deficits or adversely affecting the ability to properly perform cognitive activities. The authors of this systematic review are interested in what factors may coexist with particular levels of executive functioning in young people.

The secondary outcomes, which were explored in detail by the authors of the original research studies, will include children's executive functioning measured with standardized psychological tools or assessed by a parent, caregiver or teacher with a questionnaire rating the level of performance in tasks requiring the use of competences related to this cognitive domain.

Search methods for the identification of relevant studies

The reviewers will look for publications that meet the eligibility criteria in the materials included in the bibliographic databases, focused on research related to psychology and related fields. PsycINFO, PsycARTICLES, and PubMed will be used for this purpose. The bibliographies of appropriate articles will also be scanned.

The search strategy will follow the methodological rigor proposed by the PRISMA statement (Page et al., 2021). Two authors of the review will find publications meeting the inclusion and exclusion criteria by browsing their titles and abstracts. Selected keywords will be used for this purpose:

1. 'ADHD' OR 'Attention deficit hyperactivity disorder' OR 'ADD' OR 'Attention deficit disorder' OR 'Hyperactive children';
2. 'Cognitive functioning' OR 'cognitive functions' OR 'cognitive disfunctions' OR 'cognitive development' OR 'cognitive outcomes';
3. 'Family functioning' OR 'family factors' OR 'family structure' OR 'family organization' OR 'parent functioning'.

In the next step, the reviewers will compare the results. Abstracts and full-text articles will be imported into Mendeley software to remove duplicates. Finally, critical analysis of the collected materials will follow.

Data collection and analysis

If the publication meets all the inclusion and exclusion criteria, it will be included in subsequent analyses. After the publication is accepted for systematic review, the authors will proceed to conduct a thorough check of the important data contained in the article.

The publications will be analysed by completing the prepared data extraction spreadsheet, which will contain the following details of the study:

1. **Basic information:** title, authors, year;
2. **Research sample** (children with ADHD): age, gender, sample size;
3. **Study design:** observational, descriptive, cohort, case-control and cross-sectional studies;
4. **Types of family factors** included in the research;
5. **Methods of diagnosis:** family factors, executive functioning, ADHD.

Collected information will be synthesized by a narrative summary. The authors will note the number of publications addressing the topic, as well as the questions the researchers asked before starting this systematic review.

The authors of the systematic review will use the well-known and recommended framework summarizing the level of confidence in the presented research – Grading of Recommendations Assessment, Development and Evaluation (GRADE; Balshem et al., 2013), which will assess the quality of scientific evidence.

Risk of bias in individual studies

The authors are aware of the obligation to minimize the risk of bias in individual studies while making a systematic review. The activities will respect important principles:

1. Publications searching, analysing and data synthesizing will be repeated by two authors to compare the results of the work and consider possible differences.
2. The data will be sorted by using a specially designed data extraction form, which will enable the monitoring of the results.
3. The data synthesis process will be blinded.

The risk of bias will be reduced by following a strict methodology, inspired by the principles of creating systematic reviews in line with PRISMA statement.

Discussion

The systematic review will be published when the procedures and data extraction are completed. The authors believe that the review will provide knowledge and allow for a synthetic summary of the current studies on the impact of family factors on the level of executive functioning in children with attention-deficit/hyperactivity disorder. Conducting such a review will provide an opportunity to identify the gaps, irregularities and research directions for the future. It is also worth highlighting the extremely practical nature of the planned work by emphasizing the possibility of taking specific actions for families and children with ADHD. This knowledge could contribute to increasing the awareness of therapists working with families of children with the disorder, saving the time of practitioners searching for publications connected with the topic. There is therefore much hope that the planned systematic review will be very useful.

Abbreviations

ADHD

Attention-deficit/hyperactivity disorder

DSM-5

Diagnostic and Statistical Manual of Mental Disorders – 5th edition

ICD-10

International Statistical Classification of Diseases and Related Health Problems – 10th version.

DC

0–5: Diagnostic Classification of Mental Health and Developmental Disorders of Infancy

Declarations

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Availability of data and materials

Not applicable.

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Authors' contributions

ML is responsible for conceptualization of the protocol with an involvement of all authors. MR and ML wrote the protocol draft. BI and KSW provided valuable tips on supplementing the content of the protocol. All the authors approved the final manuscript.

Ethic approval and consent to participate

Not applicable.

Consent for publication

All authors have consented to publication.

Competing interests

The authors declare no conflict of interests.

References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington: American Psychiatric Association Publishing; 2013.
2. Baker TL, Wise J, Kelley G, Skiba RJ. Identifying barriers: Creating solutions to improve family engagement. *School Community Journal*. 2016;26(2):161–84.
3. Balshem H, Helfand M, Schünemann HJ, Oxman AD, Kunz R, Brozek J, ... Guyatt GH. GRADE guidelines: 3. Rating the quality of evidence. *J Clin Epidemiol*. 2011;64(4):401–6.

4. Barkley RA, Fischer M, Smallish L, Fletcher K. The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *J Abnorm Child Psychol.* 2002;111(2):279–89.
5. Barkley RA. Distinguishing sluggish cognitive tempo from ADHD children and adolescents: Executive functioning, impairment and comorbidity. *Journal of Clinical Child Adolescent Psychology.* 2013;42:161–73.
6. Barkley RA. Attention-Deficit Hyperactivity Disorder. A Handbook For Diagnosis And Treatment. New York–London: The Guilford Press; 2015.
7. Biederman J. Attention-deficit/hyperactivity disorder: A selective overview. *Biol Psychiat.* 2005;57:1215–20.
8. Brown TE. ADHD comorbidities: Handbook for ADHD complications in children and adults. London: American Psychiatric Publishing, Inc.; 2009.
9. Breaux RP, Brown HR, Harvey EA. Mediators and moderators of the relation between parental ADHD symptomatology and early development of ADHD and ODD symptoms. *J Abnorm Child Psychol.* 2017;45:443–56.
10. Craig F, Savino R, Fanizza I, Lucarelli E, Russo L, Trabacca A. (2020). A systematic review of coping strategies in parents of children with attention deficit hyperactivity disorder (ADHD). *Research in Developmental Disabilities, 98.*
11. Dale C, Parent J, Forehand R, DiMarzio K, Sonuga-Barke E, Long N, Abikoff HB. (2021). Behavioral Parent Training for Preschool ADHD: Family-Centered Profiles Predict Changes in Parenting and Child Outcomes. *Journal of Clinical Child & Adolescent Psychology, 1–14.*
12. Foley M. A comparison of family adversity and family dysfunction in families of children with attention deficit hyperactivity disorder (ADHD) and families of children without ADHD. *Journal for Specialists in Pediatric Nursing.* 2011;16(1):39–49.
13. Forssman L, Eninger L, Tillman CM, Rodriguez A, Bohlin G. Cognitive functioning and family risk factors in relation to symptom behaviors of ADHD and ODD in adolescents. *Journal of Attention Disorders.* 2012;16(4):284–94.
14. Gottfried AW, editor. Home environment and early cognitive development: Longitudinal research. London: Academic Press; 2013.
15. Gerstein ED, Crnic KA. Family interactions and developmental risk associated with early cognitive delay: Influences on children’s behavioral competence. *Journal of Clinical Child Adolescent Psychology.* 2018;47(1):100–12.
16. Lipowska M. Zaburzenia neurorozwojowe w najnowszych klasyfikacjach: DSM-5, ICD-10 i DC:0–5 – zmiany w diagnozie dzieci. Lublin: Presentation during the XXII Kongres Polskiego Towarzystwa Neuropsychologicznego; 2019.
17. Martel MM, Nikolas M, Jernigan K, Friderici K, Nigg JT. Diversity in pathways to common childhood disruptive behavior disorders. *J Abnorm Child Psychol.* 2012;40(8):1223–36.

18. Martin CA, Papadopoulos N, Chellew T, Rinehart NJ, Sciberras E. Associations between parenting stress, parent mental health and child sleep problems for children with ADHD and ASD: Systematic review. *Res Dev Disabil*. 2019;93:103463.
19. Mikami AY, Jack A, Emeh CC, Stephens HF. Parental influence on children with attention-deficit/hyperactivity disorder: I. Relationships between parent behaviors and child peer status. *J Abnorm Child Psychol*. 2010;38(6):721–36.
20. Millichap JG. Attention deficit hyperactivity disorder handbook: A physician's guide to ADHD. Springer Science & Business Media; 2010.
21. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, ... McKenzie JE. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ: British Medical Journal*, 372.
22. Paidipati CP, Deatrack JA. The Role of Family Phenomena in Children and Adolescents With Attention Deficit Hyperactivity Disorder. *Journal of Child Adolescent Psychiatric Nursing*. 2015;28(1):3–13.
23. Pennington BF, Ozonoff S. Executive functions and developmental psychopathology. *J Child Psychol Psychiatry*. 1996;37:51–87.
24. Pennington BF, McGrath LM, Rosenberg J, Barnard H, Smith SD, Willcutt EG, ... Olson RK. Gene × environment interactions in reading disability and attention-deficit/hyperactivity disorder. *Dev Psychol*. 2009;45(1):77.
25. Pheula GF, Rohde LA, Schmitz M. Are family variables associated with ADHD, inattentive type? A case–control study in schools. *European Child Adolescent Psychiatry*. 2011;20(3):137–45.
26. Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M. ... PRISMA-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ: British Medical Journal*, 349, 7647.
27. Theule J, Cheung K, Aberdeen K. Children's ADHD Interventions and Parenting Stress: A Meta-Analysis. *Journal of Child Family Studies*. 2018;27(9):2744–56.