BABEȘ BOLYAI UNIVERSITY
FACULTY OF PSYCHOLOGY AND EDUCATIONAL SCIENCES
DOCTORAL SCHOOL – PSYCHOLOGICAL
ASSESSMENT AND EVIDENCE-BASED PSYCHOLOGICAL INTERVENTIONS

Ph.D. THESIS

BEHAVIOR PROBLEMS IN CHILDREN AND ADOLESCENTS: PARENTAL MECHANISMS AND ONLINE PARENTING INTERVENTIONS

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CLUJ-NAPOCA 2022

ACKNOWLEDGMENTS

Firstly, I express my gratitude towards my scientific advisor, Professor Anca Dobrean, Ph.D. I have very much appreciated her valuable scientific input and guidance and, above all, her kindness, patience, and empowerment. Professor Dobrean has truly made my Ph.D. stage an enjoyable experience. My thanks also go to Professor Daniel David, Assistant Professor Costina Păsărelu, Assistant Professor Diana Nechita, and all members of the Department of Clinical Psychology and Psychotherapy for their valuable suggestions and scientific input that contributed to the quality of this thesis. Likewise, I would like to thank my colleagues from the Doctoral School of Psychological Assessment and Evidence-Based Psychological Interventions for their insightful comments and friendship. In this regard, I would especially like to thank Ionuț Milea, whose support and friendship made my Ph.D. stage easier. I want to thank my girlfriend for her love and support that have given me the state of mind to finish this thesis. Above all, my deepest gratitude goes to my parents, my grandmother (Stela), and my brother. Without their sacrifices, I would not have gone this far.

Notes. _____

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7.02.2022 FLOREAN IONUȚ STELIAN

The studies, part of this thesis, are published or under review as follows:

A. Published articles:

- **Florean, I. S.**, Dobrean, A., Păsărelu, C. R., Georgescu, R. D., & Milea, I. (2020). The Efficacy of Internet-Based Parenting Programs for Children and Adolescents with Behavior Problems: A Meta-Analysis of Randomized Clinical Trials. Clinical Child and Family Psychology Review. https://doi.org/10.1007/s10567-020-00326-0 (IF: 3.43; Q1)
- **Florean, I. S.**, Dobrean, A., & Roman, G. D. (2021). Early adolescents' perceptions of parenting practices and mental health problems: A network approach. Journal of Family Psychology. https://doi.org/10.1037/fam0000919 (IF: 2.69; Q1)
- **Florean I. S.**, Dobrean A., Balazsi R., Roșan A., Păsărelu C. R., Predescu E., & Rad F. (2022). Measurement invariance of Alabama Parenting Questionnaire (APQ) across age, gender, clinical status, and informant. Assessment. https://doi.org/10.1177/10731911211068178 (IF: 4.66; Q1)

B. Article under review

- **Florean I. S**., Anca D, and Balazsi R. (2022). From parenting self-efficacy to externalizing problems of children and adolescents: the mediator role of parent stress and inconsistent discipline. Family Process (IF: 3.53; Q1)

C. **Conferences:**

- **Florean I. S.**, Dobrean A., Balazsi R., Roșan A., Păsărelu C. R., Predescu E., & Rad F. (2021, Noiembrie) Invarianța de măsurare în funcție de vârstă, gen, status clinic și evaluator a scalei Alabama Parenting Questionnaire (APQ). [Prezentare orală in simpozion] A XIV-a Conferință Națională a Asociației Psihologilor din România (APR; Psihologie și Tehnologie: Conectați la Viitor), Online, România.
- **Florean I., S.**, Dobrean A., Roman G., D. (2021, September) Parenting Practices and Adolescents' Mental Health Problems: a Network Approach [Open Paper]. European Association for Behavioural and Cognitive Therapies (EABCT 2021), Belfast, United Kingdom.
- **Florean I., S**. & Păsărelu R., C. (2019, July) The Mediator Role of Interpersonal Emotion Regulation Between Couple Satisfaction and Intrapersonal Emotion Regulation, Attachment Style, and Cognitive Empathy [Poster Presentation]. 9th World Congress of Behavioural & Cognitive Therapies (9th WCBCT), Berlin, Germany.
- **Florean I.**, S. & Păsărelu R., C. (2019, September) Can couple satisfaction be enhanced through a brief online Rational Emotive Behavior Therapy-based intervention? [Open paper]. The 4th International Congress of Rational Emotive Behavior Therapy (4th ICREBT), Cluj-Napoca, Romania.
- **Florean I., S.** & Dobrean A. (2019, Noiembrie) Eficiența intervențiilor de parenting online: o meta analiză. [Prezentare orală in simpozion] A XIII-a Conferință Națională a Asociației Psihologilor din România (APR Re-StartPlus), Cluj-Napoca, Romania.
- **Florean I., S.** & Dobrean A. (2019, Septembrie) Investigarea intervențiilor de parenting online în reducerea problemelor de externalizare la copii și adolescenți. [Prezentare orală] Conferința Consorțiului Universitaria, București, România

D. The following article is not part of the thesis, but it was published during the doctoral stage.

- **Florean, I. S.**, & Păsărelu, C. R. (2019). Interpersonal Emotion Regulation and Cognitive Empathy as Mediators Between Intrapersonal Emotion Regulation Difficulties and Couple Satisfaction. Journal of Evidence-Based Psychotherapies, 19(2), 119–134. https://doi.org/10.24193/jebp.2019.2.17 (Impact factor 0.31, Q3)

Contents

Keywords: behavior problems; parenting practices; parent stress; parenting self-efficacy; online parenting interventions; Alabama Parenting Questionnaire; measurement invariance; network analysis; inconsistent discipline

CHAPTER I THEORETICAL BACKGROUND

1. Externalizing problems in children and adolescents

Externalizing problems include conduct problems, oppositional-defiant problems, and attention deficit/hyperactivity problems (American Psychiatric Association, 2013). The intensity of these problems is on a continuum from minor problems to diagnosable externalizing disorders (Holland et al., 2017). Conduct disorder (CD) could be the most serious externalizing disorder, as children with this diagnostic are often implicated in antisocial behaviors or serious violations of rules (American Psychiatric Association, 2013). Oppositional defiant disorder (ODD) is often seen as a precursor to conduct disorder, and children with this disorder have serious problems complying with the rules established by adults (American Psychiatric Association, 2013). Attention deficit / hyperactivity disorder (ADHD) is characterized by the presence of persistent patterns of inattention and/or hyperactivity (American Psychiatric Association, 2013). The prevalence of CD is 4% (American Psychiatric Association, 2013, p. 473), of ODD is 3.3% (American Psychiatric Association, 2013, p. 464), and of ADHD is 5% (American Psychiatric Association, 2013, p. 61). The consequences of externalizing disorders could be severe in both the long- and short-term (Erskine et al., 2016; Leadbeater & Ames, 2017; Riley et al., 2016). The factors involved in the onset and perpetuation of externalizing problems are multiple, ranging from genetic predisposition (Azeredo et al., 2018; Salvatore & Dick, 2018) to environmental factors (Lavigne et al., 2012; Murray & Farrington, 2010; Thapar et al., 2013). Perhaps the environmental factors of the highest clinical importance are those related to parenting (Pinquart, 2017).

Parental variables that were consistently found to be important in the development and persistence of behavioral problems are parenting practices, parenting self-efficacy, and parent stress (Crnic & Ross, 2017; Pinquart, 2017; Shelton et al., 1996). The relationship between these parental variables and externalizing problems of children is transactional (they reciprocally reinforce each other in a loop) (Belsky, 1984; Belsky et al., 2000). Furthermore, the relationship between parenting practices, parenting self-efficacy, and parent stress is also transactional (Coleman & Karraker, 2003; Crnic & Ross, 2017; Heath et al., 2015; Mouton et al., 2018).

Realizing the crucial role of parental factors in the onset and perpetuation of behavioral problems, several parental interventions were designed to reduce externalizing problems in children and adolescents (McNeil, 2010; Sanders, 2012; Webster-Stratton, 2001). Among the interventions with the most empirical support might be Triple P (Sanders, 2012), Incredible Years Parent Interventions (Webster-Stratton, 2001), and Parent-Child Interaction Therapy (McNeil, 2010, p. 3). The effectiveness of these parental interventions was reflected in some meta-analyses (Menting et al., 2013; Sanders et al., 2014; Thomas et al., 2017). Some of the common elements of these interventions are the emphasis placed on parents learning to use more positive parenting practices (e.g., praise, rewards), less negative parenting practices (e.g., inconsistent discipline, harsh punishment), and effective strategies to deal with child misbehaviors (e.g., logic consequences, time-out) (McNeil, 2010; Sanders, 2012; Webster-Stratton, 2001). Although these parental programs are effective in reducing child behavioral problems, few children and adolescents with mental disorders ever receive

treatment (Lawrence et al., 2015; Merikangas et al., 2011; Whitney & Peterson, 2019). Barriers that prevent parents from accessing specialized support for their children are multiple (Reardon et al., 2017). Some of these barriers relate to parents' knowledge and attitudes about mental health problems of children and mental health services providers (Reardon et al., 2017). Other barriers are related to accessibility of mental health programs in terms of cost, location, and time (Reardon et al., 2017).

Online parenting programs have the potential to overcome some of the barriers of classical interventions and increase the percentage of children and adolescents with mental health disorders who receive treatment (Baumel et al., 2016; Flujas-Contreras et al., 2019). Specifically, online parenting programs could overcome time, location, language, cost, and stigma barriers (Baumel et al., 2016; Flujas-Contreras et al., 2019). Online parenting programs could be delivered as self-guided programs (Day & Sanders, 2018) or by psychotherapists (e.g., videoconference) (Comer et al., 2017). Self-guided programs have the advantage over therapist-directed ones of being less costly and accessible 24/7 (Day & Sanders, 2018). The effectiveness of technology-based parenting programs was shown in several meta-analyses (e.g., Baumel et al., 2016; Flujas-Contreras et al., 2019). These meta-analyses found small to moderate effect sizes for the effectiveness of technology-based parenting programs in improving both the outcomes of children and parents (Baumel et al., 2016; Flujas-Contreras et al., 2019; Spencer et al., 2019; Thongseiratch et al., 2020).

Measurements are at the core of psychotherapy and psychological research. In order to reach the correct conclusions regarding the effectiveness of one intervention or about the relationship between certain psychological variables, instruments with adequate psychometric properties are needed (Crocker & Algina, 1986). In order to make a valid comparison between groups, measurement invariance across those groups must be established (Drasgow, 1984; Putnick & Bornstein, 2016). Measurement invariance indicates whether an instrument measures the same latent variable in different groups (Horn & Mcardle, 1992). Measurement invariance is usually assessed in the framework of Structural Equation Modeling (Putnick & Bornstein, 2016).

To develop more effective interventions, fundamental research is necessary to better understand the interaction between variables. A new and promising approach that could bring a better understanding of the interaction between parenting practices and child behavioral problems is the network approach (Borsboom & Cramer, 2013; Schmittmann et al., 2013). In this new framework, psychological constructs are viewed as dynamic systems of interacting elements, and the focus is moved from complex constructs to components such as behaviors, thoughts, and emotions (Borsboom & Cramer, 2013; Bringmann & Eronen, 2018; Schmittmann et al., 2013). The network approach also comes with a new set of statistical tools designed to explore the dynamic interaction of variables (Epskamp et al., 2018; Jones et al., 2019; van Borkulo et al., 2017).

We have identified four main caveats in the literature. First caveats refer to the examination of the effectiveness of online parenting programs via meta-analyses (Baumel et al., 2016; Flujas-Contreras et al., 2019; Spencer et al., 2019; Thongseiratch et al., 2020). Specifically, previous meta-analyses that inquired about the effectiveness of online parenting programs often had methodological drawbacks that precluded drawing solid conclusions about the effectiveness of online parenting programs in reducing externalizing problems of children and adolescents and improving parental outcomes. Furthermore, they have not included interventions delivered via videoconference.

The second main drawback regards the measurement of parenting practices. Specifically, APQ is one of the most widely and comprehensive instruments used to measure parenting practices (Hurley et al., 2014; Shelton et al., 1996). Furthermore, the psychometric properties of APQ have been extensively researched (Hurley et al., 2014). Despite this, we identified that the factor structure of APQ-lg (child global report) has not been confirmatory examined. Several alternative models were proposed for APQ-lg (Cubas et al., 2013; Esposito et al., 2016), but these models had not been confirmatory examined and were not compared with the original model of APQ-lg. Finally, the measurement invariance of APQ-lg and APQ-9 has not been comprehensively researched across the age, gender, and clinical status of children, nor across informants (parent vs. child report).

The network approach could facilitate an in-depth study of the relationship between parenting practices and child mental health problems (Schmittmann et al., 2013). Although network theory is in accord with the theorized dynamic nature of the relationship between parenting practices and the mental health of children, no study leveraged the strengths of the network approach to map the interaction between parenting practices and children's mental health problems. This is a limitation, as the network approach comes with new statistical tools (Epskamp et al., 2018; Jones et al., 2019) that could provide a more appropriate description (compared to the static approach) of the dynamic between parenting practices and emotional and behavioral problems of children and adolescents.

Finally, inconsistent discipline, low parenting self-efficacy, and parent stress were shown to have a detrimental effect on externalizing problems of children and adolescents (Albanese et al., 2019; Amrock & Weitzman, 2014; Pinquart, 2017; Wojnaroski, 2011). The paths that connect these variables with each other and to the mental health outcomes of children have not been studied until now. This is important because clinical and practical advances could be stimulated by conducting such studies.

CHAPTER II. RESEARCH OBJECTIVES AND OVERALL METHODOLOGY

The scope of this thesis was to advance the understanding of the interaction of parental variables such as parenting practices, parent stress, and parenting self-efficacy with externalizing problems of children and adolescents. In this endeavor, three major objectives were pursued. The first major objective was to assess the effectiveness of online parenting programs in reducing externalizing problems in children and adolescents and in improving parental outcomes (i.e., parenting practices, parent stress, and parenting self-efficacy). The second main objective was to examine the psychometric properties of the Alabama Parenting Questionnaire (APQ) in a Romanian sample of children and parents. The third major objective pertains to fundamental research of the relationship between parental variables (parenting practices, parent stress, and parental self-efficacy) and children's mental health problems (e.g., externalizing problems). This thesis is made up of four studies, and the schematic overview of the studies can be seen in Fig. 1.

Our first main objective was pursued by conducting a systematic review and meta-analysis of randomized clinical trials (RCT) that aimed to examine the effectiveness of online parenting programs (**Study 1**). In this regard, we had several objectives. Firstly, we sought to provide a solid answer on how effective parenting programs are in reducing externalizing problems in children and adolescents. We included only those RCTs that aimed to reduce externalizing problems in children or adolescents with elevated levels of behavior problems.

Therefore, RCTs that aim to improve the mental health of children and adolescents in general were not considered. Likewise, RCTs that included healthy children or children with other mental health problems than externalizing problems were not included. In the systematic review, we sought to provide a detailed description of the characteristics of online parenting programs. According to our objective, we examined and described the protocols for each included intervention. The meta-analysis had two main directions. Firstly, our objective was to quantify the effectiveness of online parenting programs compared to a waiting list. Second, our objective was to quantify the effectiveness of online parenting programs compared to non-technology-based interventions. To have a nuanced understanding of the effectiveness of these interventions, we also conducted several sensitivity and moderation analyzes. Therefore, our aim was to identify the main factors that modulate the effectiveness of these interventions. Examples of these factors are the age of the children, the number of modules, the type of intervention (i.e., self-guided interventions with or without specialized support), and the educational level of the parents.

Our second objective was to investigate the psychometric properties of APQ-lg (the long form of the scale) and APQ-9 (the short form of the scale) (**Study 2**). In this endeavor, we had several objectives. Firstly, we estimated the original factor structure of APQ-lg, and we also specified four alternative models, based on prior research. We compared the original model of APQ-lg with the concurrent models to find whether the alternative models were better representations of the data. Secondly, we examined the measurement invariance of APQ-lg across the age, gender, and clinical status of the children, as well as across informant (parent vs. child report). Third, we compared latent means across the investigated groups (i.e., age, sex, clinical status, and informant) to find whether the differences found in the literature are supported by comparison of latent means. Similar directions were followed for APQ-9. Specifically, we examine the statistical plausibility of the factor model of APQ-9. The measurement invariance of APQ-9 across age, sex, clinical status, and informant was investigated, and the latent means of the groups were compared.

In **Study 3**, our objective was to identify new possible intervention targets for parenting programs that aim to reduce mental health problems in children. We used a novel and promising methodology in this regard, namely, the network approach. In this endeavor, we had several specific objectives. Firstly, we estimated the network at the level of the APQ items. At this step, we identified the most influential nodes (parental behaviors as described by the APQ items) from the model of parenting practices. Furthermore, we sought to pinpoint the nodes that had the strongest influence outside of the community to which they belonged (i.e., domains of parental practices such as positive parenting). We did so by computing the centrality indices (e.g., strength, closeness) and the bridge centrality indices (bridge strength, bridge expected influence). Secondly, our goal was to identify the main paths through which parenting practices and mental health problems of children influenced each other. According to this objective, we computed the bridge centrality indices between the domains of parenting practices (i.e., positive parenting, parental involvement, inconsistent discipline, and corporal punishment) and the mental health problems of children (e.g., conduct problems, oppositional defiant problems, ADHD problems). This direction was important because, according to network theory, by intervening on nodes with high bridge centrality, one could prevent the contagion between two networks. Finally, we pursued to find whether the dynamic from within the parenting practices construct and the interaction of parenting practices with children's mental health problems is different across the gender of children. We pursued this objective, as this analysis could provide information on whether parenting programs could target the same behaviors in children and parents (to reduce the mental health problems of children), regardless of the gender of children.

In **Study 4**, our objective was to test the statistical plausibility of a theoretical model that considers the entanglement of parenting self-efficacy, parent stress, and inconsistent discipline with externalizing problems of children. More clearly, we tested the statistical plausibility of a model in which the relationship between parenting self-efficacy and externalizing problems of children is sequentially mediated by parent stress and inconsistent discipline. Furthermore, our objective was also to identify the impact of parenting self-efficacy with respect to the pandemic context on parent stress, inconsistent discipline, and externalization problems.

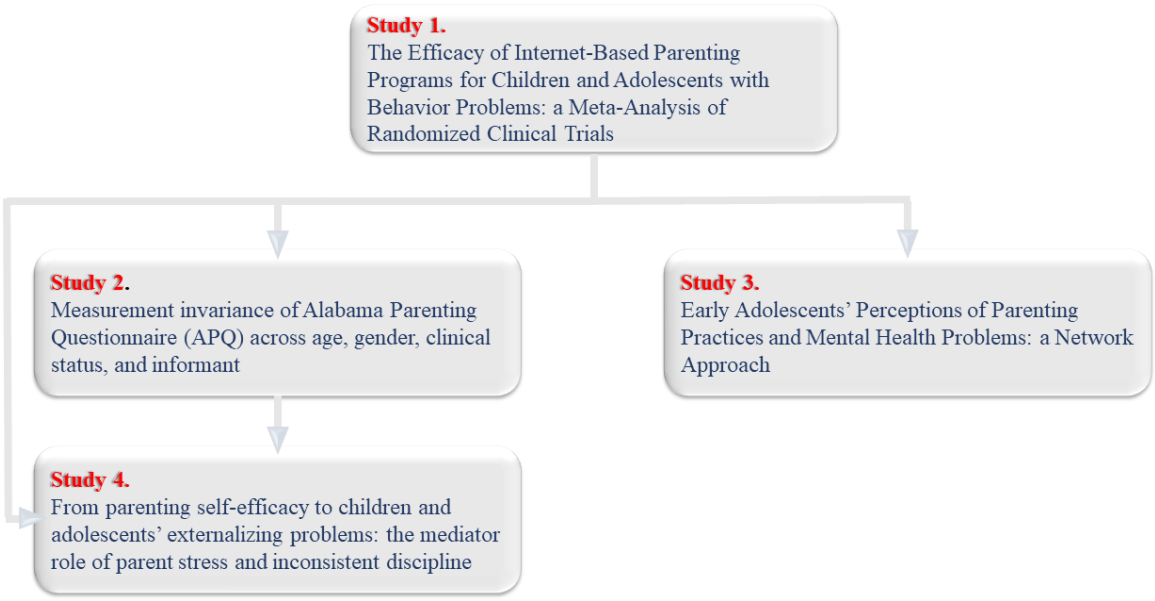

Fig. 1 The schematic overview of the studies from the present Ph.D. thesis

III. ORIGINAL RESEARCH

Study 1. The Efficacy of Internet-Based Parenting Programs for Children and Adolescents with Behavior Problems: a Meta-Analysis of Randomized Clinical Trials[1]

1.1. Introduction

The efficacy of online parenting interventions is supported by both single studies (Breitenstein et al., 2016; Sourander et al., 2016) and some meta-analyses (Baumel et al., 2016; Flujas-Contreras et al., 2019; Spencer et al., 2019; Thongseiratch et al., 2020). Baumel et al. (2016) showed that technology-based parenting interventions have a small to moderate effectiveness in reducing behavior problems in children with disruptive behaviors. Flujas-Contreras et al. (2019) found that online parenting interventions (irrespective of whether they target the mental or physical health of children) are effective for parent outcomes (self-efficacy – small effect size, parent stress – large effect size, parent knowledge – moderate

[1] This study was published such as: Florean, I. S., Dobrean, A., Păsărelu, C. R., Georgescu, R. D., & Milea, I. (2020). The Efficacy of Internet-Based Parenting Programs for Children and Adolescents with Behavior Problems: A Meta-Analysis of Randomized Clinical Trials. Clinical Child and Family Psychology Review. https://doi.org/10.1007/s10567-020-00326-0

effect size). Spencer et al. (2019) indicated that online parenting programs have moderate effectiveness in reducing behavior problems and small effectiveness in increasing positive parenting and reducing parent stress. Thongseiratch et al. (2020) reported that online parenting programs are effective (small effect size) in reducing both behavior problems and internalizing problems in children, as well as in reducing mental health problems in parents.

Besides drawing some interesting conclusions, these meta-analyses have a number of worth mentioning limitations. In the meta-analysis of Baumel et al. (2016), 4 out of 7 RCTs test online parenting interventions, but there are no separate analyses for their effectiveness. Likewise, their search is limited to 2015.

Flujas-Contreras et al. (2019) analyzed solely the parent outcomes (i.e. parent knowledge, parent distress, and parent self-efficacy). No separate analyses were made for parents' outcomes based on children symptomology (e.g. behavior problems) and parenting behavior was not considered at any point.

In the meta-analysis conducted by Spencer et al. (2019), the effect sizes for parent outcomes (e.g. positive parenting) and children outcomes (e.g. behavior problems) were pooled by combining studies with different aims and on different populations (e.g. children with traumatic brain injury, autism spectrum disorder, and behavior problems). Although they answer how effective online and web-based parenting programs are in reducing behavior problems in general, they do not answer how effective these interventions are when they are specifically designed and used for children with behavior problems.

Similar limitations were found in the meta-analysis published by Thongseiratch et al. (2020). They included 12 studies with samples of 12 years old or younger. The same analysis combined studies with different control groups (i.e. online interventions, not-technology-based intervention, waitlist), on different populations (i.e. healthy children, children with Traumatic Brain Injury, children with behavior problems, parents with Bipolar Disorder). Moreover, they included a study in which only 42% of the sample received an online intervention (Porzig-Drummond et al., 2015) and one in which behavior problems were not the main target of the intervention (Hedges and Hedberg 2007). Additionally, they did not consider parenting behavior at any point and no follow-up measures were included.

This meta-analytical review aims to investigate how effective online parenting programs are in reducing behavior problems for children and adolescents. In addition, we assessed the effectiveness of these interventions on parenting outcomes. The characteristics of the interventions, samples, and measurements were coded in order to be presented in the systematic review, as well as for performing analyses of moderation, sensitivity, and meta-regression.

1.2. Method

1.2.1. Protocol

The present meta-analysis has been carried out in line with the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement (Moher et al., 2009). The protocol for the present meta-analysis was pre-registered in PROSPERO (PROSPERO 2019 CRD42019142133).

1.2.2. Inclusion Criteria and Exclusion Criteria

The studies were eligible if the participants were the parent/s of children (under 18 years old) with elevated or diagnosed behavior problems and the main focus of the intervention was to reduce their levels of externalizing problems. The intervention was delivered online, via computer or mobile/tablet app (both self-directed and clinician

delivered). The comparison group could be either a control condition (e.g. waitlist) or an alternative intervention that was non-Internet-based. Only Randomized Controlled Trials – published in peer-reviewed journals, written in English, and providing the data required for effect size estimation - were included.

We excluded technology-based interventions that were not delivered via Internet as well as those studying children who met the diagnostic criteria for mental disorders such as autism spectrum disorder, pervasive developmental disorder, Down syndrome, fetal alcohol syndrome, traumatic brain injury.

1.2.3. Searching Strategy

An extensive search in the literature was conducted for RCTs concerning internet-based parenting interventions that aimed to reduce externalizing problems in children and adolescents. The search was conducted on 28 June 2019 in the following databases: PubMed; PsycInfo; Scopus; ProQuest; Web of Science.

1.2.4. Moderator Analyses and Coding

Congruent with our main research question the externalizing problems of children and adolescents, measured with instruments with proven psychometric properties, were regarded as primary outcome. Relevant for understanding the mechanisms of the interventions, parenting behavior, parent distress, and parenting self-efficacy were listed as secondary outcomes.

For the primary outcome, the severity of externalizing problems was coded in two categories: subclinical and clinical (diagnosed based on DSM - IV or DSM - 5). Children's ages were coded into children (3 - 11 years) and adolescents (12 - 18 years old). The symptomatology type was coded into disruptive behaviors and ADHD symptoms. The comparison group was coded as waitlist and active control condition. We coded as parent report any instrument (scale or interview) that gathered the information from one or both parents only, while the observation of parent-children interaction(s) was coded as observation. We coded interventions as Triple P and other interventions. Online interventions were coded as self-directed if parents underwent the intervention alone or therapist guided if the intervention was directly delivered by a specialist (e.g. videoconference). For self-directed interventions, support was coded as technical if parents received help only regarding the use of technology (e.g., sign in). The support was coded as specialized if parents received help in understanding and/or applying the techniques taught in the self-directed intervention. We coded the average socioeconomic status of each sample (when available) based on the authors' primary report. Furthermore, the content of each parenting module/session was coded based on the information provided in articles or available online.[2]

The continuous moderators considered were the number of sessions, children's mean age, the percentage of male children, drop out percentage, the overall risk of bias for each study, the percent of parents that completed the intervention, and parents' education level (coded as the percentage of parents who have a university degree).

1.2.5. Meta-Analytical Procedure

As the studies had been carried out in different countries on participants with various socioeconomic statuses the random-effect model was used to compute the effect size. The random-effect model was considered appropriate for the present study, as it assumes that the

[2] *Turner-HFCC-2013-Online-Triple-P-Workshop.pdf* (n.d.); Eyberg (2008); Tully et al. (2017); *Evidence based practices—Employment, Social Affairs & Inclusion—European Commission* (n.d.); Barkley (2013); Sanders (2012)

samples of the studies were extracted from different populations rather than from the same one (Borenstein et al., 2011). The effect size was separately computed for children's (primary outcome) and parents' outcomes (secondary outcomes), in each time-point (post-test and follow up). Separate effect sizes were computed for online interventions compared to a control condition, as well as for online interventions compared to an active control condition. Sensitivity and subgroup analyses were conducted as well in order to explain the clinical, methodological, and statistical heterogeneity (Fu et al., 2011). Based on Fu et al. (2011) recommendations we performed subgroup analysis only if we had at least four studies per each subgroup. If only for one subgroup we had four studies, a separate analysis for that subgroup was preferred (sensitivity analysis). The continuous moderators were analyzed through meta-regression.

1.2.6. The Calculation of the Effect Size

Effect sizes (ESs) were calculated as standardized mean difference (SMD) for each comparison, transformed in the adjusted Hedges' g (Hedges and Olkin 1985). Values between 0.20 and 0.50 indicate a small effect size, values between .50 and .80 indicate a medium effect size, and values higher than 0.80 indicate a large effect size (Cohen, 1988). Positive values indicate that the online intervention was better than the comparison group. As the number needed to treat (NNT) represents an easier way to interpret effect size value for clinicians, we computed the value of NNT using Kraemer and Kupfer's formula (Laupacis et al., 1988). NNT is defined as the number of patients needed in the intervention in order to obtain an additional success (compared to the control condition) (Kraemer & Kupfer, 2006). Outliers were defined as those studies of which 95% CI does not overlap at any point with the overall 95% CI. Before pooling the effect sizes across studies, when the same outcome (e.g. children behavior problems) was measured with more than one instrument (in the same study), the effect size was averaged (as such, a single effect size for each study was computed) (Moeyaert et al., 2017). Finally, if two online interventions (eligible for our meta-analysis) were compared with a waitlist, a single effect size for the study was computed, by combining the two effect sizes (of the online interventions) (Higgins and Green 2011).

Heterogeneity was measured by computing I^2 statistic (I^2=0 - no heterogeneity; I^2=25 - low heterogeneity I^2=50 - medium heterogeneity I^2=75 - high heterogeneity) (Crombie & Davies, 2009). A 95% confidence interval for heterogeneity (I^2) was calculated in STATA (heterogi module) using non-central x^2 (Orsini et al., 2006). For detecting categorical moderators Q statistic was employed.

1.2.7. Small Study Effects

As at least 10 studies per analysis are required in order to use funnel plots (Sterne et al., 2011) and our widest analysis included only nine studies, publication bias has not been computed.

1.2.8. Quality Assessment

The quality of the studies was evaluated by assessing the risk of bias (RoB) with Cochrane Collaboration risk of bias RoB 2.0 tool (Higgins et al. 2016). The risk of bias was rated for five domains: the adequate generation of the allocation sequence, deviations from intended interventions, handling of incomplete outcome data, measurement of the outcome, and selection of the reported results (Higgins et al. 2016). The risk of bias assessment was independently conducted by the first and the fifth authors with any disagreement being discussed. For each study, the overall risk of bias score was computed through awarding 1 point for each biased source rated with low risk of bias and adding these values up.

1.3. Results

1.3.1. Systematic Review

1.3.1.1. Studies Included

Seventy-nine articles were full text examined and 14 met the inclusion criteria. Because one article (Dadds et al., 2019) included two eligible RCTs, a total of 15 studies were included in both systematic review and meta-analysis (**Fig. 1.1** – PRISMA Flow Diagram).

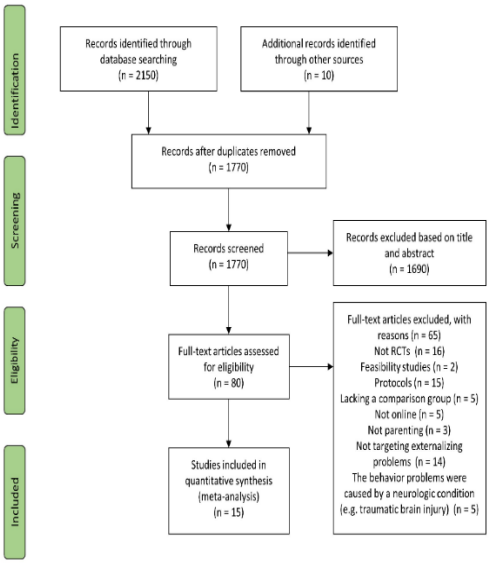

Fig. 1.1. PRISMA Flow Diagram

1.3.1.2. Treatment Characteristics and Conditions

Seventy-three percent of the studies (n = 11) tested web-based, self-directed interventions. The online intervention was Triple P online in six studies (40%). The interventions were delivered through videoconference in four studies (26%). Parents received a form of support from the research team in all the 11 studies involving self-directed interventions. In 47% of cases, the support was technical, while in 26% the support was specialized. The number of sessions ranged between 2 and 21.

In most of the studies, the first session provided an overview of the main components of the intervention, as well as introduced the major techniques taught in the program (n=8). In three RCTs the focus of the first session was to educate the parents about the main causes of the children's misbehaviors, while in three studies the parents were taught new skills right away, from the first session.

One target of the parenting interventions was to educate parents on how to reinforce children's desirable behaviors (in all 15 RCT were taught such techniques). In eight studies parents were educated to pay attention to children's good behaviors and to encourage them. In all the included interventions, parents learned how to use praise, and in 14 studies they were taught when and how to use rewards. Physical affection was presented in two RCTs as a method to reinforce positive behaviors, and, in three RCTs, it was used to improve the parent-child relationship. In three studies parents were trained to use a Token system for administrating rewards. Two RCTs taught parents to reward siblings as a team, to avoid conflicts.

To deal with children's problematic behaviors, parents were trained to use discipline techniques such as ignoring some of the children's misbehaviors, applying consequences, and

using time-out. Planned ignoring (parents were asked to identify some misbehaviors that they are going to ignore) was used in four studies, while in two papers the selective ignoring (e.g. misbehaviors that are not dangerous) was taught. The use of consequences (reasonable and acceptable) was trained in eight studies and in six articles these consequences were established by discussing with their children. Time-out techniques (e.g. time-out room, time-out chair) were presented in nine of the RCT's.

Parents were instructed techniques that aimed to prevent children's misbehaviors. In ten RCTs, parents learned how to give effective commands to their children (e.g. calm, clear, positively stated, respectful) and in eight of them, they were taught how to set clear rules. In six studies strategies of keeping children busy (e.g. designing interesting activities) were presented. Five studies provided information about how home should be organized as a safe place for children. In three papers, parents were informed on how to monitor their children's behaviors (outside the home) and in one study the emphasis was placed on the consistency in administrating children's privileges. In seven RCTs parents were instructed to plan the activities and to discuss with their children the rules, the consequences (for noncompliance), and the rewards (for complying with the rules).

In ten studies, techniques for child-parent relationship improvement were presented. In six articles, the emphasis was placed on teaching parents to show respect and consideration to their children. Seven papers described ways in which parents can spend quality time with their children. Two studies delineated behaviors that parents should avoid (e.g. complaints, criticism) and desirable behaviors (e.g. show interest in children's activities).

Other techniques were for parents to train their children (in four studies parents were instructed to train their children communication, problem-solving, and social skills). Only one study trained parents to regulate their own emotions and, in two RCTs, parents were taught techniques for increasing the quality of the relationship with their partner. In four RCTs, some techniques for keeping the acquired parenting skills and relapse prevention strategies were discussed in the last session.

Regarding the technology used in self-directed interventions, 78% of interventions made use of video clips to promote parents' social learning (through modeling). Likewise, 77% of the interventions used regular assessments as interactive exercises to enhance parents' learning. These assessments are used to monitor and adapt the interventions to parents' learning. Sixty-seven percent of the studies contained downloadable resources while 22% provided homework assignments.

1.3.1.2. Sample Description

In 93% of the studies, only one of the parents underwent the intervention. The percentage of mothers that underwent the intervention varied between 90% and 96%. Dropout has ranged between 7% and 40%. Seventy-three percent of the studies aimed to reduce the disruptive behaviors, 20% pursued to reduce the level of ADHD symptoms, while 7% targeted externalizing problems in general.

1.3.1.4. Overall Study Quality

All the studies included were overall rated as having some concerns of bias. Mainly because of the lack of blindness of the evaluators, at the fourth domain, measurement of the outcome, only 4 studies were rated as having low risk of bias, while 6 were rated as having high risk of bias and 5 as having some concerns. As no study had a preregistered protocol, all 15 studies were rated as having some concerns of bias for the fifth domain: selection of the reported results.

1.3.2. Meta-Analysis

1.3.2.1. Primary Outcome: the Effectiveness of Online Parenting Interventions in Reducing Behavior Problems in Children and Adolescents

Firstly, online parenting interventions were compared to waitlist. No outliers were found. Behavior problems of children and adolescents were reduced more in the intervention group than in the waitlist with a small effect size of $g = 0.40$ and medium heterogeneity, $I^2 = 58$. By performing sensitivity analyses, we gradually restricted the analyses only on children with subclinical symptoms, on children (younger than 12 years), on the effectiveness for disruptive behaviors, on effectiveness for ADHD symptoms, on parent reported outcomes, on Triple P interventions, and on parents with high socioeconomic status (**see Table 1.1**). A medium effect size was found for ADHD symptoms reduction, $g = 0.60$, with no heterogeneity, $I^2 = 0$ and on parents with high socioeconomic status, $g = 0.50$, $I^2 = 57$. For the rest of the sensitivity analyses, the effect sizes remained small. In subgroup analysis, the interventions in which specialized support was provided ($g = 0.63$) were not found significantly more effective ($p = 0.071$) in reducing behavior problems than the interventions in which only technical support was given ($g = 0.32$). Overall, at follow up measurements, online parenting interventions were more effective than the waitlist ($g = 0.47$) with medium heterogeneity, $I^2 = 47$.

Secondly, online parenting interventions were compared with an active control group (**see Table 1.2**). No outliers were found. There was no significant difference in reducing behavior problems between online and non-Internet-based parenting programs, $g = -0.07$, $I^2 = 0$. As three studies had less than 20 participants per arm, in the sensitivity analysis, we restricted the analysis only to the studies that had more than 20 participants per group: no significant difference were found, $g = -0.05$, $I^2 = 22$. No statistically significant differences were found between interventions delivered through videoconference and the ones delivered face-to-face, $g = -0.20$. At follow up, no significant difference between online and non-Internet-based interventions was found, $g = 0.06$, $I^2 = 0$.

Table 1.1. Primary outcomes, the effectiveness of online parenting programs for children behavior problems (intervention vs. waitlist)

	N	*g*	95% CI	I^2	I^2 95% CI	NNT	*p*
Children							
Overall Post-test	9	0.40	0.19 to 0.60	58	14-80	4.490	
Only subclinical problems	8	0.39	0.17 to 0.61	63	22-83	4.602	
Only children (younger than 12 years)	7	0.46	0.22 to 0.70	54	0-81	3.921	
Only disruptive behavior	9	0.38	0.18 to 0.59	57	11-80	4.721	
Only ADHD symptoms	4	0.60	0.34 to 0.85	0	0-85	3.043	
Only parent report	9	0.39	0.19 to 0.60	59	17-81	4.602	
Intervention - Triple P	6	0.44	0.16 to 0.71	60	3-84	4.093	
High socioeconomic status	6	0.50	0.24 to 0.75	57	0-83	3.619	
Subgroup analyses							
Support provided							.071
Technical	5	0.32	0.02 to 0.59	70	26-88	5.586	
Specialized advice	5	0.63	0.42 to 0.84	0	0-79	2.907	
Overall Follow up	4	0.47	0.20 to 0.74	47	0-83	3.841	

n = number of studies; NNT= numbers needed to treat;

Table 1.2. Primary outcomes (online parenting interventions vs. non-Internet-based interventions)

	N	g^a	95% CI	I^2	I^2 95% CI
Children					
Overall Post-test	7	-0.07	-0.22 to 0.09	0	0-71
> 20 participants per arm	4	-0.05	-0.24 to 0.15	22.451	0-88
VC vs. face-to-face	4	-0.20	-0.56 to 0.15	34.701	0-77
Overall Follow up	5	0.06	-0.10 to 0.23	0	0-79

n = number of studies; NNT= numbers needed to treat; VC = videoconference

1.3.2.2. Secondary Outcomes: the Effectiveness of Online Parenting Interventions in Improving Parent Outcomes

No outliers were found. Overall, at post-test, parent outcomes improved more in the intervention group than in waitlist, with a small effect size of $g = 0.32$ and no heterogeneity $I^2 = 0$ (see **Table 1.3**). Sensitivity analyses indicated that parenting behavior improved more in the intervention group than in waitlist, with a small effect size, $g = 0.34$; and medium heterogeneity, $I^2 = 42$. Parent distress has decreased more in the intervention group compared to waitlist, $g = 0.30$ with no heterogeneity ($I^2 = 0$). Parenting efficacy improved more in the intervention group than in the control condition, $g = 0.41$, $I^2 = 56$. Subgroup analyses revealed no significant differences between interventions in which only technical support was provided compared to the ones in which specialized support was given, $p = 0.063$. At follow up, overall, the intervention group was significantly superior to the waitlist, $g = 0.47$, $I^2 = 47$ (medium heterogeneity). The interventions were more effective than waitlist in improving parenting behavior ($g = 0.48$) and reducing parent distress ($g = 0.38$).

Table 1.3. Secondary outcomes: parenting behavior, distress, and self-efficacy (intervention vs. waitlist)

	N	*G*	95% CI	I^2	I^2 95% CI	NNT	*p*
Parents							
Post-test	9	0.32	0.20 to 0.44	0	0-65	5.586	
Parenting behavior	8	0.34	0.16 to 0.51	42	0-70	5.263	
Parent distress	6	0.30	0.14 to 0.46	0	0-68	5.953	
Parenting efficacy	6	0.41	0.17 to 0.64	56	0-84	4.384	
Intervention - Triple P	6	0.36	0.20 to 0.52	0	0-75	4.977	
High socioeconomic status	7	0.39	0.23 to 0.55	0	0-75	4. 602	
Subgroup analyses							
Support provided							0.063
Technical	5	0.25	0.11 to 0.39	0	0-79	7.127	
Specializated advices	5	0.48	0.28 to 0.70	0	0-79	3.764	
Follow up	4	0.47	0.20 to 0.74	47	0-83	3.841	
Parenting behavior	4	0.48	0.27 to 0.68	14	0-87	3.764	
Parent distress	4	0.38	0.16 to 0.60	28	0-63	4.721	

n = number of studies; NNT= numbers needed to treat;

1.3.2.3. Continuous Moderators (Meta-Regression)

For the primary outcome, we found that the number of sessions positively predicts a reduction of children behavior problems (slope = 0.09, $p < .001$). No effect was found for children's mean age, percentage of male children, dropout percentage, risk of bias, and

percentage of parents that completed all sessions. The percentage of parents with a university degree significantly predict better outcomes in children behavior problems (slope = 0.01, $p <$ .030). For the secondary outcomes, no significant continuous moderators were found.

1.4. Discussion

Complementary to the broad answer of Thongseiratch et al. (2020) about the effectiveness of online parenting programs, we presented how effective these interventions are when specifically designed to reduce children behavior problems (as children's main mental health problem). These results have practical implications. Practitioners - working with families of children/adolescents with behavior problems - might be especially interested in the effectiveness of online parenting programs that were specifically designed to reduce children/youth behavior problems.

Beyond the inquires of Thongseiratch et al. (2020), we found a small effect size for disruptive behaviors and a medium one for ADHD symptoms. The effect size for ADHD symptoms was similar to the one found in the classically delivered interventions (Coates et al., 2015). This result should be taken with caution because the effect sizes were pooled across only four studies.

The subgroup analysis indicated that online parenting interventions that provided technical support were not less effective than the ones in which specialized advice was given. The small number of studies – five studies per subgroup - might have impeded the power of detecting some of the existing differences (Fu et al., 2011). Previous works underlined the importance of specialized support in the effectiveness of online parenting programs (Baumel & Faber, 2018; Day & Sanders, 2018). In the light of these prior works and considering the small number of studies included in the subgroup analysis, our results should be considered with caution.

Online parenting interventions have similar effectiveness with non-Internet-based interventions, while videoconference delivered interventions seem to yield comparable effectiveness with the ones delivered face-to-face. These findings are in line with other meta-analyses (Carlbring et al., 2018; Suh et al., 2019), which showed that online and classically delivered interventions are equally effective for different mental health problems. This is the first meta-analysis to pinpoint that online parenting interventions and non-Internet-based interventions might be equally effective. These findings are not decisive as the effect sizes were pooled across small number of studies. As only two programs from the ones compared to face-to-face were self-directed, we cannot say how effective the online self-directed parenting programs are when compared to face-to-face ones.

We found that the percentage of parents with a university degree predicts the effectiveness of self-directed programs in reducing children behavior problems. This is consistent with Lundahl et al. (2006)'s meta-analysis, showing that financially disadvantaged parents and those with a low level of education tend to benefit less from classical delivered parenting training. Likewise, the sheer number of the modules in the programs positively predicts their effectiveness (for the child outcomes). This finding signals that increasing the retention of parents in online parenting programs by reducing the number of sessions may not be the right path, as this might damage the effectiveness of the interventions (Baker et al., 2017).

Online parenting interventions were effective in improving parenting behavior. This result adds up to Spencer et al. (2019)'s findings, who concluded that online parenting interventions (targeting children's mental health - irrespective of the type of these problems) are effective in reducing negative parenting strategies.

We showed that online parenting interventions are effective in increasing parenting efficacy. This indicates that the findings of Flujas-Contreras et al. (2019) (showing that online parenting programs targeting children's mental and physical health significantly increase parent self-efficacy) withstand when only online parenting interventions targeting children behavior problems are considered.

The follow-up measures indicated that the effects of online parenting programs (on children behavior problems, as well as on parenting outcomes) were stable and even slightly increasing from post-test to follow up (compared to waitlist). These findings should be carefully interpreted since the effect sizes were pooled across four (online vs. waitlist) and five (online vs. non-Internet-based) studies.

1.4.1. Limitations

Although the minimum number suggested by Fu et al. (2011) was reached, more studies would have allowed for more subgroup analyses and facilitate the identifications of statistically significant effects. Subgroup analyses (if they had been possible) would have allowed for better isolation of the intervention characteristics responsible for the effectiveness of the interventions.

None of the RCTs had a pre-registered protocol, which made it impossible to verify if data had been analyzed in line with a pre-specified plan. Thus, on the fifth domain of RoB 2.0, selection of the reported results, all studies were judged as having some concerns of bias.

It is also worth noticing that all but three studies used parental reports only to measure children's and parents' outcomes. This is alarming as Tarver et al. (2014)'s meta-analysis found that self-directed parenting interventions (compared to no-treatment) yielded no effect when the blinded observation was used to measure children behavior problems. Although Tarver et al. (2014)'s results are not decisive, we are joining them in emphasizing the importance of using more objective measurement (besides parenting report) in testing the effectiveness of parenting interventions.

We were not able to answer how effective parenting interventions delivered through videoconference are, compared to waitlist, as we could not tell how effective the self-directed interventions are when compared to face-to-face interventions. This remains as a possible direction for future research.

Another limitation regards the small number of online parenting programs designed for the parents of children older than 12 years. Since we only found two such studies, the question regarding the effectiveness of these interventions for adolescent behavior problems remains to be answered by future meta-analyses when enough studies on this matter are published.

Less than four studies that compared online parenting interventions with the non-Internet-based ones reported parent outcomes. Thus, we could not analyze the difference between the effectiveness of online and non-Internet-based interventions on parents outcomes.

1.4.2. Future Directions

Future RCTs should consider using more objective instruments, such as parent-child interaction observation or child report, as parents' reports might overestimate the effectiveness of interventions (Tarver et al., 2014). In the context of mobile phones becoming the most common devices to connect to the Internet (Stryjak and Sivakumaran 2019), it is high time for RCTs to test the effectiveness of parenting programs delivered through a mobile

app. New ways to increase the effectiveness of online parenting programs should be sought. More studies to compare self-directed online parenting programs with the ones delivered either face-to-face or through videoconference are needed.

Study 2. Measurement invariance of Alabama Parenting Questionnaire across age, gender, clinical status, and informant[3]

2.1. Introduction

Alabama Parenting Questionnaire (APQ; Frick, 1991; Hurley et al., 2014) is a valuable tool, being one of the few instruments that were developed and validated as a multi-informant multimethod measure of parenting practices (Shelton et al., 1996). APQ has a long (composed of 42 items: from now on APQ-lg) and a short form (containing 9 items: from now on APQ-9) (Elgar et al., 2007). APQ-9 has been derived - through factor analysis - from APQ-lg (Elgar et al., 2007) and both can be filled in by parents and children (Elgar et al., 2007; Shelton et al., 1996). APQ-lg measures five parenting practice domains, namely positive parenting, parental involvement, poor monitoring, inconsistent discipline, and corporal punishment (Shelton et al., 1996). Similarly, APQ-9 measures positive parenting, poor monitoring, and inconsistent discipline (Elgar et al., 2007).

Most of the studies that assessed the factor structure of APQ-lg took an exploratory stance (e.g., Principal Component Analysis). As a result, several models have been proposed and even when the same number of factors was identified, the content of the factors varied between studies (e.g., Clerkin et al., 2007; Esposito et al., 2016; Maguin et al., 2016; Zlomke et al., 2014).

APQ-9 has been shown to have good psychometric properties across different adaptations. Specifically, the studies find values for CFI > .95, TLI > .92, and RMSEA < .04 (Elgar et al., 2007; Gross et al., 2017; Kyriazos & Stalikas, 2019). The utility and validity of APQ-9 were further highlighted in a recent meta-analysis (Liang et al., 2021). However, no study assessed the factor structure of APQ-9 on a sample from an eastern country. Furthermore, only one study investigated the original factor structure of APQ-lg (Parent Global Report) in an eastern country (Święcicka et al., 2019).

Previous studies showed that parenting practices might vary across age, gender, and clinical status of children, as well as across informant. The levels of parental involvement, supervision/monitoring, and corporal punishment tend to decrease across adolescence (Frick, 1991; Gross et al., 2017). It has been shown that boys (compared to girls) report lower levels of positive parenting, parental involvement, and inconsistent discipline, and a higher level of corporal punishment (Essau et al., 2006). Furthermore, children with mental health problems (especially the ones with behavior problems) report more dysfunctional parenting practices such as inconsistent discipline, poor monitoring, and corporal punishment (Essau et al., 2006; Pinquart, 2017; Święcicka et al., 2019). Regarding informant, the studies have indicated that parents (compared to children) tend to report higher levels of functional parenting practices (e.g., positive parenting) and lower levels of dysfunctional parenting practices (e.g., poor monitoring) (Gross et al., 2017; Russell et al., 2016). However, the understanding of the items, their applicability, the social desirability of the answers, and the reference points of the

[3] This study was published such as: Florean I. S., Dobrean A., Balazsi R., Roșan A., Păsărelu C. R., Predescu E., & Rad F. (2022). Measurement invariance of Alabama Parenting Questionnaire (APQ) across age, gender, clinical status, and informant. Assessment. https://doi.org/10.1177/10731911211068178

answers (Chen, 2008) might vary across age, gender, clinical status, and informant. Therefore, are these differences meaningful, or are they rather measurement artifacts?

Some studies have assessed the measurement invariance of APQ-lg (Nogueira et al., 2020; Russell et al., 2016) and the APQ-9 (Gross et al., 2017; Kyriazos & Stalikas, 2019). Russell et al. (2016), on relatively small sample size (i.e., N = 255), found that the five-factor model of APQ-lg is approximatively equivalent across age (< 12 vs. ≥ 12 years) and informant (child vs. parent reports). Nogueira et al. (2020) investigated the measurement invariance - Parent Global Report - across the age of children (i.e., < 14 vs. ≥ 14 years). They supported the partial measurement invariance of APQ-lg across the age of children. However, for the Child Global Report, no study has assessed the measurement invariance of APQ-lg across the age, gender, and clinical status of the children.

The study of measurement invariance of APQ-9 has barely scratched the surface. Kyriazos & Stalikas (2019) found the measurement invariance – Parent Global Report - across the gender of children. Gross et al. (2017) supported the longitudinal measurement invariance of APQ-9 for both child and parent reports, but the measurement invariance across informant (parent vs. child report) could not be reached. These studies have addressed only some gaps from the literature of measurement invariance of APQ-9. Specifically, the measurement invariance across gender has not been assessed for the child report. Furthermore, the time-lagged in the study of Gross et al. (2017) was relatively small (about one year) and it is unclear whether their results could be generalized when a wider age range is considered. Finally, no study has examined the measurement invariance across the clinical status of children.

Considering these limitations, the present study has examined the factor structure and the measurement invariance of both APQ-lg and APQ-9. Specifically, on a Romanian sample, we assessed via CFA the plausibility of the original models of APQ-lg and APQ-9, as well as of the concurrent models of APQ-lg. We also compared the specified models of APQ-lg to find which one better describes the data. Measurement invariance was assessed – child global report - across the gender, age (≤12 vs. ≥13), and clinical status (community sample vs. clinical sample) of children. Furthermore, the measurement invariance was investigated across informant (i.e., child vs. parent reports). Finally, the latent means of the groups were compared.

2.2. Method

2.2.1 Participants

One thousand seven hundred forty-six children filled in the questionnaire in schools (the non – clinical sample). The percentage of males was 45% and the one of females was 55%. Regarding the living area, 51% were living in an urban area while 49% were living in the rural one. In respect to ethnicity, 93% were ethnic Romanian, 5% were ethnic Hungarians, 1% were ethnic Romani, and 1% were of other ethnicities. The age of the children ranged from ten to eighteen (mean age = 12.80, SD = 1.71).

In what concerns the clinical sample, 166 children took part in the study. Forty-seven percent were males and 69% were living in an urban area. The age varied between 7 and 18 years old, with the mean age being 14.11 (SD = 2.54). The mental disorders of children were diagnosed by a psychiatrist according to the manual of International Statistical Classification of Diseases and Related Health Problems – 10th (ICD – 10; World Health Organization, 1993).

From the non-clinical sample, one hundred forty-nine mothers filled in the APQ (parent report). The parents' mean age was 38.93 (SD = 5.51) with the ages varying from 29 to 68 years old. Seventy-two percent of them lived in an urban area while 28% lived in a rural area. Regarding ethnicity, 90% were ethnic Romanians, while 9% were ethnic Hungarians. Fifty-two percent of their children were females, while 48% were males. Regarding the age of their children, it ranged from 11 to 15 with a mean age of 12.02 (SD = 0.79).

2.2.2. Instruments

Alabama Parenting Questionnaire (APQ; Frick, 1991) consists of 35 items that measure five parenting practices domains and seven supplementary items (they do not belong to any scale) that have the role of avoiding the bias toward the items that measure corporal punishment (i.e., items 33, 35, and 38). Each of the 35 items describes a parenting practice and the answers are given on a five-point Likert scale (on which the frequency of each practice is rated as follows: 1 - *Never*, 5 - *Always*).

Alabama Parenting Questionnaire short form (Elgar et al., 2007) consists of 9 items (three items for each of the three scales of parenting practice) that measure positive parenting, poor monitoring, and inconsistent discipline.

The items of APQ were translated from English into Romanian by three researchers (two bilingual - speaking both English and Romanian (mother tongue) - and one native English speaker), using the back-translation method (Tyupa, 2011).

2.2.3. Procedure

This study has been approved by the Ethics Committee of Babeș-Bolyai University and the approval was obtained from the boards of the schools, as well as from the boards of the mental health centers. Furthermore, informed consent was obtained from both children and parents. Data collection took place in schools (non-clinical sample), clinics (clinical sample), and at home (parent report). In school, children filled in the scale in the classrooms, and the process was overseen by both the class teachers and a research assistant. In clinics, a doctor (psychiatrist) assisted the children while they filled in the assessment. Concerning the parent report, the scale was filled in at home (the school children were asked to deliver the questionnaire to their parents and to return them when completed).

2.2.4. Data analysis

The analyses were conducted in R studio (RStudio Team, 2019). Data were screened for missing values and both univariate and multivariate assumptions were assessed. Univariate normality assumptions (for each item of APQ) were tested by computing Skewness and Kurtosis. Multivariate normality assumptions were examined by computing Mardia Skewness and Mardia Kurtosis. As per recommended practice (Hancock et al., 2018, p. 112), the primer for the invariance analyses (for APQ-lg) was determined by specifying and comparing different alternative models that have been suggested in the literature. Besides the five-factor model (the original model: *Model 1*), four other models have been specified.

We tested the measurement invariance by using Multi-Group Confirmatory Factor Analysis (MGCFA) in three steps (Horn & Mcardle, 1992). Diagonally Weighted Least Squares (DWLS) was used as the main estimator (Li, 2016; Rhemtulla et al., 2012). The fit indices estimated were RMSEA, SRMR, and CFI. Values of RMSEA ≤ 0.06, SRMR ≤ 0.10, and CFI ≥ 0.90 would indicate acceptable model fit (Bentler, 1990; Hu & Bentler, 1999; Petscher et al., 2013, Capitolul 6). To compare configural models to metric ones and the metric models to scalar ones, goodness of fit indices (ΔGOFs) was computed. Values of ΔRMSEA ≤ 0.015, ΔSRMR ≤ 0.01, and ΔCFI ≤ 0.01 would support the measurement

invariance (Chen, 2007). When non-invariance was found, based on the Modification Index, we conducted partial measurement invariance (Schmitt et al., 2011).

When the groups are severely unbalanced, the estimates could be distorted and the chance of incorrectly assuming the measurement invariance increases (Yoon & Lai, 2018). To deal with this issue, the subsampling approach has been proposed (Yoon & Lai, 2018). The subsampling approach was used for assessing the measurement invariance across the clinical status (unbalance rate was 1/10). When the sample size is small, the ΔGOFs could be biased (the rate of falsely concluding the measurement invariance is high) (Counsell et al., 2020). An alternative to the ΔGOFs is the equivalence test (EQ) (Yuan & Chan, 2016), which was shown to be type I error robust even with sample sizes as small as N = 100 per group (Counsell et al., 2020).

The latent means of the groups were compared with projection method (Deng & Yuan, 2016) which allows the calculation of a *validity index* (that is, that represents the percentage from the difference in the observed scores between two groups that is explained by the differences in the latent attributes (Deng & Yuan, 2016)).

2.3. Results

Item 26 had the highest percentage of missing values (1.9%), while item 21 had the lowest (0.3%). Age had 6% missing values and gender had 0.1%. All the items had values for Skewness and Kurtosis between 2 and – 2, except item 38 (Skewness = 2.73, Kurtosis = 7.20) and 27 (Kurtosis = 2.15). Multivariate normality assumptions have not been supported as both Mardia Skewness and Kurtosis were statistically significant ($p < .001$).

2.3.1. APQ-lg

For the child report, the model with the best fit indices (significantly better than all the concurrent models) was *Model 1 (APQ-lg original model)*, $\chi^2 = 2857.37$, RMSEA = 0.047, SRMR = 0.053, CFI = 0.911. The standardized loadings and inter-factor correlations could be seen in **Fig. 2.1**. For the parent report, *Model 1* had a significantly better fit than the concurrent models (i.e., $\chi^2 = 699.92$, RMSEA = 0.039, SRMR = 0.091, CFI = 0.937).

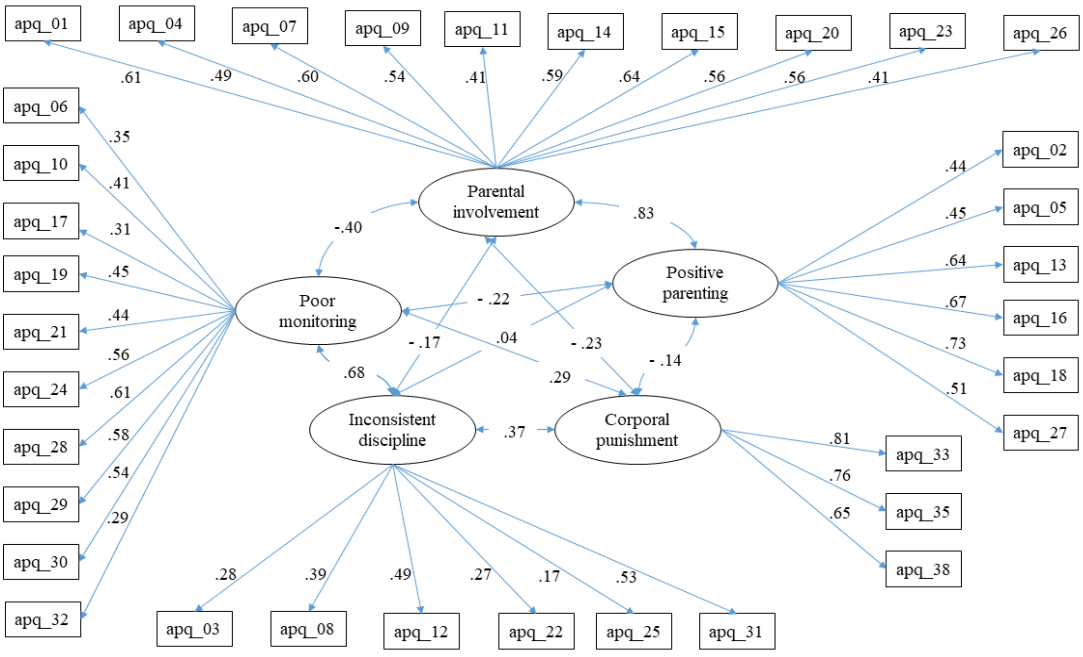

Fig. 2.1

Ordinal Cronbach's alpha was good for parental involvement (alpha = .85), positive parenting (alpha = .80), poor monitoring (alpha = .79), and corporal punishment (alpha = .87) and low for inconsistent discipline (alpha = .53).

APQ-lg showed both metric (ΔRMSEA = - .001, ΔSRMR = - .001, and ΔCFI = .003; δ_0 = 286.50, p < .001) and scalar (ΔRMSEA = - .001, ΔSRMR = - .001, and ΔCFI = .004; δ_0 = 286.50, p < .001) invariance across gender.

After removing the imposed equality constraints on the loadings of the items 11, 20, 32, and on the intercept of item 15, 13, 17, 11, and 10 we found partial metric invariance (ΔRMSEA = - .001, ΔSRMR = - .002, ΔCFI = .009; δ_0 = 241.78, *p* < .001) and partial scalar invariance (ΔRMSEA = - .000, ΔSRMR = - .001, and ΔCFI = .004; δ_0 = 214.92, *p* < .039) across the age of children.

Regarding clinical status, we encountered some issues in assessing the metric invariance (i.e., "Heywood cases"). In this context, the interpretation of the fit indices is not recommended. As we assumed that the estimator could be one of the sources for this issue (Lorenzo-Seva & Ferrando, 2021), we used for this analysis ML estimator only. In this instance, missing data were handled via FIML (Enders & Bandalos, 2001). We found metric (ΔRMSEA = - .000, ΔSRMR = - .003, and ΔCFI = .007) and partial scalar invariance (ΔRMSEA = - .000, ΔSRMR = - .000, and ΔCFI = .008) across the clinical status of children (the equality constraints on the intercepts of the items 2, 5, 12, 14, 15, 20, and 28 were removed).

Concerning the informant (i.e., child vs. parent reports), partial metric invariance was reached (ΔRMSEA = - .003, ΔSRMR = - .000, and ΔCFI = .010; δ_0 = 31.08, *p* <.030) after removing the equality constraints on the loadings of the items 21, 24, 18, 4, 5, 25, 20, 27, and 29. Furthermore, the partial scalar invariance was reached after removing the equality constraints on the intercepts of 16 items (ΔRMSEA = - .000, ΔSRMR = - .001, and ΔCFI = .003; δ_0 = 20.72, *p* < .029).

Male children (compared to females) reported lower levels of parental involvement, higher levels of poor monitoring, inconsistent discipline, and corporal punishment. Preadolescents (compared to adolescents) reported higher levels of parental involvement, positive parenting, and corporal punishment and lower levels of poor monitoring. The clinical sample (compared with the non-clinical one) reported less parental involvement and more corporal punishment. Finally, children (compared to parents) reported more poor monitoring. *The validity index* for the comparison across age, gender, clinical status, and informant was .74, .68, .56, .07 respectively.

The correlation between observed scores of APQ-lg and APQ-9 was strong. Specifically, *r* = .89 (positive parenting long – positive parenting short), *r* = .84 (inconsistent discipline long – inconsistent discipline short), and *r* = .73 (poor monitoring long – poor monitoring short).

2.3.2. APQ-9

The standardized loadings and inter-factor correlation are presented in **Fig. 2.2.** Overall, APQ-9 showed excellent values for the fit indices for all the groups considered in the analyses. RMSEA varied from 0.000 to 0.045, SRMR ranged between 0.022 and 0.070, and CFI was 0.936 or higher. For the parent-child dyads the fit indices were also excellent (i.e., RMSEA = 0.000, SRMR = 0.061, CFI = 1.000). Ordinal Cronbach's alpha indicated acceptable reliability for the positive parenting (alpha = .69) and poor monitoring (alpha = .63) scales, but poor reliability for the inconsistent discipline scale (alpha = .53).

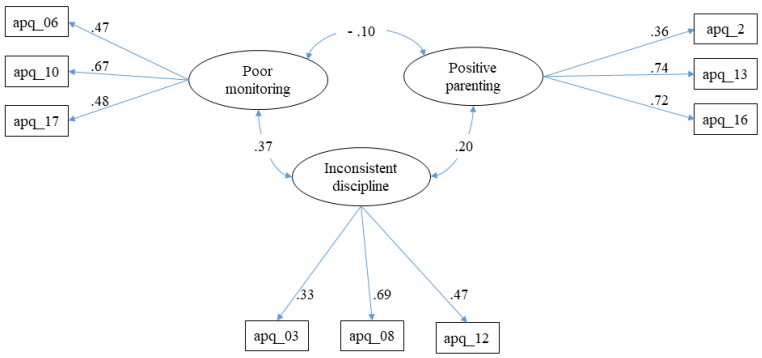

Fig. 2.1

Metric (ΔRMSEA = - .000, ΔSRMR = - .001, and ΔCFI = .002; δ_0 = 57.30, p <.001) and scalar (ΔRMSEA = .002, ΔSRMR = - .000, and ΔCFI = - .001; δ_0 = 57.30, p <.001) invariance were supported across the gender of the children.

Regarding age, metric invariance (ΔRMSEA = - .003, ΔSRMR = - .004, and ΔCFI = .009; δ_0 = 53.73, p <.012) was supported, while the scalar one was found only after the imposed equality constraints on the intercept of the item 13 was removed (ΔRMSEA = - .001, ΔSRMR = - .002, and ΔCFI = .006; δ_0 = 44.78, p <.001).

The metric (ΔRMSEA = - .001, ΔSRMR = - .004, and ΔCFI = .001) and scalar (ΔRMSEA = - .002, ΔSRMR = - .007, and ΔCFI = .001) invariance were found across clinical status.

Partial metric (ΔRMSEA = .008, ΔSRMR = - .001, and ΔCFI = - .006; δ_0 = 5.92, p < .034) and partial scalar (ΔRMSEA = .008, ΔSRMR = - .000, and ΔCFI = - .004; δ_0 = 4.44, p < .041) invariance were found across informant. We removed the equality constraints for the loading of items 10 and 16 as well as for the intercepts of items 2, 17, and 13.

We found that males reported higher levels of poor monitoring and inconsistent discipline. Preadolescents reported higher levels of positive parenting. The clinical sample (compared to the non-clinical one) reported lower levels of positive parenting and higher levels of poor monitoring. Finally, children (compared to parents) reported higher levels of poor monitoring. *The validity index* for the comparison across age, gender, clinical status, and informant was .69, .91, .52, and .73, respectively.

2.4. Discussion

As we merged positive parenting and parental involvement (*Model 3*) into a factor and poor monitoring with inconsistent discipline into another one (*Model 4*), the fit indices of these models have significantly worsened (compared to the original model). The fit indices of the three-factor model (*Model 3*) were below the acceptable cutoff values. *Model 5,* in which we specified two higher-order factors for the positive and negative dimensions of parenting practices, had acceptable fit indices, but still significantly lower than the original model. These results – consistent with findings of the previous studies (e.g., Esposito et al., 2016; Maguin et al., 2016) - emphasized that, while keeping the integrity of the scale (retaining all items), the concurrent models are not better alternatives to the original model of APQ-lg.

In line with the results of Nogueira et al. (2020), we found that APQ-lg has only partial invariance across the age of the children. However, the primer for their analyses was different (they found a three-factor solution with 20 items). Our results are important as the original model of APQ-lg was supported in both clinical and research settings (e.g., Cova et al., 2020; Hawes & Dadds, 2006; Święcicka et al., 2019).

Our results are different of those of Gross et al. (2017), who concluded the full longitudinal metric and scalar invariance of the APQ-9. The difference might be explained by the time-lag and cohort. In the study of Gross et al. (2017), the time between the first and the second measurement was one year (13 and 14 years). Although major cognitive, social, and physical differences set preadolescents and adolescents apart (Berger, 2015), within one year, the changes might be less substantial and the inequalities of loadings and/or intercepts might be less likely. Regarding cohort effect, our age groups were more heterogeneous in the sense that we had different people for the groups of preadolescents and adolescents.

Another important contribution of the present study is that we are the first to show that the measurement invariance of both APQ-lg and APQ-9 (child report) holds across the gender of children. Thus, the comparison of the latent means of APQ-lg and APQ-9 across gender is supported.

The comparison between clinical and non-clinical samples is crucial in both research and practice settings. In this context, our results are important, as we indicate that APQ-9 and APQ-lg are two valid instruments that could be used to compare the latent means of clinical and non-clinical samples.

For APQ-lg, the validity index showed that only 7% of the differences between the observed means of parents and children are explained by the difference in the latent attributes. This result is concerning as it implies that the observed scores of APQ-lg must not be used to compare parent and child reports. Such an endeavor might be like comparing 'chopsticks with forks' (Chen, 2008). Nevertheless, we supported the comparability of the latent scores (partial scalar invariance across informant was reached after removing the equality constraints on the intercepts of 16 items).

For APQ-9, we observed partial metric and partial scalar invariance across informant. These results are contradicting Gross et al. (2017)'s findings which indicated that partial measurement invariance could not be reached across informant. A possible explanation for this difference might be the age of adolescents. In our study, the children were 12.02, while in the study of Gross et al. (2017) they were around 14 years. As 14 years old tend to be a more turbulent period for the parent-child relationship (than 12 years), more inequalities in the loadings and intercepts could have emerged (Hadiwijaya et al., 2017).

Regarding the comparison of the latent means, most of the differences found were in line with the prior literature (Essau et al., 2006; Frick et al., 1999; Gross et al., 2017; Pinquart, 2017; Russell et al., 2016; Święcicka et al., 2019). However, when comparing the means of two (or more) groups, the measurement invariance is a serious concern. If the instruments do not have measurement invariance across the compared groups, the results of the comparisons could be misleading (Guenole & Brown, 2014).

One of the lowest values for the validity index was for the comparison across the clinical status (.56 for APQ-lg and .52 for APQ-9). Only half of the observed differences across the clinical status of children (i.e., 56%, 52%) are explained by the differences in the latent means. As per this result, we warn against the use of the observed scores of APQ-lg and APQ-9 to compare clinical and non-clinical samples (latent scores are preferable).

2.4.1. Limitations

The mean age of the clinical sample was 14.11 and of the non-clinical one was 12.80. Thus, in the context of the measurement invariance across the clinical status of the children, age might have been a confounding variable.

The second limitation refers to the fact that only a fraction of children retrieved the scale filled in by their parents (13%). Significant differences (small effect size) were found between those who retrieved the scale compared to those who have not.

As we have not found guidelines about the implementation of EQ in the subsampling approach, we only relied on computing ΔGOFs. However, EQ was shown to be more robust in terms of type I error control than ΔGOFs with small sample sizes (Counsell et al., 2020).

ΔGOFs for the measurement invariance across the clinical status (APQ-lg) were computed with ML only. We did so, as for the metric model, most of the covariance matrixes were not positive definite. Our results should be considered as preliminary evidence, replicated with a larger sample size, and more appropriate estimators (e.g., DWLS).

2.4.2. Future directions

More work must be done regarding the measurement invariance of the parent report of APQ across clinical status and gender of the children. Although certain studies indicated that mother and father reports of parenting practices differ (Święcicka et al., 2019), no study has assessed the measurement invariance across parents. This direction should be also pursued by future studies.

Future studies should investigate the longitudinal measurement invariance across the age of adolescents (over longer periods of time such as 2 – 3 years). An especially important direction might be to assess the longitudinal measurement invariance across clinical status (e.g., before and after treatment).

Another direction worth considering is the cross-cultural measurement invariance. Several differences in parenting strategies were found between western and eastern cultures. By establishing cross-cultural measurement invariance, latent means can be compared and more accurate information regarding intercultural differences could be acquired.

Study 3. Early Adolescents' Perceptions of Parenting Practices and Mental Health Problems: a Network Approach[4]

3.1 Introduction

A new and promising field in psychopathology that takes into account the complexity of the psychological phenomenon is the network approach (Borsboom & Cramer, 2013; Bringmann & Eronen, 2018; Schmittmann et al., 2013). The prominent features of this approach are that the psychological constructs are viewed as dynamic, and the focus is placed on components (e.g., observed behaviors) instead of wholes (e.g., latent constructs) (Bringmann & Eronen, 2018). Thus, in the network approach, psychological constructs are no longer interpreted as the outcome of the static (stable and unidirectional) effect of a latent variable, but are postulated as emerging from the interaction of their constituent parts (Schmittmann et al., 2013). According to this stance, different parenting practices such as kissing, hugging, praising, and rewarding the child tend to co-occur because they are part of the same causally connected network of behaviors. Consequently, this prompts a refocus in attention, from the higher-order aggregates (i.e., latent variables) to the elements (Bringmann & Eronen, 2018).

[4] This study is published such as: Florean, I. S., Dobrean, A., & Roman, G. D. (2021). Early adolescents' perceptions of parenting practices and mental health problems: A network approach. Journal of Family Psychology. https://doi.org/10.1037/fam0000919

The networks have two main components: nodes (the variables included in the model) and edges (depicting the dynamic relationship between variables by connecting the nodes). In the past, the network approach has been described in contrast to the latent variable framework (e.g., Borsboom & Cramer, 2013). However, the core difference between the network approach and latent framework is a theoretical one (Borsboom, 2017) (it has been shown that mathematically they are interchangeable (Bringmann & Eronen, 2018; Epskamp et al., 2017)). Specifically, according to the latent framework, the changes spread from the latent variable to the observed behaviors. In the network approach, it is posited that the changes propagate from one behavior to another. This distinction is not inconsequential, as it generates different predictions. As per the latent framework, intervening on one symptom would not result in changing other symptoms (as local independence is assumed (Borsboom & Cramer, 2013)). For the same situation, the network theory posits that changes in one behavior would propagate through the system, producing modifications on other behaviors as well (Bringmann & Eronen, 2018; Marsman et al., 2018).

We argue that this gap in research into parenting practices as a network of behaviors is warranted and timely. The fact that parenting behaviors influence each other was suggested in several correlational studies and Randomized Clinical Trials (RCTs). Several studies using the first approach established that there is a positive correlation between different functional parenting practices, as well as between different dysfunctional parenting practices (Essau et al., 2006; Russell et al., 2016). Furthermore, functional and dysfunctional parenting practices were found to be negatively correlated (Essau et al., 2006; Russell et al., 2016). Then, based on research using the second approach it is now known that parenting programs that teach parents functional parenting practices result in reducing dysfunctional parenting practices as well (without being directly targeted) (Sanders, 2012). These facts are consistent with the idea that parenting practices have a dynamic nature (they influence each other).

We argue that there are several characteristics of network analysis that make it a prime candidate for the in-depth study of parenting practices. As parenting behaviors are expected to influence each other, a question one may ask is "which behaviors are more central than others within this constellation of inter-related behaviors?". This question can be answered by computing centrality indices (e.g. *strength, closeness*, and *betweenness*) (Epskamp et al., 2018). The identification of the most central nodes is important, as it was argued (Robinaugh et al., 2020) that targeting these nodes might be the most effective way of producing a change at the level of the network (Cramer et al., 2010).

The nodes of a network that are highly central within another network are called *bridge* nodes (Cramer et al., 2010; Jones et al., 2019). Until now, the interaction between networks has been limited to the investigation of the comorbidity between different mental disorders (Borsboom & Cramer, 2013; Cramer et al., 2010; McNally, 2016). As we conceptualize parenting practices and adolescents' mental health problems in the form of networks, *bridge analysis* comes into play as an appealing methodology for describing the complex entanglement between parenting and adolescents' outcomes. Investigating these paths (bridges) between networks is crucial, as by intervening on the "bridges" one may prevent the contagion between two networks (Jones et al., 2019).

Finally, several studies revealed that differences might appear in the parenting practices between male and female adolescents (e.g., Escribano et al., 2013; Liu & Miller, 2020; Zou et al., 2020). Additionally, it has long been indicated that males are more likely to display externalizing problems, while females are more likely to exhibit internalizing problems (American Psychiatric Association, 2013). However, existing studies on the moderation role of the gender of offspring between parenting practices and offspring mental

health outcomes have been contradictory (Pinquart, 2017). Thus, the gender of offspring might impact the interaction between parenting and youth outcomes in subtle and complex ways that might be missed in the classical "static" approach. Here, the network approach might provide a more appropriate methodology for an in-depth comprehension of the differences between males and females. Specifically, by conducting the network comparison test, one can find out if the structure (i.e., connectivity patterns) and the global strength (i.e., the sum of the absolute values of all edge-weights from a network) of the models are significantly different across males and females (van Borkulo et al., 2017).

This is the first study that leverages the powerful features of the network approach to explore in-depth parenting practices and their interplay with adolescents' mental health problems. There are several aims to our exploratory endeavor. The complex interaction between parenting behaviors was mapped and we identified the most central behaviors from the model. As parenting practices are described as a multifactorial construct (APQ-lg subscales), we identified the main bridges between the five parenting practices. The networks of parenting behaviors reported by female and male participants were compared to see whether there were significant differences.

Similar directions were followed for the dual network comprising both parenting practices and youth mental health. We estimated the network and identified the most central nodes, as well as the strongest edges. We also determined the main bridges between parenting practices and adolescents' mental health problems. Furthermore, we compared the network of male and female participants to find out if there were significant differences.

3.2. Method

3.2.1. Participants

A community sample of early adolescents (N = 1125) took part in this study. Their ages varied from 10 to 13 years (M=11.61, SD=0.67), with 49.1% of them being in the fifth grade (10-11 years) and 50.9% in the sixth grade (both fifth and sixth graders were recruited from the same schools: in the Romanian education system these grades are part of Middle School). Regarding gender, 46% were males while 54% were females. With regard to ethnicity, 92.7% were Romanian, while 5.6% were Hungarian and 1.3% were Roma. Furthermore, 71.8% of them lived in a city or town and 28.2% lived in a village.

The study has been approved by the Ethics Committee of Babeș-Bolyai University. Data collection took place within a larger research project and a part of the data included in this study (namely three subscales from the Alabama Parenting Questionnaire and the global score for internalizing problems from the Youth Self-Report) were used in a previously published study (i.e., Balan et al., 2017). The boards of the public were contacted and notified about the research project (at this point their permission for collecting data was attained). Passive consent was sought from parents and active assent from adolescents. Before taking part, the youths were briefed about the research project and were reassured that they may skip questions or quit the study at any time. Research assistants oversaw the data collection and teachers contributed to the invigilation process.

3.2.2. Instruments

Parenting practices were measured with the *Alabama Parenting Questionnaire,* Child Global Report (APQ; Frick, 1991).

Adolescents' mental health problems were measured via the *Youth Self Report* (YSR; Achenbach & Rescorla, 2001). The YSR is composed of 112 items (e.g., "I drink alcohol without my parents' approval") with answers recorded on a three-point Likert scale (Not

True, Sometimes True, Often True). Six DSM-oriented scales can be computed: *Affective Problems, Anxiety Problems, Somatic Problems, ADHD Problems, Oppositional Defiant Problems,* and *Conduct Problems*. The YSR was validated across different cultures, including Romanian (Ivanova et al., 2007).

3.2.3. Data Analysis Plan

The statistical analyses were performed in RStudio (RStudio Team, 2019). First, we reverse-scored the APQ items depicting positive parenting practices (i.e., positive parenting, involvement). Second, we examined missing data patterns and data compliance with multivariate assumptions. Missing values were handled via multiple imputation by chained equations (Buuren, 2018). Both univariate and multivariate normality assumptions were tested by computing Skewness and Kurtosis. The reliability of the scales was assessed with ordinal Cronbach's alpha (Gadermann et al., 2012).

Two networks were estimated. First, we mapped parenting practices by estimating a network based on the items of the APQ. Second, we estimated a network for parenting practices (as measured by the subscales of the APQ) and youths' psychological problems (DSM-based, as measured via the YSR). The *Pairwise Markov Random Field* (PMRF; Costantini et al., 2015) model used to estimate the networks is called *Gaussian Graphical Model* (GGM; Costantini et al., 2015).

To estimate more conservative and interpretable networks, the *Least Absolute Shrinkage and Selection Operator* (LASSO; Tibshirani, 1996) was used to regularize the networks (Epskamp et al., 2018). *LASSO* reduces the edges which have values close to zero (positive or negative) to exactly zero and, therefore, these edges are eliminated from the model.

The GGM for parenting practices (the APQ items) was estimated with the 'EBICglasso' method (Epskamp et al., 2018) and the one regarding parenting practices (the APQ subscales) and adolescents' mental health problems (the YSR subscales) was estimated with the 'huge' method (Zhao et al., 2015).

Centrality indices computed were *strength, closeness,* and *betweenness. Strength* is computed by summing the absolute values of all the edge-weights a certain node has (Costantini et al., 2015). *Closeness* indicates the ease with which, starting from a certain node, one can reach all the other nodes in the model (Costantini et al., 2015). *Betweenness* is computed by counting the number of instances where a certain node is the shortest path between two nodes (Costantini et al., 2015).

For the estimation of the edge-weights accuracy, nonparametric bootstrapping (as is recommended for GGM) was used to compute the 95% CI around each edge (Epskamp et al., 2018). To estimate the stability of the centrality indices, the *correlation stability coefficient* (CS – coefficient) was computed, using the *case-dropping subset bootstrap* framework (Epskamp et al., 2018).

To test if there were statistically significant differences between two centrality indices as well as between two edge-weights, we used *the bootstrapped difference test* (Epskamp et al., 2018).

Bridge strength, bridge closeness, bridge betweenness, and bridge expected influence were computed (Jones et al., 2019). *Bridge strength* represents the sum of the absolute values of the edge-weights a node has outside of the community it belongs to (Jones et al., 2019). *Bridge closeness* represents the inverse of the mean distance of a node to all the other nodes

placed outside of its community (Jones et al., 2019). *Bridge betweenness* represents the number of times a node is the shortest way between two nodes that belong to different communities (Jones et al., 2019). *Bridge expected influence* differs from *bridge strength,* as only the positive edge-weights are summed.

Network Comparison Test (NCT; van Borkulo et al., 2017) was used to investigate whether the networks of male and female participants were invariant along two dimensions: *network structure* and *global strength* (van Borkulo et al., 2017). *Network structure invariance* shows whether the connection patterns are significantly different between the two groups. *Network global strength invariance* measures if there is a significant difference between the sums of the absolute values of all the edge-weights of two networks. To zoom in for more specific differences, the *centrality strength differences* and *edge-weights differences* were computed (van Borkulo et al., 2017). *The centrality strength difference* is used to test if the centrality coefficients of a certain node are significantly different between the two models. *Edge-weights differences* show if a certain edge has a significantly different weight across two networks.

3.3. Results

3.3.1. Parenting Practices

The network for parenting practices is presented in **Fig. 3.1**. The stability of the centrality indices is excellent with respect to strength (*CS-coefficient* = .75) and questionable with respect to closeness (*CS-coefficient* = .44) and betweenness (*CS-coefficient* = .36). We further focused our attention of the interpretation of strength.

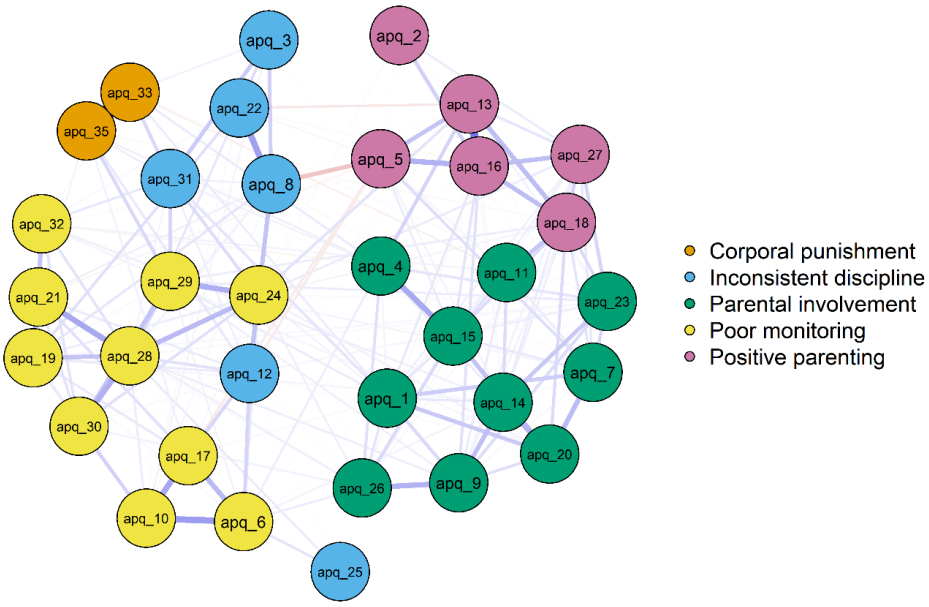

Fig. 3.1 Estimated network model for parenting behaviors (the items of APQ)

With regard to strength, we found that items 28 (“You stay out later than you are supposed to and your parents don’t know it”) and 16 (“Your parents praise you for behaving well”) were the strongest. They were significantly stronger than 86% of the nodes. Items 25 (“Your parents don’t punish you when you have done something wrong”) and 2 (“Your parents tell you that you are doing a good job”) had the lowest strength (significantly lower than 94%). Regarding bridge centrality, items 18 (“Your parents hug or kiss you when you have done something well”) and 12 (“Your parents give up trying to get you to obey them

because it's too much trouble") had the highest bridge strength and bridge expected influence (1 - step).

We found that males reported a higher level of exposure to dysfunctional parenting practices (M = 75.45) compared to females (M = 71.72) (t = 3.87, $p < .001$). However, in terms of structure (i.e., the pattern of connections within the network), the two networks were not significantly different (maximum difference = 0.21, $p = .131$). Furthermore, there were no significant differences (global strength difference = 0.64, $p = .574$) between the global strengths (i.e., the sum of the absolute values of all edge-weights from a network) of the networks for female (*global strength* = 13.04) versus male adolescents (*global strength* = 13.68).

3.3.2. Parenting Practices and Adolescent Mental Health Problems (see Fig. 3.2.)

We found excellent levels of stability with respect to strength (*CS-coefficient* = 0.75) and closeness (*CS-coefficient* = 0.75) and a questionable one with regard to betweenness (*CS-coefficient* = 0.36). We further focused our attention on the interpretation of strength and closeness.

Oppositional defiant problems, ADHD problems, and affective problems had the highest centrality strength (significantly higher than 64%, 55%, and 55% of the nodes). Then, poor monitoring had the highest closeness levels (significantly higher than 55% of the nodes). The strongest edge was the one between involvement and positive parenting (it was significantly stronger than all the other edges). Regarding parent-child interaction, the edge between poor monitoring and conduct problems was significantly stronger than 67% of the edges. The bridge with the highest strength, closeness, and expected influence (1-step) was that connecting poor monitoring and conduct problems.

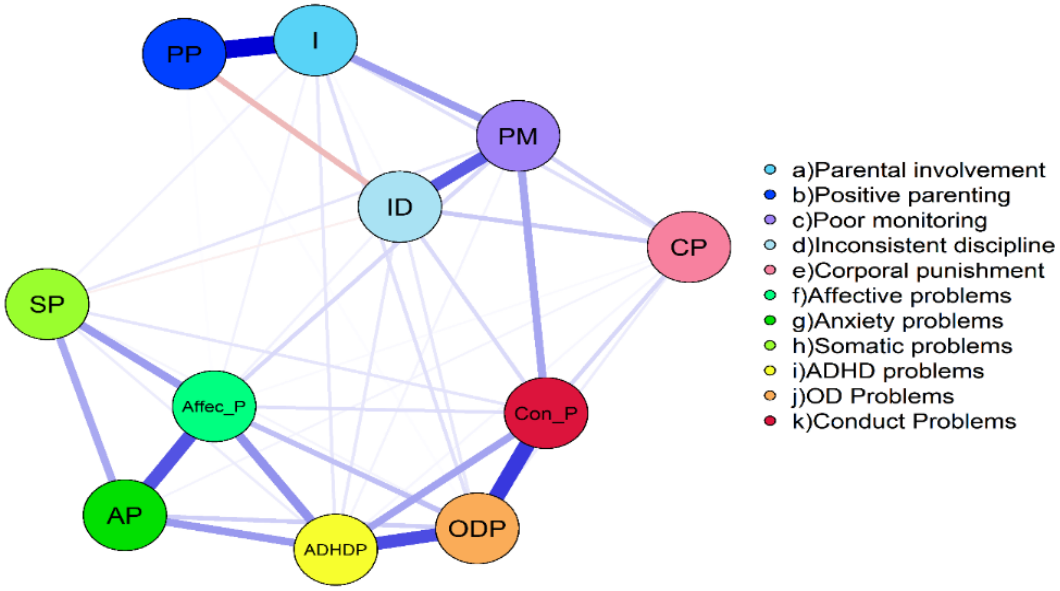

Fig. 3.2. Estimated network model for parenting practices and adolescents' mental health problems

No significant difference was found between the structures of the networks across genders (maximum difference = 0.128, $p = .285$). However, the global strength was significantly higher for males (global strength = 4.75) ($p = .035$) than for females (global strength = 4.22). The centrality of positive parenting was significantly higher in strength ($p < .022$) for males than for females.

3.4. Discussion

According to network theory (Robinaugh et al., 2020), the easiest way to produce a change in a network is by targeting the nodes with the highest centrality levels (Cramer et al., 2010). Consequently, parenting programs may consider the behaviors described by items 28 ('you stay out later than you are supposed to and your parents don't know it'), 16 ('your parents praise you for behaving well'), and 18 ('your parents hug or kiss you when you have done something well') as possible primary targets. Conversely, the behaviors described by items 25 ('your parents don't punish you when you have done something wrong'), 2 ('your parents tell you that you are doing a good job'), and 3 ('your parents threatened to punish you and then do not do it') may receive lower priority, as they seem to have little influence (low levels of centrality) in the network.

Although males reported higher levels of dysfunctional parenting practices than females, the networks were invariant across gender. This result suggests that the dynamics underpinning the various parenting practices considered here is similar across gender. Consequently, parenting programs may target the same nodes of the parenting practices network for both boys and girls.

We showed that poor monitoring was the parenting practice most directly linked to adolescents' mental health problems. As such, other parenting practices may have a more indirect effect (through poor monitoring). Our findings suggest that improving parenting practices (i.e., positive parenting, involvement, inconsistent discipline, and physical punishment) should be seen as a means of improving parental monitoring (Kerr et al., 2010).

The *global strength* of the network for males was significantly higher than that for females. It is argued that the stronger the connectivity within a network, the easier it is for a node to produce a change across that network (Borsboom & Cramer, 2013; Robinaugh et al., 2020). For our results, this means that it was easier for dysfunctional parenting practices and adolescents' mental health problems to exhibit reciprocal influences in the case of males (compared with females). This is in agreement with and a potential explanation for the higher observed prevalence of behavior problems among males (compared to females) (American Psychiatric Association, 2013).

As the sample was relatively small, we could not perform (while keeping the edge-weights accuracy and centrality indices stability at acceptable levels) the analysis at the level of the items of the YSR and APQ (combined). Had this been possible, it might have provided a more nuanced understanding of parent practices and youth mental health interplay.

Our findings rely on the views early adolescents have of their own mental health problems, as well as of their parents' parenting practices. However, adolescents' and parents' perspectives might be different (Russell et al., 2016). Thus, it is unclear if network analysis performed on parents' reports would lead to the same insights.

Within the narrow focus of the constructs considered here, an interesting avenue to pursue refers to whether there are significant differences in the networks of parenting practices for adolescents of different ages. Likewise, differences in networks of parenting practices could be studied between clinical samples and normative ones. Along these lines, it would be interesting to determine how the networks of parenting practices change as a result of the intervention.

Study 4. From parenting self-efficacy to the externalizing problems of children and adolescents: the mediator role of parent stress and inconsistent discipline

4.1. Introduction

PSE was defined as the parents' belief that they can fulfill their parental duties (Weaver et al., 2008). Several studies, both cross-sectional and longitudinal, showed that PSE predicted less emotional and behavioral problems in both children and adolescents (Albanese et al., 2019; Jones & Prinz, 2005; Weaver et al., 2008). There is also a large body of literature that documented the detrimental effect of parent stress on offspring mental health outcomes (e.g., Amrock & Weitzman, 2014; Stone et al., 2016).

Studies showed that inconsistent discipline predicts more externalizing problems in children and adolescents (e.g., Symes et al., 2016; Wojnaroski, 2011). Furthermore, the decrease of inconsistent discipline was associated with better treatment outcomes in children with conduct disorder (Muratori et al., 2015). Although the harmful effects of low PSE, parent stress, and inconsistent discipline on offspring externalizing problems have been long recognized, the understanding of the paths through which these parental factors relate to each other and offspring psychopathology is still in its infancy.

We argue that a theoretically plausible model is one in which parent stress and inconsistent discipline sequentially mediates the effect of PSE on children's externalizing problems. Low self-efficacy has been long theorized to lead to more emotional distress. For instance, it has been argued that people with low self-efficacy, by appraising their coping skills as low, are prone to experience negative emotions such as anxiety (Bandura, 1988). The negative association between PSE and parent stress and psychopathology has been long documented (Deater-Deckard & Panneton, 2017, Chapter 11). One explanation of this relationship might be that low PSE leads to parent stress (Deater-Deckard & Panneton, 2017; Harper et al., 2013; Kunseler, 2015). Parents with low PSE might perceive themselves as less capable to undertake their parental duties which in turn could lead to more stress.

Parenting practices were described as the specific behavior through which parents perform their parental responsibilities (Darling & Steinberg, 1993). That is, parenting practices consist of all the behaviors parents employ to discipline and educate their children. According to this stance, variables such as PSE and parent stress are expected to have an indirect effect on children's outcomes through parenting practices (Darling & Steinberg, 1993).

The outbreak of the COVID-19 pandemic accompanied by the measures instated by the states to limit the spread of the disease produced substantial distress in many families. The externalizing problems and parent stress might have been exacerbated (Giannotti et al., 2021; Johnson et al., 2020; Mazza et al., 2021). Thus, in this period the parent-child relationship might have been under a lot of strain. In this context, the parenting self-efficacy regarding the management of children's schedules and emotions could have led to lower parent stress, inconsistent discipline, and externalizing problems (Morelli et al., 2020).

This is a preliminary study (on cross-sectional data) in which we investigated the plausibility of a model whereas the effect of PSE on the externalizing problems of offspring is sequentially mediated by parent stress and inconsistent discipline. We examined four possible indirect paths. We expected parent stress to mediate the relationship between PSE and inconsistent discipline (*path 1*), parent stress to mediate the relationship between PSE and child externalizing problems (*path 2*), inconsistent discipline to mediate the relationship between PSE and child externalizing problems (*path 3*), and parent stress and inconsistent discipline to serially mediate the relationship between PSE and offspring externalizing

problems (*path 4*). Furthermore, we specified a second model in which PSE was replaced with PSE concerning the pandemic situation.

4.2. Methods

4.2.1. Participants

Seven hundred forty-nine parents of children and adolescents (4 – 17 years old) were eligible to take part in this study. The mean age of parents was 37.82 (SD = 5.90), ranging from 21 to 63 years old. Most of the parents were mothers (93%) and few fathers (7%). Most of the parents lived in the urban area (78%) while some lived in the rural one (22%). Regarding the parents' civil status, they were either married (86%), unmarried (5%), divorced (5%), or single (4%). Regarding education, 40% of parents had a university degree, 31% had post-university studies, 23% had high school studies, and 7% had only 10 years of formal education. About work, 54% had a full-time job, 25% had a remote job (working from home) while 21% did not have a job. Regarding the age of children, the first born had a mean age of 10.01 (SD = 5.18), the second one had a mean age of 6.87, and the third one had 3.74.

4.2.2. Measurements

Me as a Parent scale (MaaP; Hamilton et al., 2015) was employed to measure *parenting self-efficacy*. MaaP is a self-report questionnaire that measures four parent self-regulation domains namely personal self-efficacy, personal agency, self-sufficiency, and self-management. In the present study, only the self-efficacy scale was considered. This scale comprised four items that regard the degree to which parents are confident in their abilities to undertake the parenting duties.

Bearing on Morelli et al. (2020)'s work, we added three supplementary items to measure PSE related to pandemic context. These are rated on a 5-point Likert scale (1-Strongly disagree – 5-Strongly agree). The wording of the items are (1) "*I feel capable of calming my child down and getting rid of the worries he/she has during this period when many changes have taken place",* (2) *"I am able and I managed to organize his/her daily life following the rules imposed by the authorities, even if he/she stays at home and goes to school online, the child respects his/her sleep schedule, physical activity, relaxation, sits on the phone, etc.", and* (3) *"I can explain to my child what is happening so that he/she understands and reduces his/her worry".*

Perceived Stress Scale - 10 (PSS-10; Cohen & Williamson, 1988) was utilized to measure parent stress. This is a self-report questionnaire composed of 10 items. The items of PSS-10 measure the amount in which one perceives the events from their lives as stressful. The answers are offered on a 5-point Likert scale (i.e., 0-never – 5-very often).

Alabama Parenting Questionnaire short (APQ-9; Elgar et al., 2007) was selected to measure inconsistent discipline. For the present work, only the scale of inconsistent discipline was included.

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) was used to measure the externalizing problems of children. Two total scores for externalizing and internalizing problems could be computed. In this work, we considered the 10 items that regarded externalizing problems. The answers are provided on a 3-point Likert scale (i.e., 0-Not True – 2-Certainly True).

4.3.4. Procedure

This study has been approved by the ethical committee of Babeș-Bolyai University. Data collection took place exclusively online through a secure platform. Before collecting

data, informed consent was sought from parents. Data collection took place between December 2020 and June 2021. During these months the schools moved mostly online.

4.3.5. Data analyses

The analyses were conducted in R (RStudio Team, 2019). We investigated if there were multivariate outliers via Mahalanobis distance (De Maesschalck et al., 2000). Missing data was inspected and Little's Test was used to assess whether the data were missing completely at random (MCAR; Little, 1988). To examine the univariate normality assumptions, Skewness and Kurtosis were computed. Mardia Skewness and Kurtosis were employed to test the multivariate normality assumptions. The multicollinearity was assessed by examining the correlation matrix (i.e., we examined whether there were correlation coefficients larger than .90). Linearity was investigated by plotting (Q-Q plot) the standardized residual (Osborne & Waters, 2019).

The models were specified and tested via Structural Equation Modeling (SEM): we considered the measurement and structural models together (Kline, 2015, Capitolul 10). The models were estimated with Diagonally Weighted Least Square (DWLS).

To assess the statistical plausibility of the models, we consulted several fit indices. These were RMSEA, CFI, TLI, SRMR. Values of RMSEA ≤ 0.06, CFI ≥ 0.90, TLI ≥ 0.90, and SRMR ≤ 0.10 would indicate an acceptable data-model fit (Bentler, 1990; Hu & Bentler, 1999). The indirect paths were assessed via bootstrapping and were considered significant if the 95% bootstrapped confidence interval did not include 0.

4.3. Results

4.3.1. Preliminary analyses

We identified nine multivariate outliers for $\chi^2(35) = 66.62$. The percent of missing data was below 1% and Little's test was not significant (p =.275) indicating that the data was MCAR. Skewness and Kurtosis were within the acceptable ranges for all items excepting item 22 from SDQ (Skewness = 6.24, Kurtosis = 41.92) which was excluded from the subsequent analyses. Mardia Skewness and Kurtosis were significant ($p < .001$) showing that the multivariate normality assumptions were not met.

4.3.2. Descriptive statistics

All the correlations between the variables were statistically significant and in the expected directions. Specifically, PSE (both general and the one regarding the pandemic context) correlated negatively with the rest of the variables (i.e., parent distress, inconsistent discipline, externalizing problems). Furthermore, parent stress, inconsistent discipline, and externalizing problems were positively correlated.

4.3.3. Structural Equation Modeling

We specified a model in which we freely estimated all the direct paths between the interest variable (*Model 1*). We found that the direct path between parenting self-efficacy and inconsistent discipline was not significant (p = .965). Consequently, we posteriorly respecified a model in which this path was set to 0 (*Model 2*). By computing the chi-square difference test, we found that Model 2 was not significantly worse than Model 1 ($\chi^2 = 0.00$; p = .965). Thus, in the subsequent analyses, we used *Model 2* (see *Fig. 4.1*).

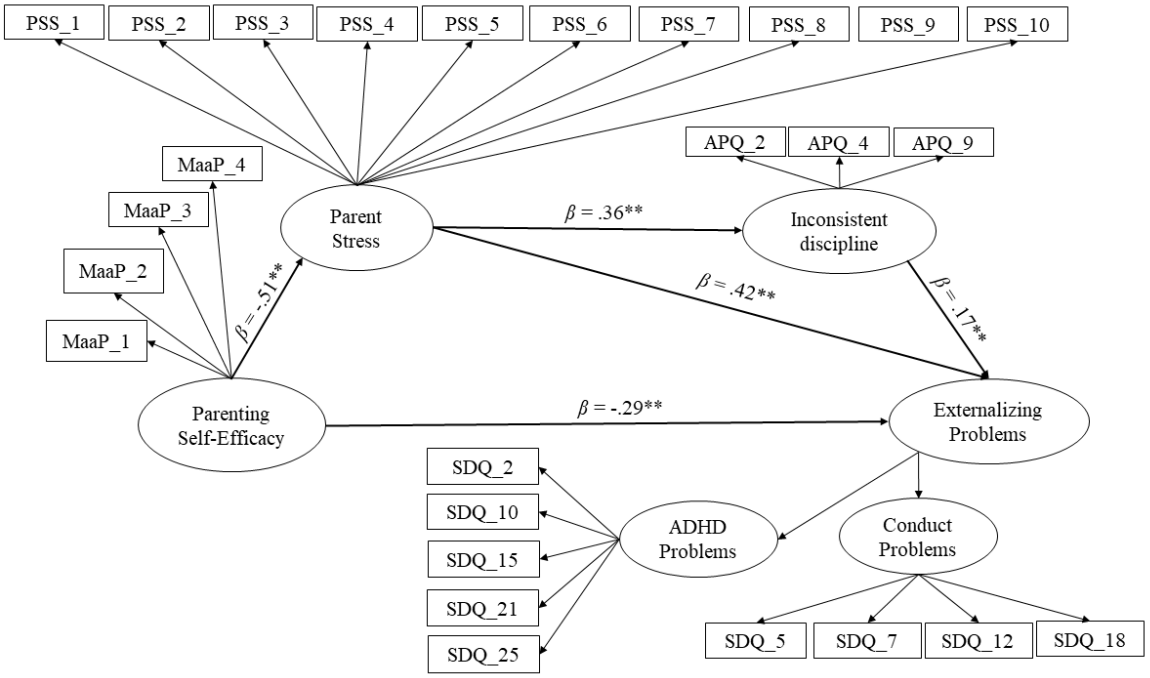

Fig. 4.1 Path analysis with latent variables and standardized regression coefficients

Model 2 had acceptable values in terms of the fit indices (CFI = .97, TLI = .97, RMSEA = .05, SRMR = .06). All the direct and indirect paths specified were statically significant. PSE predicted parent distress (β = - 0.51, p < .001) and externalizing problems (β = - 0.29, p < .001). Parent stress predicted inconsistent discipline (β = 0.36, p < .001) and externalizing problems (β = 0.42, p < .001). Finally, inconsistent discipline predicted externalizing problems (β = 0.17, p < .001).

Table 4.2 Unstandardized regression coefficients and their bootstrapped 95% confidence intervals

	Estimate[95%CI]	*p*
Direct effects		
PSE → Parent stress	-0.66 [-0.78, -0.54]	.001
PSE → Externalizing problems	-0.21 [-0.29, -0.14]	.001
Parent stress→ Inconsistent discipline	0.51 [0.39, 0.64]	.001
Parent stress→ Externalizing problems	0.24 [0.18, 0.31]	.001
Inconsistent discipline → Externalizing problems	0.07 [0.04, 0.11]	.001
Indirect effects		
PSE → Parent stress→ Inconsistent discipline → Externalizing problems	-0.02 [-0.04, -0.01]	.001
PSE → Parent stress → Externalizing problems	-0.16 [-0.21, 0.12]	.001
Parent stress→ Inconsistent discipline → Externalizing problems	0.04 [0.02, 0.06]	.001

Note: PSE – parenting self-efficacy

Regarding indirect effects, we found that parent distress mediated the relationship between parental self-efficacy and externalizing problems (β = - 0.16, p < .001). Inconsistent discipline mediates the relationship between parent distress and externalizing problems (β = 0.04, p < .001). Finally, parent distress and inconsistent discipline sequentially mediates the relationship between PSE and externalizing problems (β = - 0.02, p < .001).

Finally, we specified a model (i.e., ***Model 2b***) in which we replaced parenting self-efficacy scale with parenting self-efficacy regarding management of the effects of the pandemic. This model had excellent fit indices (i.e., CFI = .97; TLI = .97; RMSEA = .04; SRMR = .06). PSE pandemic negatively predicted the parent stress (β = - 0.53, p < .001) and child externalizing problems (β = - 0.20, p < .001). Parent stress positively predicted the level of inconsistent discipline (β = 0.36, p < .001) and externalizing problems (β = 0.46, p < .001). Finally, inconsistent discipline positively predicted behavioral problems (β = 0.17, p < .001).

Parent stress significantly mediated the relationship between PSE regarding pandemic and behavioral problems (β = - 0.25, p < .001). Inconsistent discipline mediated the relationship between PSE regarding pandemic and behavioral problems (β = - 0.06, p < .001). Finally, the sequential mediation path was significant (β = - 0.03, p < .001).

The variables included in the model (i.e., PSE, parent stress, inconsistent discipline) explained 49% (Model 2) and 45% (Model 2b) of the variance of the child externalizing problems. PSE and PSE regarding pandemic context explained 26% and 28% of the variance of parent stress. Finally, parent stress explained 13% of the variance of inconsistent discipline (*Model 2 and 2b*).

4.4. Discussion

All the direct and indirect paths specified were statistically significant. These results are not surprising. Inconsistent discipline was not expected to completely mediate the effect of the included variables on externalizing problems. Parenting practices are complex and diverse (Amato & Fowler, 2002; Shelton et al., 1996). The impact of PSE and parent stress on externalizing problems is expected to be mediated by several parenting practices (Bjørknes et al., 2012; Brotman et al., 2009). Nevertheless, this work supported the mediator role of inconsistent discipline between PSE, parent stress, and offspring behavioral problems.

The interventions that target inconsistent discipline might have the potential to substantially reduce the detrimental effect of low PSE and parent stress on children's externalizing problems. Furthermore, the interventions that target parent distress might have the potential to substantially reduce the detrimental effect of low PSE on offspring behavioral problems. Since the direct paths were all significant, the most effective interventions might be the ones in which all three parental variables (PSE, parent stress, and inconsistent discipline) are simultaneously targeted. Focusing on these variables might be especially effective for reducing the externalizing problems of children as our results indicated that 47% of the variance in externalizing problems could be explained by the variance in PSE, parent stress, and inconsistent discipline.

Inconsistent discipline received little attention in prior research. However, inconsistent discipline might be especially important in the context of parent stress. It has been shown that inconsistent discipline is stronger correlated with parent stress than other parenting strategies (i.e., positive parenting, parental involvement, poor monitoring/supervision, and corporal punishment) (Barry et al., 2009). That is, fluctuation in parent distress might be associated with fluctuation in parenting strategies. Part of our results replicates Barry et al. (2009)’s findings who supported the mediator role of inconsistent discipline between maternal distress and children’s externalizing problems.

An interesting result is that parent stress completely mediates the relationship between PSE (and PSE regarding pandemic) and inconsistent discipline. One interpretation for this result is that PSE could lead to inconsistent discipline, only through increasing parent stress.

These results might imply that by targeting parent stress one could stop the negative effect of low PSE on inconsistent discipline.

Another important contribution of our study is that it has been conducted in the pandemic context, while the schools moved mostly online (in Romania). Since parents and children spent more time together, the impact of parenting factors (on externalizing problems) might have been increased. Furthermore, both parents and children might have had to face new challenges during this period. On the one hand, this could have increased the parent stress and inconsistent discipline, while on the other hand, it could have elevated the behavioral problems of offspring.

To get more insights into how the pandemic affected the parental factors we measured PSE regarding the pandemic. Interestingly, PSE and PSE regarding pandemic generated models with analogous fit indices and parameters values. Furthermore, the correlation between PSE and PSE regarding pandemic was strong (i.e., $r = .52$). These results suggested that parenting PSE and PSE regarding the pandemic might impact the parent stress, inconsistent discipline, and externalizing problems through similar mechanisms.

The results of this study should be regarded considering several limitations. First, the present study is based on cross-sectional data. In this regard, future studies should consider the use of longitudinal designs. The exclusive use of self-report measurements (parent report) should be considered a limitation. Future studies should use multiple informants and methods to measure parent and child variables. This way more solid conclusion could be drawn (Lindhiem & Shaffer, 2016; Shelton et al., 1996).

CHAPTER IV. GENERAL CONCLUSIONS AND IMPLICATIONS

1. Clinical implications

With relevance for mental health service providers and parents, we indicated that online self-guided parenting programs are effective in reducing the externalizing problems of children and adolescents. These interventions are also effective in improving parenting practices and parenting self-efficacy, as well as reducing parent stress. Online self-guided programs may be preferable for parents who have university studies, as we have found that this population tends to benefit more from these interventions. Furthermore, we pointed out that interventions with more sessions would be preferred to those with 2 –4 intervention modules. A certain level of specialized support, provided by a psychotherapist, to facilitate the understanding of the modules or the implementation of the techniques could improve the effectiveness of self-guided online parenting programs. The use of technology as a channel through which mental health professionals and parents meet each other (i.e., video conference) could be considered a good treatment option, as we did not find any significant differences between these interventions and those delivered face-to-face.

Mental health providers could use APQ-lg and APQ-9 to assess the level of positive and negative parenting practices. Practitioners could use APQ-lg and APQ-9 to make valid comparisons of parenting practices across age, gender, clinical status, and informant (with some caveats). That is, they could use APQ-lg and APQ-9 to assess the need for psychotherapy (parenting programs), as well as to guide their interventions that aim to improve parenting practices and reduce externalizing problems in children and adolescents. As APQ-9 has only 9 items, it could be used in repeated measurements, allowing mental health service providers to monitor the progress made by parents in improving parenting

practices. As parents and children could fill out the APQ, practitioners could use the APQ to gather information about parenting practices from multiple sources.

Study 1 (meta-analysis) indicated that the effectiveness of online parenting programs (compared to waitlist) has a small effect size (i.e., for child and parent outcomes). Therefore, in studies 3 and 4, we focused on better understanding the mechanisms that connect parenting practices, parent stress, and parenting self-efficacy with externalizing problems of children and adolescents. In this process, we sought to identify new possible primary targets for parenting programs that could increase their effectiveness. In this direction, using the network approach, we indicated that the behaviors described in items 28 ("*You stay out later than you are supposed to and your parents don't know it*") and 16 ("*Your parents praise you for behaving well*") could be regarded as primary targets in parenting programs. In contrast, behaviors such as those described in items 25 ("*Your parents don't punish you when you have done something wrong*") and 2 ("*Your parents tell you that you are doing a good job*") should receive less attention in interventions, as they were found to have little influence on the network. We have also indicated that parental interventions that aim to reduce mental health problems in early adolescents should consider poor monitoring as one of their main targets. Complementary, in study 4 we found that 49% of the variance in externalizing problems of children could be explained by parenting self-efficacy, parent stress, and inconsistent discipline. Furthermore, we found that both direct and indirect (mediated) paths to externalizing problems of children were significant. These results suggest that parental interventions that aim to reduce behavior problems in children might be more effective if they target all three parental variables together (i.e., parenting self-efficacy, parent stress, and inconsistent discipline).

Some of the differences we found when comparing latent means could be of interest to parents, practitioners, and researchers. Children with mental health problems reported less parental involvement and positive parenting, and more corporal punishment and poor monitoring. Male children (compared to females) reported less parental involvement and more poor monitoring, inconsistent discipline, and corporal punishment. Early adolescents (compared to adolescents) reported more parental involvement, positive parenting, and less poor monitoring and corporal punishment. Based on these results, we could state that children with mental health problems, males or those older than 12 years, could have a higher likelihood of experiencing less positive parenting practices and more negative parenting practices. We suggest that this category of children should receive special attention in parental programs, especially in those geared toward prevention.

2. Methodological implications

Compared to previous meta-analyses, study 1 had several methodological strengths, which allowed us to draw stronger conclusions about the effectiveness of online parenting programs in reducing externalizing problems in children and adolescents and improving parent outcomes. Firstly, we included only those studies that had explicitly stated the reduction of externalizing problems of children and/or adolescents as the main objective of the interventions. Secondly, we included only studies in which interventions had been conducted online. Thirdly, we included only studies in which the main problems of children were externalizing problems (i.e., diagnosed or high levels). Fourthly, we also included the parenting interventions delivered by videoconference. Fifthly, we compared the online parenting intervention with waitlist (first comparison) and other non-technology-based interventions (second comparison). Sixthly, we also included studies testing online parenting interventions for externalizing problems of adolescents. Seventhly, follow-up measurements were also considered to quantify the long-term effectiveness of these interventions.

The research questions addressed in studies 2, 3, and 4 were rigorously answered using state-of-the-art analytical tools, such as the Equivalence Test, the projection method, network analysis, and path analysis with latent variables. Furthermore, the analyses were performed in RStudio, and the scripts of the analyzes were made available as supplementary materials. As a result, our analyzes could be thoroughly evaluated and replicated. Furthermore, studies with similar research questions could use the script we provided to guide their analyses.

As we underlined in study 1 that most of the studies that examined the efficacy of the intervention relied solely on the parent's report, we contributed to the evidence-based assessment investigating the measurement invariance of the APQ - a multidimensional scale that could be completed by both parents and children. Measurement invariance was rigorously assessed using MG-CFA, the Equivalence Test (EQ), and the subsampling approach (for unbalanced samples) in conjunction. For more information, the projection method was used to compare the latent means of the groups and to calculate the validity index (this is, the percentage of the difference between two observed scores that is explained by the difference in the latent score). Study 3 has important methodological contributions, as it is the first study to take advantage of the strengths of the network approach to study parenting practices and children's mental health problems. Therefore, we illustrate how parenting practices and mental health problems could be examined from this promising theoretical perspective. The main methodological strength of Study 4 is that we used path analysis with latent variables. Although path analysis is usually used with observed scores, the use of latent variables is preferable. Unlike observed scores, latent scores are considered error-free (Kline, 2015).

3. Theoretical implications

We showed that the effect size for the effectiveness of online parenting programs (compared to waitlist) is small in almost all instances. These findings call for new theoretical and clinical developments that could increase the effectiveness of these interventions. We have addressed this gap by conducting two studies that have high theoretical implications. In study 3 we provided valuable information regarding the dynamic within parenting practices, as well as for the parenting practices – child mental health problems interaction. We indicated the most central nodes in the network of parenting practices that might be regarded as primary targets in the interventions that aimed to improve parenting practices (that is, items 24 and 16). Furthermore, we indicated the main paths connecting parenting practices and early adolescents' mental health problems (i.e., poor monitoring and conduct problems). Intervening on poor monitoring might be the most effective way to prevent negative parenting practices in order to activate the network of mental health problems of early adolescents. In study 4, we proposed and tested the statistical plausibility of a model that could explain the mechanisms through which parenting practices, parent stress, and inconsistent discipline impact externalizing problems of children. In this respect, we showed that a possible model that explains the interaction between variables is one in which the effect of parenting self-efficacy on externalizing problems is partially mediated by parent stress and inconsistent discipline.

4. The main limitations of this thesis

As we found 15 RCTs eligible for the meta-analysis, only one subgroup analysis (i.e., self-guided programs with specialized support vs. self-guided programs with technical support only) was performed. Had there been more studies available, more subgroup analyzes could have been possible and more nuances regarding the effectiveness of online parenting programs could have been revealed. Regarding the quality of the studies (as investigated with

the Cochrane Risk of Bias tool 2.0 (Higgins et al., 2016)), we found that none of the included RCTs had a preregistered protocol. This made it impossible to examine whether the selection of the reported results took place (see the fifth domain of RoB 2.0 (Higgins et al., 2016)). Most RCTs used only parent self-report questionnaires to measure the outcome of the intervention. This was concerning, as each measurement method has its limitations and the importance of using multiple methods and informants was underlined (Lindhiem & Shaffer, 2016; Shelton et al., 1996). Finally, RCTs that aimed to reduce the externalization problems in adolescents were scarce.

Limitations related to the small sample size were present in studies 2 and 3. Specifically, in study 2 the size of the clinical and parent samples was small, affecting the strength of our findings. Furthermore, the children in the clinical sample were, on average, older than those in the non-clinical one. In study 3, had we had a larger sample size, we would have been able to perform the analyses at the combined level of the items of APQ and YSR (Youth Self-Report; Achenbach & Rescorla, 2001). In turn, this could have provided more details about the interaction of parenting practices with mental health problems in early adolescents.

Limitations related to the measurements of the variable of interest were present in studies 3 and 4. Specifically, in study 3, we only used child reports to measure parenting practices and mental health problems of youth. On the other hand, in study 4 we only used the parent's report to measure parenting practices and child externalizing problems. These are limitations, as the gold standard in the field is to use different methods and informants to measure parent and child variables (Lindhiem & Shaffer, 2016; Shelton et al., 1996).

In studies 3 and 4 we used cross-sectional data, which is another limitation. Specifically, cross-sectional data do not permit the separation of the within- and between-person effects, which precludes the drawing of conclusions regarding the within-person effects (Curran & Bauer, 2011).

5. Future directions

To better understand the effectiveness of online parenting interventions, future studies may replicate our meta-analysis with more RCTs. Complementarily, since we have found a small effect size, more theoretical studies are required that could advance the understanding of the relationship between parental variables and externalizing problems of children. In turn, these theoretical studies could provide information on new intervention targets to incorporate into online parenting programs.

Future studies should examine the measurement invariance of APQ-42 and APQ-9 on a larger clinical sample (measurement invariance across the clinical status of children) and on a larger sample of parents (measurement invariance between informants). Similarly, the network of parenting practices and youth mental health problems should be replicated with a larger sample size that would allow network analyses at the level of YSR and APQ items.

Multiple informants should be used to measure parenting practices and child mental health problems and replicate our findings. Furthermore, longitudinal studies should be considered. The longitudinal measurement invariance of APQ should be investigated to gain a better understanding of changes in intercepts and loadings across the age of children. Using longitudinal data, one can better understand how the dynamic between parenting practices and child mental health problems evolves over time. Finaly, by using longitudinal data, one could detangle the within- and between-person effects and might be also able to model the temporal succession of the effects (e.g., changes in variable one lead to the changes in variable two).

6. Summary of the main contributions of this thesis

Based on the studies that compose this thesis, the following main conclusions are to be drawn:

1. Compared to waitlist, self-guided online parenting programs are effective in reducing externalizing problems in children and adolescents, as well as in improving parenting practices and parenting self-efficacy and reducing parent stress. The effect size was small in almost all cases, but stable at follow-up measurements. These interventions are more effective if they have more modules or are delivered to parents who have a university degree.
2. The effectiveness of parenting programs delivered via videoconference is not significantly different from that of those delivered face-to-face in reducing externalizing problems of children and adolescents. Similar results were found in follow-up measurements, indicating that videoconference-based parenting programs could be regarded as effective alternatives to classically delivered parenting programs.
3. The Romanian version of APQ-42 and APQ-9 could be used to make valid comparisons (with some caveats) across the age (early adolescents vs. adolescents), gender, clinical status (community vs. clinical sample) of children, as well as between informants (parent vs. child). This is supported by the fact that we attested the measurement invariance of APQ-lg and APQ-9 across these groups.
4. The comparison of latent means revealed that adolescents (compared to pre-adolescents), males (compared to females), healthy children (compared to those with a mental disorder), and children (compared to parents) reported more frequently negative parenting practices (e.g., inconsistent parenting, poor monitoring, corporal punishment) and less often positive parenting practices (e.g., positive parenting, parental involvement). These results corroborated the findings of previous studies.
5. The most central nodes of the parenting practices network are the ones described in items 28 ("*You stay out later than you are supposed to and your parents don't know it*") and 16 ("*Your parents praise you for behaving well*"). These behaviors should receive special attention in programs that aim to improve parenting practices.
6. In contrast, parental behaviors described by items 25 ("*Your parents don't punish you when you have done something wrong*") and 2 ("*Your parents tell you that you are doing a good job*") were the least central from the network. These behaviors should receive little attention in programs that aim to improve parenting practices.
7. Parenting programs that aim to reduce behavior problems in early adolescents should regard poor monitoring as one of their main targets. We showed that poor monitoring and conduct problems of early adolescents form the main path through which parenting practices and mental health problems of children interact with each other. Thus, parenting programs that aim to reduce the mental health problems in early adolescents should consider poor monitoring one of their primary targets.
8. The effect of parenting self-efficacy on externalizing problems of children and adolescents is partially mediated by parent stress and inconsistent discipline. All direct paths to externalizing problems were also significant. Parenting self-efficacy, parent stress, and inconsistent discipline explain 49% of the variance in externalizing problems of children and adolescents. These results highlight that parenting self-efficacy, parent stress, and inconsistent parenting should be targeted together in parenting programs that aim to reduce externalizing problems in children and adolescents.

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