

Research project

Development and preliminary validation of a screening battery for the presence of attention deficit hyperactivity disorder in adults

Theoretical background

Attention deficit hyperactivity disorder (ADHD) is a chronic condition, which emerges relatively early in childhood and is persistent over development, with potentially serious impact on adult life (Wilens & Dodson, 2004). It involves approximately 4% of the population worldwide (Faraone et al., 2003) and 2.8% of the population in Italy (De Graaf et al., 2008).

Literature recommends an accurate assessment of the evolution of ADHD symptoms from childhood to adulthood, but adult ADHD often remains undiagnosed. The difficulties in the assessment of adult ADHD are due to various factors. The diagnostic interview is the core of the diagnostic assessment but must be complemented by information from other sources such as rating scales, neuropsychological assessment and clinical observation, and the presence of ADHD symptoms before age 12 must be confirmed by a family member who has known the patient before this age (Kooij et al., 2019). Another issue relates to the cognitive impairment that characterizes these patients, such as impairment of executive functions, mainly in working memory (Alderson et al., 2013; Fabio & Capri, 2017).

DIVA interview (Kooij & Francken, 2010) is the most used tool for the diagnosis of ADHD in adults. However, it takes a very long time to be completed by both patients and relatives and is not suitable in healthcare settings, where short self-reported scales are preferred (Goodman, Surman, Scherer, Salinas, & Brown, 2012). Moreover, only few screening tests are available in Italian and most of them only include the essential ADHD symptoms based on DSM criteria without any items on potential comorbidities or cognitive impairments (e.g., ASRS-V1.1; Adler, Kessler, & Spencer, 2003).

Aims and Hypotheses

The study aims to develop and preliminarily validate a short self-report battery for the screening of ADHD, related cognitive impairments, and potential comorbidities in adults. We expect that such a screening tool will be able to:

- 1) detect the presence of ADHD with adequate sensibility and specificity using the DIVA interview as a criterion;
- 2) discriminate ADHD patients from healthy controls as regards ADHD symptoms and related cognitive impairments;
- 3) identify symptoms of potential comorbid conditions most frequently seen in ADHD patients, as to recommend a further in-depth investigation;
- 4) show good preliminary psychometric characteristics like structural and criterion validity and reliability.

Methods

Participants and sample

Adults with ADHD ($n = 100$), one relative for each of them, and a sample of healthy controls ($n = 100$) will be enrolled. The relative must have known the patient and be able to retrieve information on their behaviors between the age 5-12 years.

Patients and their relatives will be recruited from the associations of families with ADHD members (e.g., AIFA Onlus) at a national level. Healthy controls will be recruited through social networks and selected based on the sociodemographic characteristics (i.e., gender, age, and educational level) of the patient group. Inclusion criteria will be age > 18 years for both groups and a diagnosis of ADHD for the patient group. Controls should not report any psychopathological diagnosis.

Tools

Each participant will complete the battery online. General demographic characteristics will be collected. A question on received psychopathological diagnosis will be included to select both patients and controls. The battery will include items on: ADHD symptoms according to the DSM-5 criteria, cognitive impairments characteristics of ADHD and main comorbid disorders. ADHD participants and their relatives will be invited to the DIVA interview (Kooij & Francken, 2010).

Development of the battery

A thorough examination of the literature will be conducted to retrieve all available information on:

- 1) measures of ADHD in adults;
- 2) screening tests for cognitive impairments in ADHD;
- 3) main short self-reports for the screening of comorbid psychopathological conditions frequently observed in ADHD adults.

The items to be included in the battery will be discussed within a panel of 10 national experts using a Delphi method (Dalkey & Helmer, 1963). It will be discussed whether: the content of each item is representative of a-priori defined constructs; the formulation of each item adheres to the criteria for the formulation of an adequate set of items; the answer format is appropriate and helps measuring the desired constructs as continuous variables. After a three-round discussion, an online survey will be submitted to panel experts to collect their judgements in a quantitative form and compute inter-rater agreement for each item.

Procedure

Three researchers will select a large number of items and 10 experts will evaluate them using a Delphi method to select the final item pool. The obtained battery will be inserted online with Qualtrics. A link to the battery will be posted on the ADHD associations websites and various social networks to recruit non-ADHD participants. The ADHD patients and their relative will then take part to a DIVA interview.

Statistical analyses

Inter-rater agreement between experts in the Delphi process will be measured by intraclass correlation coefficients. Preliminary item analysis will be performed to select an appropriate set of items. Factor analysis will be used to test for the battery construct validity and Cronbach's alpha will be computed to assess reliability. Criterion validity will be tested using the DIVA interview for convergent validity in the ADHD patient group. Discriminant validity will be tested by analysis of variance between ADHD patients and controls. Sensibility and specificity will be calculated using ROC curves with results of the DIVA interview as a criterion.

Declaration of commitment to request ethical approval

All the procedure will follow the Declaration of Helsinki and approval will be applied to the Bioethical Committee of the University of Bologna.

Expected results and implications

We expect to obtain a short self-report battery to be used in both research and clinical practice for the screening of ADHD in Italian adults. It would be a relatively short, easy to use and non-time-consuming tool. In clinical practice, such a tool may have great usefulness, as it would provide the clinicians with reliable information on the patient's ADHD symptoms, cognitive impairments, and potential comorbidities at the same time, and may help them identify the patients who deserve a further in-depth clinical examination. The use of the tool in research could help estimating the incidence of ADHD persistence in adulthood and clarify protective and risk factors of adult ADHD. It may also advance current understanding of the impact of ADHD on adults' life and the efficacy of specific recommended interventions.

Character count: 6,970

References

- Adler, L. A., Kessler, R. C., & Spencer, T. (2003). *Adult ADHD self-report scale-v1.1 (ASRS-v1.1) symptom checklist*. New York, NY: World Health Organization.
- Alderson, R. M., Kasper, L. J., Hudec, K. L., & Patros, C. H. (2013). Attention deficit/hyperactivity disorder (ADHD) and working memory in adults: A meta-analytic review. *Neuropsychology, 27*(3), 287–302.
- Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management Science, 9*(3), 458-467.
- De Graaf, R., Kessler, R. C., Fayyad, J., ten Have, M., Alonso, J., Angermeyer, M., ... & Haro, J. M. (2008). The prevalence and effects of adult attention-deficit/hyperactivity disorder (ADHD) on the performance of workers: Results from the WHO World Mental Health Survey Initiative. *Occupational and Environmental Medicine, 65*(12), 835-842.
- Fabio, R. A., & Capri, T. (2017). The executive functions in a sample of Italian adults with ADHD: Attention, response inhibition and planning/organization. *Mediterranean Journal of Clinical Psychology, 5*(3).
- Faraone, S. V., Sergeant, J., Gillberg, C., & Biederman, J. (2003). The worldwide prevalence of ADHD: Is it an American condition?. *World Psychiatry, 2*(2), 104-113.
- Goodman, D. W., Surman, C. B., Scherer, P. B., Salinas, G. D., & Brown, J. J. (2012). Assessment of physician practices in adult attention-deficit/hyperactivity disorder. *The Primary Care Companion for CNS Disorders, 14*(4), PCC.11m01312.
- Kooij, J. J. S., Bijlenga, D., Salerno, L., Jaeschke, R., Bitter, I., Balazs, J., ... & Stes, S. (2019). Updated European Consensus Statement on diagnosis and treatment of adult ADHD. *European Psychiatry, 56*(1), 14-34.
- Kooij, J. J. S., & Francken, M. H. (2010). *The diagnostic interview for ADHD in adults*. Den Haag, The Netherlands: The Diagnostic Interview for ADHD in Adults (DIVA) Foundation.
- Wilens, T. E., & Dodson, W. (2004). A clinical perspective of attention-deficit/ hyperactivity disorder into adulthood. *The Journal of Clinical Psychiatry, 65*(10), 1301–1313.

Plan of activities

Project activities: literature review, battery development, Delphi study, data collection and analysis, writing of papers to be submitted to international scientific journals and dissemination at national/international congresses.

Training activities: during the whole period, the post-doc researcher will be trained in ADHD assessment, Delphi method and statistical procedures for psychometric testing.

Timing of activities: Month 1: literature review and item selection; Month 2: Delphi study and preparation of the online battery; Months 3-10: data collection and interviews of patients and relatives; Month 11: statistical analyses; Month 12: dissemination of results: according to the various steps of the study, two papers will be prepared and submitted to international scientific journals, one concerning the literature review and the development of the tool, and one concerning the psychometric characteristics of the battery.

Feasibility of the project: the project is highly feasible and involves low risks. The tutor, the cotutor and the components of their research groups have expertise in psychometric methods used for validation. The software for the statistical analyses have been already acquired. The project will involve a large cohort of participants, however, because of active formal contacts between the research group in Psychometrics and the associations of families with ADHD members, the project feasibility will be assured.

Character count: 3,498

Coherence with or more themes of the project of excellence

The proposed research project aims to develop and preliminary validate a self-report tool to be used in research as well as in clinical practice for the screening of ADHD symptoms, related cognitive impairments and potential comorbidities in adulthood. The need for such a project comes from the evidence that ADHD symptoms, which usually emerge in childhood, continue to impair functioning, well-being and health-related quality of life in adulthood. However, the literature highlights a recurrent lack of recognition of ADHD symptoms in adults by clinicians, along with the lack of adequate tools to assess them.

The availability of a valid and reliable screening battery for ADHD in adults may have a great usefulness in clinical practice, as it is expected to support clinicians in the differential diagnostic process as well as in the identification of potential comorbidities and cognitive impairments in ADHD. Such information is deemed essential to select the treatment strategies that are most appropriate for the patient. Furthermore, the use of the proposed tool has the potential to prevent underdiagnosis and underestimation of ADHD in adulthood. From a research perspective, its use would be important to finally obtain better estimates of the incidence and protective and risk factors of ADHD persistence in adulthood. It may also expand current knowledge on both the impact of ADHD on adults' life and the efficacy of specific interventions recommended to reduce such impact. This new knowledge, in turn, might guide the development and study of innovative strategies to prevent the multiple intrapersonal and interpersonal difficulties faced by ADHD adults. Altogether, the aims and expected implications of the proposed research project perfectly fit the scientific objectives of the Departments of Excellence development project and are closely linked to the thematic area 1 "Health and Well-Being". Specifically, the present research project is oriented towards the acquisition of new knowledge and intervention possibilities in: 1B) development of cognitive and socio-emotional processes for adaptation and learning and new risk and protective factors in typical and atypical development populations, and 1C) stress factors and coping capacities, new lifestyles, psychological well-being, conceptualized as a protective factor against mental and somatic disorders, in clinical and nonclinical contexts and ageing.

Coherent with subtheme 1B), we aim to contribute to a better assessment of symptoms, potential comorbidities and cognitive impairments in the atypical development population of ADHD adults, which might provide new knowledge on protective and risk factors of ADHD persistence in adulthood. Coherent with subtheme 1C), we aim to provide clinicians with a valid and reliable tool to assist them in the diagnostic process and treatment selection, whereas the use of this tool in research might offer new knowledge on the intrapersonal and interpersonal life domains that are more negatively affected by ADHD in adulthood, as to guide the development of tailored interventions to support their psychological well-being.

Character count: 3,204