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Covid-19 Stress and Coping Questionnaire for children: Evidences of validity

Questionário de Estresse e Enfrentamento contra Covid-19 para crianças: Evidências de validade

Cuestionario de Estrés y Afrontamiento frente al Covid-19 para niños: Evidencias de validez

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Resumo

Os estressores relacionados à pandemia de Covid-19 afetam todas as idades, e é essencial avaliá-los com base no estágio de desenvolvimento. Este estudo teve como objetivo desenvolver e reunir evidências de validade de um questionário de enfrentamento da pandemia para crianças de seis a dez anos. O instrumento inclui nove vinhetas, avaliadas em duas etapas: intensidade do estressor e forma de enfrentamento. O coeficiente de validade de conteúdo foi de 0,93. A análise de componentes principais indicou dois fatores: limitações e demandas

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(α=0,62), e dependência e relacionamentos (α=0,72). Como implicação clínica, o instrumento permite identificar padrões de estresse e enfrentamento em crianças, favorecendo intervenções precoces e adequadas ao desenvolvimento. Pode ser aplicado em contextos clínicos e escolares para detectar dificuldades emocionais em momentos de crise. Sugere-se a realização de novos estudos para ampliar as evidências psicométricas.
Palavras-chave: psicometria; validade; psicologia pediátrica;
psicologia do desenvolvimento.

Abstract

Covid-19-related stressors affect all age groups, and assessing them according to developmental stage is essential. This study aimed to develop and gather validity evidence for a coping questionnaire for children aged from six to ten years old. The instrument includes nine vignettes, assessed in two steps: stressor intensity and coping response. The content validity coefficient was 0.93. Principal component analysis revealed two factors: limitations and demands (α=0.62), and dependency and relationships (α=0.72). As a clinical implication, the instrument allows for the identification of stress and coping patterns in children, supporting early interventions tailored to developmental needs. It can be applied in clinical and school settings to detect emotional difficulties in times of crisis. Further studies are suggested to expand the psychometric evidence.
Keywords: psychometrics; validity; pediatric psychology;
developmental psychology.

Resumen

Los estresores relacionados con la pandemia de Covid-19 afectan a todas las edades, y es esencial evaluarlos según la etapa de desarrollo. Este estudio tuvo como objetivo desarrollar y reunir evidencias de validez de un cuestionario de afrontamiento para niños de seis a diez años. El instrumento incluye nueve viñetas, evaluadas en dos etapas: intensidad del estresor y forma de afrontamiento. El coeficiente de validez de contenido fue de 0,93. El análisis de componentes principales señaló dos factores: limitaciones y demandas (α=0,62), y dependencia y relaciones (α=0,72). Como implicación clínica, el instrumento permite identificar patrones de estrés y afrontamiento en niños, favoreciendo intervenciones tempranas y adecuadas al desarrollo. Puede aplicarse en entornos clínicos y esco-

lares para detectar dificultades emocionales en momentos de crisis. Se sugieren nuevos estudios para ampliar las evidencias psicométricas.
Palabras clave: psicometría; validez; psicología pediátrica;
psicología del desarrollo.

Introduction

An event can be characterized as a stressor based on the individual assessment of how the event threatens or challenges Basic Psychological Needs (BPN): the need to be able to manage situations and be effective in achieving objectives (competence); the need to be able to do things as you see fit (autonomy); and the need to have bonds of mutual trust and support (relationship) (Deci & Ryan, 1985; Ryan & Deci, 2017; Skinner & Welborn, 1994). The Motivational Coping Theory (MCT) proposes a model for coping with stress, with hierarchical and developmental characteristics (Skinner et al., 2003; Skinner & Welborn, 1994; Skinner & Zimmer-Gembeck, 2016, 2023). Self-regulation, the ability to control emotions, cognition, and behaviors in order to achieve a certain aim, becomes increasingly intrinsic with age (Sameroff, 2010), with self-regulation being necessary to cope with stress, according to MCT (Skinner & Zimmer-Gembeck, 2016).

MCT is considered a hierarchical proposal in which instances of coping make up the basis of the structure, representing behaviors directly coping with the stressor. The cluster of those which have the same function is called ways of coping (WC). Finally, WC are grouped into twelve families of coping, higher-order categories, of which six are characteristic of adaptive coping (Problem-solving, Information seeking, Self-comforting, Support seeking, Accommodation, Negotiation) and six are characteristic of maladaptive coping (Helplessness, Escape, Delegation, Social isolation, Submission, Opposition), associated with the three NPB. Maladaptive families of coping are associated with more negative outcomes in mental health, since they indicate a difficulty in self-regulation in the face of stressors, while adaptive families of coping are associated with better adjustment (Skinner & Welborn, 1994; Skinner & Zimmer-Gembeck, 2016, 2023). In addition, the concept of coping is also intrinsically associated with that of stress, since it concerns dealing with a specific stressor and that depends on three aspects: characteristics of the stressor, resources (personal and social) and stage of development (Fields & Prinz, 1997; Skinner & Edge, 1998).

Considering that not all children react to stress in the same way and the variability between and within development stages, some may develop

symptoms associated with the experience of the Covid-19 pandemic (Jiao et al., 2020). Considering that both the stage of development and the characteristics of the stressor influence coping (Skinner & Zimmer-Gembeck, 2023; Zimmer-Gembeck & Skinner, 2010), specific instruments to assess stress and coping are necessary to cover the singularities of a particular stressor context, such as the pandemic of Covid-19.

To the authors' knowledge, no instruments adapted to Brazilian Portuguese have been found to assess children's stress and coping during the Covid-19 pandemic, particularly those that could be self-reported by children. This conclusion is based on an unpublished systematic review conducted by the authors, following PRISMA guidelines and using the PICO strategy. The search was carried out in five databases (PubMed, Scopus, Web of Science, PsycNet, and Virtual Health Library) between September and October 2020. The descriptors included terms related to children and adolescents, psychological stress, coping behavior, psychometric properties, and validation studies. The inclusion criteria required studies to present at least one measure of validity and one of reliability. A total of 23 studies were included. The review revealed a scarcity of instruments directed specifically at children, particularly self-report tools based on developmental coping theories such as the Motivational Theory of Coping (MTC).

For children, it is recommended that instruments be built that contain few items, though being representative of the construct (Clark & Watson, 2019), since most of them have a low capacity to maintain attention for a long time (Moss & Moss-Racusin, 2021; Reynolds & Romano, 2016). In addition, illustrative tools can assist in the rating scale on memory. For example, the vignette model, which can make the child put himself in the situation and respond to it (Hughes & Huby, 2012; Wilks, 2004). Considering that Covid-19 is a new stressor and, therefore, a specific instrument is necessary, the aim of this study was to develop and estimate the evidences of validity of a coping questionnaire in the face of the pandemic for children aged six to ten years old.

Method

Participants

The final sample was composed by 334 children from all regions of Brazil (South, Southeast, North, Northeast, and Midwest). All of the participants were students at a private school, in elementary level. Participants had an average age

of 9±1.57 years old (from 6 to 11 years), mostly female (51.92%). Sample size was chosen based on the recommendation of at least 5 to 15 subjects per item of the instrument (Marôco, 2010).

Instrument

The instrument consists of nine vignettes, each divided into two parts: the first referring to the intensity of the stressor and the second the ways of coping one would use to cope with this stressor[1]. Each stressor is linked to one of the three basic psychological needs: competence, autonomy, and relationship. The stressor is measured on a visual analog scale from zero to ten. An illustration was devised of an ant and an elephant to make the differences between sizes or dimensions of stress intensity more understandable for a child.

In relation to coping, each question has four possible answers, related to each coping family, two adaptive and two maladaptive. The only exception is the first question, with five coping alternatives, due to its relevance regarding the coping reported in the literature.

The first questions pertain to situations that can be stressful for a child during the Covid-19 pandemic, in vignette format so that it is playful, and the child can relate. The visual analog scale helps the child understand the intensity of stress and being from zero to ten a parallel is made to the way performance is evaluated in Brazilian schools, so it gets even closer to the child's reality and, therefore, their understanding. Each stressor is related to a basic psychological need (BPN) – autonomy, competence, or relationship – and the ways of coping (second part of each question) concern the four families of coping related to such BPN, according to the MTC, with two adaptive alternatives and two maladaptive ones, except for the first question.

For the questionnaire to attract children's attention and generate better understanding, it was designed as vignettes and for each answer there are images that illustrate the situation. The questionnaire was constructed on the digital graphic design platform Canva (https://www.canva.com/), and the images were taken from Canva and from the Freepik website (https://br.freepik.com/), using only copyright-free images.

To perform the theoretical and content evaluation of the constructed instrument, a five-point Likert scale was used, designed to verify (a) practical and theoretical relevance and (b) language clarity of the instrument. These scales allowed investigating the consistency of the judges' opinions about the items of the instrument. The experts' opinions were initially collected individually with the scale and later discussed collectively in group sessions to improve the quality of

the construct and review any disagreements. Modifications were made and then pilot data started being collected.

Ethical statement

The study was approved by the Ethics Committee in Human Research of the Sorocaba University (approval number 4.086.836). All ethical procedures were followed, in accordance with Brazilian and international standards for research with human beings. Specifically, the study complied with Resolution 510/2016 of the Brazilian National Health Council (Ministério da Saúde, 2016), which regulates research in the human and social sciences, and with the General Data Protection Law (LGPD) (Brasil, 2018), ensuring the confidentiality and protection of participants' personal data. Informed consent was obtained from the parents or guardians, and children provided written assent, in accordance with ethical protocols for research involving minors.

Procedures

The instrument development process consisted of six stages to assess instrument content validity, based on several technical guidelines in the literature on the construction of psychometric instruments (Irwing et al., 2018; ITC, 2013). The steps consisted of: (a) definition of the theoretical model (MTC), with the purpose of defining dimensions of the construct and number of items in each one; (b) literature review on pandemic stressors for the target population, in order to provide a context for the assessment of stressors and coping strategies; (c) literature review on instruments on coping for children and adolescents, in order to analyze the most used and effective forms of response; (d) panel of experts to write and discuss the initial pool of items, with the purpose of selecting the most relevant stressors and coping behaviors for the target audience; (e) evaluation by expert judges, in which three judges (psychologists studying for their master's or doctorate degrees, from three different states in Brazil, aged around 37 years old) evaluated the items according to the criteria of clarity and relevance; and, finally, (f) pilot study with the target population (90 children, aged 9.49 years old on average [*SD*=1.29], who studied at a private school in the state of Rio Grande do Sul, in Brazil), in order to identify possible difficulties in understanding and responding to the instrument's items.

Data collection was divided into two parts: a pilot study, to test the understanding of the scale; and a validation study. For both data collections, a signed informed consent was obtained from the parents or guardian of the children and

a signed term of assent from children. In addition, both data collections were carried out online, through Google Forms, because of the Covid-19 pandemic.

For the pilot study, a school was contacted which belongs to the education enterprise that was a partner in this research. Eight classes were used, with the children and parents being instructed during the class, which happened online, and who then responded to the instrument.

For the validation study, 1,795 schools and 3,512 teachers were contacted, from the same education enterprise that took part in the research, and responses were obtained from 73 of them. Data collection took an average of 25 to 30 minutes in total, considering that the first part of the instrument was answered by parents (approximately 15 minutes) and the second part was answered by the children themselves (approximately 15 minutes). Despite this separation of responses, this study only considered the children's answers.

Data analysis

We started analyzing content validity by a content validity coefficient for each item of the instrument (CVCi) and for the questionnaire as a whole (CVCt) (Hernández-Nieto, 2002), with a cutoff of 0.80 to be deemed acceptable. Then, we conducted descriptive analysis, including mean, median, standard deviation, and absolute and relative frequencies to investigate the stressors and the coping styles (adaptive or maladaptive; adaptive process) more prevalent in the study sample. Secondly, we performed some graphical representations of variables, including box plots and histograms, and the Mann-Whitney test to assess the relationship and interactions between stress and coping.

Parallel analyses were conducted (Timmerman & Lorenzo-Seva, 2011) to estimate the number of factors to be retained for the stressor intensity and coping. For the factor retention, two criteria were observed, the Kaiser criteria of eigenvalue ≥1 and the comparison of empirical and sample-permuted eigenvalues. Then, exploratory factor analysis was performed using the least squares extraction method, with tetrachoric correlation. Next, the ordinal Cronbach's alpha coefficients (Zumbo et al., 2007) and McDonald's omega (Zinbarg et al., 2006) were estimated for each subscale.

It is important to consider how to analyze the instrument. Considering that theoretically stress and coping should be analyzed as a process (Skinner & Zimmer-Gembeck, 2016) and that the instrument's descriptive data showed that there is a relationship between stress and coping for most of the instrument's items, it was recognized that the calculation needed to be done based on this relationship. Considering this, firstly, it is possible to multiply stressors and coping

scores. We also code adaptive coping with a score of +1 and maladaptive coping with a score of –1. The stressor intensity is measured according to a scale from zero to ten. Thus, the more negative the total score (–10), the worse the stressor and the way of coping. The closer to zero, it means that the stressor is not as intense for that person. High positive score (+10) means that the stressor is intense, though the person copes adaptively.

Considering that this instrument relates two constructs in the same analysis – stress and coping – does not represent a unique latent trait structure, Principal Component Analysis was chosen. This method can reduce the dimensionality of a dataset creating an index, increasing interpretability, and preserving the variability (Jolliffe & Cadima, 2016). Although the development of psychological instruments commonly involves Exploratory Factor Analysis (EFA) to identify latent constructs, in the present study, a choice was made to apply Principal Component Analysis (PCA) as an exploratory strategy. This choice was based on the goal of reducing dimensionality and summarizing the data structure in a preliminary version of the instrument, composed of contextualized vignettes intended to simulate everyday situations during the pandemic. PCA was considered appropriate given the early stage of instrument development, the relatively small sample size, and the interest in examining item grouping patterns rather than estimating latent factors *per se* (Jolliffe & Cadima, 2016; Watkins, 2018).

Undirected weighted networks graphs were built based on a correlation matrix. Partial correlations coefficients were estimated through the GLasso method. Those pairwise partial correlations were depicted as edges connecting nodes. Node size varies according to the mean score for each item. The thickness of the lines represents the correlation's strength; the blue lines represent positive correlation and red lines represent negative correlation. It was also used by a walktrap community algorithm, to investigate how many clusters exist and the distribution between the items (Costantini et al., 2015; Epskamp et al., 2012; Epskamp, Borsboom & Fried, 2018).

Concurrent validity was assessed by the comparison of the gender and age scores between groups in which the behavior is expected to differ. Thus, the difference will demonstrate the ability of the instrument in discriminating differences between groups in which the difference is known to exist. Our hypothesis was that higher values – that is, greater stressor intensity and less effective coping – would be observed among younger children and among girls, based on previous findings (Hampel & Petermann, 2005; Zimmer-Gembeck & Skinner, 2010). All analyses were conducted with R Language for Statistical Computing, through the psych, qgraph, Rcsdp, acepack, igraph and bnlearn packages.

Results

Content validity evidences

All items and dimensions achieved coefficients of clarity of language and practical relevance above 0.80. The global content validity coefficient is 0.93, indicating that the judges found the items to be consistent with the underlying theoretical conceptualization.

Descriptive analysis and group comparison

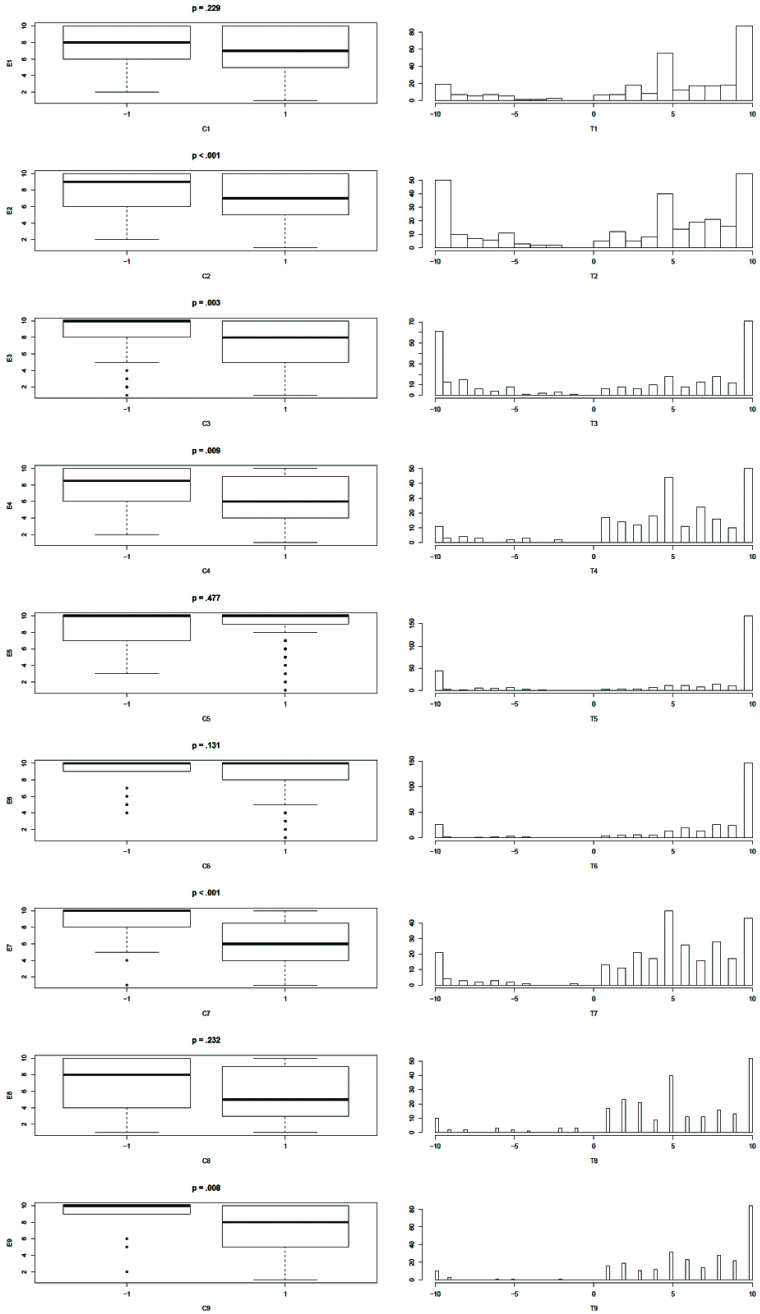
Descriptive analysis showed the mean and standard deviation about the stressor and the total score, composed by the stress plus coping. The percentage of adaptive coping was considered for each item (Table 1).

Table 1 — Descriptive analysis about the stress and coping questionnaire

Stressor situation item	Stressor *M* (*SD*)	Proportion of adaptive coping	Total stress and coping *M* (*SD*)
I1	6.73 (3.15)	83.90%	4.73 (6.05)
I2	6.74 (3.18)	68.18%	2.17 (7.46)
I3	7.26 (3.32)	59.85%	1.06 (8.26)
I4	5.00 (3.64)	88.52%	4.55 (5.28)
I5	8.53 (2.64)	78.33%	5.09 (7.56)
I6	8.14 (2.78)	87.91%	6.35 (6.10)
I7	5.78 (3.33)	86.64%	4.20 (5.68)
I8	4.66 (3.77)	89.21%	4.58 (5.07)
I9	6.23 (3.56)	94.22%	5.97 (4.71)

Looking at stress and coping with graphical analysis, by histograms and boxplots, it was possible to verify a relevant interaction between the constructs in several items, as shown in Figure 1. The first column is composed of boxplots and the *p*-value comes from the Mann-Whitney U test. In the second column, the histograms of the combined stress score multiplied by coping are presented having the total value. It is possible to verify that, in general, when coping was maladaptive, the stressor is interpreted as high, that is, as a threat. This further demonstrates the importance of data being computed as a process, stress and coping together, since childhood.

Figure 1 — Comparison of stress level by adaptive and maladaptive coping and distribution of scores



Notes: E: stress level; C: coping valence (–1 for negative, 1 for positive); T: combining "total" score (E*C).

The group comparison was made by the Wilcoxon test and the ANOVA. It was compared by the gender, age, school level and state of Brazil. There were no differences when the groups were compared, all $p>0.05$. The effect size in point-biserial correlation was: C1, nonsignificant (ns); C2, 0.29; C3, 0.24; C4, 0.21; C5, ns; C6, ns; C7, 0.32; C8, ns; C9, 0.23.

Internal structure

The parallel analyzes indicated the presence of three factors with eigenvalues higher than the simulated data for the scores of stress intensity and coping style. However, only the first factor had an eigenvalue >1, with only one factor being retained for each form of item scoring. Table 2 shows the factorial load of the items and the reliability measures for each form of scoring the items (stressor or coping). The items presented appropriate factorial loads (≥0.32), with the exception of item one for the coping score.

Table 2 — Factor loadings, principal component analysis and reliability measures for stress intensity measures and coping type for the Covid-19 Stress and Coping Questionnaire for children

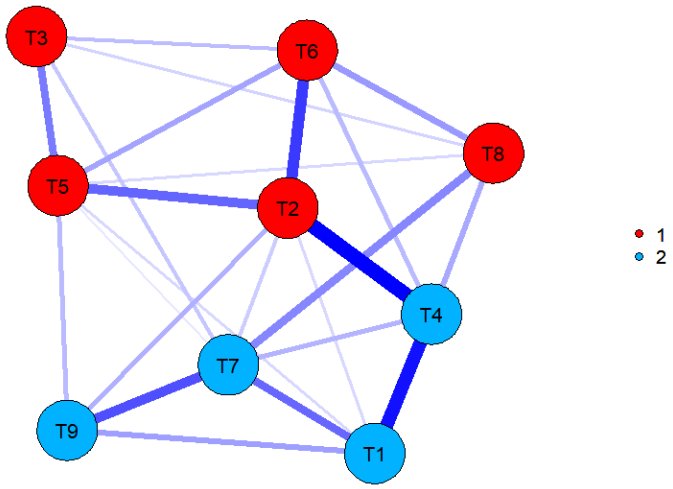
Items		Stress factor load	Coping factor load	Principal component analysis		
				RC1	RC2	h2
I1	I can't go out	.53	.53	.72*	–.09	.53
I2	I have nothing to do at home	.60	.86	.57*	.32*	.42
I3	Sometimes my family gets angry and starts fighting	.57	.30	–.07	.63*	.40
I4	I have no space to play at home	.57	.81	.68*	.08	.47
I5	I'm afraid that someone in my family or someone I care for will get Covid-19	.53	.58	.18	.61*	.40
I6	I'm afraid of getting sick and having to go to the hospital	.57	.59	.15	.64*	.43
I7	Teachers give many tasks	.39	.71	.56*	.18	.34
I8	My internet is worse than everyone else's	.50	.49	.11	.52*	.28
I9	I'm worried about the exams and whether I'll move on to the next grade	.45	.68	.51*	.09	.27
Cronbach's alpha		.77	.85			
McDonald's omega		.68	.65			

* Factor loadings that correspond to the factor from which the item was interpreted.

Principal Component Analysis indicated two components: limitations and demands (first component); and dependency and relationships (second component). It is important to note that the item in this distribution is composed of the stressor and the coping answer (total value).

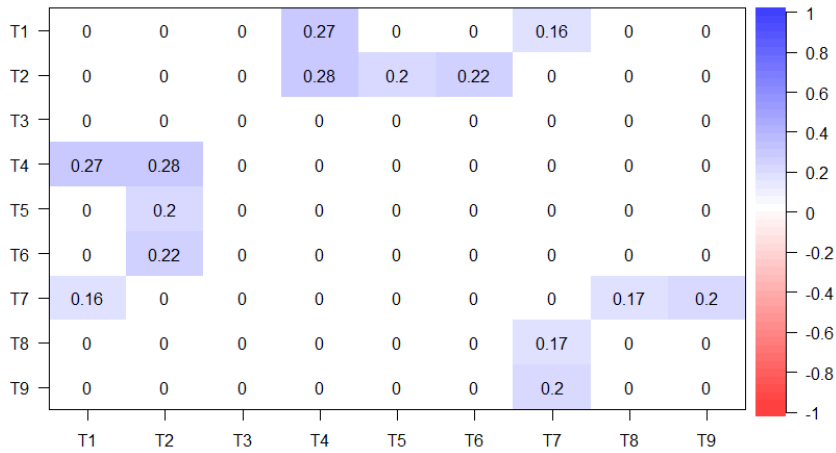
Component loadings indicate all items were adequate, except item two, in which there is a high component loading in the first and second components. However, the analysis was continued to verify what the best option for this item was. Another way to investigate internal structure of the instrument was carried through a network analysis, with walktrap community (clustering) algorithm. The results are shown in Figures 2a, 2b and 2c.

Figure 2a — Network analysis results



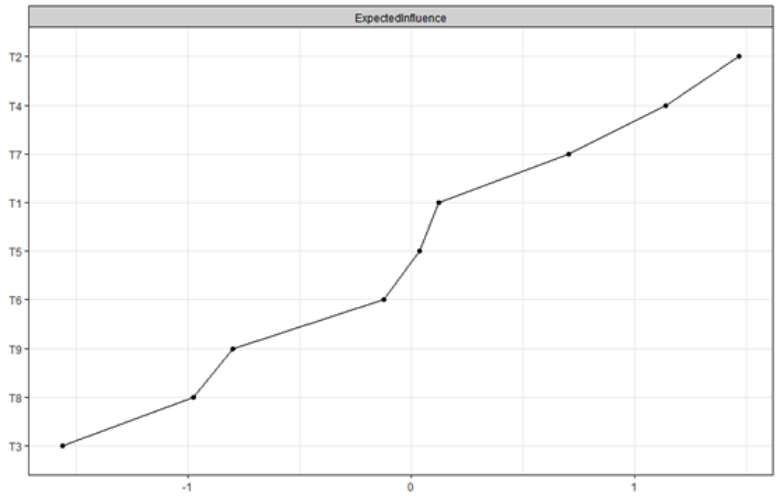
Note: T: combining "total" score (E*C).

Figure 2b — Partial correlation load



Note: T: combining "total" score (E*C).

Figure 2c — Centrality analysis – expected influence on the network



Note: T: combining "total" score (E*C).

The walktrap community algorithm divided the network into two clusters – one composed by items two, three, five, six and eight; and the other composed by items one, four, seven and nine. This distribution was the same

as that proposed by the principal component analysis. Despite that, it is possible to observe that there is a strong relation between items two and four; four and one; two and six. This is understandable considering that in the principal component analysis item two had a higher value in both components. The centrality analysis showed that item two (I have nothing to do at home) has the most expected influence in the network, followed by the item four (I have no space to play at home) (Figures 2a, 2b and 2c). Considering that, it is possible to keep item two in the instrument.

Discussion

This is the first study in Brazil to construct and check the validity evidence of a Covid-19 pandemic stress and coping questionnaire for children. It is important that coping questionnaires specifically assess a particular stressor (Aldwin, 2009; Skinner & Zimmer-Gembeck, 2016). What is perceived is that the pandemic and all its restrictions for the preservation of health, entailed a worsening of the psychological condition in all age groups (Fegert et al., 2020; Phelps & Sperry, 2020). However, there are differences in coping according to the age group that need to be considered (Skinner & Zimmer-Gembeck, 2016, 2023).

For this theory, the stressor can be interpreted as a threat (maladaptive coping), or as a challenge (adaptive coping). The data showed that when the stressor was interpreted less harshly, the children used both adaptive and maladaptive coping; however, when the stressor had a very high intensity, the coping was maladaptive, in agreement with the Motivational Coping Theory (Skinner & Zimmer-Gembeck, 2016, 2023).

In addition, it was considered that when children start school life they tend to greater self-confidence and present more sophisticated coping skills than younger children. At this stage, cognitive strategies are developed in all adaptive families of coping, especially in relation to mastery-related problem-solving strategies, more complex distraction techniques and the ability to intentionally turn attention to the positive points of the stressful situation (Zimmer-Gembeck & Skinner, 2010). At this age, children still need the support of parents and caregivers, but in a more targeted way, relying more on support that is also informative (not just emotional) and looking for other sources of support, such as colleagues and teachers (Zimmer-Gembeck & Skinner, 2010). However, in this pandemic scenario, with remote classes and no face-to-face access to

teachers and friends, there may be a delay in the development of coping strategies that are also relevant to be evaluated (Mazrekaj & De Witte, 2023). It is important to consider that adverse childhood experiences could be related to elevated risk of toxic stress and heighten the risk of developmental delays and health problems in adulthood (Araújo et al., 2021).

Considering that children have difficulties in maintaining attention for a long time and they often need a context to understand what they are being asked, a short instrument was built (nine questions), with pertinent items practically and theoretically, in vignette format and with images to be attractive and understandable for children of that age, as is suggested by several authors (Clark & Watson, 2019; Hughes & Huby, 2012; Reynolds & Romano, 2016; Wilks, 2004). This format was well evaluated when observing the assessment made by expert judges for content analysis. All items obtained clarity of language and practical relevance coefficients above 0.80 and the final content validity coefficient was 0.93. Values above 0.80 are considered acceptable, according to Hernández-Nieto (2002).

The item that presented the worst stressor was "I am afraid that someone in my family or someone I care for will get Covid-19", but despite this, they dealt well with the situation using adaptive coping. It is understandable that children are afraid of this situation, as the disease has already infected 396,558,014 people and killed 5,745,032 around the world (data as of February 09, 2022) (WHO, 2022). According to Idoiaga et al. (2020) in a survey of 250 Spanish children, they said they were afraid and concerned mainly because they think their grandparents could be infected. For these authors, the lockdown produced conflicting emotions in the children, such as being scared, nervous, sad, bored, angry, or happy with their families. In addition, children need care and are dependent on their guardians (Aldwin, 2009; Skinner & Zimmer-Gembeck, 2016); thus, it is hypothesized that there may be apprehension in the imaginary about who will take care of them. In addition, Sayed et al. (2024) discuss in their review of literature that several countries have found that the Covid-19 pandemic is associated with greater stress levels, depression, anxiety, insomnia, drug misuse, and other mental health challenges among young individuals. Even after the pandemic ends, it is crucial to prioritize understanding the long-term impacts of the pandemic on mental health, and in order to understand this, an efficient psychological assessment is necessary.

In our survey, the adaptive coping possible answers for this question were "I try to have good thoughts, like soon this will pass or soon we will have a vaccine" or "I'm close to my family or who I like". Support seeking is one of families

of coping used earlier and most used in general around the world. However, the ability to develop self-comforting as a family of coping involving cognitive aspects is not so common (Skinner & Zimmer-Gembeck, 2016, 2023). In other words, the possibilities of responses were expanded here, considering the stages of development and learning of new instances of coping. Therefore, despite a strong stressor, children cope adaptively with this condition.

The stressor that they coped with best was "I'm worried about the tests and if I'm going to pass the year". In this context, it is worth remembering that the data collection took place in partnership with private schools in a national education network, where possibly there was more support from teachers and even parents. The options for adaptive responses to this question were "I study a lot", which may even reflect the commitment to respond to the survey online and, therefore, present greater responses; and "I ask teachers, friends and family that I have doubts", the information seeking being a family of coping used earlier in the human development (Skinner & Zimmer-Gembeck, 2016, 2023).

The possibility of assessing stress and coping in an integrated manner, with a total score, is a methodological advance, since until now, to the authors' knowledge in a systematic review of the literature, there is no instrument that generates such a final score. Only the Responses to Stress Questionnaire (RSQ) (Connor-Smith et al., 2000) considers stress and coping in the same instrument, but there is no total score, as in this study. It is important to emphasize that coping is associated with stress, one not existing without the other (Skinner & Zimmer-Gembeck, 2016), reinforcing the idea of the importance of an analysis that simultaneously compares the two components of the system.

To verify internal structure, Principal Component Analysis was used. It found two components: the first, called "limitations and demands" (α=0.62) represents limitations of physical space and school demands; the second, called "dependency and relationships" (α=0.72) is about interpersonal conflicts and how it can be affected by the lack of things to do, bad internet connection and fears about Covid-19. All of these stressors are cited by authors who researched the effects of the pandemic on children (Fegert et al., 2020; Lawson et al., 2020; Phelps & Sperry, 2020). Our second hypothesis was partially confirmed. It is possible that children did not have enough cognitive ability to separate basic psychological needs when they responded to the test. In this case, a grouping of the BPN for competence and autonomy was perceived.

The results showed good component loadings in only one component, except item two. However, as the validation of a test is a continuous process by

searching for evidence of validity, network analysis was also used, which helped to better understand this item.

The network analysis showed that item two was better distributed in the first cluster, limitations and demands. As it is the most relevant item in the network, it is explained to have component loads in both components, when compared in the analysis of main components. The most relevant items cope with the lack of things to do at home and the lack of space to play. Distraction through playing, for children, is an important way of coping, adaptively, with different stressors (Skinner & Zimmer-Gembeck, 2016, 2023). When this possibility does not exist due to the limitations imposed by the pandemic, stressors worsen (Iqbal & Tayyab, 2021), which was expected.

It is important to note that network analysis considers partial correlations, that is, not only bivariate relations, but controlling the effect of the other variables in the system. In the case of psychometric analysis, the magnitude of the effects of the relationships of all items on the one being analyzed will be controlled within the given cluster. In this case, item two could be considered a collider, which is a node that connects with others, being central to the system (Burger et al., 2020 preprint).

The present study has limitations that must be considered. One limitation with this study is related to its sample. The results showed that for this research there was no difference in responses when compared by gender, age, school level and state of Brazil, refuting the third hypothesis. In relation to Brazilian states, this can be explained by the lack of a balanced or sufficient number of participants in all of them. About gender, age and school level, the sample was homogeneous; thus, it is suggested that further research be done with heterogeneous samples to verify the instrument's discriminatory power and if there are significant differences between groups. Besides that, all students came from private schools, with data collection online. Future studies should approach these issues concerning cross-validation in a way the results may be generalized to other independent samples in Brazil. Future studies should apply EFA or Confirmatory Factor Analysis (CFA) to verify the dimensionality of the construct and the theoretical adequacy of the proposed model.

However, our innovation regards testing the Brazilian version with a sample of children and with this specific stressor: Covid-19 pandemic. Our results demonstrate that the Covid-19 Stress and Coping Questionnaire may provide relevant information to help psychologists and psychiatrists understand stress and coping with Covid-19 pandemic amongst children, allowing practitioners to understand different dimensions and potentially providing parameters to practice

in the pandemic context, which confirmed our first hypothesis. However, further studies should replicate the Covid-19 Stress and Coping Questionnaire psychometric properties testing with other samples and other cultures, to confirm the factor solution stability found in these results, specifically with confirmatory approaches. Also, other psychometric properties need to be addressed such as external validity, responsiveness, or even individual item parameters.

The process of validating an instrument must be ongoing, in which searches for evidence of validity become cumulative. The present study advanced in this sense, because, in addition to performing the content analysis of the items and the reliability of the questionnaire, it used the analysis of main components and network analysis. This constituted a robust procedure, which allowed the evaluation of the interaction of items in a complex system, as well as the separation by clusters, enabling their distribution to be seen (Constantini et al., 2015; Epskamp et al., 2012; Epskamp, Borsboom & Fried, 2018). There was also the possibility of verifying the most important items for the system, which can assist in professional practice, thinking about future interventions, bearing in mind that psychological assessment is the first step to think about interventional professional practices.

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Notes

[1] https://drive.google.com/file/d/1x0hbmo3r4T-M7v9NzNJT6xmKWVajeXFC/view

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