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Parental stress and associated symptoms in premature babies' parents: a systematic review

Estresse parental e sintomas associados em genitores de prematuros: uma revisão sistemática

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Abstract

Objective
The objective of the study was to identify in the scientific papers the variables associated with parental stress of premature babies' parents through the graph analytics technique.

Method
This is a Systematic Literature Review performed in the CINAHL, Cochrane Library, Medline, PsycInfo and Web of Science databases.

Results
The search yielded 12 articles that were submitted to the data graph analytics technique for analysis and visualization through the NodeXL Program. Among the variables reviewed, the following stand out: parental psychological distress, risk factors, maternal characteristics, child characteristics, environmental characteristics, parent-infant relationship, and intervention. The main symptoms associated with parental stress were depression, anxiety and post-traumatic stress.

Conclusion
The implementation of interventions aimed at the baby and the family's well-being can minimize the conditions faced.

Keywords: Anxiety; Depression; Parents; Premature infant; Psychological stress.

Resumo

Objetivo
Objetivou-se identificar, na produção científica internacional, as variáveis associadas ao estresse parental de genitores de bebês prematuros através da técnica de análise de grafos.

Método

Trata-se de uma revisão sistemática da literatura nas bases de dados CINAHL, Cochrane Library, Medline, PsycInfo e Web of Science.

Resultados

As buscas resultaram em 12 artigos, que foram submetidos à técnica de análise e visualização de dados em grafos por meio do Programa NodeXL. Entre as variáveis analisadas, destacam-se: sofrimento psicológico dos pais, fatores de risco, características maternas, características da criança, características ambientais, relação pais-bebê e intervenção. Os principais sintomas associados ao estresse parental foram depressão, ansiedade e estresse pós-traumático.

Conclusão

A implementação de intervenções voltadas ao bem-estar do bebê e da família podem minimizar as dificuldades enfrentadas.

Palavras-chave: *Ansiedade; Depressão; Pais; Prematuro; Estresse psicológico.*

Prematurity is characterized by the birth of a child with gestational age less than 37 weeks (World Health Organization, 2015). The subsequent hospital admission of the preterm neonate in a Neonatal Intensive Care Unit (NICU), has repercussions on the family dynamics, and may feature the occurrence of symptoms of stress, distress, anxiety and depression in the parents (Contim et al., 2017; Ong et al., 2018). Several factors and events throughout life can generate stress, among them, those experienced by parents in connection with their children (parental stress). Parental stress can be defined as an adverse psychological reaction to the demands associated with the parental role, experienced with negative feelings, which are directly attributed to the parenting demands involving parents and the child (Deater-Deckard, 1998).

In a meta-analysis of 38 studies that investigated parental stress experienced by preterm infants' parents from birth to adolescence, Schappin et al. (2013) revealed that fathers and mothers of preterm infants experience slightly higher levels of stress than the parents of full-term babies, and the parental stress is greater in mothers than in fathers. This stress increase is associated with a reduced gestational age and low birth weight. It was not the focus of the meta-analysis mentioned to describe and review other psychological symptoms that may be combined with parental stress and cause greater suffering in parents, which justifies the performance of the present study.

This systematic review intended to organize the data found in the articles using some principles of the Network Science. In this perspective, a network can be conceptualized as a set of points, called nodes or vertices, interconnected by connections to the edges (Newman, 2003). A network can be mathematically represented through a graph G = (V, E), formed by Vertices (V) and Edges (E). Each vertex or node represents a player and each edge represents the relationship between two players in the network (Bordin et al., 2014).

The theoretical framework provided by the network theory (social and complex networks), in particular knowledge networks, serve as a basis for analyzing the variables investigated in the articles that make up this systematic review. Knowledge networks can be considered a derivation or subcategory of the social networks concept in the scientific practice. Thus, the concept of knowledge network can be described by the relationships between the variables investigated in the articles as well as the networks of scientific collaboration between researchers in a given area, also called networks of co-authorship of scientific articles between authors (Hayashi et al., 2015).

Thus, this systematic review aimed to identify in the scientific literature the variables associated with parental stress of premature babies' parents through the technique of graph analysis.

Method

This is a Systematic Literature Review (SLR). For its operationalization, the recommendations of the Cochrane Institute seven steps for carrying out SLR were followed, namely: 1) Formulation of the question, 2) Location and selection of studies 3) Critical evaluation of studies 4) Data collection, 5) Data analysis and presentation, 6) Data interpretation, and (7) Review improvement and update (Higgins & Green, 2011). It drew also from the criteria adopted by the PRISMA recommendation, which consists of a checklist with 27 items. The PRISMA criteria directed to meta-analyses were not used.

The first step consisted of formulating the question; for this purpose, the PVO technique was used, which consists of an adaptation of the PICO model, aimed at research dealing with issues associated with psychology or related areas (Biruel & Pinto, 2011). Based on the application of this technique, it is considered: (a) Q (question): Which variables are associated with parental stress of premature babies' parents?; (b) V (variables): those associated with parental stress of preterm infants' parents; and (c) O (outcomes): identify, describe and review the variables associated with parental stress in preterm infants' parents.

As for the second step, location and selection of studies, the search strategy consisted of using the following Boolean descriptors and operators: (Parental stress OR Maternal stress OR Paternal stress) AND (Preterm OR Preterm infant OR Premature infant). The inclusion criteria were: (a) empirical articles available in full and free of charge; (b) in English and Portuguese; (c) published from January 2009 to December 2020 (d) target audience: parents of premature babies (mother, father or both); (e) specific instruments used to assess parental stress; and (f) peer-reviewed articles. Articles of SLR, essays, reviews, not available in full for free, published in other languages, that did not assess parental stress and those published before or after the indicated dates in the inclusion criteria were excluded. The following databases were consulted: CINAHL, Cochrane Library, Medline, PsycInfo and Web of Science that contain different types of information in health and other areas with independent and high-quality evidence for decision making.

The third and fourth stages consisted of the critical evaluation of the studies and data collection. The selected articles were submitted to tests to verify the methodological quality. The relevance test I, applied to titles and abstracts by the main researcher, consisted of two objective questions. Subsequently, the relevance test II was applied by two independent judges, who read the full articles; the test consisted of five objective questions. When there was disagreement between the reviewers, a third judge was consulted.

Data collection followed the following steps: data mining to characterize the articles, which were organized in a Microsoft Excel 2015 software spreadsheet. After data collection, studies that, in addition to investigating parental stress, also evaluated other psychological symptoms, such as anxiety, depression, post-traumatic stress, among others, were selected to enter this review. Therefore, the objective and method of the selected articles were analyzed. Subsequently, the objectives of the studies that met this prerogative were transcribed and the main variables investigated were cut out.

In the fifth stage, the analysis and presentation of the data took place. With the objectives that make up the database, terms with the same semantic value and representing the same idea were organized. Subsequently, the analysis was carried out using the NodeXL Program (version 1.0.1.251), which allows calculating metrics to identify dynamic interactions, intermediation rules and degrees of centrality between the elements that make up the set of variables of interest to researchers (Hansen et al., 2010; Ramos et al., 2020).

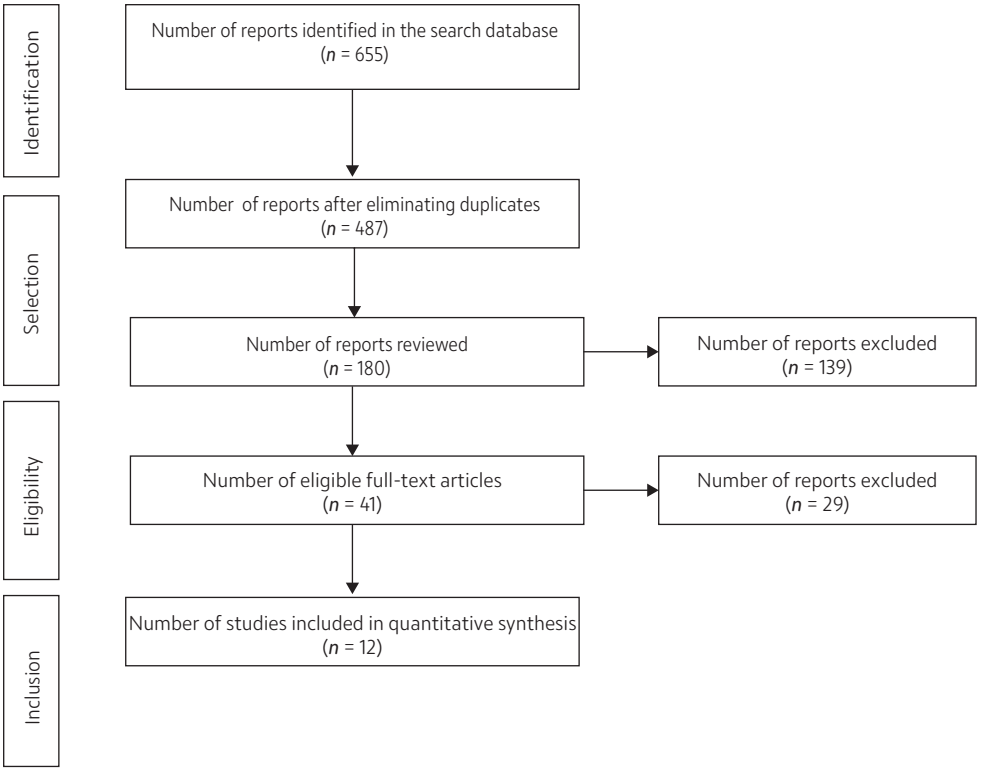
Among the metrics, the following deserve to be highlighted in this study: 1) Eigenvector Centrality, which measures the links between neighboring vertices, to verify which links pass through a given vertex. Thus, the more edges a pair of vertices receives, the stronger the connection between them (Pinheiro, 2013; Ramos et al., 2020); 2) Clustering Coefficient C(C), which measures the tendency of the vertices in a network to cluster, forming clusters, taking as a starting point the existing triads in the network, that is, it is a metric generated by the measure of relative value of triangles existing in the graph. The larger the C(C) of a graph, the shorter the paths between its vertices (Pinheiro, 2013; Ramos et al., 2020). Finally, in the sixth and seventh stages, data interpretation and the improvement and updating of the review took place.

Results

A total of 655 articles were identified in the databases, including CINAHL (113), Cochrane Library (161), Medline (180), PsycInfo (67) and Web of Science (134). The relevance test I was applied to 180 articles and the relevance test II was applied to 58 articles that were read in full by two independent judges. In addition to assessing parental stress, studies that investigated other psychological symptoms (such as anxiety, depression, post-traumatic stress) associated with parental stress were selected. Only 12 articles met this criterion and are the ones that make up the sample of this SLR. The four steps that make up the PRISMA flowchart and that were followed in data collection can be seen in Figure 1.

As for the characterization data, it was observed that 50% of the articles reviewed were issued in the United States (6), 17% of the articles are from Italy (2), and the other articles are from

Figure 1
Data inclusion and exclusion flowchart



Australia (1), Greece (1), Canada (1) and New Zealand (1); each of these four countries represents 8% of the sample, totaling 32%. Regarding the year of publication, in 2014 five articles were published, and this was the year with the highest number of articles (41.67%), followed by the years 2015 and 2016, in which two articles were published each year, which represents (33.34%). Regarding the participants, 58.33% had the participation of only the mothers; father and mother participated in 41.67% of the surveys (Table 1).

Table 1
Synthesis characterization of the systematic literature review articles

Variables	*n*	%
Year		
2013	1	8.33
2014	5	41.67
2015	2	16.67
2016	2	16.67
2017	1	8.33
2018	0	0
2019	1	8.33
Origin		
Australia	01	8
Canada	01	8
U.S.	06	50
Greece	01	8
Italy	02	17
New Zealand	01	8
Participants		
Mother	7	58.33
Mother/Father	5	41.67
Father	0	0

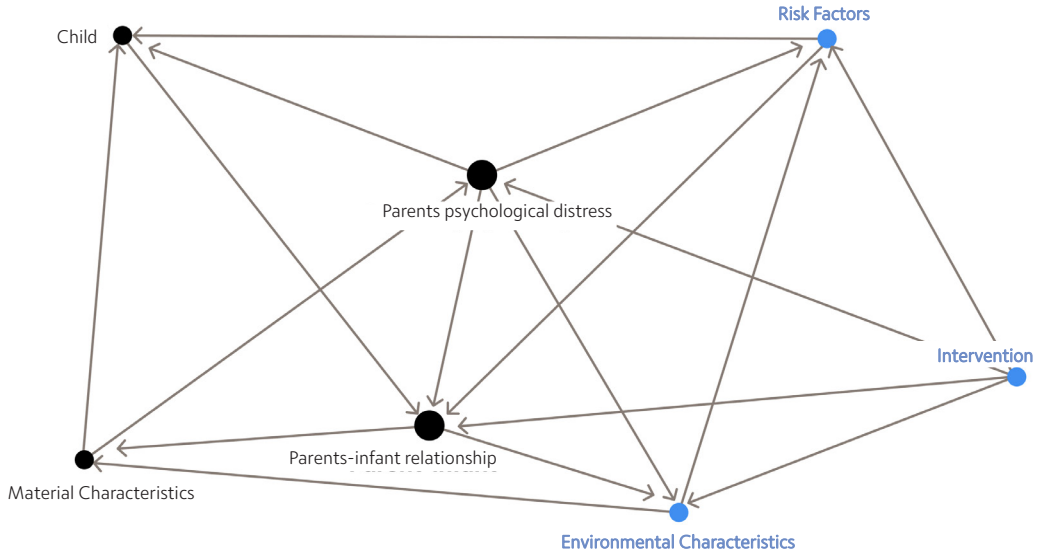
Analysis of the variables of the systematic literature review articles

Using the Eigenvector Centrality metric, we were able to organize the variables identified in the database. Thus, considering the importance of the variables found, their hierarchy was established, namely: Parental Psychological Distress (1.167), Parent-Baby Relationship (1.164), Environmental Characteristics (0.583), Risk Factors (0.583), Intervention (0.285), Child Characteristics (0.250) and Maternal Characteristics (0,250).

The application of the Cluster Coefficient metric generated two clusters, represented by different colors and called Personal Aspects (Group 1), which involved the variables psychological distress of parents, maternal characteristics, child characteristics and parent-infant relationship; and Contextual Aspects (Group 2), which encompassed the variables risk factors, environmental characteristics and intervention, represented by the light blue color, as can be seen in Figure 2.

Figure 2 presents the multigraph of the variables investigated in the articles. Each point (vertex) represents a variable and each line (edge) the connections between these vertices, that is, it indicates the frequency between a pair of variables in the articles. This multigraph represents a directed unweighted network in which the variables are connected, but there is no value, weight or coefficient, which could indicate the magnitude of such a connection between the nodes.

Figure 2
Multigraph of article variables



In the directed networks, it is possible to identify the direction between the edges that connect pairs of vertices, represented by edges with arrowheads at one of their ends, indicating the direction of the forecast, and perhaps causality (Fonseca-Pedrero, 2017). Thus, in connection with the clusters "Personal aspects" and "Contextual aspects", the main results of the articles that make up this SLR will be described.

Personal aspects

Parents' Psychological Distress

The parents' psychological distress was the vertex that occupied the most central position in the multigraph (Figure 2), being considered the most influential in the network for presenting the largest number of edges. This result was expected and can be justified by the fact that the term "parental stress" was used in the searches and also as inclusion criteria the articles that addressed parental stress associated with other psychological symptoms. It is also possible to note that four vertices pointed the arrows in their direction, which demonstrates the close relationship they establish such as: maternal characteristics, parent-infant relationship, environmental characteristics and intervention. The vertex "parental suffering" pointed to all six variables that make up the graph: child characteristics, risk factors, maternal characteristics, parent-infant relationship, environmental characteristics and intervention, which demonstrates its relevance in the network.

This category included studies that evaluated parental stress associated with other psychological symptoms, such as anxiety (Busse et al., 2013; Fotiou et al., 2016; Gondwe et al., 2017; Holditch-Davis et al., 2014; Holditch-Davis et al., 2015; Ionio et al., 2019; Linden et al., 2015; Treyvaud et al., 2014), depression (Alkozei et al., 2014; Busse et al., 2013; Gondwe et al., 2017; Holditch-Davis et al., 2014; Holditch-Davis et al., 2015; Ionio et al., 2019; Linden et al., 2015; Montirosso et al., 2014; Park et al., 2016; Treyvaud et al., 2014; Woodward et al., 2014) and post-traumatic stress (Gondwe et al., 2017; Holditch-Davis et al., 2014; Holditch-Davis et al., 2015).

When examining the relationship between stress and anxiety, depression, fatigue and sleep disturbances among parents of infants admitted to the NICU, Busse et al. (2013) observed that these

variables were significantly correlated with parental stress. This datum was corroborated by the investigation by Ionio et al. (2019), who, when assessing the levels of stress and negative feelings in parents of preterm babies, observed that fathers and mothers experienced different forms of psychological distress soon after the birth of their premature child. In addition, mothers scored higher than fathers on the tension, anxiety, depression, and discouragement subscales assessed by the Profile of Mood States.

In assessing the long-term influence of the birth of very preterm infants on parental mental health, family functioning, and parental stress at age two and seven, Treyvaud et al. (2014) revealed that parents of very preterm infants report symptoms of moderate to severe anxiety ($p = 0.03$), higher levels of depression symptoms ($p = 0.03$), worse family functioning ($p < 0.05$), and higher levels of parental stress ($p < 0.001$) seven years after the birth of their children. The researchers found that parental distress did not appear to decrease over time, as the results suggest that high levels of parental stress in parents of preterm infants remain high even after the baby's first few years of life.

Parent-infant relationship

This was the second most important vertex in the network; four vertices pointed in its direction, which also made it fit into a position of centrality. Studies were included that addressed how the baby's prematurity can influence the parent-child relationship and change the parental role, causing changes in the parents' mental health. The relationship of the parents with the premature baby is influenced by multiple variables, as demonstrated in this SLR: characteristics of the child, psychological distress of the parents, risk factors and intervention. Findings in the results of the articles reviewed suggest that the significant change in parental role was the greatest source of stress measured by the PSS (Parental Stressor Scale): NICU (Alkozei et al., 2014; Busse et al., 2013; Woodward et al., 2014) and was significantly associated with fatigue (Busse et al., 2013).

In order to examine sources, predictors, and infant outcomes associated with the stress experienced in the neonatal intensive care unit (NICU) by mothers of very preterm infants, Woodward et al. (2014) applied the PSS: NICU to 133 participants. The results revealed that the most stressful aspect of the NICU experience was the perceived loss of the parental role, specifically the experience of being separated from their child, feeling powerless and unable to protect their infant from pain and painful procedures.

Child characteristics

Studies that addressed the relationship between child characteristics, such as gender, clinical complications and social behavior, with parental stress were included. This vertex occupied a peripheral position in the network, making fewer connections when compared to the most relevant vertices. Only two arrows, parental psychological distress and risk factors, pointed in its direction. On the other hand, "Child Characteristics" pointed to the vertices parent-infant relationship and risk factors, which demonstrates the closer relationships established between these variables.

It was observed that the relationship between the infant's social behavior, such as crying, irritable mood, besides the sociodemographic variables such as gender, were correlated with symptoms associated with parental stress (Gondwe et al., 2017; Holditch-Davis et al., 2015). Furthermore, babies who demand a greater number of days of mechanical ventilation, with higher neurobiological risk, with lower birth weight, showed more problems in social behaviors than low-risk babies (Gondwe et al., 2017), which in turn affects symptoms associated with parental stress.

Maternal characteristics

Articles that approached the relationship between characterization data such as maternal age, education, socioeconomic status, with parental stress among others, were included. This vertex also occupied a peripheral position in the network, two arrows pointed in its direction: psychological suffering of parents and environmental characteristics; in turn, the vertex maternal characteristics pointed only to the psychological suffering of the parents.

In this connection, Holditch-Davis et al. (2015) estimated the relationships between depressive symptoms, anxiety, post-traumatic stress symptoms, stress due to the baby's appearance and behavior, and stress due to changing parental role in a multiethnic sample of mothers of premature babies during the child's admission to the NICU. The results of the study indicated that the classes of psychological distress of premature infants' mothers (low distress, moderate distress, high distress) did not differ statistically in terms of age, marital status, first pregnancy or public assistance received. They observed that mothers considered of having a high level of depression and anxiety were predominantly of Hispanic origin. The incidence of extreme distress was lower among African-American mothers (Holditch-Davis et al., 2015).

By relating maternal stress and other measures of psychological distress with maternal and child sociodemographic variables after birth, up to 12 months of corrected age for prematurity, Gondwe et al. (2017) observed higher scores of depressive symptoms, parental stress and concern in mothers in older age groups, with fewer years of schooling, single, with small-for-gestational-age babies, with male children. This correlation can be explained by the fact that older mothers were more likely to have undergone infertility treatments and were concerned about having a positive pregnancy outcome.

Contextual aspects

Risk factors

The risk factors category occupied a central position in the multigraph, and involved articles that evaluated the relationship between neonatal risk factors, parental stress and other psychological measures. The directed vertices, that is, those in which the arrows pointed connections in their direction, were: characteristics of the child, psychological suffering of the parents, environmental characteristics and intervention. Furthermore, "risk factors" pointed to the characteristic vertices of the child and the parent-infant relationship. Studies (Gondwe et al., 2017; Holditch-Davis et al., 2015; Linden et al., 2015) revealed that parents of very premature children who have more risk factors, such as lower weight and gestational age, have higher rates of infections and neonatal surgeries, longer stay in the NICU, continued to experience stress well beyond the first years of their child's life.

Environmental characteristics

The vertex "environmental characteristics" occupied a central position in the network; three arrows pointed in its direction: parent-infant relationship, parents' psychological distress and intervention; in addition this vertex pointed to risk factors and maternal characteristics. This variable discusses studies that evaluated both the hospital setting, especially the NICU, and the home setting in which the premature baby spends his first years of life and the relationship with parental stress.

In this connection, Montirosso et al. (2014) investigated how the quality of care provided in 25 tertiary NICU units affects maternal stress and depression. The results showed that mothers of full-term newborns (gestational age from 37 weeks and birth weight > 2500 g), who did not require admission to a NICU, reported a lower level of depression than mothers of premature infants hospitalized in low care and high care units.

The HOME instrument (version 0-3), which measures the socio-emotional and stimulation characteristics of the home environment, was used by Gondwe et al. (2017) and Holditch-Davis et al. (2014). The data from the HOME subscales were combined with five interaction dimensions, and the results revealed that mothers of preterm infants who participated in auditory-tactile-visual-vestibular stimulation and mother kangaroo care interventions, which were intended to reduce maternal distress, had higher HOME scores than mothers who had no intervention (Holditch-Davis et al., 2014).

Intervention

This category included studies that suggested an intervention for parents of premature babies with the aim of minimizing parental stress and associated symptoms. This vertex occupied a peripheral position in the network, had no arrows directed towards it; however, it pointed arrows towards other vertices such as: risk factors, psychological distress of parents, parent-infant relationship and environmental characteristics.

In the study by Fotiou et al. (2016) parents of premature infants were invited to participate in interventions, such as interactive courses lasting 90 minutes. In these courses, the following topics were addressed: prematurity, stress in the NICU, breastfeeding, preparation for hospital discharge and home care for the infant. These courses offered insights into positive thinking, healthy lifestyle and self-awareness. The parents were instructed to practice relaxation technique exercises twice a day (diaphragmatic breathing, progressive muscle relaxation and guided imagery). Upon discharge, the parents received an audio CD of recorded relaxation techniques, and the researchers also sent reminders to parents about stress management via SMS messages or phone calls. The results showed that these interventions were associated with reduced parental anxiety (p = 0.02) after the child was discharged. The authors indicated that interventions aimed at parents of premature babies reduced psychological distress, including symptoms of anxiety, depression and parental stress.

The study by Holditch-Davis et al. (2014) examined the effects of auditory-tactile-visual-vestibular intervention and kangaroo care on maternal distress and on the mother-infant relationship. Significant effects of the interventions were observed during the period that the premature infant stayed in the NICU, and that lasted over time. Fathers who performed a form of intervention, such as massage or kangaroo care, experienced a faster decline in depressive symptoms ($p < 0.05$) that stabilized earlier than in the case of mothers who did not engage in any intervention ($p < 0.05$).

Discussion

Through the multigraph analysis (Figure 2) it was observed that not all vertices had the same importance in the network. A vertex is considered central if it has many links (Fonseca-Pedrero, 2017). In this connection, regarding the psychological distress of parents' vertex, the most influential in the multigraph, the literature has shown that, in addition to high levels of stress, parents of premature/low birth weight babies have high levels of depression, anxiety and post-traumatic stress when compared to parents of full-term babies (Bener, 2013; Gangi et al., 2013; Ong et al., 2018).

Along this line, the study by Coletti et al. (2015) indicated that mothers of very preterm infants (gestational age ≤ 32 weeks) had significantly higher levels of stress than mothers of late preterm infants (gestational age 33-36 weeks); these mothers are likely to face more difficulties in the daily management of the child and his/her demands.

Regarding the parent-infant relationship vertex, which also occupied a central position, the literature has shown that the parents' relationship with the premature baby is influenced by variables such as child characteristics, parents' psychological distress, risk factors and intervention. The study by Gangi et al. (2013) revealed that early involvement of parents, and especially of mothers, in neonatal care (particularly if the initial assessment indicates a high risk of anxiety), besides the familiarization with the NICU setting should constitute a primary objective to prevent the occurrence of a post-traumatic stress disorder. Such findings demonstrate the relationship between the vertices parent-infant relationship and parents' psychological distress. The long stay of the premature infant in the NICU changes the role of parents, since care is now carried out, above all, by the multidisciplinary team, which can generate a feeling of incapacity in parents, and be associated with increased psychological distress (Contim et al., 2017; Ong et al., 2018).

Studies on the risk factors, the third most important vertex in the multigraph, indicate that mothers of babies with very low birth weight, high risk and who were in conditions of low social support had higher levels of personal, family and child-related stress when compared to mothers of full-term babies (Singer et al., 2010). Babies born prematurely, who have more risk factors and clinical comorbidities, are those who may generate more distress in their parents, which occurs as a result of fear and concern about unfavorable outcomes (Contim et al., 2017; Ong et al., 2018).

As to the relationship between the vertex environmental characteristics and parents' psychological distress, the results of the study by Pisoni et al. (2019) draw attention, as mothers of premature babies admitted to the NICU reported intense symptoms of postpartum depression and a high level of stress, even though their children had low perinatal risk and normal neurological exams.

The maternal characteristics and child characteristics vertices are peripheral vertices, that is, they are at the end of the network and make few connections. Divergent data were observed in the literature, such as the relationship between the age of preterm infants' parents and levels of parental stress and other psychological symptoms. In the study by Gondwe et al. (2017) parental stress, depression, and worry scores were higher in mothers in the higher age groups. On the other hand, Bener (2013) identified that mothers of premature babies and who had higher depression and anxiety scores were the youngest, least educated, in addition to the baby having lower body weight and the family having lower income. Such data are corroborated by other studies that claim that both young mothers and fathers, especially adolescents, experience greater levels of psychological distress for having a premature child. It is possible that this datum is due to parental figures not knowing how to act and what to expect from the situation (Dudek-Shriber, 2004).

Although 41.67% of the sample of this SLR articles participants is composed of mothers and fathers of premature babies, it is noteworthy that the vertex originated refers only to "Maternal characteristics", that is, no vertices referring to paternal characteristics were found. Despite the authors' efforts to include the father figure in the research, the data and discussions are mostly aimed at mothers, who are the main parental figures who take care of the child. This reality has been progressively undergoing transformations. Ordinance 930, of May 10, 2012, of the Ministry of Health, which defines guidelines on comprehensive and humanized care for serious and potentially serious premature infant, determines that mothers and fathers have free access to NICUs; in addition, the

participation and protagonism of the mother and father in the care of the premature infant should be encouraged (Ministério da Saúde, 2012).

In order to reduce parental stress, there must be adequate social support. Thus, the literature indicates that higher levels of parental stress would be negatively associated with the quality of fatherhood and co-parenting, that is, with less support from the father figure in child care (Lucassen et al., 2021; Stevenson et al., 2019).

The authors note the enhancement of male participation in domestic activities. However, the tasks of caring for the children continue to be carried out mostly by the mothers. As explanatory hypotheses, it is pointed out that paternity would be culturally more sensitive to contextual influences, such as stress and demands from the work environment, which can result in the use of more coercive parenting strategies and less effective co-parenting strategies. In contrast, cultural patterns and the potency of the mother-child dyad can make mothers more likely to remain in their parental roles, regardless of the demands of the environment (Lucassen et al., 2021; Stevenson et al., 2019).

From this perspective, the susceptibility that single-parent families have to parental stress should be considered. The study by Stack and Meredith (2018) explored the impact of financial difficulties on the well-being of single mothers. The results showed high levels of stress, psychological distress and anxiety, including rumination of thoughts, insomnia and suicidal ideation, which were associated with an overload in the parental role, and a decrease in social support or coparenting. Thus, high levels of stress and lack of support can lead to ineffective coping strategies, which highlights the need to share parental roles and the benefits that single mothers can have with interventions, since there is a greater tendency for this group to experience overload feelings.

Regarding the child's characteristics' vertex, the baby's age does not seem to be a significant predictor of stress, since even after hospital discharge, their mothers' stress levels did not change significantly over time, remaining high in the first years of the child's life. In addition, these babies have some prevalent characteristics, such as more frequent crying episodes, reduced parental interaction, babies who do not meet expectations (such as physical or emotional characteristics) compared to full-term babies, and tend to be perceived by mothers as more vulnerable and at greater risk of developing comorbidities (Mughal et al., 2017), which could lead to a situation of continuous stress for mothers (Spinelli et al., 2013).

As for the intervention vertex, the literature has shown that the implementation of programs for the family, through early educational and emotional support aimed at parents of premature babies, in addition to identifying the exact sources of parental stress on an individual basis, seem to reduce stress in the NICU environment (Schappin et al., 2013; Ong et al., 2018).

Conclusion

Through network analysis, we could extract the pattern of the awareness network involving the theme of prematurity and parental stress. In this connection, the present review contributes with the literature by identifying the most central vertices in the reviewed studies, namely: psychological distress of parents, parent-infant relationship, risk factors and environmental characteristics.

Despite its contribution, this SLR has some limitations, such as the non-inclusion of articles published in other languages. In this connection, it is recommended that future studies be more comprehensive, including search terms such as "anxiety", "depression" and "posttraumatic stress".

It is suggested that SLR studies be developed that use the technique of analysis and visualization of graph data, identifying the most strongly connected variables and the gaps in the literature.

Advances in the care for premature neonates are undeniable, as they have considerably reduced their morbidity and mortality. However, despite the implementation of interventions aimed at the family in the NICU setting, it is essential that this assistance be expanded and that there is a multidisciplinary follow-up not only in the neonatal period, but also during the whole childhood. The empirical evidence found supports the notion that these actions will minimize parental suffering.

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L. S. M. OLIVEIRA contributed to the design, collection, analysis and interpretation of data, review. E. F. COSTA and F. BRITO helped in the analysis, discussion and review of the manuscript. F. A. R. PONTES and S. S. COSTA E SILVA contributed to the analysis and interpretation of data, review and approval of the final version of the article.