

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II
DIPARTIMENTO DI STUDI UMANISTICI



DOCTORATE IN
MIND, GENDER, AND LANGUAGE

XXXVIII CYCLE

DOCTORAL DISSERTATION

**CARING FOR THOSE WHO TAKE CARE: FOSTERING THE
PSYCHOLOGICAL HEALTH OF PARENTS AND NURSING STAFF IN
NEONATAL INTENSIVE CARE UNIT**

PhD CANDIDATE

CARMINE VINCENZO LAMBIASE

SUPERVISOR

PROF.SSA FEDERICA VALLONE

COORDINATOR

PROF. DARIO BACCHINI

ACADEMIC YEAR 2024/2025

Caring for those who take care: fostering the psychological health of parents and nursing staff in Neonatal Intensive Care Unit

Table of contents

Chapter I. Introduction	p.9
I.1 Background	p.9
I.2 Objectives of the thesis	p.10
I.2.1 Chapter II: Parenting and nursing stress models: a multidimensional perspective	p.11
I.2.2 Chapter III: Family-centered care (FCC) in Neonatal Intensive Care Unit: implications for parents and nurses	p.11
I.2.3 Chapter IV: NICU-Related Stress and Psychophysical Health Conditions in Parents During their Infant Stay: The Role of Individual and Dyadic Coping Strategies	p.12
I.2.4 Chapter V: NICU Stress and Social Support in Parenting Very Preterm Infants a comparison study among Italy and Portugal	p.12
I.2.5 Chapter VI: The financial burden experienced by families during NICU hospitalization and after discharge: A single center, survey-based study	p.13
I.2.6 Chapter VII: The Relationship among NICU Stressors and Irritable Bowel Syndrome in Parents during their infant stay: the mediating role of Anxiety	p.13
I.2.7 Chapter VIII: Irritable bowel syndrome in parents of NICU discharged infants: gender differences and the interplay with psychological distress and psychophysical well-being	p.13
I.2.8 Chapter IX: Caring till the end: psychological impact, mediating, and moderating factors of nursing death or dying patients in Adult and Neonatal Intensive Care Unit	p.14
I.2.9 Chapter X: Final summary, implications, limitations, and further research	p.14
Part 1: The theoretical background	p.15
Chapter II: Parenting and nursing stress models: a multidimensional perspective	p.16
II.1 Transactional models of stress	p.16
II.2 Parental stress models	p.17
II.2.1 Parental stress: what happens with a sick child?	p.19
II.2.2 Caring for a neonate in NICU: what kind of infants live in?	p.21
II.2.3 The emotional roller coaster of parents in the Neonatal Intensive Care Unit	p.22
II.3 Stress in the nursing profession: the emotionally and challenging experience of caring for patients	p.24
II.3.1 Nursing the dying patient and his family	p.26
II.3.3 Death and dying in critical care nurses	p.27
Chapter III. Models of Care in Neonatal Intensive Care Unit: implications for parents and nurses	p.29
III.1 A path towards a holistic vision of care	p.29
III.2 <i>"Infant does not exist alone"</i> : the role of parents to care for their infant	p.31
III.2.1 Principles and models for caring in the NICU	p.32
II.3 Family-Centered Care: the perspective of nurses and the other NICU professional	p.36
Part 2: Risks and resources linked to parental stress during NICU hospitalization	p.38

Chapter IV: NICU-Related Stress and Psychophysical Health Conditions in Parents During their Infant Stay: The Role of Individual and Dyadic Coping Strategies	p.39
IV.1 Introduction	p.39
IV.2 Objectives	p.41
IV.3 Methods: Sampling and Procedures	p.43
IV.3.1 Measurement Tools	p.43
IV.3.2 Data Analyses	p.45
IV.4 Results	p.45
IV.5 Summary, discussion, and implications	p.59
Chapter V: NICU Stress and Social Support in Parenting Very Preterm Infants a comparison study among Italy and Portugal	p.62
V.1 Introduction	p.62
V.2 Objectives	p.63
V.3. Methods: Sampling and Procedure	p.63
V.3.1 Measurement Tools	p.64
V.3.2 Data Analyses	p.65
V.4 Results	p.66
V.5 Summary, discussion, and implications	p.73
Part 3: From NICU hospitalization up to after discharge: financial and somatic dimensions in parents	p.77
Chapter VI: The financial burden experienced by families during NICU hospitalization and after discharge: A single center, survey-based study	p.78
VI.1 Introduction	p.78
VI.2 Objectives	p.78
VI.3. Methods: Sampling and Procedure	p.78
VI.3.1 Measurement Tools	p.79
VI.3.2 Data Analyses	p.81
VI.4 Results	p.81
VI.5 Summary, discussion, and implications	p.89
Chapter VII: The Relationship among NICU Stressors and Irritable Bowel Syndrome in Parents during their infant stay: the mediating role of Anxiety	p.93
VII.1 Introduction	p.93
VII.2 Objectives	p.94
VII.3 Methods: Sampling and Procedure	p.95
VII.3.1 Measurement Tools	p.95
VII.3.2 Data Analyses	p.96
VII.4 Results	p.96
VII.5 Summary, discussion, and implications	p.100
Chapter VIII: Irritable bowel syndrome in parents of NICU discharged infants: the interplay with psychological distress and psychophysical well-being	p.103
VIII.1 Introduction	p.103
VIII.2 Objectives	p.104
VIII.3 Methods: Sampling and Procedure	p.104
VIII.3.1 Measurement Tools	p.105
VIII.3.2 Data Analyses	p.106
VIII.4 Results	p.107

VIII.5 Summary, discussion, and implications	p.113
Part 4: From the other side of the incubator: specifiers in nursing critically ill infants	p.116
Chapter IX: Caring till the end: psychological impact, mediating, and moderating factors of nursing death or dying patients in Adult and Neonatal Intensive Care Unit	p.117
IX.1 Introduction	p.117
IX.2 Objectives	p.119
IX.3. Methods: Sampling and Procedure	p.121
IX.3.1 Measurement Tools	p.121
IX.3.2 Data Analyses	p.123
IX.4 Results	p.124
IX.5 Summary, discussion, and implications	p.135
Chapter X: Final summary and Conclusions	p.140
X.1 Introduction	p.140
X.2 Final Summary	p.140
X.3 Research and Practical Implications	p.157
X.4 Study limitations	p.159
X.5 Future steps and further research	p.160
References	p.161
Appendix	p.210

List of Tables

Table 1. Sociodemographic characteristics of the final sample stratified by gender.

Table 2. Mean scores and cut-off levels of psychophysical health conditions and NICU-related stress dimensions.

Table 3. Mean differences among mothers and fathers in individual coping strategies.

Table 4. Differences among mothers and fathers dyadic coping strategies.

Table 5. Mean differences among self-and-other perception dyadic coping strategies in mothers and fathers.

Table 6. Hierarchical multiple regression analyses predicting Depression, Anxiety and Somatization in parents of NICU infants (N = 102).

Table 7. Descriptive statistics of sociodemographic and perinatal data of the whole sample and stratified by Country

Table 8. Model fit indices for number of class solutions.

Table 9. Multinomial logistic regression of sociodemographic variables predicting Class 2 and Class 3 membership with the Beneficial Supported System (Class 1) as reference.

Table 10. Descriptive statistics of enrolled mothers (N=122) and fathers (N=120).

Table 11. Family and household characteristics of the enrolled sample.

Table 12. The characteristics of the involved infants.

Table 13 Mean NICU hospitalization expenses (in euros) stratified by preterm severity and birthweight category.

Table 14. Neurodevelopmental outcomes of the enrolled infants.

Table 15. Outgoings after NICU discharge (euro).

Table 16. Comparisons among parental sociodemographic information.

Table 17. Infants (N = 51) characteristics and neurodevelopmental outcomes.

Table 18. Comparison of IBS score, severity, incidence and IBS-SSS items among mothers and fathers.

Table 19. Comparisons among maternal and paternal sociodemographic information.

Table 20. Infants (N = 58) characteristics and neurodevelopmental outcomes.

Table 21. IBS-SSS mean score and item comparisons among mothers and fathers.

Table 22. IBS-QoL subscale mean comparisons among mothers and fathers.

Table 23. Description of dimensions, measures, and variables included in the present study.

Table 24. Characteristics of study participants (N = 62) according to the working unit.

Table 25. Means and standard deviations of the study variables according to the working unit (N = 62).

Table 26. Mediating analyses: path coefficients according to the working unit.

Table 27. Moderation analyses: regression coefficients according to the ward.

Table 28. Summary of the Hypothesis and Results of the Chapter IV.

Table 29. Summary of the Research Questions and Results of the Chapter IV

Table 30. Summary of Research Questions and Results of Chapter V.

Table 31. Summary of Research Questions and Results of Chapter VI.

Table 32. Summary of the Hypothesis and Results of Chapter VII.

Table 33. Summary of the Research Questions and Results of Chapter VIII.

Table 34. Summary of the Research Questions and Results of Chapter IX.

List of Tables in the Appendix

Table 1A. Psychophysical health mean comparisons among Neonatal ward parents and NICU after birth.

Table 2A. Psychophysical health mean comparisons among Neonatal ward parents and NICU six months after birth.

Table 3A. Correlation analysis between the study variables of parents of NICU infants

Table 4A. Inter-correlations between study variables according to the working unit (ICU and NICU).

List of Figures

Figure 1. Representation of the Abidin's model of Parenting Stress (from Fang et al., 2022 and adapted from Abidin, 1990; 1992).

Figure 2. The Preterm Parental Distress Model (from Holditch-Davis et al., 2000)

Figure 3: The development of the care practices moving from the Patient-Centered Care to the Person-Focused Care up to the Humanization of Care. (From Busch et al., 2019).

Figure 4: Models of care and types of intervention in the NICU from Franck & O'Brien, 2019.

Figure 5. Theoretical hierarchical framework of individual and situational predicting factors of psychophysical health outcomes in parent of NICU infants.

Figure 6. Moderation slopes of Stress Communication-Other perception effect on the relationship between NICU Stress and Depression.

Figure 7. Moderation slopes of Emotion Focused-Other perception effect on the relationship between NICU Stress and Depression.

Figure 8. Moderation slopes of Problem Focused-Other perception effect on the relationship between NICU Stress and Depression.

Figure 9. Moderation slopes of Delegate-Other perception effect on the relationship between NICU Stress and Depression.

Figure 10. Moderation slopes of Dyadic Coping Perceived efficacy effect on the relationship between NICU Stress and Depression.

Figure 11. Moderation slopes of Dyadic Coping Perceived Efficacy effect between NICU Stress and Anxiety.

Figure 12. Moderation slopes of Dyadic Coping Perceived Efficacy effect between NICU Stress and Somatization.

Figure 13. Class prevalence for the whole sample.

Figure 14. Class prevalence stratified by Country.

Figure 15. Subscales rates according to classes to the NICU stress dimensions (above) and Social Support dimensions (below).

Figure 16. The application of the Patient Perspective framework to the study of financial burden in parents of NICU graduated infants.

Figure 17. Comparison of perceived FB rated divided by normal versus adverse outcome

Figure 18. FB rates comparing presence vs. absence of government financial support.

Figure 19. The hypothesized mediation models.

Figure 20. The summary of the mediation models among NICU stressors, anxiety and IBS symptoms in parents of NICU hospitalized infants.

Figure 21. Flow diagram of participant recruitment.

Figure 22. Conceptual framework.

Figure 23. Summary: statistically significant mediating and moderating effects among (a) ICU nurses and (b) NICU nurses.

Figure 24. The moderation effect of Self-Blame strategy in the association among Conflicts with Supervisors and Psychological Disease.

Figure 25. The moderation effect of Escape/Avoidance strategy in the associations between Conflicts with Supervisors and Psychological Disease among nurses working in ICU.

Figure 26. The moderation effect of Social Support in the association among Conflicts with Physicians and Psychological Disease in NICU Nurses.

Figure 27. Moderation effect of Job Control in the associations between Conflicts With Physicians and Psychological Disease among nurses working in NICU.

Chapter I

Introduction

I.1 Background

The title of this thesis (i.e., “*Caring for those who take care: fostering the psychological health of parents and nursing staff in Neonatal Intensive Care Unit*”) is the result of an effort to synthesize the work done with few words that would be able to explain the general aim of this thesis project from several levels (i.e., from a semantic, linguistic, and meaning level). Every word was adopted to express the general proposal of this thesis. The main word around which all the others rotate is “*Caring for*”. This choice was made moving from the framework of the Family-Centered Care which is both the starting and the arrival point of each study that is part of this thesis project.

Specifically, this thesis aims to address both the psychophysical and emotional experience of both providers (i.e., nurses) and receivers (i.e., both mothers and fathers) of Family-Centered Care interventions. Moving from the examination of the health processes of those carers to improve the developmental practices for the NICU infants using validated tools and robust statistical methods. The design of the thesis project was built considering both the hospitalization and the after-discharge period within a multidimensional perspective. This choice has been taken to explore several factors (e.g., financial burden, irritable bowel syndrome, death and dying stressor) at different time points and in diverse subjects (i.e., mothers, fathers and nurses).

Arietta Slade in his pioneering work with families with social problems stated that the main task of the home visitor was helping parents in minding the baby (Slade et al., 2005). This meant that parents who live risk condition (i.e., traumatization; addictions, extreme poverty) are at risk of maladaptive parenting behaviours and adverse child outcomes (Lyons-Ruth & Jacobvitz, 2016). Therefore, they need someone who start think to the baby when they cannot and, subsequently, help them to keep the baby in mind (Slade et al., 2020).

Applying this concept to the context of Neonatal Intensive Care Units, it is clear that - most of times - parents were not at risk of any social disadvantage. However, they still struggle to mind the baby, because the baby that they are in front of it is totally different from the imagined one during pregnancy (Stern, 1985). They must learn being parents in a new and unique way, never thought before at both individual and familial level (Nukpezah & Atanuriba, 2025).

On the other hand, social and healthcare professionals involved in caring for newborns in NICUs and managing parents' uncertainties also require particular attention from researchers, so that they

can be supported in dealing with such highly emotionally demanding work (Chatzigianni et al., 2018).

Accordingly, based on a transactional and multidimensional perspective, the present thesis stems from the need to explore the experiences of “carers” (i.e., parents and healthcare professionals who are in the forefront line, namely nurses) within Neonatal Intensive Care Units (NICU), who must be indeed able to “mind the baby” in a high-risk life condition. In particular, this thesis aims to identify not only risk factors but also protective factors - that could be promoted through interventions - in order to support parents and healthcare professionals in dealing with the condition of an infant (for parents) and a patient (for healthcare professionals) on the edge “between life and death”.

For parents (mothers and fathers), particular attention will be given to exploring potential gender differences, in order to identify potential specificities - and therefore potential differentiated resources – to develop tailored evidence-based interventions.

The richness of models and perspectives - the Family-Centered Care practices- have been the tools to build up the studies of this thesis and the implications to optimally care for parents and nurses caring for NICU babies.

I.2 Objectives of the thesis

The following sections will illustrate the specific objectives of the thesis, through a brief summary of each chapter. It will start with the Part 2 that explores the theoretical background of parenting and nursing stress models that have characterized the development of the literature in this field (Chapter II) moving to the implications and the respective roles of parents and nurses within the framework of the Family-Centered Care applied to the Neonatal Intensive Care Unit (Chapter III). Parts 3, 4 and 5 will be dedicated to three different aspects and perspective that consider different subjects (i.e., parents or nurses) during different time points (i.e., during NICU hospitalization vs. after discharge). The research studies are strictly linked to the above-mentioned theoretical frameworks and harmoniously aim to improve Family-Centered Care practices for parents, infants, and nurses.

Specifically, Part 3 will explore the risks and resources to cope with NICU hospitalization experience in parents considering individual and dyadic factors (Chapter IV) and the extended social support system across Italy and Portugal (Chapter V). Part 4 will illustrate three studies that investigated two relatively new aspects of parental NICU stress. On one hand, psychosomatic

distress following several stressful situations will be studied in parents of NICU infants both during hospitalization (Chapter VII) and after discharge (Chapter VIII) within a biopsychosocial framework sensitive to gender differences comparing mothers and fathers. On the other hand, the objective and subjective features of the financial burden lived by parents both during NICU stay and one year after discharge will be examined (Chapter VIII). Part 5 will investigate NICU-related stress *“from the other side of the incubator”*, using the perspective of nurses (Chapter IX). Specifically, the job duty of caring for death and dying critically ill infants will be examined on the one hand considering individual coping strategies and work resources and, on the other hand, comparing NICU nurses with nurses working in adult Intensive Care Units.

I.2.1 Chapter II: Parenting and nursing stress models: a multidimensional perspective

The chapter aims to provide an overview on the most used stress models in parenting and nursing within a multidimensional perspective. Firstly, the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) will be introduced as a proposed theoretical and multidimensional framework to study both parental and nursing stress. Secondly, common characteristics and differences across parental stress models will be underlined. Then, stress models will be exposed in relation to paediatric hospitalization and Paediatric Intensive Care Unit admission and their effects on parental mental health, child development and parent-child dyad adjustment. Subsequently, the specific environmental characteristics of the Neonatal Intensive Care Unit (NICU) and the epidemiological characteristics of the infants admitted in this ward will be explained. Parental stress models currently applied within the NICU context will be explored. In the last part of the chapter, models, and tools to study stress in the nursing profession will be presented. Finally, the chapter will focus on the challenge to care for a dying/death patient and his family specifically addressing critical care wards.

I.2.2 Chapter III: Family-centered care (FCC) in Neonatal Intensive Care Unit: implications for parents and nurses

In this chapter, models of care will be exposed. In the first part of the chapter the steps towards the Humanization of Care will be reviewed. Paradigm shift from the medical care of the disease to patient/ person centered care will be underlined with the specific consequences on the care

practices, and decision-making processes. Individual, organizational, and structural characteristics of the Humanization of Care will be outlined to provide indications on how to implement new healthcare environments *ad hoc* for people. Subsequently, care models will be explored within the context of the pediatric patient and his family. Firstly, parental role of care as fundamental to promote infant and child development across context will be reviewed. Secondly, an overview on the origins, features and effect of family-based interventions and models of care in the NICU context will be provided. The link among different levels of care and their characteristics will be illustrated. The evolution of the models of care in NICU will be underlined with special interest on Kangaroo Mother Care (KMC), Family-Centered Care principles and Family-Integrated Care practices (Franck & O'Brien, 2019). Finally, barriers and facilitators of different models of care within the NICU context from the perspective of nurses and other healthcare professionals will be described.

I.2.3 Chapter IV: NICU-Related Stress and Psychophysical Health Conditions in Parents During their Infant Stay: The Role of Individual and Dyadic Coping Strategies

The chapter will introduce the background of NICU-related psychological distress experienced by parents and the individual coping strategies most used to face this stressful situation according to the Transactional Model of Stress and Coping (Lazarus & Folkman, 1989). Moreover, the dyadic coping, a construct originated from the Systemic Transactional Theory (Bodenmann, 1995) and never studied in parents of NICU infants, will be introduced. This chapter will aim to integrate the contribution of situational, individual, and dyadic factors in determining the psychophysical health outcomes of parents during NICU stay. Specifically, both the main and moderating effects of individual and dyadic coping strategies among NICU stress and anxiety, depression, and somatization will be examined. Finally, insights for implementing interventions both for the individuals and the dyads based on the findings will be provided.

I.2.4 Chapter V: NICU Stress and Social Support in Parenting Very Preterm Infants a comparison study among Italy and Portugal

Family-Centered Care Model recently emphasised the potential role of unformal social support systems (e.g., family, friends, significant others) and facilitators for parental adjustment during

NICU stay (Kainiemi et al., 2025). This chapter will examine NICU Stressors and Social support resources using a Person-Centered statistical approach (Collins & Lanza, 2009) comparing Italian and Portuguese parents of very preterm infants admitted to the NICU. The choice moves from the objective to obtain classes of risks and resources among parents of very preterm infants. Further the study will test the cultural relevancy of the identified classes across Italian and Portuguese parents. Finally, the role of sociodemographic factors will be examined to further characterize parents' membership to each class and improve screening practices and early support for parental mental health in the NICU.

I.2.5 Chapter VI: The financial burden experienced by families during NICU hospitalization and after discharge: A single center, survey-based study

The chapter will illustrate objective and subjective measurement of financial burden experienced by parents both during NICU hospitalization and one year after the discharge using a Patient-perspective framework (King et al., 2021). Sources of support to face costs and social and health disparities within the group of parents of NICU infants will be examined. Finally, initiatives to reduce financial burden will be exposed.

I.2.6 Chapter VII: The Relationship among NICU Stressors and Irritable Bowel Syndrome in Parents during their infant stay: the mediating role of Anxiety

Based on the Parental Preterm Distress Model (Holditch-Davis et al., 2000) and the biopsychosocial perspective (Drossman, 1998), this chapter will test the role of parental anxiety symptoms as mediating factor among the NICU stressors and the irritable bowel syndrome. Overall, the aim of the chapter will be to expand the parental distress examination connecting the psychological dimension with the somatic one. Finally, the chapter will provide potential applications of evidence-based interventions to improve parental psychophysical well-being.

I.2.7 Chapter VIII: Irritable bowel syndrome in parents of NICU discharged infants: gender differences and the interplay with psychological distress and psychophysical well-being

This chapter will underscore the relationship among irritable bowel syndrome, psychological distress, and psychophysical well-being in parents during the first year following NICU discharge. Further, irritable bowel syndrome and its impact on quality of life will be examined within a biopsychosocial perspective (Grunberg et al., 2023) sensitive to gender differences (Salomè et al., 2022). Implications for caring for parents even after NICU discharge and suggestions to improve the neurodevelopmental follow-up of NICU graduated infants will be described. Finally, a paradigm-shift from an Infant-centered perspective to an extended Family-Centered model of care will be presented.

I.2.8 Chapter IX: Caring till the end: psychological impact, mediating, and moderating factors of nursing death or dying patients in Adult and Neonatal Intensive Care Unit

This chapter will illustrate an application of the Demands Resources and Individual Effects Nurses Model (DRIVE-Nurse Model; Vallone et al., 2020) to examine specific risks and key protective factors (Stressors in Nursing, Work-Resources, Coping Strategies) in the relationship among Death and Dying Stressor and psychological disease in nurses working in Adult Intensive Care Unit (ICU) as compared to those working in the NICU. Common factors and differences will be underlined. Individual, relational, and organizational factors to improve the care provided to both dying/death adults and infants in (N)ICUs will be examined.

I.2.9 Chapter X: Final summary, implications, limitations, and further research

The last Chapter will illustrate the findings of the entire thesis, through a summary. All hypotheses, analyses and results will be discussed in detail, also focusing on the implications for Family-Centered Care practices. Furthermore, the limitations of this project will be acknowledged and considered. Finally, a window on the future research planned to improve the proposed study will be explained.

Part 1:
Theoretical background

Chapter II

Parenting and nursing stress models: a multidimensional perspective

II.1 Transactional models of stress

The Transactional Model of Stress and Coping describe stress as a process between an individual and a stressor in the environment where he/she lives the stressful situation (Lazarus & Folkman, 1989). Therefore, the transactional model of stress is situation specific (Lazarus, 1990). The aim of this model is to provide a framework that can disentangle the complex relationship among the situation-dependent stressors and the individual resources. Lazarus and Folkman (1989) illustrated the dynamic transaction among the stressor and the coping strategies. Indeed, their model states the presence of a primary appraisal, in which the individuals evaluate the threat of the stressor that must be faced. Then, in the secondary appraisal phase, individuals look for their personal resources to face the stressors as optimal as possible (Lazarus & Alfert, 1964). This process is quite rapid and automatically conducted. When individuals reach to face the stressor with the coping strategies contained in their “toolbox”, the process ends with the return to an equilibrium phase. On the contrary, when individual coping strategies are not sufficient to overcome the stressor, we could have a potential exacerbation of both the psychological and physical health (Zurlo, Vallone & Smith, 2018).

Initially, among the resources to face the stressor were only considered two types of individual coping strategies: problem-focused coping strategies and emotion-focused coping strategies (Folkman & Lazarus, 1980). Problem-focused strategies directly target the stressor trying to change it using cognitive (e.g., looking for and choosing different solutions to solve the problem) and behavioral (e.g., practically acting on it) strategies. On the contrary, emotion-focused coping strategies rely on the individual thoughts and emotion regulation (Biggs, Brough & Drummond, 2017). When it is not possible to physically change the stressor, emotion-focused strategies aim to change the reaction of the individual to that stressor (Biggs, Brough & Drummond, 2017). Examples of that type of strategies are self-regulation techniques (e.g., relaxation). In the revised version of the model, Folkman (2008) stated that when stressors are perceived as overwhelmingly aversive and uncontrollable, meaning-focused coping strategies are useful to reduce stress (Folkman, 1997; 2008). Specifically, meaning-focused coping strategies are relied upon the values and life goals of the individual and underline the potential positive role of the stressful situation for

his personal growth (Carver and Connor-Smith, 2010; Folkman, 2008). One of the principal strategies of this kind of coping is the positive reframing which consists in reconstructing the stressful situation in a way that enriches the individual on his way to life goals (Folkman, 2008).

All those three types of coping strategies can be protective or risky for health and well-being. There are some strategies that usually exacerbate distress, like avoiding/escaping strategy from the stressful situation (Holahan et al., 2005; Yu & Sherman, 2015; Shaw et al., 2016; Zurlo, Cattaneo Della Volta & Vallone, 2019). On the contrary, others, like seeking social support may generally serve as a protective factor promoting health (Penninx et al., 1998; Strine et al., 2009). However, some studies suggest, in line with the situational specific nature of the Transactional Model of Lazarus and Folkman (1984), that coping strategies are not useful or harmful at all (Zurlo, Cattaneo Della Volta & Vallone, 2019). The role of coping strategies is dependent on the stressor, the time in which the stressor is experienced and the history of the individual (Zandi & Ahmadi, 2024). Indeed, coping strategies are tools learnt along the course of life. Thus, life experiences shape the type of strategies learnt and most frequently used by each individual when facing stressful situations. In general, we can state that as well as coping strategies are different and include several cognitive, behavioural, and emotional reactions to stress also stressors can be different and can be related to their own or a loved one illness, work-related or any other life domain (Mark & Smith, 2012; Litzelman et al., 2023).

Overall, the application of the Transactional Model of Stress, proposed also in this thesis, potentially contribute to fit the context, trying to capture the multidimensional interaction among individual and environment. This possibility is confirmed by several studies that applied the Transactional Model of Stress to study different contexts (e.g., occupational, and perinatal health) and with different populations (e.g., teachers, migrant workers, infertile couples; Zurlo, Cattaneo Della Volta & Vallone, 2019; Zurlo, Vallone & Smith, 2020; Zurlo, Pes & Cooper, 2007).

Based on those findings, we used the Transactional Model of Stress as the main framework to potentially capture in a wide way the experience of the parents and nurses who are the closest ones taking care of the infants hospitalized in the Neonatal Intensive Care Unit (NICU). The choice to study those two groups was due to the fact that both parents and nurses are the closest ones to the infant during NICU hospitalization. Moreover, they are the main caretakers of the infant playing a pivotal role in its neurodevelopment (Soleimani et al., 2020). In this perspective, the NICU is an extended relational ecosystem in which the whole experience is mainly build up by the co-construction of parents and nurses experiences both individually and in interaction among them (Steinberg & Patterson, 2017). Therefore, adopting a multidimensional perspective of the different

dimensions characterizing parental and nursing experience may potentially provide the stage to improve the NICU ecosystem targeting specific domains (O'Dean et al., 2025). To this aim, the next paragraphs will provide an overview of the most important parental and nursing stress models deepening the specific factors and most used models to understand stress experience within the NICU setting.

II.2 Parental stress models

Parental stress is the feeling of overwhelming distress due to demands related to the parental role (Deater-Deckard, 2004). Concerns related to parenting are approximately experienced by 36–50% of parents (Akister & Johnson, 2004; Reijneveld et al., 2008). This can lead to adverse health outcomes for parents, children, and their relationship (Eo & Kim, 2018).

Parenting is a fundamental function to let newborn develop harmoniously (Roncallo, Barreto & de Miguel, 2018). However, parenting can be also challenging, and several factors have been detected as potential barriers to positive parenting function. Specifically, risk factors can be related to parents (e.g., poverty, parental substance abuse, postpartum depression, Chaplin & Sinha, 2013; Ostberg, 1998; Soliday, McCluskey & O' Brien, 1999) or strictly related to the child (e.g., chronic health disease, atypical development; Cousino & Hazen, 2013; Valicenti-McDermott et al., 2015; Craig et al., 2016; Ilchena et al., 2023).

Among the most used models to study parental stress one can include the Stress Process Model (Pearlin, 1999; Pearlin & Bierman, 2013), the Demand-Rewards Perspective (Nelson et al., 2013) and the Parent-Child relationship model (Abidin, 1992).

The Stress Process Model (SPM; Pearlin, 1999; Pearlin et al., 1981) involves three components: stressors, resources, and stress consequences. Stressors, defined as sources of stress can be acute or chronic conditions that dysregulate the individual system. Resources include the behavioural and cognitive strategies to alleviate the effect of the stressors. Consequences involve the health outcome (i.e., physical and mental health and well-being) of the relationship among stressors and resources (Pearlin & Bierman, 2013). This model take into account individual differences in the health outcome due to different resources used to face the stressors (Nomaguchi & Milkie, 2020).

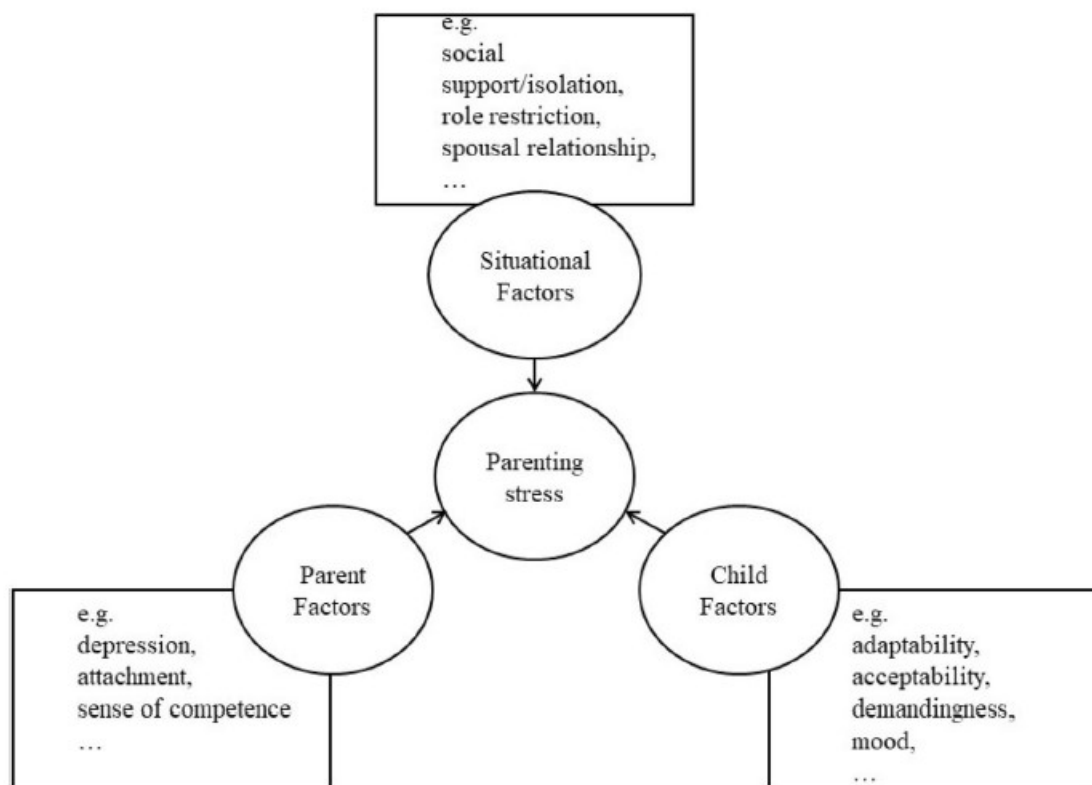
The Demand-Rewards Perspective (Nelson et al., 2013) considers the ratio among the demands and the rewards specifically related to parenting in determining distress or well-being. An unbalanced ratio in which the demands are more than the rewards will lead to experience distress and reduced

well-being. On the contrary, a high rate of rewards will attenuate the effort perceived due to the demands and will maintain a positive health outcome (Rusu et al., 2025).

Within the Transactional Model of Stress and Coping framework (Lazarus & Folkman, 1984), the Parent-Child relationship model (Abidin, 1992) is the most used to study parental stress. The Abidin's model considers parental stress as the outcome of several parental and child-related factors. Specifically, this model considers three domains (Figure 1): parent domain (e.g., personality, depression), child domain (e.g., temperament, demandingness), and situational domain (e.g., social, and spousal support). This model can be adapted to different stages of child's age (Fang et al., 2024) and different situations, including personal characteristics of parents and the intersection of those three domains.

Adapting this model to the specific context of interest can provide an in-depth understanding of the specific mechanisms that potentially lead to adverse health outcomes for both parents and children.

Figure 1. Representation of the Abidin's model of Parenting Stress (from Fang et al., 2022 and adapted from Abidin, 1990; 1992).



II.2.1 Parental stress: what happens with a sick child?

Parenting a child with disability or a sick child has been shown to produce an additional burden to parents (Lee et al. 2008; Ingersoll and Hambrick 2011). Indeed, parents of a sick or with a disability child experience higher levels of stress than parents with typically developing and healthy children (Gerstein et al. 2009; Woodman, 2014). Parents with a sick or with disability child can experience several barriers and constraints due to both the healthcare and the community systems (Blacher et al. 2005). In those cases, parental coping strategies based on problem solving (Smith et al. 2008), emotion regulation (Pakenham et al. 2005) and spiritual strategies (Estes et al. 2009) can attenuate parental stress and increase positive parent-child bonding. Moreover, parental challenges are closely related to the severity of illness or disability (Gugliandolo et al., 2023; Scibelli et al., 2021) and the developmental stage in which the child or the adolescent lives in (Greydanus, Rimsza & Newhouse; 2002; Hamilton, Mazzucchelli & Sanders, 2015).

Pediatric hospitalization is an acute factor able to exacerbate parental stress. While pediatric hospitalization aims to promote physical recovery, it is also an event that can potentially disrupt child psycho-emotional growth leading to regressions or arrest of the development (DeMaso & Snell, 2013; Perrin & Shipman, 2009). Moreover, pediatric hospitalization may also exacerbate parental mental health affecting the ability to care for their child (Cammarata, Bujoreanu & Wohlheiter, 2020).

Among the different types of hospitalization, the one in the Pediatric Intensive Care Unit (PICU) is among the most burdening for parental mental health (Boonchooduang et al., 2025). Although PICU is a high technology ward, parents may experience severe psychological distress that can have adverse effects on the emotional and psychological functioning of their children/infants in different ways (Yagiela et al., 2019). According to the Integrative Trajectory Model of Paediatric Medical Traumatic Stress (PMTS; Price et al., 2016), parents and children who experience elevated psychological distress during hospitalization are both at risk to develop traumatization due to the PICU experience and are in need to be considered as strictly linked to each other and deserving psychological support. Indeed, parents who experience posttraumatic disorder may in turn transmit traumatization symptoms to their own children after discharge (Long et al., 2024). Accordingly, several studies underscored the importance of psychological support during PICU hospitalization, especially for those parents who are at increased risk to experience psychological burden (Cammarata, Bujoreanu & Wohlheiter, 2020). Moreover, parents and children should be followed-up to take care of their adjustment after discharge (Riley et al., 2021).

While in the case of PICU hospitalization, the parent-child bonding is already formed and need to be kept. On the contrary, the hospitalization of a sick newborn in the NICU imply an early separation after birth among mother and infant that can deeply constrain and avoid the formation of the bonding (Green et al., 2021).

In the next paragraph an overview of epidemiology, and characteristics of the infants usually admitted to the NICU will be carried out. Then, studies related to parental stress in the Neonatal Intensive Care Unit and models specifically related to this setting will be examined.

II.2.2 Caring for a neonate in NICU: what kind of infants live in?

One in eight babies born each year will be needing special care worldwide (Royal College of Paediatrics and Child Health, National Neonatal Audit Programme, 2017). Among them, 15 million children are born preterm globally (before the 37th week of gestational age) that is more than 1 in 10 (Howson et al., 2013). In Italy, 7%, approximately 32,000 per year, are preterm (Boldrini et al., 2016). Prematurity is currently one of the leading causes of death in the perinatal period (Lawn, Wilczynska-Ketende & Cousens, 2006). Prematurity rate is also increasing due to the greater use of medically assisted reproductive techniques (ART; Jackson et al., 2004).

The causes of prematurity can be different, with the most common being spontaneous preterm labor, multiple pregnancies, uterine malformations, antepartum hemorrhages, intrauterine growth restriction (IUGR), and socioeconomic and behavioral factors (e.g., substance use during pregnancy) which can hinder access to care (Moutquin, 2003; Sharma, Shastri & Sharma, 2016), especially among ethnic minority groups (Ananth et al., 2005, 2006).

Preterm birth can also be caused by a series of risk factors related to maternal health and medical history (diabetes, advanced age, previous miscarriages, preterm pregnancies, and Cesarean sections, Khalil et al., 2013; Williams et al., 2021) that can influence the infant's subsequent development (Lodha et al., 2020). The degree of prematurity is usually determined by gestational age (GE; the period calculated from the last menstrual period). It is estimated that 5% of premature infants are extremely preterm (i.e., born before 28 weeks of GE), 15% are very preterm (28-31 weeks), 20% are moderate preterm (32-33 weeks), and 60-70% are late preterm (34-36 weeks). Along with EG, birth weight is particularly important for newborn health. Indeed, it plays a significant role in the baby's chances of survival. Newborns with a birth weight less than 2500 grams are at high risk of an

adverse prognosis (Hughes, Black & Katz, 2017). Prematurity is also characterized by a high rate of comorbidity with various pathologies due to the immaturity of the newborn's organs (such as lungs, brain, stomach), which are not fully developed and ready for extrauterine life (Kim et al., 2018; Thébaud et al., 2019; Schmidt Mellado et al., 2022).

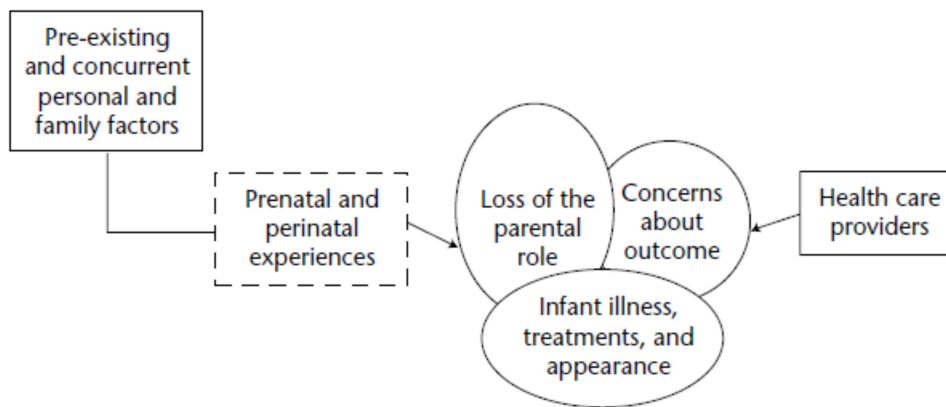
The immaturity of these organs can prolong the newborn's stay in the NICU, requires transfer to a specialized facility, and, in some cases, even surgical operations (Liu et al., 2022). For this reason, preterm infants need various devices to stay alive, such as, ventilators for breathing, a nasogastric tube for feeding, and a pulse oximeter to monitor their heart rate.

Furthermore, several studies have highlighted that preterm infants are at high risk of developing, over the course of their lives, neurodevelopmental issues such as autism spectrum disorders (Vermeirsch et al., 2021), specific learning disabilities (Johnson et al., 2016), sensorineural disabilities, and behavioral problems (Duncan & Matthews, 2018). Overall, NICU infants, and particularly preterm ones, are exposed to a series of fetal and extrauterine complications that place them at high risk of disability.

II.2.3 The emotional roller coaster of parents in the Neonatal Intensive Care Unit

Parents with a NICU hospitalized infant experience high levels of stress as compared to parents of full-term healthy infants (Persson et al., 2023). Historically, the Preterm Parental Distress Model developed by Miles and colleagues (1993) has been the most used to study the NICU stressors in parents. The Preterm Parental Distress Model derived from the Transactional Model of Stress (Lazarus & Folkman, 1984) and focused on three main sources of stress: Sights and Sounds of the NICU wards (e.g., lights, and noises from the machines), Infant Behavior and Appearance (e.g., tiny, and fragile aspect of the infant, jerky movements) and Parental Role Alterations (e.g., feelings of detachment from their own infant, being scared to hurt him/her by touching; not knowing how to care for him/her properly; Holditch-Davis et al., 2000). From this model (Figure 2) has been developed the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU; Miles et al., 1993) that is the most used questionnaire to measure NICU-related stress worldwide (Caporali et al., 2020).

Figure 2. The Preterm Parental Distress Model (from Holditch-Davis et al., 2000)



Most of studies indicated that mothers used to experience higher levels of stress than fathers (Ionio et al., 2019; Kawafha et al., 2025). Parental Role Alterations is the subscale with the highest scores in both mothers and fathers (Baía et al., 2016; Salomè et al., 2022). However, other studies failed to find differences in parental stress among mothers and fathers in any subscale of the PSS: NICU (Pichler-Stachl et al., 2019) while others only found differences in Parental role Alterations subscale (Matricardi et al., 2013). This result could be because when fathers are highly involved in infant care, use to experience high levels of stress (Noergaard et al., 2019). Indeed, masculinity dilemma of fathers parenting NICU infants may underline different stress-related aspects than mothers. Fathers may think that mothers deserve to touch and stay with the infant because their role it the most important one (Noergaard et al., 2017). Moreover, the breadwinner role is usually assigned to fathers who must continue working during NICU hospitalization (Noergaard et al., 2017). Because of that they are less present at the bedside of their infant (Raiskila et al., 2017) leading the healthcare staff to underestimate the paternal role not sharing timely updates regarding the infant, not supporting their emotional needs, or involving them in the infant's care (Rio et al., 2022).

Given the essential role of parental care to promote infant neurodevelopment since the first days after birth (Soleimani et al., 2020), elevated stress levels have the potential to decrease caring skills in parents leading to adverse infant health outcome (Aucott et al., 2002; Obédait et al., 2009). Moreover, several studies underlined the long-term effect of NICU hospitalization on parental psychological health up to one year after discharge (Leftkowitz et al., 2017; Salomè et al., 2022). Those long-lasting effects on parental mental health may also disrupt parent-infant relationship

(Horwitz et al., 2015) with additional impairments on the neurodevelopmental outcome of NICU discharged infants (Poehlmann et al., 2012).

Based on the above-mentioned literature, this thesis work attempted to study the hospitalization in the Neonatal Intensive Care Unit and the period after discharge in relation with different challenges (e.g., emotional, financial, social ones) that both mothers and fathers must live to care for their own infant. Furthermore, the next paragraph, according to the Preterm Parental Distress Model, will be focused on the nurses who are the closest ones to both parents and infants among the NICU healthcare staff members. To this aim, the occupational stress models in nursing profession will be reviewed. Then specific demands of the nurses working in the NICU ward will be illustrated.

II.3 Stress in the nursing profession: the emotionally and challenging experience of caring for patients

Occupational stress in health care setting is widely studied (Tomei et al., 2016; Gabeyehu & Zeleke, 2019). Among health care professionals, nurses are at the highest risk to experience work-related stress (Yesuf et al., 2022).

Indeed, nursing profession has been found to be characterized of high stress levels and adverse psychological health (Achour et al., 2018). Factors determining stress in nurses are both organizational (e.g., shortage of staff, lack of resources of the health care system; Rodwell & Munro, 2013) and relational factors (e.g., emotional burden due to care for patient and his family, conflict with physicians; McVicar, 2003). Moreover, nurses' turnover is higher than in other industries (Duffield et al., 2014; Japanese Nursing Association & JNA News Release, 2017). The World Health Organization (WHO) estimated that shortage of nurses would reach 9 million by 2030 (International Council of Nurses, 2019). However, prior to the final cognitive stage of turnover (Raza, Khan & Mujtaba, 2018; Mosallam et al., 2015), nurses are at risk to experience several psychophysical health issues (Zurlo, Vallone & Smith, 2018; Vallone, Smith & Zurlo, 2020) that can lead to exacerbate levels of sickness absence (Buchan & Aiken, 2008) affecting work conditions for the remaining nursing staff, quality of patient care and the functioning of the health care system (Aiken, Clarke & Sloane, 2002).

Traditionally, two occupational stress models namely the Job Demand-Control-Support (JDCS; Karasek, 1979) and the Effort-Reward Imbalance model (ERI; Siegrist, 1996) are the most used ones in nursing occupational health.

The JDCS dimensions, namely Job Demands, Job Control (i.e., skill discretion and decision authority) and Social Support, states that high levels of both job demand, job control and social support have positive effects on well-being. On the contrary, high levels of job demands but low levels of job control and social support negatively impacted on well-being (Theorell and Karasek 1996; Johnson and Hall 1988). JDCS dimensions were significantly related to job dissatisfaction, turnover intentions, burnout, and somatic complaints (Parkes, Mendham, & Von Rabenau, 1994; Bourbonnais, Comeau, & Vézina, 1999; Gelsema et al., 2006; Jalilian, Shouroki, Azmoon, Rostamabadi, & Choobineh, 2019).

Moreover, the ERI Model dimensions, namely Effort and Rewards, explain work-related stress as an imbalance between experienced efforts and individual perception of both material and immaterial rewards (Siegrist, 2008). Several studies found that nurses' effort-rewards imbalance is very high (Salem & Ebrahim, 2018; Alvarado, Bretones & Rodríguez, 2021; Deng, Fang & Cai, 2021) mirroring the complexity of the work setting (Fei et al., 2023). Importantly, the effort-reward imbalance is associated with depressive symptoms, that in turn increases the risk of burnout and turnover intentions (Pratt, Kerr & Wong, 2009; Bagaajav et al., 2011; Alvarado, Bretones & Rodríguez, 2021). Therefore, both the ERI and the JDCS Model provided important information concerning factors determining nurse occupational health (Babamiri et al., 2022).

Importantly, transactional models recently paid more attention also on the role played by individual variables to influence psychological health conditions of nurses (Zurlo Vallone & Smith, 2018). In particular, the *Demands-Resources and Individual Effects applied to Nurses Model* (DRIVE-Nurses Model; Vallone et al., 2020) considers both individual (e.g., coping strategies) and situational variables (both the ERI and the JDCS Model dimensions) and their dynamic interrelations to determine psychological health of nurses.

The *DRIVE-Nurses Model* has recently highlighted the influence of the interpersonal and inter-role conflicts (Vallone & Zurlo, 2024) in determining psychophysical health conditions of nurses, prompting the attention to consider not only the relationships among nurses and patients but even the conflicts among peers and with the other health care professionals.

The Expanded Nursing Stress Scale (ENSS, French et al., 2000) is a widely used tool to measure stress levels of nurses in both single wards (Alomari et al., 2021) and across them (Vallone & Zurlo,

2024). Importantly, it encompasses several sources of stress concerning organizational stressors (i.e. Workload), individual-related stressors (i.e. Uncertainty concerning treatment, Inadequate Emotional Preparation), relational stressors related to other health care professionals (i.e. Conflict with Peers; Conflict with Physicians; Conflict with Supervisors; Discrimination) and patients and their families (i.e. Patients and their Families, Death and Dying).

Concerning organizational stressors, high workload is a well-known predictor of worse psychological health conditions, leading to increase sickness absence, burnout, and staff shortage (Diehl et al., 2021). Within individual-related stressors, uncertainty concerning treatment appears one of the most experienced stressors (Chatzigianni et al., 2018). It seems to be strictly linked to patient's health status complexity, showing that nurses with a low number of patients assigned but with high severity health issues experience high stress levels related to the treatment of those patients (Hagan, Walden & Brand, 2022). Uncertainty concerning treatment of a patient may be exacerbated by the presence of other relational stressors linked to negative interpersonal relationships and lack of collaborative cooperation with other nurses, physicians, and supervisors (Sarafis et al., 2016). In addition, conflicts with other health care professionals lead to affect nurses' psychological health (Vallone & Zurlo, 2024) and reduce job satisfaction (McGilton et al., 2007).

Consequently, since nurses need to manage for conflicts within the ward, their response to patients and their family requests may be inadequate (Newel & Jordan, 2015) reducing the quality of care provided to patients (Aiello, Garman & Morris, 2003; Sarafis et al., 2016) and blocking the holistic provision of care (Firth, 2006).

Noteworthy, among the relational stressors that nurses must face, death and the dying process of a patient are ones of the most emotionally burdening (Sarafis et al., 2016; Chatzigianni et al., 2018).

II.3.1 Nursing the dying patient and his family

Death is a universal event in human life. However, ways to cope with death can be very different according to philosophical, societal, and cultural factors (Braun et al., 2010). Although death and dying is commonly shared among all the health care professionals, nurses must face death and dying daily. In fact, they are the closest ones to patients and their families during each phase of the care and the end-of-life stage (Peters et al., 2013; Pimenta Lopes Ribeiro et al., 2022). The death of a patient can emotionally impact nurses beyond the burden limited to the need of dealing with patient's family and other contextual factors (e.g., conflict with physicians; Sarafis et al., 2016).

Several characteristics of the dying patient could lead nurses to suffer more for his death. Those features may be related to commonalities that link the nurse and the patient (e.g., individual similarities, time spent together; Shorter & Stayt, 2010; Velarde-García et al., 2016) or specific features of the dying patient that are generally opposite to the death (e.g., youths, pregnant women; Kisorio & Langley, 2016; McMeekin et al., 2017; Betriana & Kongsuwan, 2020). Among the most frequent coping mechanisms adopted by nurses one can find normalization of death, compartmentalization, and emotional disconnection (Bloomer et al., 2023).

Recently, a growing body of research studied nursing profession with respect to the death across wards (Üstükuş & Eskimez, 2021; Kim et al., 2023) and settings (Higashibata et al., 2023). Indeed, even if nurses have to face shared challenges such as lack of organizational resources, patients' health issues and dealing with their families (Della Bella et al., 2022), the degree of those factors in terms of the severity of the disease, time spent with the patient and his family can vary (Higashibata et al., 2023).

II.3.2 Death and dying in critical care nurses

Critical care nurses, both those working in the adult Intensive Care Unit (ICU) and the ones working in the Neonatal Intensive Care Unit (NICU), usually care for patients at high-risk of life and with uncertain conditions. Critical care nurses show higher stress levels as compared to nurses of other wards (Rahmani, Behshid, Zamanzadeh, & Rahmani, 2010; Guntupalli et al. 2014) experiencing high levels of demands and low control in the workplace (Trousselard et al., 2016). Among the most influent stressors in critical care nurses, the literature found problems with dealing patients and their families requests, conflicts with physicians and supervisors, and uncertainty concerning treatment (Saedpanah et al., 2016). Importantly, those stressors may jointly contribute to exacerbate psychological health of critical care nurses.

With regards to the individual characteristics, critical care nurses use more frequently active coping strategy based on problem solving (Fiske, 2018) than other wards (Kostka, Borodziez & Krzemińska, 2021). Problem focused strategies in ICU and flexibility in NICU showed to buffer secondary traumatic syndrome while avoidance and self-blame significantly predicted adverse psychological health outcomes (Al Barmawi et al., 2019; Nissanholtz Gannot et al., 2022) and elevated stress levels (Alharbi & Alshehry, 2019). Furthermore, support from colleagues and supervisors was found to be essential when facing adverse events (Kappes et al., 2024).

Moreover, although there is a known concern to provide palliative care education for all the nurses apart from the working ward (DeVader et al., 2012), there is still a lack of knowledge about this even among the wards that are closer to death and dying patients like acute and critical care wards (Clark, 2007; Hamric et al., 2007) where societal expectation may lead nurses to think that the only goal to achieve is immediate resuscitative and life-preserving treatment (Chan, 2006, Clarke, 2008).

In addition, differences among acute and critical care wards with regards to the death of a patient are relevant and organizationally determined. Indeed, while emergency department nurses' approach with many dying patients within a very short time range, critical care nurses take care of patients from few days to several months. Therefore, critical care nurses spend a lot of time caring for the patients. Further, organizational routine leads to the fact that each nurse has to care for the same patients enhancing emotional bond among nurses, patients and their families.

Nurses working in critical care wards must frequently face death and dying of the patients. In fact, mortality rate in ICU ranges from 10 to 29% (Society of Critical Care Medicine, 2022) while death rates can vary from 4 to 46% in the NICUs of developed countries (Chow et al., 2015).

Both in ICU and NICU setting, nurses recognize their patients' signals of sufferance prior to other health care professionals. Moreover, nurses are the front-line intervention providers and become the reference of the patient's family (Peters et al., 2013). Thus, nurses need to handle their emotional reactions inhibiting them during risky moments for patients' lives as well as the end-of-life stages and death and provide optimal care to patient and emotional support to his family (Granda-Cameron & Houldin, 2012).

Notably, health care guidelines emphasized the importance to provide a good death for those patients. Good death is a concept developed in Western countries defining the features and needs of all the actors of the dying process (Meier et al., 2016). This demand implies to move from preparedness, emotion avoiding and reactivity during the emergency states of the patient to the provision of a holistic and supporting care for dying patients and their families (Costello, 2006; Ellershaw et al., 2010; Watts, 2012). However, death and dying process could exacerbate psychological distress in nurses (Lief et al., 2018) blocking the provision of adequate communication and support to patients and their families during the end-of-life stages (Cevik & Kav, 2013). To study the relationship among death and dying stressors and psychological distress in ICU and NICU nurses, this thesis will present an application of the DRIVE-Nurses Model to the ICU and NICU context (Chapter IX). The aim of the study will be identifying specific factors directly and indirectly influencing psychological health of ICU and NICU nurses to develop evidence-based interventions and tailored educational programmes.

The overview on parental and nursing stress models presented in this chapter highlighted several factors potentially affecting the ability to care for the NICU infants in both parents and nurses. On the contrary, the next chapter will review the diverse models of care developed to promote parental well-being and the essential role of nurses in implementing developmentally sensitive practices for promoting infant and its family well-being.

Chapter III

Models of Care in Neonatal Intensive Care Unit: developments and implications for parents and nurses

III.1 A path towards a holistic vision of care

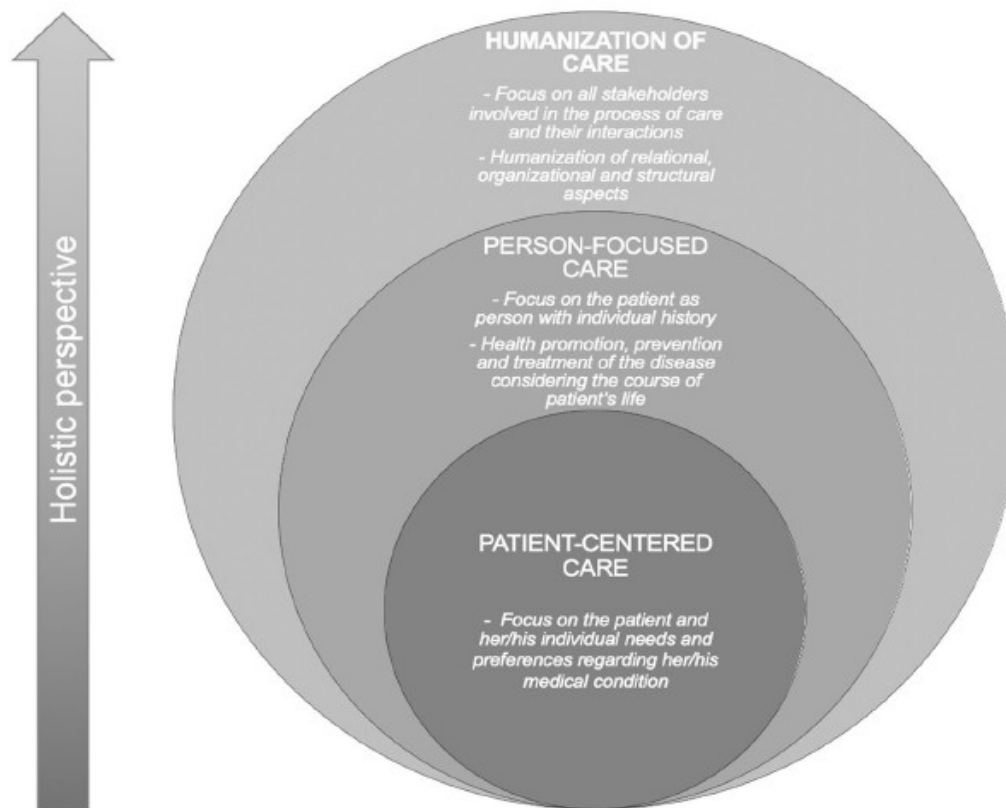
The advancement of technology and of medical procedures in the NICU increased the survival rate of highly sick infants (e.g., infants with hypoxic-ischemic encephalopathy, extremely preterm infants). This improvement in the medical care needed a new theoretical and practical improvement of caring for the emotional needs of both parents and their infants. However, the exclusively use of standardized protocols could lead to disrupt doctor-patient relationship with subsequent lack of trust on the medical aids (Stange, 2009).

Humanization of care is the result of a paradigm shift that moved from the focus on the disease to the focus on the person experiencing the disease (Borbasi et al., 2012). It aimed to care for each individual considering his unique characteristics instead of treating every person having the same disease at the same way (Behruzi et al., 2014).

Specifically, according to a recent conceptualization (Busch et al. 2019), there are different layers (Figure 3) in which humanization of care is situated. The first layer is the Patient-Centered Care. It encompasses the physicians' attitude of showing empathy to the patient, considering his individual values, thoughts and emotions and their interplay with the disease (Balint, 1969). Further, at this layer, patients are directly involved in the decision-making process concerning their disease (Borbasi et al., 2012).

The second layer is the Person-Focused Care (Starfield, 2011). It considers the disease not only in relation with the individual characteristics of the sick person, but also within the specific individual history of the person and the moment of his life in which the disease affects him (Starfield, 2011). Therefore, while Patient-Centered Care is focused on the specific episode in which the patient experiences the disease (Balint, 1969), the Person-Focused Care contextually integrates the specific disease within the life path history of the individual, taking into account the meaning-making of the disease into the person' life (Starfield, 2011).

Figure 3: The development of the care practices moving from the Patient-Centered Care to the Person-Focused Care up to the Humanization of Care. (From Busch et al., 2019).



Following the development of care practices, the humanization of care is the most recent step. It includes the previous mentioned aspects adding patients' caregivers, and the health care systems as actors interacting for the development of new practices to care for patients. At this step, on one hand, the focus is both on the relations among healthcare professionals and among them and the patients and their family. On the other hand, the design of healthcare settings considering both organizational and structural characteristics is essential to create adequate places to care for people (Douglas & Douglas, 2005; Daykin et al., 2008). Overall, humanization of care underpins three principal areas: the Relational area, the Organizational area and the Structural one. While improving those areas require both human and material resources (Cassiano et al., 2015), they can positively promote both patients and the healthcare professionals' satisfaction (Busch et al., 2019). Humanization of care can lead to optimize health outcomes of patients, improving relational skills and work-related well-being in healthcare professionals and making healthy communities (Henry et al., 2012).

In the next paragraph, practices specifically related to the neonatal critical care area will be reviewed. Several models of care and family-based interventions will be illustrated.

III.2 “*Infant does not exist alone*”: the role of parents to care for their infant

The pioneering work of Donald Winnicott (1965) underlined the fully dependency of the infant from his own parents. Historically, the essential role of family to take care for the infant has been demonstrated within hospital settings with scarcity of resources (Levin, 1994).

Later, due to the advance of technologies and medical care practices, the role of family has been put beside (Gooding et al., 2011). While pediatric hospitalization aims to promote physical recovery, it is also an event that can potentially disrupt child psycho-emotional growth leading to regressions or arrest of the development (DeMaso & Snell, 2013; Perrin & Shipman, 2009). In addition, hospitalization may also exacerbate parental mental health affecting the ability to care for their child (Cammarata, Bujoreanu & Wohlheiter, 2020). Given the potential detrimental impact of hospitalization on both children and parents, several studies promoted a shift of paradigm in which to really care for the physical disease of the pediatric patient the healthcare staff needs to care for patient’s individuality and his family members (Lavanco & Romano, 2008).

Importantly, several studies have demonstrated that the integration of parental care improve pediatric patient’s health outcome (Hickson et al., 2006; Renfrew et al., 2009) and parental satisfaction of the healthcare system with positive effects on both child and parental well-being (Çamur & Sarıkaya Karabudak, 2021).

In the last decades, research advances aimed to systematize the findings of the caring sciences (Moreno-Sanz et al., 2024). This effort had multiple objectives. On the one hand, there was a need to integrate the study findings into a conceptual framework in turn to advance the knowledge in the field starting from a theoretically based method (Franck et al., 2015; Frank & O’Brien, 2019). On the other hand, several studies underscored the need to translate research findings into structured care practices (Committee on Hospital Care & Institute for Patient and Family-Centered Care, 2012).

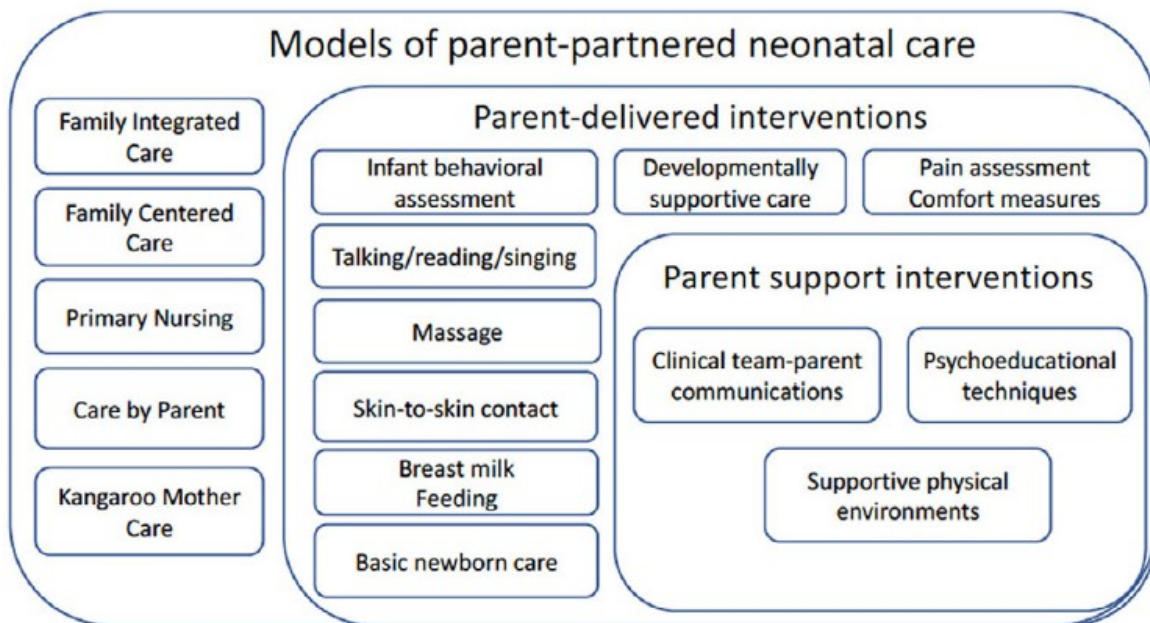
In this context, the next paragraph will examine types of interventions and models of baby and family—care along with their differences and clinical implications in the NICU context.

III.2.1 Principles and models for caring in the NICU

Family-Centered Care (FCC) is a philosophical approach and set of principles to guide the delivery of healthcare for infants and their families (Frank & O'Brien, 2019). FCC aims to improve the clinical outcome and the whole healthcare experience increasing patient and his family participation in the decision-making process, improving psychological well-being, and the care for the specific individual and family needs (Johnson et al., 2008). The first model of care was applied in the NICU in 1978. It was the Kangaroo Mother Care (KMC) in Bogota, Colombia. Initially, KMC was the solution to reduce the rate of infections and provide preterm infants with a warm and safe environment (Whitelaw & Sleath, 1985). One year later, in Tallin, Estonia, KMC was used to compensate the shortage of staff and lack of incubators. Infants were laying down on their mothers' chest and supervised by a nurse, exclusively breastfed and with minimal contact with the NICU staff members (Levin, 1994). Nowadays, KMC is one of the most used models of care worldwide due to its beneficial effects on the neurodevelopmental outcome of preterm infants (Bera et al., 2014; Charpak et al., 2017; Patra et al., 2017).

Frank and O'Brien (2019) conceptualized all the available tools to care for NICU babies and their parents (Figure 4). The authors divided the literature findings into three levels. The first and the second level grouped interventions according to their target (i.e., parents or parent-infant interaction). The third level consider different Models of Care that can include some or all the components of the previous levels of interventions. Each Model of Care describe the essential actors, utilities, NICU physical and organizational structure that are necessary to provide the interventions.

Figure 4: Models of care and types of intervention in the NICU from Franck & O'Brien, 2019.



At the first level, there are the Parent support interventions. In this category, the target of the interventions is exclusively parents. This group includes psychoeducation, counselling, emotional support, improvement of parent-staff communication, and environmental modifications to help parents to cope with the NICU experience letting them to be able to parent their infant. Psychoeducational intervention using Cognitive Behavioural Therapy (Shaw et al., 2013, 2014) and reflective interventions (e.g., expressive writing with diaries; Rabiepoor, Vatankhah-Alamdary & Khalkhali, 2020; Sorrentino et al., 2025) demonstrated to reduce stress, anxiety, depression, and the traumatic symptoms due to the NICU hospitalization (Furuta et al., 2018). Psychoeducational interventions are considered essential to improve parental mental health and lead parents to be actively involved in both caring for their infant and participate with the NICU staff to the decision-making process (Hynan & Hall, 2015). Other interventions at this level aim to improve parental staff communication. Research studies demonstrate the utility of standardized family round meetings, infant's progress chart and messaging to improve parental participation to the decision-making process (Grzyb et al., 2014) and reduce inequalities due to ethnic minority status (Penticuff & Arheart, 2005) and gender (e.g., fathers who cannot daily participate to parent-staff rounds due to work; Fletcher et al., 2025). Another type of intervention included into the parent support interventions is the modification of NICU setting and facilities to accommodate parental needs and promote parents' involvement (Franck et al., 2015). Single family rooms (Vohr et al. 2017), parent overnight accommodation (Franck et al., 2015), especially for those who live far from the ward, and

dedicated in-hospital parent spaces (White et al., 2013) have demonstrated to improve parental experience with improvements of their ability to take care for their infants (Frank & O'Brien, 2019), leading to increased rates of exclusive breastfeeding and reduced incidence of sepsis (van Veenendaal et al., 2019). Importantly, NICU design needs to be tailored as much as possible to the different needs of families living the NICU hospitalization experience (Frank & O'Brien, 2019).

The second level encompasses the parent-delivered interventions that activate parents as the main caretaker of the infant. The target of the interventions is both parents and infants. On the one hand, parents are educated by the nurses to deliver the interventions (e.g., baby massage, reading communicative signals of comfort or pain of their infant). On the other hand, the target of the parental interventions is the infant. The most studied and used methods are Kangaroo Care and Breastfeeding. They showed to provide both short-term effects (i.e., regulating preterm infant's body temperature; create parent-infant bonding, reducing parental psychological distress, providing optimal nutrition for the infant) and long-term effects (i.e., improving infant's neurodevelopmental outcome and the whole hospitalization experience in parents; Puthussery et al., 2018). Specifically, the parent-delivered interventions have multiple positive effects including improvement of the infant's health outcome, reducing parental stress and improve their self-efficacy (Benzies et al., 2013; Evans et al., 2014). Moreover, positive effects on parental mental health have been found up to one year from NICU admission (Athanasopoulou & Fox, 2014; Bera et al., 2014; Holditch-Davis et al., 2014; Sweeney et al., 2017).

The third level is characterized by the parent-partnered model of care. In this case, the target is the whole environment surrounding infant's health (i.e., parents, direct care providers, health system and hospital leaders, and NICU leadership). This level requires a holistic vision of care integrating all the above-mentioned actors specifically trained to deliver the interventions of the previous two levels (Frank & O'Brien, 2019). Several models of care have been designed and studied in the literature.

KMC is the oldest model of care. It aims to reach the almost exclusive infant's care provided by parents. KMC showed strong evidence on positive short-term and long-term infant's neurodevelopmental outcomes, parental mental health, and parent-infant bonding (American Academy of Pediatrics et al., 2016; United States Institute for Kangaroo Care, 2018). Similar models like the Care-by-parent unit are more focused on designing optimal spaces (e.g., single family rooms) to provide parent-delivered interventions (e.g., Kangaroo Care, talking/reading/singing interventions; Joaquim, Calado & Costa, 2024).

Family-Centered Care (FCC) aims to provide a holistic vision of care. FCC focuses on the building of a positive relationship among parents and healthcare professional leading to infant's positive health outcomes and understanding of parental needs (Harrison, 2010). FCC is based on the following principles:

- *Information sharing* with parents of all the updates regarding their infant in an understandable and clear way.
- *Respect and Dignity*: this is a large principle that accounts for the awareness of healthcare professionals regarding the differences among parents and their different cultural and social backgrounds. For instance, ethnic and linguistic minorities need to be provided with additional tools to live their NICU experience and their parental role in the best manner (Trajkovski et al., 2025). Dignity is strictly connected with respect, but its focus is on the relational patterns taking place during NICU hospitalization among parents and their infants (Hutchfield, 1999). NICU staff members should validate parental emotional experience, accepting their roller coaster feelings as due to the characteristics of the NICU hospitalization and not linked to the healthcare professionals (Mäkelä et al., 2018).
- *Participation*: it is one of the core principles of FCC. Involving the parents in caring for their own infant is the goal of this model to improve infant's outcome and parental well-being.
- *Collaboration*: it illustrates the role of parents as active part of the NICU team and their participation in the decision-making process.

Integrating parents into the NICU healthcare team is the core of other models of care. Specifically, the Family-Integrated Care Model (FICare) is based on the active involvement of parents in all the process regarding their infant's care (e.g., from basic caring needs as changing the diaper to the recognition of alarm signals and oral medical therapy administration) mentored by the healthcare professionals (Moreno-Sanz et al., 2024). In addition, FICare includes parents as core team members of the different process of their infant's care. Strong collaboration among parents and healthcare staff is also emphasized in the Primary Care Nursing Model (Bethea, 1985). In this

perspective, the constant presence of the same nurses implied in nursing the infant and listening to parental needs is essential for parental satisfaction of the healthcare system (Franck, McNulty & Alderdice, 2017).

Overall, literature states the effectiveness of KMC in reducing infections and improving both infant and parents' health. Moreover, FICare model is promising to integrate different roles (parents, infants, and healthcare professionals) in designing spaces and procedures to implement the caring of the whole NICU environment (Franck & O'Brien, 2019). In the next paragraph, nurses and other NICU professionals' perspective concerning the Models of Care will be explored. The aim of the paragraph is illustrating benefits and challenges in family-based practices. Opportunities to improve the caring practices will be also presented.

II.3 Family-Centered Care: the perspective of nurses and the other NICU professionals

Family-Centered Care (FCC) is widely recognized to improve care for infants and parents (Gooding et al., 2011). However, several barriers can obstacle the implementation of FCC practices disrupting the passage from parents as present visitors of the NICU to parents as actively engaged in infant care.

Educational and training factors of the healthcare staff include fear of parents' reaction to the preterm infant and parental inability to care for the infant. Specifically, healthcare professionals may believe that parents, who are scared to hurt their infant, completely delegate the care to them because they are not interested in that infant at all (Belkin et al., 2025). However, when healthcare professionals accept this complete care excluding parents, they may reinforce the parental feelings of inadequateness already experienced for giving birth to a sick/preterm baby (Flacking et al., 2016). On the contrary, FCC practices implemented by nurses reduce parental stress (Loutfy et al., 2024) strengthening the parental perception of nurses as supporters to navigate the process of becoming parents and assuring the infant's safety (Reid, Bredemeyer & Chiarella, 2019). On the contrary, relational factors linked to the power imbalance of NICU health care professions over parents and of doctors over other NICU professionals may also obstacle FCC implementation (Mirlashari et al., 2020).

Organizational factors encompass high workload shifts that impede nurses to interact with the parents, lack of leadership in the FCC implementation and unclear policies and unavailability of

spaces to involve parents in the caring practices (Dall'Oglio et al., 2019; Mirlashari et al., 2020). Healthcare systems that do not adopt FCC practices also affect the specific language, rules for the care routines, and work requests completely changing the parental experience of parents (Ramezani et al., 2014).

Social, cultural, and economic differences among families encompass distance from the NICU, problems to handle other children at home, poverty, and previous psychological and reproductive health issues (Belkin et al., 2025; Mirlashari et al., 2020). All those factors can exacerbate parental involvement in caring behaviours and establishing distance among parents and NICU staff when they are not addressed (Hendson et al., 2015).

Those findings underlined the intersection among culture and organizations that do not promote FCC implementation (Coats et al., 2018). Given the growing number of studies confirming the benefits of FCC practices for both infants and parents (Dahan et al., 2023; Guillaume et al; 2013; Franck et al., 2021), healthcare systems need to adaptively organize structures, human resources, and practices according to the cultural context and economic resources to structurally integrate FCC culture (Strine et al., 2025) into the standard of care (Gómez-Cantarino et al., 2020).

Despite the above-mentioned barriers, there are several tools to implement FCC practices into the NICU setting with elevated cost-effectiveness benefits (Griffiths et al., 2019). In this context, nurses play a key role as the staff member who is daily close to the parents and the baby during NICU hospitalization (Coats et al., 2018). They can serve to screen emotional state and coping of parents and refer them to tailored supportive interventions (Meert, Clark & Eggly, 2013). With regards to the infant, nurses can use different caring tools. A growing number of studies (Aita et al., 2021) is supporting the positive effects of the Newborn Individualized Developmental Care and Assessment Program (NIDCAP; Als, 1986) to promote stimulations that are sensitive to the developmental status of each NICU baby.

Moreover, nurses can serve as a model for parents to care for their infant in a developmentally supportive way (Altimier, Kenner & Damus, 2015). On one hand, when nurses teach the signals to read infant's behaviour promote the parent knowledge of a previously perceived unknown baby (Flacking et al., 2012). On the other hand, encouraging parents to talk and read to the baby promote parent-infant attachment and improve the cognitive development of the baby (Braid & Bernstein, 2015; Roué et al., 2017; Sutton & Darmstadt, 2013).

The next chapters will examine different aspects of the NICU hospitalization and after discharge experience. Although moving from different theoretical backgrounds (i.e., the Transactional Model

of Stress and Coping, the Systemic Transactional Model, Patient Perspective framework, the Biopsychosocial model, the Demands Resources, and Individual Effects Model), all the studies will aim to examine the parental and nurses' experience of caring for infants in the NICU setting across cultural, financial, somatic, and psychological dimensions. All the studies will be connected from the common objective of improving the baby and family-based care practices.

Part 2:

**Risks and resources linked to parental stress during NICU
hospitalization**

Chapter IV

NICU-Related Stress and Psychophysical Health Conditions in Parents During their Infant Stay: The Role of Individual and Dyadic Coping Strategies

IV. Introduction

One in eight babies born each year will be needing special care of the Neonatal Intensive Care Unit (NICU; Royal College of Paediatrics and Child Health, National Neonatal Audit Programme, 2017). They are at high risk of mortality, accounting for approximately 15% of all neonates globally (WHO, 2020).

Parents having an infant admitted to Neonatal Intensive Care Unit (NICU) usually experience high levels of stress, depression, and anxiety than parents of healthy full-term infants (Shatty et al., 2024) even up to one year after NICU discharge (Salomè et al., 2022). Many studies promote the involvement of both mothers and fathers to care for their infant during NICU hospitalization (Moreno-Sanz et al., 2024). This means specifically understanding and addressing their needs within a family-centred care perspective that gives value to the way they live the NICU experience both individually and as a family system (Almalki, Gildea, & Boyle, 2025).

According to the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984), stressors' threat is firstly evaluated (i.e., primary appraisal) and secondly approached using the available individual coping strategies (i.e., secondary appraisal).

Based on this model, coping strategies, defined as the individual resources used to face the stressors, mediate the dynamic transaction among life stressors and health outcomes (Lazarus & Folkman, 1984). The most part of the literature divide coping strategies into problem-focused (i.e., actions to practically reduce the threat of the stressor) and emotion-focused strategies (i.e., self-regulation techniques to reduce the emotional burden; Folkman & Lazarus, 1980). However, some authors (Carver et al., 1998) enlarged this view considering a broad array of individual coping strategies and their cognitive, behavioural, and emotional correlates interacting with the stressors. Importantly, a simplistic approach that divide coping strategies into macro categories may fail to capture the complexity and simultaneous activity of coping strategies (Connor-Smith et al., 20). Therefore, it is important to study the specific role of the different individual coping strategies and the external factors rising in the specific context in which individual face stressors (Carver & Connor-Smith, 2010).

Individual Coping Strategies and Gender differences among mothers and fathers of NICU infants

Within the NICU context, avoidance was found to increase psychological distress (Reichman, Miller, Gordon, & Hendricks-Munoz, 2000), whereas problem-solving and cognitive reframing were associated with more positive outcomes (Roque et al., 2017; Lasheras et al., 2020). Spiritual or secular coping, the way in which people trust to religion or to an existential perspective to overcome stressful events, has been found to do not play an active role on family adjustment during NICU hospitalization (Brelsford et al., 2016). However, its role on the psychophysical health conditions of parents of NICU infants needs further investigation (Brelsford et al., 2016).

Moreover, a growing number of studies investigated the different use of individual coping strategies in mothers and fathers during NICU hospitalization of their own infant (Roque et al., 2017). Specifically, mothers reported to use a wider variety of coping strategies than fathers (Pinelli, 1998). Seeking social support, turning to religion and emotion-focused strategies are more frequent in mothers as compared to fathers (Doering, Dracup, & Moser, 1999; Aftyka et al., 2017).

Dyadic coping

In the last decades, scientific literature shifted from studying the individual stress response to examine the way in which couples face stressors together (Bodenmann, 1995; Lyons et al., 1998). In fact, several studies started to examine dyadic coping, that is an umbrella term to define the strategies adopted by an individual and his/her own partner to face a stressor that could be proper of one of the partners (Bodenmann, 2005; Weißflog et al., 2016) or directly include both of them (Van Schoors et al., 2019; Felnhofer et al. 2023).

In particular, the Systemic Transactional model is a comprehensive approach that examines the process of each partner to react to a stressor as an attempt to establish a new homeostatic equilibrium within the couple system after a stressful perturbation (Bodenmann, 1995). Furthermore, the Systemic Transactional model theorizes the experience of coping with a stressor as a shared experience among the members of the couple (“*we experience*” “*we stress*”; Bodenmann et al., 2016). The Systemic Transactional model considers a wide range of dyadic coping strategies on three different levels:

- Self-perception (i.e., the way in which the individual copes within the couple);
- Other perception (i.e., the way in which the individual perceives their own partner coping style within the couple);

- Common dyadic coping (i.e., the coping style shared among the partners of the couple).

Among the stressors that a couple might face during the life, the one linked to the illness of their own offspring is one of the most influenced by the child's developmental stage and illness severity (Körner et al., 2013; García-López et al., 2016). However, there is a lack of quantitative studies investigating the specific role played by dyadic coping strategies in parents of NICU infants.

In this perspective, individual factors (i.e., individual coping strategies), situational factors (i.e., NICU stressors) and relational factors (i.e., dyadic coping) might interact with each other to determine health outcomes (Carver & Connor-Smith, 2010; Falcionier & Khun, 2019).

However, there is a lack of quantitative studies investigating the specific role played by individual and dyadic coping strategies and their interplay with NICU-related Stress and Psychophysical Health of parents during their infant's stay.

IV.2 Objectives

The primary aim of this study was examining gender differences in NICU-related Stress, Psychophysical health conditions (i.e., Anxiety, Depression, and Somatization) individual and dyadic coping strategies among mothers and fathers during NICU hospitalization of their own infant.

According to the above-mentioned scientific literature we tested the following hypothesis:

Hypothesis One (H1): Mothers will experience higher levels of NICU-related Stress than fathers.

Hypothesis Two (H2): Mothers will experience higher levels of Anxiety, Depression and Somatization as compared to fathers. Parents of NICU infants will experience higher rates of Anxiety, Depression, and Somatization than parents of healthy full-term infants early after birth and 6-9 months after.

Hypothesis Three (H3): Mothers will use more individual coping strategies than fathers

Hypothesis Four (H4): NICU-related Stress will increase Anxiety, Depression and Somatization scores in parents.

Moreover, due to the sparse nature of the literature on individual coping strategies and the lack of studies on the dyadic coping strategies in parents of NICU infants, and based on the situation-

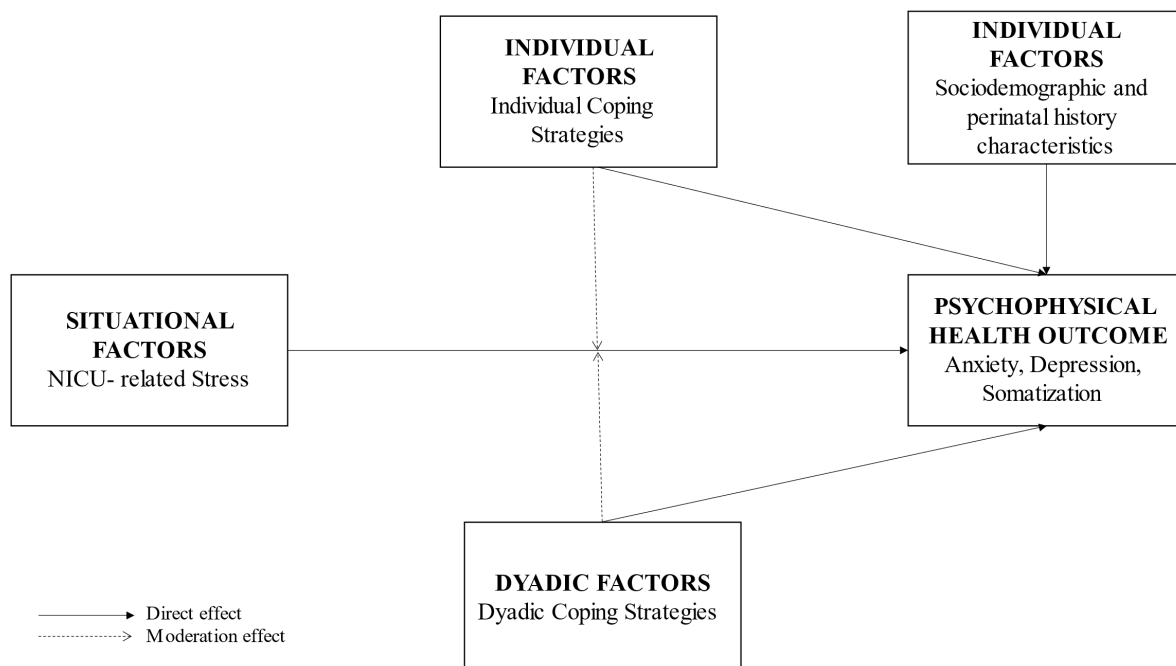
specific role played by coping strategies (Lazarus & Folkman, 1984; Folkman, & Moskowitz, 2004), this study aimed to explore the following research questions:

Research question One (RQ1): Do self-and-other perception of dyadic coping strategies are different in mothers than fathers (i.e., interindividual level) and within both mothers and fathers (i.e., intraindividual level)?

Research question Two (RQ2): Will sociodemographic, individual, and dyadic coping strategies play a direct role on Anxiety, Depression, and Somatization scores in parents? (Figure 5).

Research question Three (RQ3): Will individual and dyadic coping strategies moderate the relationship among NICU-related stress and Anxiety, Depression and Somatization in parents.

Figure 5. Theoretical hierarchical framework of individual and situational predicting factors of psychophysical health outcomes in parent of NICU infants.



IV.3. Methods: Sampling and Procedures

The study was approved by the Ethics Committee for the Psychological Research of the University of Naples Federico II (protocol number: 42/2023). Both mothers and fathers were asked to fill out questionnaires during the hospitalization of their infant from September 2023 to July 2024. Inclusion criteria: 1) Parents having their infant hospitalized for ≥ 7 days in the NICU; 2) being available; 3) Infant was medically stable at least in feeding or breathing parameters. Exclusion criteria: 1) Having an infant medically unstable or who was going to do not survive according to physicians' opinion; 2) Being unavailable; 3) Lack of proficiency in Italian written form.

IV.3.1 Measurement Tools

A *sociodemographic survey* was used to collect parental gender, age, education level and previous pregnancy loss.

Parental Stressor Scale: Neonatal Intensive Care (PSS:NICU; Miles, Funk & Carlson, 1993; Montirosso et al., 2012) is composed of 26 items and divided into 3 subscales: Sights & Sounds, Infant Look and Behaviour, and Parental Role Alterations. Parents had to rate each item on a 5-point Likert scale ranging from 1 (not at all stressful) to 5 (extremely stressful) according to their stress at time of administration. An overall stress score is computed from the three subscales, and it ranges from 0 to 5. According to the guidelines of the questionnaire, we calculated the above-mentioned scales according to the Stress Occurrence Level (SOL) that highlight the lived parental experience (Miles, Funk & Carlson, 1993). Due to the absence of a cut-off score, a score of ≥ 3 as moderate stress based on previous studies was used (Lazzerini et al., 2024; Barcala et al., 2025). For the regression analysis it was used the overall stress score as a general index of stress experience (i.e., NICU-related stress). In the present study, Cronbach's α and McDonald's ω were computed for all the subscales and for the total scale, and they ranged from .796 to .935 and from .805 to .935 respectively.

The *Coping Orientation to Problem Experienced-New Italian Version* (COPE-NIV; Sica et al., 2008), which consists of 60 items on a 5-point Likert scale ranging from one ("I usually don't do this at all") to four ("I usually do this a lot") divided into five subscales: Seeking Social Support (12 items assessing coping strategies centred on seeking social support for instrumental reasons, seeking social support for emotional reasons, and focusing on and venting of emotions; validation mean value: 27.7); Avoiding (16 items assessing coping strategies centred on denial, humour,

alcohol and drug disengagement, behavioural disengagement and mental disengagement; validation mean value: 23.5); Positive Attitude (12 items assessing coping strategies centred on acceptance, positive reinterpretation and restraint coping; validation mean value: 30.9); Problem Solving (12 items assessing coping strategies centred on suppression of competing activities, planning and active coping; validation mean value: 32); Turning to Religion (8 items assessing coping strategies centred on seeking comfort found in religious and spiritual practices; validation mean value: 22.7). In the present study, Cronbach's α and McDonald's ω were computed and ranged from .738 to .844 and from .714 to .838 respectively.

Dyadic Coping Questionnaire (DCQ; Bodenmann, 2000; Donato et al., 2009) measures dyadic coping behaviours through 41 items on a Likert-type 5-point scale ranging from "never" to "very often." In particular, 39 items are related to six different styles of dyadic coping: stress communication (8 items), emotion focused (6 items), problem-focused (4 items), delegated (4 items), negative (10 items), and common (7 items) while the last two items evaluate satisfaction and efficacy for dyadic coping. The scores of the negative coping items must be reversed, so the higher the score of this subscale, the lower is the use of hostile, ambivalent or superficial strategies by the partner (Donato et al., 2009). The mean of all positive and reversely coded negative items reveals the partners' perceived total dyadic coping skills. The higher the score, the more the partners feel they are jointly managing the stressful situation. The subscales related to stress communication, emotion-focused, problem-focused, delegated, and negative dyadic coping consider both self-perception (i.e., one's own dyadic coping) and other perception (i.e., partner's dyadic coping). Considering both self- and other-perception allows a comparison between partners' perceptions and an investigation of the balance between the support provided and received by partners, both at an intra-individual and an interpersonal level (Donato et al., 2009). The reliability of each subscale computed using Cronbach's α and McDonald's ω ranged from .722 to .887 and from .708 to .823 respectively.

The *Symptom Checklist 90 Revised* (SCL-90-R; Derogatis, 1977; Prunas et al., 2012) is a self-report questionnaire consisting of 90 items referring to the psychological symptoms experienced the previous week. It includes nine primary symptomatic dimensions: (1) somatization; (2) obsessive compulsive; (3) interpersonal sensitivity; (4) depression; (5) anxiety; (6) hostility; (7) phobic anxiety; (8) paranoid ideation; (9) psychoticism. For this study only the most experienced symptomatology by parents of NICU infants according to the literature were examined by using both mean scores and clinical cut-off values: Anxiety ($\alpha=.875$, $\omega=.877$; Cut-off male = 0.91, Cut-

off female = 1.31), Depression ($\alpha=.912$, $\omega=.914$; Cut-off male = 1.08, Cut-off female = 1.62) and Somatization ($\alpha=.902$, $\omega=.902$; Cut-off male = 1.09, Cut-off female = 1.67).

IV.3.2 Data Analyses

All the statistical analyses were carried out by using the Statistical Package for the Social Sciences (SPSS; Version 29). Data normal distribution was established evaluating Skewness (range -2-to-+2) and Kurtosis (-7-to-+7) (Hair et al., 2010; Ryu, 2011). To test H1, H2, H3 and RQ1, study variables were computed and mean scores and frequency/percentages among mothers and fathers were compared respectively using t-test (for continuous variables) and Chi-square test (for categorical or dichotomous variables, the latter split into low and high levels by using the cut-off/normative values reported in the Italian validation studies of each measurement tool reported in the Measurement Tool section). Cohen's d and Cramer's V were used to measure effect sizes. Due to the relatively small size of the sample, the Bonferroni–Holm correction method was used to adjust the p -values ($\alpha = 0.05$), to reduce the risk of Type I error. A comparison was also drawn between NICU-parents and parents of healthy-full term infants (control group) to explore potential differences in their psychophysical health conditions (Depression, Anxiety, Somatization) both at T1 (within the first month after delivery) and at T2 (6 month after delivery). Preliminary two-tails correlations were computed using Spearman's rank coefficient to test relationships among sociodemographic variables, individual coping strategies, dyadic coping strategies, NICU-related Stress, Anxiety, Depression and Somatization. Hierarchical regression analysis was run to test the contribution of individual, relational (i.e., Individual, and dyadic coping strategies; RQ2), and situational (i.e., NICU-related stress; H4) factors on psychophysical health outcomes (Figure 5). PROCESS macro 4.2 for SPSS (Hayes, 2022) was used to test the moderating role of individual and dyadic coping strategies in the relationship among NICU-related stress and psychophysical health conditions (RQ3).

IV.4 Results

Preliminary, all the study variables were tested and resulted normally distributed.

Sociodemographic characteristics of the final sample stratified by gender are displayed in Table 1.

Table 1. Sociodemographic characteristics of the final sample stratified by gender.

		Mothers (N=58)	Fathers (N=46)	<i>Adjusted p-Values^a</i>
Age Mean (SD)		33.7(5.3)	36.1(6.0)	.024*
Education level N(%)				.460
Primary school		1 (1.7)	3 (6.5)	
Middle school		9 (15.5)	5 (10.8)	
High school		19 (32.7)	20 (43.4)	
University		27 (46.5)	16 (34.7)	
Missing		1 (1.7)	1 (2.1)	
Employed N(%)	Yes	40(68.9)	44 (95.6)	.002**
	No	18 (31.1)	1 (2.2)	
	Missing	0 (0)	1 (2.2)	
Previous pregnancy loss N(%)	Yes	19 (32.7)	15 (32.6)	.938
	No	39 (67.3)	31 (67.4)	

^a Adjusted p-values calculated via Holm–Bonferroni correction method. Statistically significant values (* $p < 0.05$. ** $p < 0.01$) are highlighted in bold.

Regarding NICU-related stress and psychophysical health conditions, mothers scored higher in Parental Role Alterations than fathers ($t_{(101)} = 3.207$, Cohen's $D = .637$, $p < .01$), Anxiety ($t_{(95)} = 2.646$, Cohen's $D = .500$, $p < .01$), Depression ($t_{(99)} = 3.193$, Cohen's $D = .637$, $p < .01$) and Somatization ($t_{(95)} = 3.069$, Cohen's $D = .580$, $p < .05$). NICU-related stress levels and anxiety, depression and somatization are displayed in Table 2. Mothers reported both higher mean scores and prevalence of clinically significant levels of Parental Role Alterations as compared to fathers ($\chi^2 = 8.059$, Cramer's $V = .280$, $p < .05$). Mothers scored above the clinical cut-off ranging from 26.3% for Somatization to 33.3% for Anxiety, while fathers scored above the clinical cut-off score ranging from 17.4% for Somatization to 26.1% for Anxiety. Any other significant difference in clinical cut-off was not found (Table 2). With respect to the comparison between NICU-parents and parents of healthy-full term infants (control group) to explore potential differences in their psychophysical health conditions (Depression, Anxiety, Somatization) both at T1 (within the first month after delivery) and at T2 (6 month after delivery), data revealed that parents of NICU infants experienced higher levels of Anxiety, Depression, and Somatization as compared to parents of healthy full-term infants at T1 (Please, see Table 1A in Appendix). However, this difference was not statistically significant at T2, namely 6 months after birth (Please, see Table 2A in Appendix).

Table 2. Mean scores and cut-off levels of psychophysical health conditions and NICU-related stress dimensions.

	Mothers (N=58)	Fathers (N=46)	Adjusted <i>p</i>-values^a	Women cut-off score	Men cut-off score	Adjusted <i>p</i>-values^a
<i>NICU-related Stress</i>	Mean (SD)	Mean (SD)		N (%)	N (%)	
Sights and Sounds	2.60(.85)	2.73(1.12)	.768	21(36.2%)	20(44.4%)	1.00
Infant Look and Behaviour	2.93(1.22)	2.79(1.25)	.768	32(55.1%)	21(46.6)	1.00
Parental Role Alterations	4.02(.93)	3.37(1.13)	.004**	51(87.9%)	29(64.4%)	.020*
NICU Stress total	2.91(.88)	2.74(1.06)	.768	28(48.27%)	18(40.0%)	1.00
<i>Psychophysical health conditions</i>						
Anxiety	1.07(.89)	.68(.55)	.005**	19(33.3%)	12(26.1%)	.792
Depression	1.20(.91)	.70(.65)	.003**	18(31.6%)	10(21.7%)	.792
Somatization	1.11(.94)	.64(.59)	.003**	15(26.3%)	8(17.4%)	.792

^a Adjusted *p*-values calculated via Holm–Bonferroni correction method. Statistically significant values (* $p < 0.05$.

** $p < 0.01$) are highlighted in bold.

Mothers reported to use more individual coping strategies related to Turning to religion ($t_{(102)} = 2.540$, Cohen's $D = .5015$, $p < .05$; Table 3) than fathers. Considering the mean cut-off values of the Italian validation of the COPE-NVI, more than the half of both mothers and fathers use strategies based on seeking social support (mothers= 72.4%, fathers= 52.2%), positive attitude (mothers=62.1%, fathers=58.7%), and turning to religion (mothers=79.3%, fathers=69.6%) than the validation population. On the contrary, less than the half of our sample used strategies based on problem solving (mothers=48.3%, fathers=43.5%), and avoiding (mothers=41.4%, fathers=39.1%).

With regard to the dyadic coping strategies, mothers reported higher self-perceived stress communication scores than fathers ($t_{(102)} = 3.065$, Cohen's $D = .6051$, $p < .01$; Table 4).

Table 3. Mean differences among mothers and fathers in individual coping strategies.

	Mothers (N=58)	Fathers (N=46)	
<i>Individual Coping Strategies</i>	Mean (SD)	Mean (SD)	Adjusted <i>p</i>-values^a
Seeking Social Support	31.1 (7.55)	28.8 (6.03)	.220
Avoiding	23.9 (5.89)	23.7 (7.54)	1.00
Positive Attitude	32.8 (5.54)	32.4 (5.64)	1.00
Problem Focused	32.2 (6.59)	32.0 (5.68)	.436
Turning to Religion	26.6 (4.59)	24.4 (3.96)	.036*
Individual Coping total score	146.6 (17.18)	141.3 (17.67)	.248

^a Adjusted *p*-values calculated via Holm–Bonferroni correction method. Statistically significant values (* $p < 0.05$.) are highlighted in bold.

Table 4. Differences among mothers and fathers dyadic coping strategies.

	Mothers (N=57)	Fathers (N=46)	
<i>Dyadic Coping Strategies</i>	Mean (SD)	Mean (SD)	Adjusted <i>p</i>-values^a
Total score	165.82 (18.41)	160.24 (20.58)	.075
Common Dyadic Coping	24.64(3.75)	24.32(4.06)	.691
<i>Self-perception</i>			
Stress Communication	15.41 (3.17)	13.48 (3.24)	.005**
Emotion-focused support	13.09 (1.70)	12.76 (2.09)	.498
Problem-focused support	8.14 (1.33)	7.87 (1.48)	.498
Delegated	7.42 (1.61)	7.26 (1.84)	.498
Negative	23.28 (2.80)	24.00 (3.90)	.252
<i>Other perception</i>			
Stress Communication	13.95 (3.26)	14.89 (3.25)	1.00
Emotion-focused support	12.53 (2.74)	12.59 (2.83)	1.00
Problem-focused support	8.14 (1.83)	7.65 (1.78)	.264
Delegated	7.74 (1.86)	7.02 (1.89)	.140
Negative	23.26 (2.56)	22.11 (3.87)	.140

^a Adjusted *p*-values calculated via Holm–Bonferroni correction method. Statistically significant values (** $p < 0.01$) are highlighted in bold.

Intraindividual level analysis

Self-perception of stress communication was higher than the other perception of stress communication ($t_{(56)}=2.685$, Cohen's $D = .356$, $p < .05$) in mothers. Differently, fathers reported higher other perception stress communication as compared to self-perception stress communication strategies ($t_{(45)} = -2.460$, Cohen's $D = -.363$, $p < .05$ Table 5).

Table 5. Mean differences among self-and-other perception dyadic coping strategies in mothers and fathers.

	Mothers (N=57)		Adjusted <i>p-values</i> ^a	Fathers (N=46)		Adjusted <i>p-values</i> ^a
	<i>Self- perception</i> Mean (SD)	<i>Other- perception</i> Mean (SD)		<i>Self- perception</i> Mean (SD)	<i>Other- perception</i> Mean (SD)	
Stress Communication	15.36 (3.17)	13.94 (3.26)	.040*	13.47 (3.24)	14.89 (3.25)	.045*
Emotion-focused support	13.09 (1.7)	12.52 (2.73)	.082	12.76 (2.09)	12.58 (2.83)	.298
Problem-focused support	8.14 (1.33)	8.14 (1.83)	1.00	7.87 (1.48)	7.65 (1.77)	.213
Delegated	7.42 (1.61)	7.73 (1.85)	.157	7.26 (1.84)	7.02 (1.89)	.227
Negative	23.28 (2.80)	23.26 (2.56)	.961	22.26 (.575)	22.11 (3.86)	.365

^a Adjusted *p-values* calculated via Holm–Bonferroni correction method. Statistically significant values (* $p < 0.05$.) are highlighted in bold.

Correlation analysis among the study variables is reported in Table 3A in the Appendix.

Regression analysis

With respect to the final predictive models for Depression, Anxiety, and Somatization among NICU partners (Table 6), they accounted for 57% of the variance in Depression, for 56% of the variance in Anxiety, and for 46 % of variance in Somatization.

For all the three models, a statistically significant amount of the variance was predicted by individual coping strategies (28% for Depression, 23% for Anxiety, and 17% for Somatization, respectively), followed by total NICU-stress (13% for Depression, 17% for Anxiety, and 13% for Somatization, respectively). A non-significant amount of the variance was predicted by socio-demographic characteristics and perinatal history (8% for Depression, 7% for Anxiety, and 7% for Somatization, respectively), as well as by dyadic coping strategies self-perception (0.2% for Depression, 0.6% for Anxiety, and 2% for Somatization, respectively), by dyadic coping strategies other-perception (5% for Depression, 5% for Anxiety, and 3% for Somatization, respectively), and by dyadic common coping strategies (0.5% for Depression, 0.5% for Anxiety, and 0.2% for Somatization, respectively), as well by the dyadic coping perceived functioning (1% for Depression, 3% for Anxiety, and 4% for Somatization, respectively). Notwithstanding the non-statistically significant increase in the variance after including individual coping strategies, the

inclusion, in each step, of all the dimensions related to dyadic coping strategy still increased the overall explained variance.

The final predictive model for Depression, Anxiety and Somatization included being mother, perceived total NICU Stress, and recurring to Avoiding coping strategy, as risk factors, and recurring to Positive Attitude, as protective factor.

Table 6. Hierarchical multiple regression analyses predicting Depression, Anxiety and Somatization in parents of NICU infants (N = 102).

Predictor variables	Depression				Anxiety				Somatization			
	ΔR^2	R^2	F	β	ΔR^2	R^2	F	B	ΔR^2	R^2	F	B
Step 1- Socio-demographics and perinatal history	.087	.087	1.737		.071	.071	1.39		.074	.074	1.456	
Gender				-.295*				-.277**				-.249*
Age				.066				.126				-.027
Education level				.015				-.017				.026
Employment status				-.002				.085				-.025
Previous pregnancy loss				-.050				-.040				-.025
Step 2- NICU-related Stress	.127**	.214	14.518**		.167**	.238	19.76*		.131**	.205	14.804**	
Total NICU Stress				.372**				.372**				.378**
Step 3- Individual Coping Strategies	.284**	.497	9.590**		.232**	.470	7.43**		.170**	.375	4.618*	
Seeking social support				.060				.138				.122
Avoiding				.460**				.413**				.363**
Positive attitude				-.326**				-.286**				-.254*
Problem Focused				.066				.110				.063
Turning to religion				-.154				-.075				.057
Step 4- Dyadic Coping Strategies Self-perception	.002	.500	.068		.006	.476	.20		.016	.390	.409	
Stress Communication				-.030				-.009				-.008
Emotion-focused support				.023				.041				.079
Problem-focused support				-.006				-.099				-.106
Delegated				-.040				-.024				-.067
Negation				.023				.022				.094
Step 5- Dyadic Coping Strategies Other	.053	.553	.124		.051	.528	1.63		.030	.420	.770	

perception											
Stress											
Communication											
Emotion- focused support											
Problem- focused support											
Delegated											
Negation											
Step 6- Common Dyadic Coping Strategies	.005	.558	.380		.005	.533	.81		.002	.422	.243
Common Dyadic Coping											
Step 7- Dyadic Coping perceived functioning	.010	.567	.453		.027	.560	2.18		.038	.460	2.541
Efficacy											
Satisfaction											

* $p < .05$; *** $p < .001$

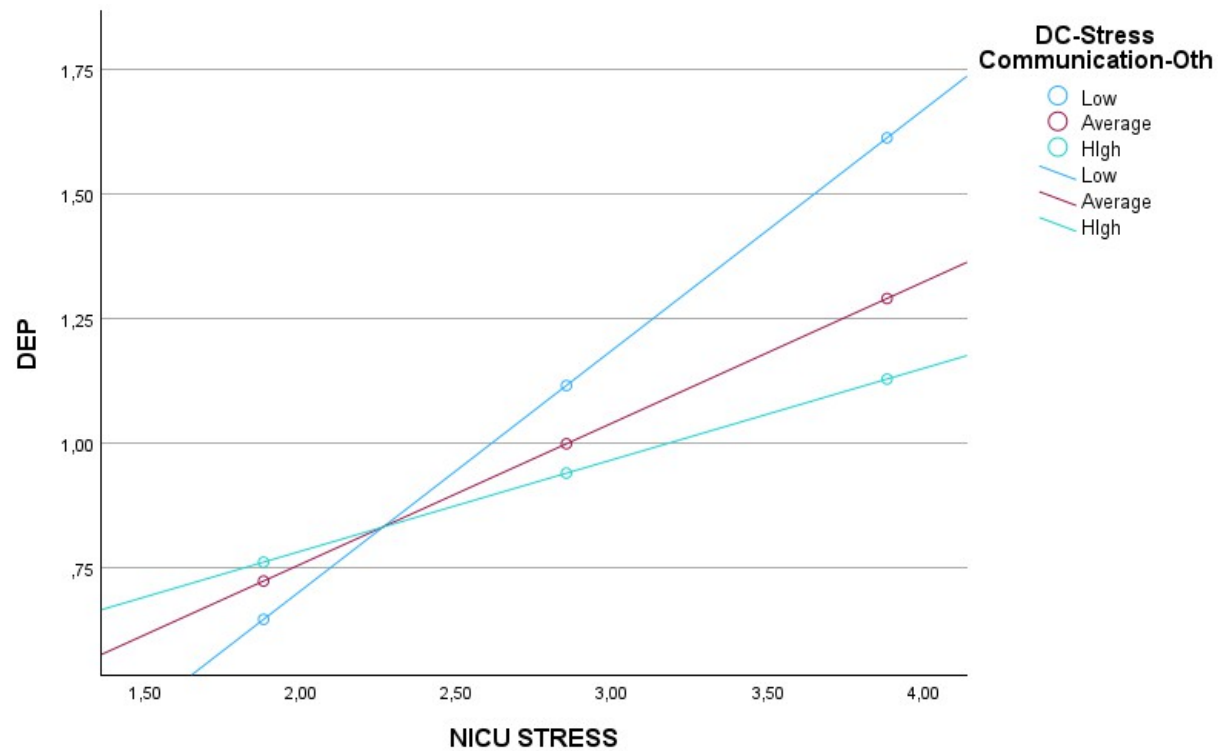
Moderation analysis

With respect to Depression, after controlling for gender, the detrimental effect of NICU Stress (Figure 6) was buffered by the other perception of Stress communication ($\Delta R^2 = .034$, $t = -2.075$, $\beta = -.050$, $SE = .024$, $CI: [-.098, -.002]$, $p = .041$), Emotion-focused support ($\Delta R^2 = .034$, $t = -2.105$, $\beta = -.064$, $SE = .030$, $CI: [-.124, -.004]$, $p = .038$; Figure 7), Problem-focused support ($\Delta R^2 = .058$, $t = -2.782$, $\beta = -.134$, $SE = .048$, $CI: [-.229, -.038]$, $p = .006$; Figure 8), Delegated ($\Delta R^2 = .031$, $t = -2.023$, $\beta = -.092$, $SE = .046$, $CI: [-.183, -.002]$, $p = .046$; Figure 9) and the overall Efficacy perception of the dyadic coping functioning ($\Delta R^2 = .050$, $t = -2.285$, $\beta = -.246$, $SE = .094$, $CI: [-.433, -.060]$, $p = .010$; Figure 10).

Efficacy of the dyadic coping functioning ($\Delta R^2 = .030$, $t = -2.071$, $\beta = -.178$, $SE = .086$, $CI: [-.349, -.007]$, $p = .041$; Figure 11) and Delegated-other perception ($\Delta R^2 = .030$, $t = -2.027$, $\beta = -.084$, $SE = .042$, $CI: [-.167, -.002]$, $p = .045$) buffered the effect of NICU Stress on Anxiety.

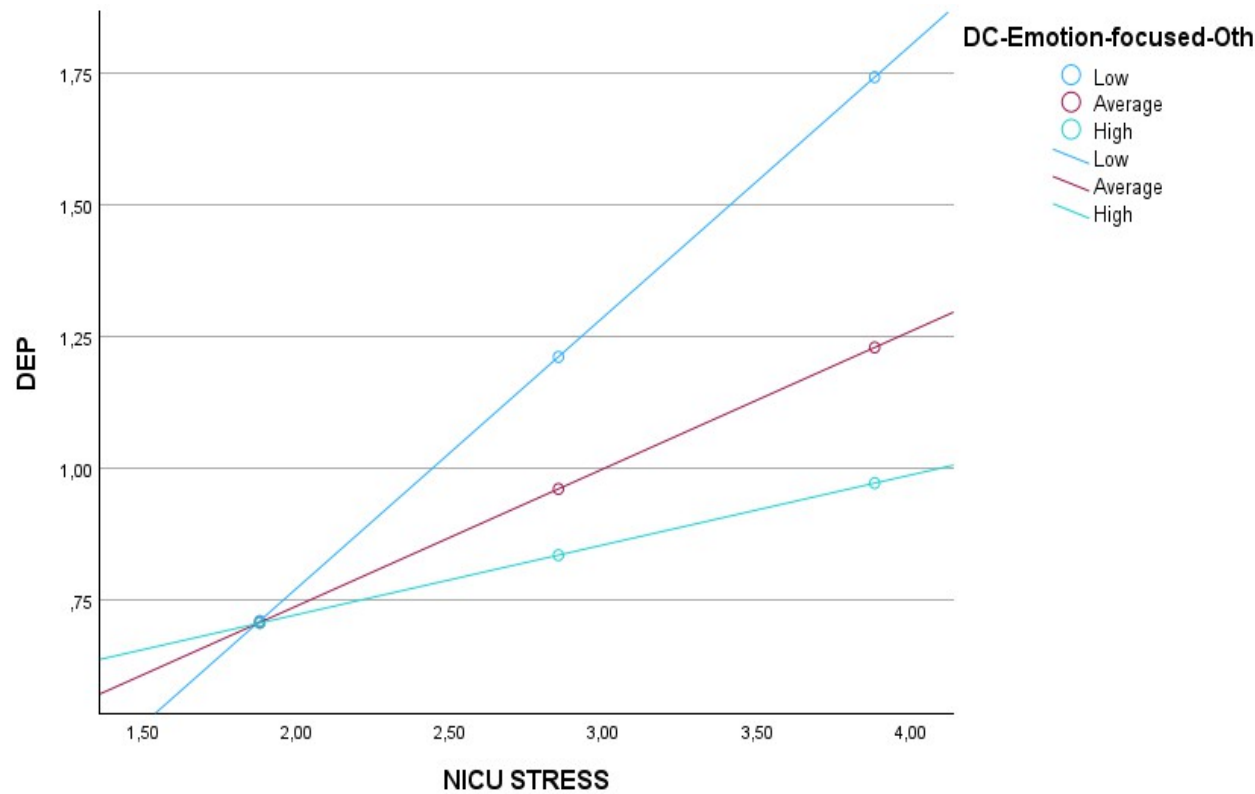
Efficacy perception of the dyadic coping functioning moderated the relationship among NICU Stress and Somatization ($\Delta R^2 = .041$, $t = -2.293$, $\beta = -.220$, $SE = .094$, $CI: [-.411, -.030]$, $p = .024$; Figure 12).

Figure 6. Moderation slopes of Stress Communication-Other perception effect on the relationship between NICU Stress and Depression.



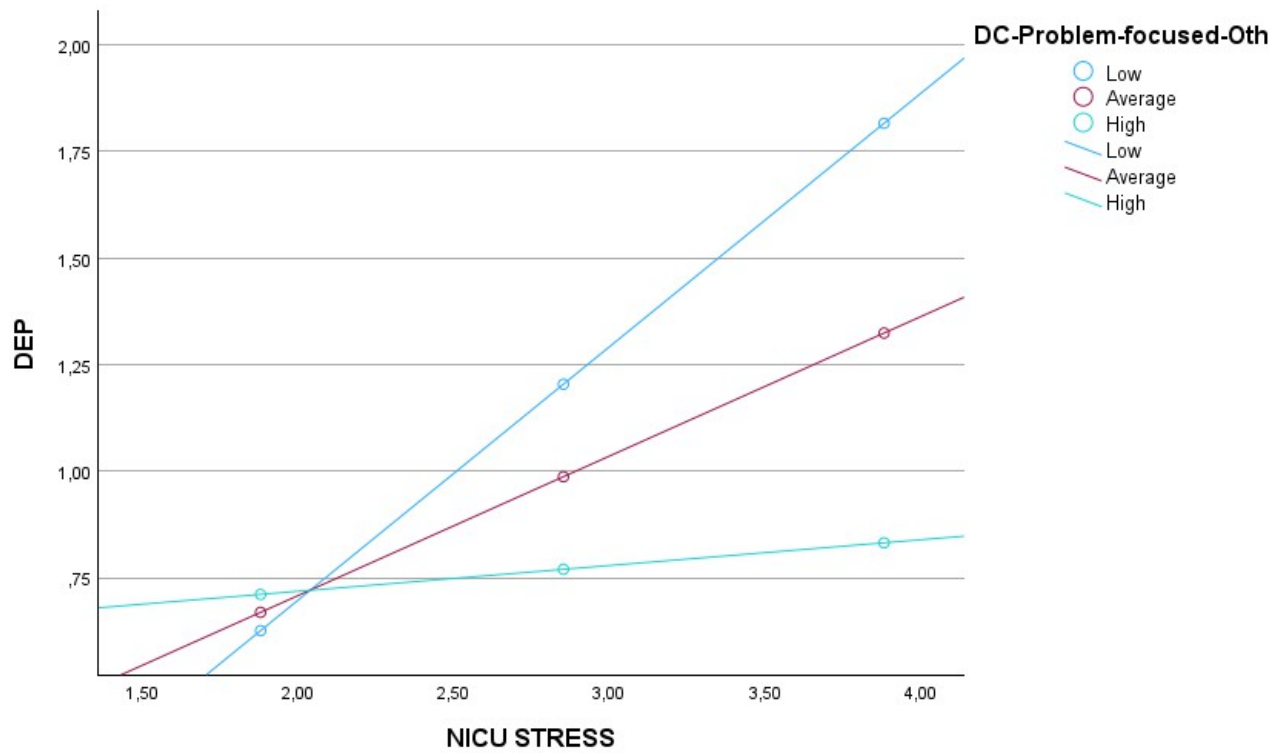
Note: DEP= Depression; DC=Dyadic Coping; Oth= Other perception.

Figure 7. Moderation slopes of Emotion Focused-Other perception effect on the relationship between NICU Stress and Depression.



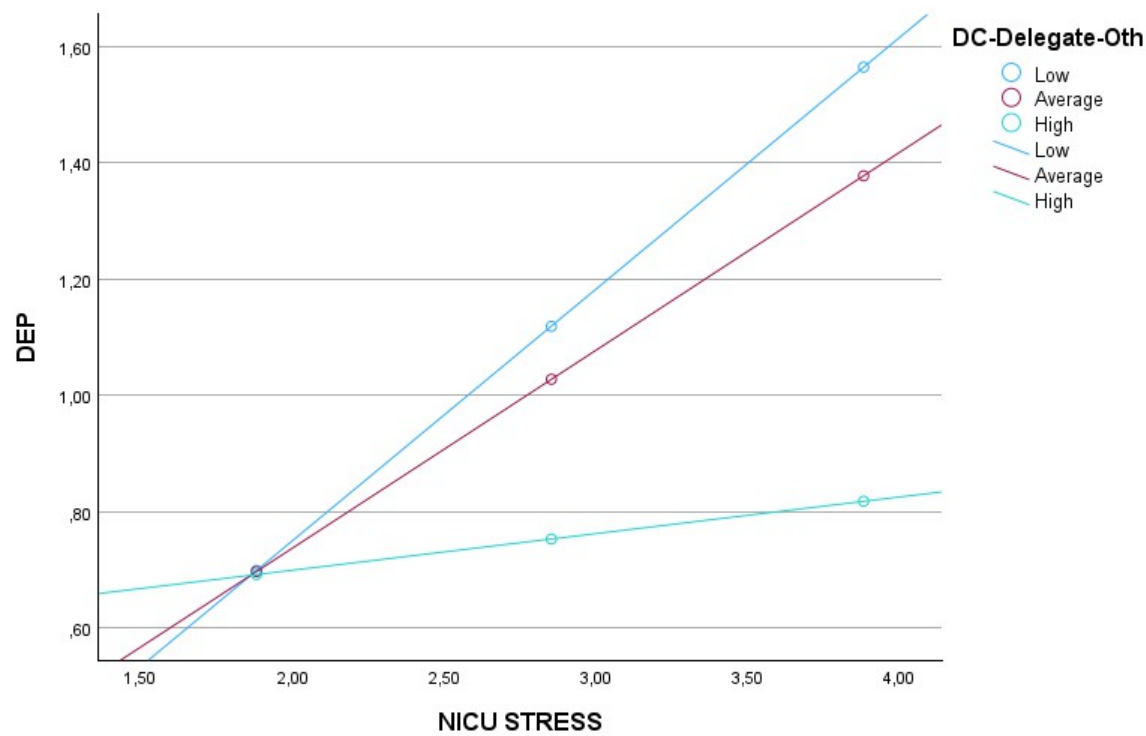
Note: DEP= Depression; DC=Dyadic Coping; Oth= Other perception.

Figure 8. Moderation slopes of Problem Focused-Other perception effect on the relationship between NICU Stress and Depression.



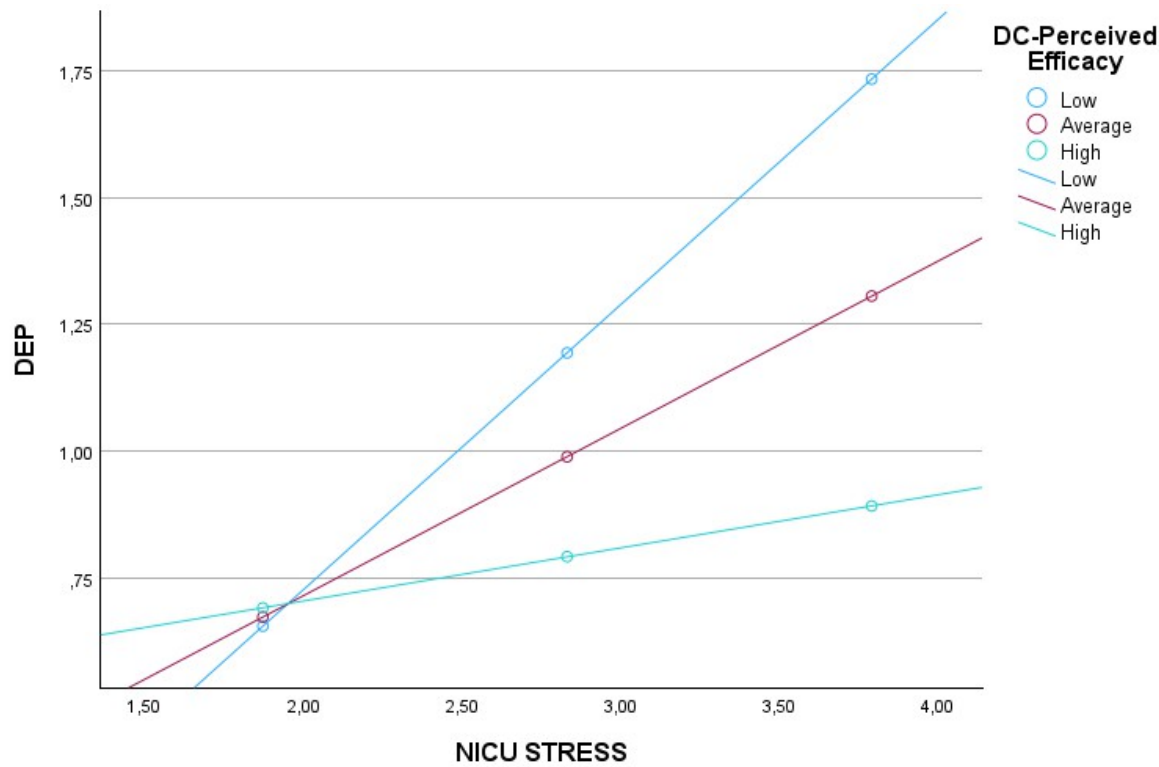
Note: DEP= Depression; DC=Dyadic Coping; Oth= Other perception.

Figure 9. Moderation slopes of Delegate-Other perception effect on the relationship between NICU Stress and Depression.



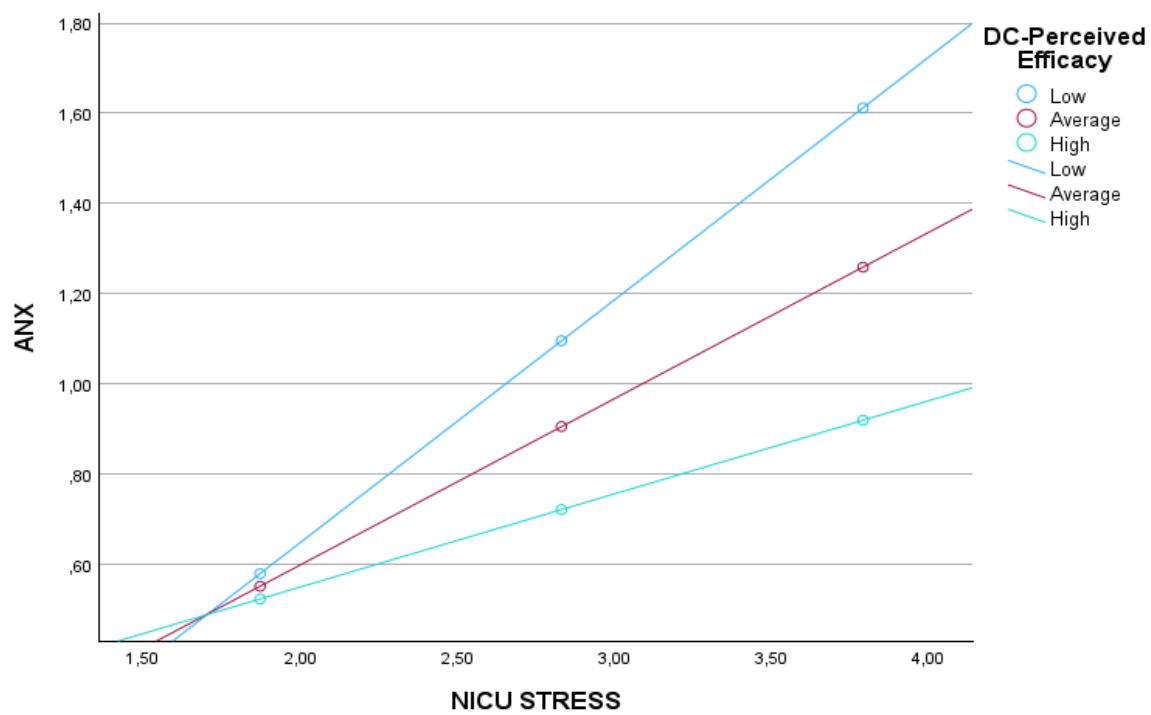
Note: DEP= Depression; DC=Dyadic Coping; Oth= Other perception.

Figure 10. Moderation slopes of Dyadic Coping Perceived efficacy effect on the relationship between NICU Stress and Depression.



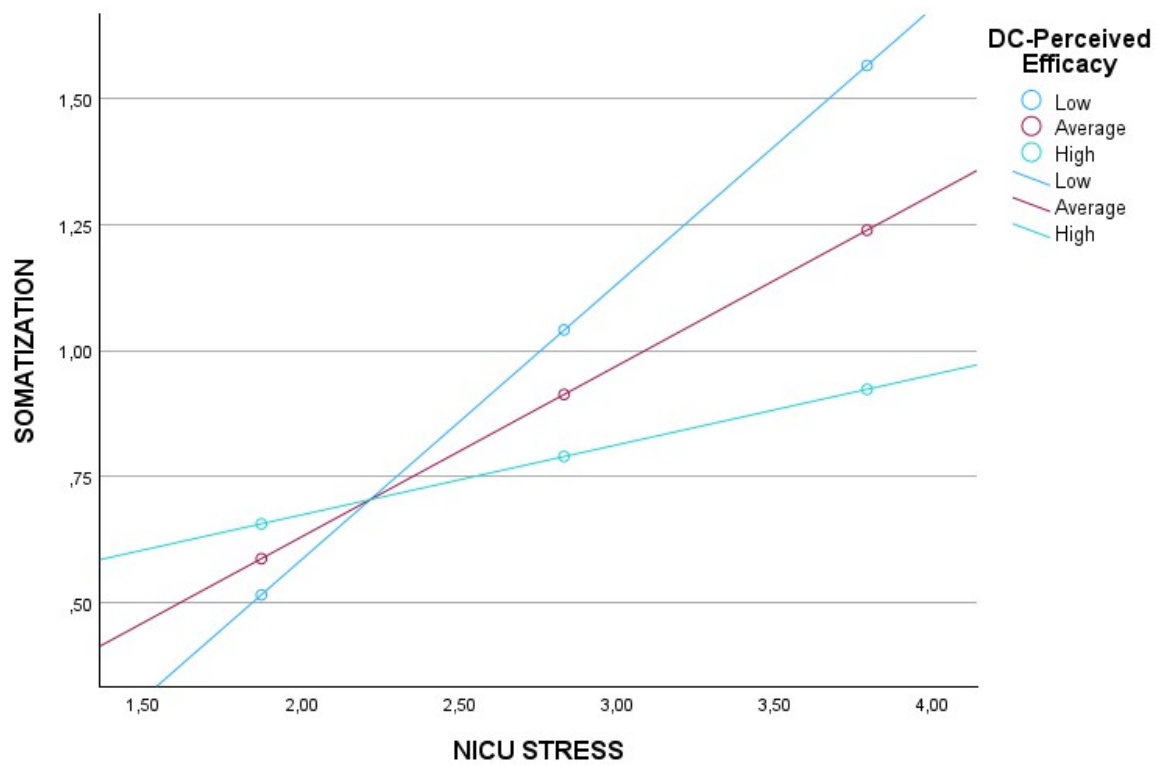
Note: DEP= Depression; DC=Dyadic Coping.

Figure 11. Moderation slopes of Dyadic Coping Perceived Efficacy effect between NICU Stress and Anxiety.



Note: ANX= Anxiety; DC=Dyadic Coping.

Figure 12. Moderation slopes of Dyadic Coping Perceived Efficacy effect between NICU Stress and Somatization.



Note: SOM= Somatization; DC=Dyadic Coping.

IV.5 Summary, discussion, and implications

Our study confirms that Parental Role Alterations is the most prominent stressor experienced in both mothers and fathers (Baia et al., 2016). However, our findings did not confirm mothers scoring higher than fathers in the other two subscales of the PSSS: NICU. This result is contrast with the most part of the literature (Ionio et al., 2019; Kawafha et al., 2025). Other studies failed to find differences in parental stress among mothers and fathers in any subscale of the PSS: NICU (Pichler-Stachl et al., 2019) while some studies only found differences in Parental role Alterations subscale (Matricardi et al., 2013). This result could be due to the fact that the fathers of our sample might be highly involved in infant care leading them to experience high levels of stress (Noergaard et al., 2019). Regarding psychophysical health conditions, mothers reported higher scores than fathers in Anxiety, Depression and Somatization. This finding is in line with the literature that widely states the higher psychological burden in mothers as compared to fathers (Salomè et al., 2022; Lazzarini et al., 2024; Barcala et al., 2025). Overall, our findings may underline common perception of the NICU environment as stressful meanwhile psychophysical health dimensions differ across gender due to factors related to culture, gender roles, pregnancy-related issues and the healthcare system (Noergaard et al., 2017; Cislighi & Heise, 2020).

The findings of this study highlighted that mothers and fathers use considerably higher proportion of individual coping strategies than the general population. Specifically, Turning to Religion was the most used coping strategy in both mothers and fathers whereas problem-solving was less used.

This could be because NICU hospitalization is a period full of uncertainty where the active role of parents in promoting infant well-being is not immediately understood and sometimes underrated due to low use of Family-Centered Care practices (Kokorelias et al., 2019). Therefore, parents may put, especially in the first period during the hospitalization, all their efforts towards religion as the unique way to genuinely help their own infant. However, due to the frequent changes in infant's health status during the hospitalization (Mäkelä et al., 2018), positive religious coping might turn into negative emotions with respect to religion due to its perceived lack of effectiveness. Helping parents to reinterpret their role as active members in nurturing the infant is essential to promote its neurodevelopment (Pineda et al., 2018).

Further, while maternal coping was more focused on seeking social support, fathers adopted more frequently a Positive attitude-based strategy. Notably, Avoidance was the less used strategy to cope with NICU stressful situation. Our results are in line with the literature that reports mothers using a

wide range of coping strategies, in particular emotion-focused strategies than fathers (i.e., seeking social support; Roque et al., 2017).

Although there are few possibilities to actively work on the stressful situation, our results newly indicated that Positive attitude strategies could play a beneficial role across psychophysical health conditions of Anxiety, Depression and Somatization. The wide part of the literature recognizes the protective role of positive attitude strategies to reduce psychological distress (Zurlo, Cattaneo Della Volta, Vallone, 2019; Easterlin et al., 2020; Obispo et al., 2023) and improve life satisfaction (Zięba et al., 2022). Positive attitude involves cognitively reframe the meaning of the stressful situation without directly changing it (Sica et al., 2008). Importantly, promoting meaning making processes, particularly with the Acceptance and Commitment Therapy (ACT; Esser et al., 2020) and narrative diaries (Sorrentino et al., 2025) could improve parental experience during NICU stay.

On the other hand, Avoidance coping strategy exacerbated all the psychophysical health outcomes considered. This is in line with the literature that acknowledges the detrimental role of avoiding coping strategies on other health outcomes such as PTSD (Shaw et al., 2016) and in other population (Holahan et al., 2005; Yu & Sherman, 2015; Shaw et al., 2016; Zurlo, Cattaneo Della Volta & Vallone, 2019). Importantly, improving parental acceptance of the stressful situation tuning them with the present moment using mindfulness-based techniques adapted to the NICU setting (Landry et al., 20223; Arasteh et al., 2025) are promising to improve parental care skills and the bonding with their own infant while reducing psychological distress (Ginsberg et al., 2023).

With regards to dyadic coping, our results highlighted that fathers play an important role in supporting mothers stressful times. However, those differences in stress communication strategies may underline that paternal needs related to the opportunity to communicate their own negative feelings to their partner and perceive their own needs and feelings as acceptable. Informing couples on the potential emotional states lived by both mothers and fathers during their infant stay in the NICU could increase the chances for parents to accepts their negative emotions and share them with their partner (Shaw et al., 2006) leading to live NICU stay as a “we experience” challenge (Bodenmann et al., 2016).

We newly demonstrated that dyadic coping, in particular the perception of their own partner, play a moderating role on the relationship among NICU-related Stress and psychophysical health outcomes of both mothers and fathers during NICU hospitalization.

Having a partner that is able to provide both emotional support and different perspectives of the problem and handling with tasks that are of their own partner while demonstrating that he/she is

living the same emotional rollercoaster (Stacey, Osborn & Salkovskis, 2015) is useful to reduce depressive symptoms and avoid feelings of helplessness.

Providing psychoeducation to both partners since the beginning about their shared emotions and roles as an active team (Moreno-Sanz et al., 2025) while helping them to practically organize their new daily routine and their roles could improve their couple functioning.

The importance of the dyadic coping is also underlined by the protective role of the Perceived efficacy of being able to cope with stressful events as a couple against Anxiety, Depression and Somatization during NICU hospitalization.

Among the strengths of our study there is a wide examination of both individual and dyadic coping strategies and their role on psychophysical health conditions of both mothers and fathers of NICU infants. Among the limitations we acknowledge the relatively small sample size. Future studies could investigate infant medical factors potentially changing the role of individual and dyadic coping strategies in mothers and fathers during NICU hospitalization.

Our findings demonstrated that NICU hospitalization of an infant is a stressful event that include parents both as individual and as couple members. Considering both these dimensions is important in order to help parents to cope with NICU setting and promote their psychophysical health.

Promoting individual acceptance of the situation and positively reframing parental thoughts on the NICU stressful experience educating them in tuning with their own infant can improve psychophysical health conditions. From an interpersonal point of view, improving the perceived efficacy of navigating NICU emotional experience together, being aware of their own partner feelings, and both provide and receive support from their partner improve psychophysical health conditions in both mothers and fathers. Considering both individual and interpersonal level is important to understand parental functioning and look for strategies to help them to cope with NICU hospitalization of their own infant.

Chapter V

NICU Stress and Social Support in Parenting Very Preterm Infants: a comparison study among Italy and Portugal

V.1 Introduction

Preterm birth is one of the leading causes of neonatal death across Europe (Blencowe et al., 2013). Prevalence of lived birth is stated at 7.3% varying across European countries from 5.2–5.9% to 8.2–10.4% (Zeitlin et al., 2019) due to both differences in healthcare systems (Delnord, Blondel & Zeitlin, 2015) and socioeconomic factors (Kayode, et al., 2024). Among preterm births, very preterm infants (VPT; infants who were born <32 gestational weeks) are at enhanced risk of life and long-lasting developmental sequelae (Pascal et al., 2018). VPT infant prevalence ranges from 0.8 to 1.2 in Europe (Europeristat project 2015-2019, 2020) with a wide variety across countries. Even when VPT infant prevalence is similar, like in the case between Italy and Portugal (0.9 vs. 1.0 of live births respectively; Delnord et al., 2017), less is known about the parental care practices.

In fact, VPT infants will need admission to Neonatal Intensive Care Unit (NICU) disrupting the typical process of parent-infant closeness after birth (Flacking et al., 2012). Following NICU hospitalization, both mothers and fathers usually experience high levels of stress (Baía et al., 2016; Salomè et al., 2022) with potential disruptions of their parental role (Matricardi et al., 2013; Kawafha et al., 2025). A wide range of Family-Centered Care (FCC) practices are adopted from NICU staff members to formally support parents and improve their adaptation to the NICU setting (Franck & O'Brien, 2019).

FCC also emphasized the role of unformal social support to help parents to cope with the NICU hospitalization (Aliabadi et al., 2014; Flacking et al. 2022). Unformal social support includes both emotional and instrumental support provided by their personal system of relationships (i.e., family, friends and significant other; Finfgeld-Connett, 2005; Rossman, Greene & Meier, 2015).

Research on social support system for parents of NICU infants alternatively focused on significant others (e.g., peers, spouses; Amorim et al., 2019; Kestler-Peleg et al., 2020) and family and friends (Erbaba & Pinar, 2021; Frisman et al., 2012; Hagen et al., 2019) underlying their importance in providing both emotional and practical help (e.g., caring for another child, providing financial aids; Lambiase et al., 2024). However, there is a paucity of studies evaluating the relationship of those three sources of support with parental NICU-related stressors during the hospitalization (Younge et

al., 2023) within a holistic and culturally sensitive perspective of the family in their relational context (Flacking et al., 2022).

Person-Centered approaches are a group of statistical methods able to stratify samples into homogenous profiles or classes according to the variables of interest (Collins & Lanza, 2008). Specifically, multigroup latent class analysis is a method that leads to determine classes starting from a pre-defined grouping variable (e.g., gender, nationality). Firstly, this method permits to identify different classes that are homogenous within them. Secondly, multigroup latent class analysis provides prevalence for each class according both the whole sample and for each sample according to the pre-defined grouping variable. Finally, multigroup latent class analysis tests the assumption of measurement invariance that is particularly useful to establish the validity of the emerged classes across the groups (Kim et al., 2022).

V.2 Objectives

Therefore, the primary aim of this study was, combining NICU-related stressors and sources of social support, to identify classes of risks and resources with respect to the NICU experience of parents of VPT infants in both Italy and Portugal. Secondary aim was to test whether the classes found are culturally shared in both Italian and Portuguese parents. Finally, we tested the role of sociodemographic factors to influence class membership.

V.3. Methods: Sampling and Procedure

This is a cross-sectional and cross-comparison study gaining data from two research projects about Parenting within the NICU setting, conducted in Portugal (between 1st July 2013 and 30th June 2014; Alves et al., 2014) and in Italy (from June 2023 to August 2024) in 8 III level NICUs (Portugal = 7; Italy = 1). The two research studies were respectively approved by the Portuguese Data Protection Authority, the Ethics Committee for the Psychological Research of the University of Naples Federico II, and the Ethics Committees of all Hospitals where the studies were performed. The research was carried out in accordance with the Declaration of Helsinki and written informed consent was obtained from all participants.

Based on the convenience sampling method, parents of VPT infants hospitalized in NICU in the Northern Health region of Portugal and in a Southern region of Italy were invited to fill out standardized questionnaires with paper and pencil or using an online platform (Google form)

according to their preference, between the third and the fourth week after birth. All the questionnaires were completed by mothers and fathers separately in a silent and bright dedicated room, while a research psychologist (Italy) or a trained interviewer (Portugal) was present.

Inclusion criteria to participate were I) Being a parent of a VPT infant hospitalized in the NICU at the time of data collection; II) Parents aged ≥ 18 years old; III) Understanding Portuguese or Italian written form fluently; IV) Being emotional available at the time of data collection. Exclusion criteria were I) Parents whose infants were not hospitalized in NICU at the time of data collection, due to discharge, transfer to another hospital or dead; II) Parents of infant with congenital diseases or parents of infants who were not likely to survive according to physician's opinion; III) Parents who were not present in NICU during the baby's hospitalization period.

Among the eligible participants, 122 Portuguese families (N= 211, parents; response rate: 98.6%) and 55 Italian families (N= 92 parents; response rate: 88.5%) completed the questionnaires and were included in the analysis.

V.3.1 Measurement Tools

Sociodemographic information: Gender (mothers vs. fathers), age (years), and having at least one other child were collected. Education level was harmonized among the two educational systems of the two countries and dichotomized as $\leq 12 / > 12$ years of education. Occupational status was classified according to the Portuguese Classification of Occupation (PCO) and the Italian classification of occupation from the Italian Institute of Statistics (ISTAT). Urban area was classified according to the Degree of Urbanization approach (Eurostat and DG for Regional and Urban Policy – ILO, FAO, OECD, UN-Habitat, World Bank) calculating density of inhabitants per km².

The Degree of Urbanization identifies three types of settlements:

1. Cities, which have a population of at least 50,000 inhabitants in contiguous dense grid cells ($>1,500$ inhabitants per km²).
2. Towns and semi-dense areas, which have a population of at least 5,000 inhabitants in contiguous grid cells with a density of at least 300 inhabitants per km².
3. Rural areas, which consist mostly of low-density grid cells (<300 inhabitants per km²).

Length from NICU (kms), duration of trip from home to the NICU (minutes) were also calculated using Google maps.

The Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU; Miles et al., 1993) encompasses 26 items divided into 3 subscales: Sights & Sounds (SISO; Portuguese sample $\alpha=.750$; Italian sample $\alpha=.810$, Infant Look and Behaviour (IBA; Portuguese sample $\alpha=.927$; Italian sample $\alpha=.919$) and Parental Role Alterations (PRA; Portuguese sample $\alpha=.854$; Italian sample $\alpha=.880$). Plus, an overall stress item evaluates the general experience of parents. Parents must rate each item on a 5-point Likert scale ranging from 1 (not at all stressful) to 5 (extremely stressful) according to their stress at time of administration. Parents can also rate with 0 (not applicable) those items that are not related their own experience during NICU hospitalization. An overall stress score is computed from the three subscales ranging from 1 to 5. As our focus of interest was related to potential cultural differences in the parenting experience among countries, we used the Stress Occurrence Level (SOL) calculated including only experienced items (Miles et al., 1993).

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1990) is a 12-item questionnaire on a Likert scale ranging from 1 (completely disagree) to 7 (completely agree). It is designed to measure the perceived social support from three sources: Family (Portuguese sample $\alpha=.905$; Italian sample $\alpha=.950$), Friends (Portuguese sample $\alpha=.960$; Italian sample $\alpha=.942$), Significant Other (Portuguese sample $\alpha=.819$; Italian sample $\alpha=.930$).

V.3.2 Data Analyses

First, given the presence of some missing values, we applied Little's Missing Completely At Random (MCAR) test (Little, 1988) to assess whether the pattern of missingness was completely unrelated to the variables under study. A non-significant result ($p > .05$) in this test indicates that the data are missing completely at random. In our case, the test was non-significant ($\chi^2 = 37.668$, $df = 26$, $p = .06$), suggesting that the missing data can be considered random. This result allowed to handle missing values using Full Information Maximum Likelihood (FIML) estimation (Enders & Bandalos, 2001). Sample normality and preliminary descriptive analysis (i.e., means, standard deviations, percentages) were run. Bivariate correlations were computed among the variables of interest. We used SPSS v.29 for the above-mentioned analysis.

In accordance with the original development of the PSS:NICU (Miles & Frunk, 1985) and the Portuguese (Souza, Dupas & Bailero, 2012) and the Italian validations (Montirosso et al., 2012), we used the Bartlett's test of sphericity and the *lavaan* package (Rosseel et al., 2023) of the jamovi

software v.2.6 (The jamovi project, 2024) to run Principal Component Analysis (PCA) using Oblimin rotation both in the Portuguese and the Italian sample. Further, Bartlett test for sphericity was used to test the equal variance of the population.

Multigroup Latent Class Analysis (MLCA) was carried out using the glca package (Kim & Chun, 2021; Seol, 2025) of jamovi software v.2.6 (The jamovi project, 2024). NICU stressors and social support sources were turned into 4 quartiles corresponding to 25th, 50th, 75th and 100th quartile of the sample distribution for interpretation. Specifically, perception of stress and social support were classified as 1 (25th quartile) = low, 2 (50th quartile) = medium/low, 3 (75th quartile) = medium/high and 4 (100th quartile) = high. The stepwise approach (Nylund, Asparouhov & Muthén; 2007) was used to select the number of classes that fits our data in the best way, starting from two classes and going ahead. Due to the sparse nature of our data, we used the Bayesian information criterion (BIC; Geiser, Lehmann & Eid, 2006) and the Entropy score $> .80$ to define the best fitting data model its measurement invariance between the two groups (Collins & Lanza, 2009).

Multinomial Logistic Regression analysis was used to test the associations among the sociodemographic variables and the membership to the emerged classes.

V.4 Results

Three-hundred three parents (51 mothers and 41 fathers from Italy; 120 mothers and 91 fathers from Portugal) were included in the study. Descriptive statistics are displayed in Table 7. Significant correlations among social support sources ranged from .481 (between Family and Significant other subscales) to .526 (between Friends and Significant Other subscale) and from .496 (between SISO and PRA) to .612 (between IBA and PRA). No correlations among any social support sources and NICU stressors were found ($p > .05$).

Principal Component Analysis confirmed the original three-factor structure (Appendix) with similar explained variance across groups: Italian sample = 57% (Bartlett test: $\chi^2=1546$, $df=325$, $p<.001$), Portuguese sample= 54.9% (Bartlett test: $\chi^2=3157$, $df=325$, $p<.001$).

Table 7. Descriptive statistics of sociodemographic and perinatal data of the whole sample and stratified by Country

	Total sample (N=303)		Portuguese sample (N=211)		Italian sample (N=92)	
	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)
Gender						
Female	171 (56.4)		120 (56.9)		51 (55.4)	
Male	132 (43.6)		91 (43.1)		41 (44.6)	
Missing	0		0		0	
Age		32.8 (5.65)		32.14		34.23 (6.01)**
Missing		0		(5.37) 0		0
Education level						
>12	117 (38.6)		79 (37.4)		38 (41.3)	
≤12	186 (61.4)		132 (62.6)		54 (58.7)	
Missing	0		0		0	
Occupational status	240 (79.2)		166 (78.7)		74 (80.4)	
Employed	63 (20.8)		45 (21.3)		18 (19.6)	
Not employed	0		0		0	
Missing						
Job category						
Upper white collar	113 (43.0)		81 (38.4)		32 (34.8)	
Lower white collar	73 (27.8)		57 (27.0)		16 (17.4)	
Blue collar	77 (29.3)		53 (25.1)		24 (26.1)	
Missing	0		20		0	
Previous children						
Yes	108 (35.6)		57 (27.0)		51 (55.4)	
No	195 (64.4)		154 (73.0)		41 (44.6)	
Missing	0		0		0	
Previous abortion						
Yes	89 (29.4)		57 (27.0)		32 (34.8)	
No	214 (70.6)		165 (73.0)		60 (65.2)	
Missing	0		0		0	
Distance from the NICU (kms)		24.4 (26.37)		21.72		27.85
Missing		88		(27.16) 87		(24.70)** 1
Distance from the NICU (mins)		27.94 (22.11)		19.79		39.04
Missing		88		(17.76) 87		(24.69)** 1
Predominantly Urban area						
Yes	154 (50.8)		110 (52.1)		44 (47.8)	
No	61 (20.1)		14 (11.3)		47 (51.1)	
Missing	88 (29.1)		87 (41.2)		1 (1.1)	
Extreme preterm delivery ^a						
Yes	80 (26.4)		45 (21.3)		35 (38.0)	

No	223 (73.6)	166 (78.7)	57 (62.0)
Missing	0 (0.0)	0 (0.0)	0 (0.0)
Extremely low birthweight ^b			
Yes	94 (31.0)	63 (29.9)	31 (33.7)
No	209 (69.0)	148 (70.1)	61 (66.3)
Missing	0 (0.0)	0 (0.0)	0 (0.0)

* $p < .05$; ** $p < .001$; a <28 gestational weeks; b <1000 g.

The 3-class model provided the best fit for the data (Table 8). In fact, this model had the lowest BIC scores and the highest Entropy score. More than the 5% of the subjects were present in each class both considering the total sample (Figure 13) and across countries (Figure 14).

The BIC index in the model that accepts the measurement invariance (BIC= 3404) was better than the one in the model that does not accept measurement invariance between groups (BIC=3593).

Table 8. Model fit indices for number of class solutions.

Class	Log-likelihood	AIC	CAIC	BIC	Entropy	df	G ²
2	-1608	3291	3470	3432	0.766	264	846
3	-1536	3189	3462	3404	0.822	244	703
4	-1501	3158	3525	3447	0.791	224	632

Figure 13. Class prevalence for the whole sample.

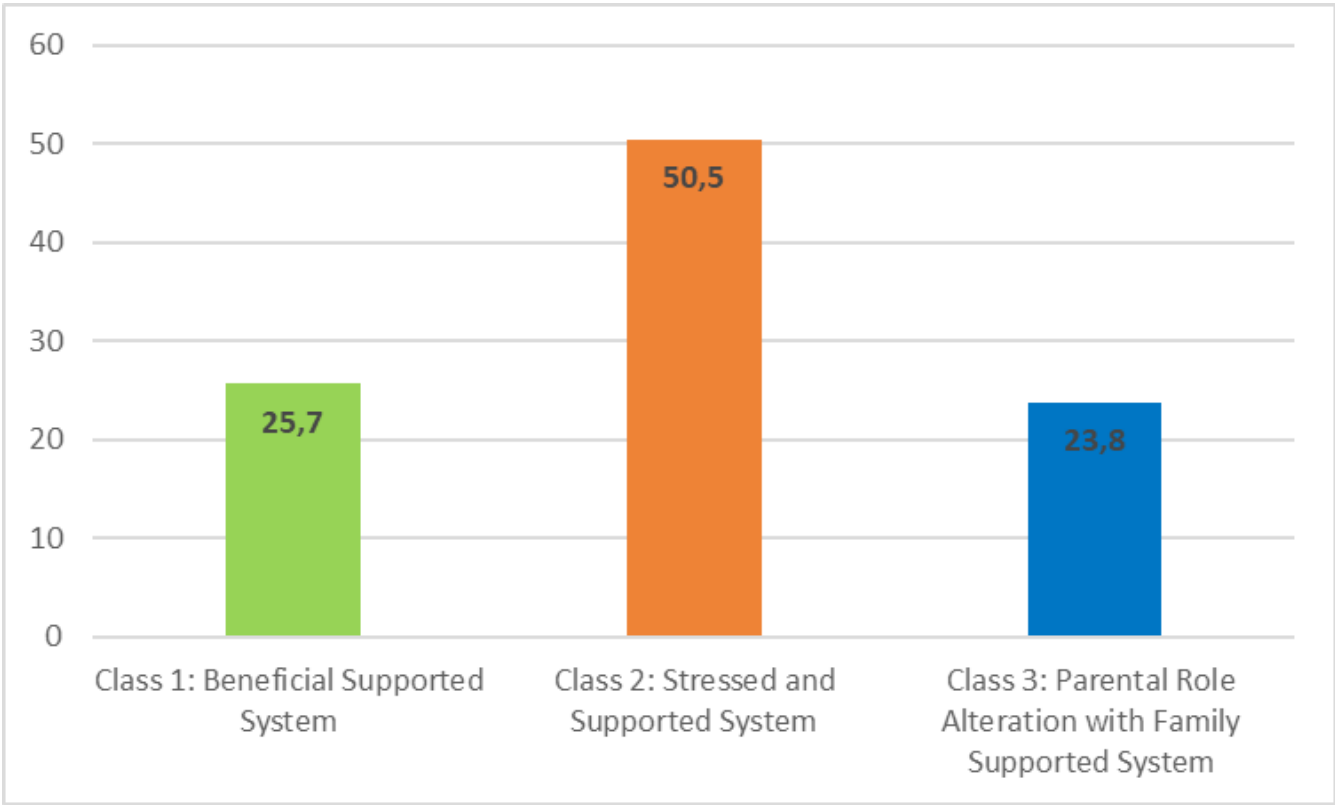
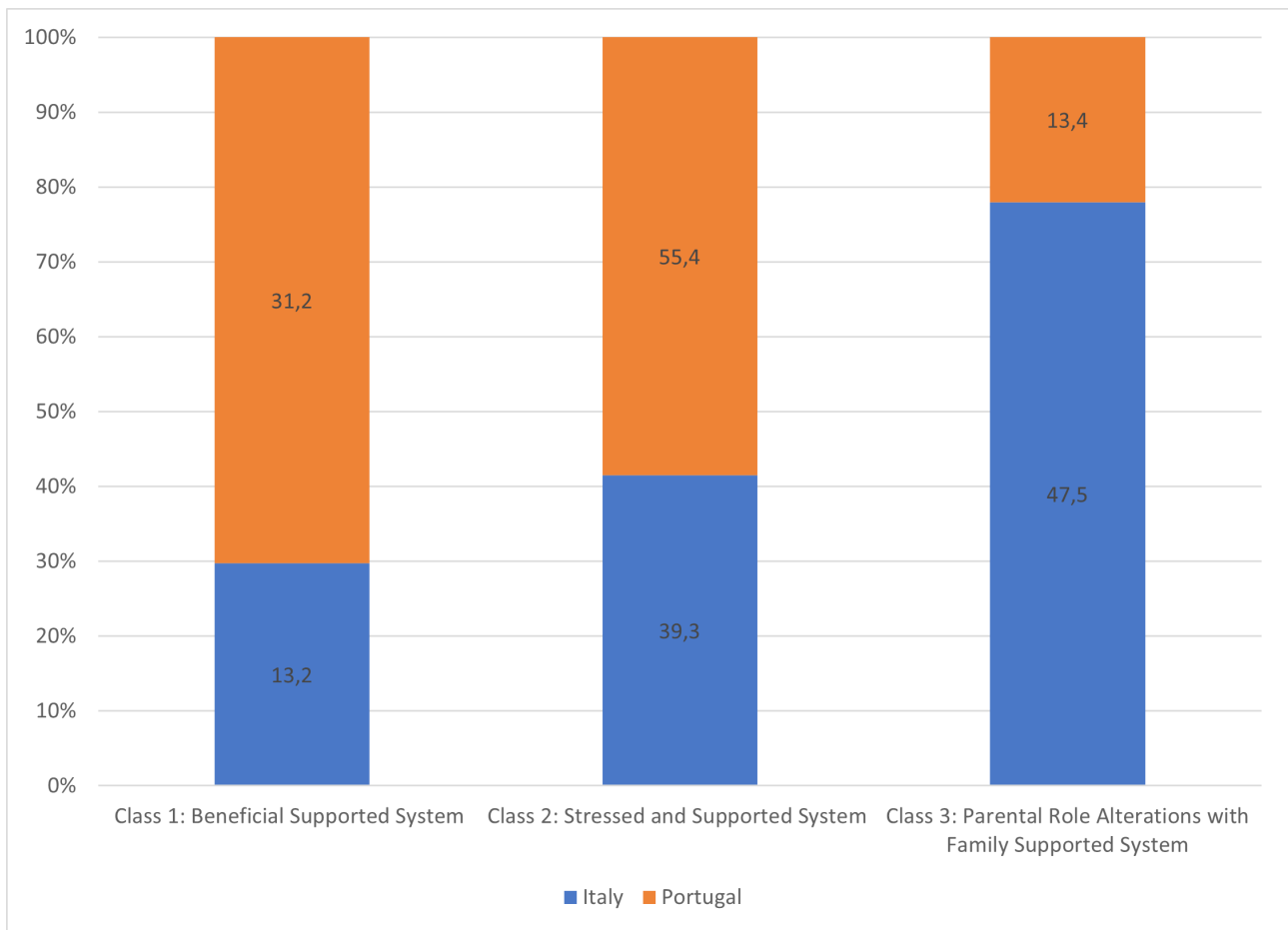


Figure 14. Class prevalence stratified by Country.



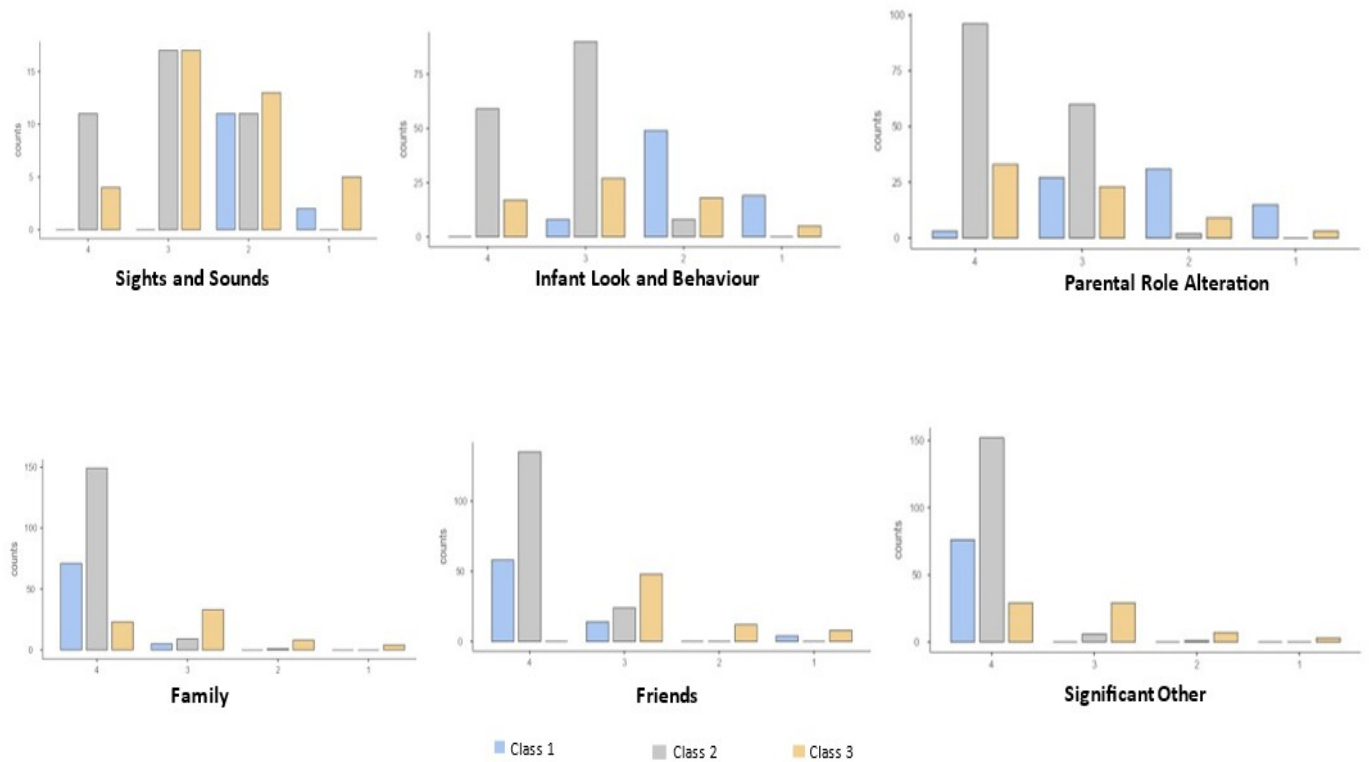
To label the emerged classes we visually inspected both the crosstabs and the bar graphs (Figure 15) showing the trends of the scores of NICU stressors and sources of social support for each class in both the Italian and the Portuguese sample.

Class 1 was labelled as the *Beneficial Supported System*, and it was featured by low perceived levels of *NICU stressor* and high perceived levels of *Social Support* sources;

Class 2 was labelled as *Stressed and Supported System* and it was featured by medium/high levels of *NICU stressors* and high levels of *Social Support* sources;

Class 3 was labelled as *Parental Role Alterations with Family-Supported System* and it was featured by medium/low levels of stress related to *Sights and Sounds* and *Infant Behaviour and Appearance*, by medium/high levels of stress related to *Parental Role Alterations*, by medium/high levels of support perceived from *Significant Other and Family* while medium/low levels of support perceived by *Friends*.

Figure 15. Subscales rates according to classes to the NICU stress dimensions (above) and Social Support dimensions (below).



The final regression model explained the 22.6% of the variance. Being Italian and mother was associated with higher likelihood to be part of both the Stressed and Supported System (Italian: $B [SE] = .880 [.403]$, $p = .029$; mother: $B [SE] = -.718 [.290]$, $p = .013$) and the Parental Role Alterations with Family-Supported System (Italian: $B [SE] = 2.340 [.452]$, $p < .001$; mother: ($B [SE] = -.940 [.377]$, $p = .013$) than the Beneficial Supported System (Table 9). Young age increased the likelihood of the Stressed and Supported System ($B [SE] = -.087 [.041]$, $p = .032$) membership.

An interaction effect among Country and Age was found. Specifically, with increasing of the age, Italian parents had higher likelihood to be part of the Stressed and Supported System as compared to the Beneficial Supported System ($B [SE] = .172 [.071]$, $p = .015$). Further, advanced age parents with other children were more likely to be part of the Parental Role Alterations with Family-Supported System than the Beneficial Supported System ($B [SE] = .220 [.076]$, $p = .004$).

Table 9. Multinomial logistic regression of sociodemographic variables predicting Class 2 and Class 3 membership with the Beneficial Supported System (Class 1) as reference.

	Beneficial Supported System (Class 1) OR (95% CI)	
	Class 2 ^a	Class 3 ^b
Country (Italy)	2.412 [1.094, 5.316]	10.383 [4.279, 25.193]
Gender (Female)	.488 [.276, .861]	.391 [.186, .819]
Age	.917 [.847, .993]	.947 [.846, 1.061]
Other children (Yes)	1.324 [.702, 2.498]	1.978 [.885, 4.419]
Country (Italy)*Age	1.187 [1.033, 1.364]	1.116 [.952, 1.307]
Age*Other children (Yes)	1.063 [.943, 1.198]	1.246 [1.074, 1.445]

Note: Bolded numbers indicate significant results; ^aClass 2: Stressed and Supported System; ^bClass 3: Parental Role Alterations with Family-Supported System,

V.5 Summary, discussion, and implications

Our findings provided three classes that identify both risk and resources in parents of VPT infants. Specifically, Class 1, named Beneficial and Supported System, accounted for the 25.7% of the whole sample. In this class, sources of social support and NICU-related stressors are inversely related. The informal social support can buffer the effect of NICU stressors and ameliorate parental experience during NICU hospitalization. These findings are in line with both variable-centered studies (Younge et al., 2023) and qualitative studies (Kainiemi et al., 2025) and call for considering the importance of informal social support and the ways to activate it to reduce parental stress into the FCC practices.

On the contrary, Class 2, named Stressed and Supported System, detected half of the parents from the whole sample. Unless parents in this class experience high levels of support from their social system, they still expressed elevated levels of stress. Importantly, this class accounts for the ambivalence of informal social support for whom being close to parents does not mean being supportive (Kainiemi et al., 2025). Indeed, family members, friends and significant others are usually people who are unaware of the rules and the medical challenges of the NICU context. This is probably because most of NICUs have rules and rooms that do not permit to visit parents and infants during NICU hospitalization (Flacking et al., 2022). Furthermore, in some cases, family members who are close to parents (e.g., grandparents), might struggle to balance support and intrusiveness (Frisman et al., 2012) due to elevated need of assurance regarding infant medical condition (Huang et al., 2024) and, in this way, being an additional burden for parents during NICU stay.

Providing practical information on NICU environment to the parents' extended relational system along with acknowledging their emotional experience as different than the one of parents of NICU infants but still important may lead them to positively support parents.

Class 3, named Parental Role Alterations with Family Supported System, was defined with a very specific pattern in which stressor related to parenting within NICU and infant appearance coupled with the presence of a family support system. This class defines parenting function as the main stressor for parent of VPT infants and a specific challenge to deal with. These findings are in line with other quantitative studies in which Parental Role Alterations is the most prominent stressor experienced by parents (Ionio et al., 2019; Hendy et al., 2024). Importantly, these results shed a light on a specific group of parents who may experience lack of understanding of the unique

challenges of parenting in NICU leading to an intergenerational rupture among the grandparents, the parents and the infant in the caring practices (Zafrir Priel, Possick & Even-Zohar, 2022).

Early identification of these parents can lead to implement tailored interventions to improve parental skills (Matricardi et al., 2013; Franck & O'Brien, 2019) and enabling them to share their multifaceted experience of parenting with their family members.

Those findings underlined the ambivalent role played by social support in parents of NICU infants. On one hand, social support was widely present within the three classes (i.e., medium-to-high levels were found in all three classes). However, its function might be different across the classes. In fact, family, friends, and significant others could look for assurance on infant medical conditions (Huang et al., 2024), misunderstanding challenges lived by parents during hospitalization due to lack of opportunity to visit the NICU setting (Flacking et al., 2022) or serving as a proxy for the new family adjustment (Boadu, Ohene & Senoo-Dogbey, 2025).

Regarding cross-country comparison, our study highlighted that the three classes were meaningfully valid both in Italy and Portugal while parental distribution was different across countries. Importantly, those findings shed a light on the common experience of parents across two European Countries giving the opportunity to further characterize social and health inequalities, implement universal screening programmes and improve NICU care practices.

With regards to the relationship with sociodemographic factors, Italian parents were at higher risk to experience elevated stress and parenting difficulties than Portuguese ones unless moderate-to-high perceived social support. Further, this risk enhanced with the increasing of age in Italian parents. These results reflect previous findings in which both Italian parents and nurses experienced lower quality of FCC as compared to other European countries (Raiskila et al., 2017). This is potentially due to several barriers affecting FCC implementation including staff shortage, lack of emotional training for nurses, scarce financial resources (Corchia and Orlando, 2012; Gagliardi et al., 2016) and scantiness of structured organizational models (Dall'Oglio et al., 2019). Therefore, lack of standardized FCC practices might limit the beneficial effect of the social support system. Moreover, those effects could be exacerbated in Italy that is the European country with the highest maternal age at the time of the first childbirth (Eurostat, 2023). Indeed, advanced age pregnancies are at risk of previous fertility treatments failures (Bhattacharya, Maheshwari, & Mollison, 2013) and several perinatal complications (Pinheiro et al., 2019). Those factors could lead advanced age parents to reach NICU admission with an additional burden related to their previous path. Our findings call for the structural implementation of standardized FCC practices specifically addressing

the empowerment of emotional support skills in NICU staff to respond to the necessities of both parents and their social support system.

Also, mothers were at risk to experience high levels of NICU-related stress and parenting difficulties unless moderate-to-high perceived social support. These results could counteract the literature that underlines the protective role of social support during the perinatal period (Wickramaratne et al., 2022). However, mothers at high-risk of psychological distress may benefit less from some sources of social support (Hitzler et al., 2022). In addition, family members might not be fully aware of the situation (Huang et al., 2024) or being traumatized by NICU admission (Zafirir Priel, Possick & Even-Zohar, 2022). Those factors may limit social support system resources to help mothers coping with the NICU experience. Importantly, NICU staff could counsel the social support system (e.g., grandparents) with the best ways to facilitate communication and closeness with parents (Amorim et al., 2019) according to the different emotional needs lived by mothers than fathers (Fegran, Helseth & Fagermoen, 2008).

Further, young age has shown to play a role for Stressed and Supported System membership. On the contrary, advanced age was a risk factor for Parental Role alteration and Family Supported System membership in parents having other children out of the NICU. While some studies stated that younger age was a risk factor for NICU-related stress in parents (Baía et al, 2016; Younge et al., 2023). Other research found that advanced age was a risk factor (Chourasia et al., 2013; Turner et al., 2015).

Our study underlines the importance to consider age-related differences in relation with their specific cultural, societal, and community context (Lansford, 2022). Furthermore, the use of person-centered approaches could have the potential to inform on the interplay of different risk factors (i.e., advanced age and having other children) that increase the likelihood of specific parental stress class membership (i.e., Stressed vs. Parental Role alterations).

Overall, our findings shed a light on specific categories of vulnerable parents and intervention targets with the potential to implement tailored programmes according to parental skills, social support, and NICU staff emotional training. Future cross-cultural studies including more countries and considering the specific contexts where NICU hospitalization take place could inform on each country specific needs and policies to carry out for improving well-being in parents of VPT infants across the globe.

Among the strengths, this was the first study to compare social support and parental NICU-related stress in two different countries using a person-centered approach. This study highlighted the

innovative potential of person-centered approaches in studying the interplay among risks and resources within specific times of crisis like NICU hospitalization in parents of VPT infants. Moreover, findings underlined the importance to consider the relationship among NICU care practices and parental social support systems, and their role in shaping parental experience during hospitalization. Further, our findings highlighted sociodemographic risk factors leading to address specific parents (i.e., mothers, advanced age parents with other children) and specific contexts (i.e., FCC practices in Italy) that are at high-risk to experience high levels of stress, parenting difficulties and lack of beneficial social support system.

Among the limitations we acknowledge the different size of the sample that although adequate to use the Multigroup Latent Class Analysis, is not balanced across countries. Moreover, the monocentric nature of the Italian data limits the generalizability of the results, particularly regarding the Italian context. Finally, the different time of data collection across countries is due to the retrospective and inductive nature of the study design. Importantly, different time-points in data collection could influence parental experience due to the growing interest in FCC practices implementation encompassing parental involvement and family-friendly NICU design (Franck & O'Brien, 2019). Therefore, those factors need to be considered when interpreting the results of this study. However, as stated before, the objective of this study was to test the role of social support in relation with NICU stress using a Person-Centered approach and to compare its structure across countries. This implies a series of constant factors that can partially attenuate the long-time gap among the two data collections. On the one hand, social support is an intrinsic and quite stable aspect across time and similar in both Italy and Portugal (Costa et al., 2016). On the other hand, the PSS:NICU closely aligns with the contemporary conceptualization of NICU-related parental stress since three decades (Tzeli et al., 2025) confirming its validity across countries unless the advancements of NICU setting (Caporali et al., 2020). Therefore, to the best of our knowledge, although the long-time gap in data collection may influence data comparability, this is the first person-centred study providing new insights on important factors (i.e., social support and NICU stressors) that are still at the centre of the scientific literature in the field (Younge et al., 2023; Kainiemi et al., 2025; Fieß et al., 2025).

Future studies could implement person-centered approaches to compare the role of social support across parents of NICU infants across different gestational ages and in relation to other psychological distress dimensions (e.g., anxiety and depression) frequently experienced by parents of NICU infants.

In conclusion, this study contributes to create a taxonomy of experiences in parenting VPT infants that requires different degrees and types of targeted interventions. Importantly, adding social support systems evaluation within the screening procedures of parental mental health may provide a wide view of the family socio-cultural context and the opportunity to implement friendly practices for both parents and their relational system, leading them to positively cope with the NICU experience. NICU staff should implement parental social support system as a resource of FCC practices and mediate among parents of VPT and their social support system to guarantee beneficial support.

Part 3:

From NICU hospitalization up to after discharge: financial and somatic dimensions in parents

Chapter VI

The financial burden experienced by families during NICU hospitalization and after discharge: A single centre, survey-based study

VI.1 Introduction

One in eight babies born each year will be needing special care (Royal College of Paediatrics and Child Health, National Neonatal Audit Programme, 2017). A number of studies highlighted the financial burden (FB) experienced by families during NICU hospitalization (Lakshmanan et al., 2022). Fewer studies investigated the costs faced by families after discharge, especially in Europe (King et al., 2021). Despite that FB has been studied in patients and caregivers (Lakshmanan et al., 2022; Parker et al., 2022), its definition is not clear yet (Shao et al., 2017). The FB is typically described as one's perceptions of the financial strain (i.e., the subjective pressures) and stress (i.e., objective economic challenges) (Lindley & Mark, 2010; Marsack-Topolewski & Church, 2019). To our knowledge, no Italian studies examined the FB experienced by families of NICU graduate infants both during hospitalization and after discharge. Further, a systematic review (Lakshmanan et al., 2022) recently underlined the paucity of studies that takes into account direct medical costs (e.g., medical outpatient visits), non-medical costs (e.g., cost for transportation at medical outpatient visit) and indirect costs (e.g., loss of work due to specific event).

VI.2 Objectives

To address both these gaps, we aimed to investigate a broad array of costs (i.e., direct and non-direct medical costs, indirect costs) and perceived FB of Italian families both during NICU hospitalization and after discharge.

VI.3. Methods: Sampling and Procedure

This was a cross-sectional, survey-based study. Parents of NICU graduate infants were asked to fill in the survey during the routinely developmental follow-up visit from September 2022 to May 2023. Two research psychologists orally informed them about the study. The study protocol was approved by the Ethics Committee "Carlo Romano" of the University Federico II of Naples

(protocol number 68/22). Written consent was obtained from all the participants to the study. Inclusion criteria were the following: being parent of an infant who joined our developmental follow-up program and fluency in Italian written form of at least one parent. Exclusion criteria were the following: infant did not survive after NICU discharge or enrolment in another developmental follow-up program.

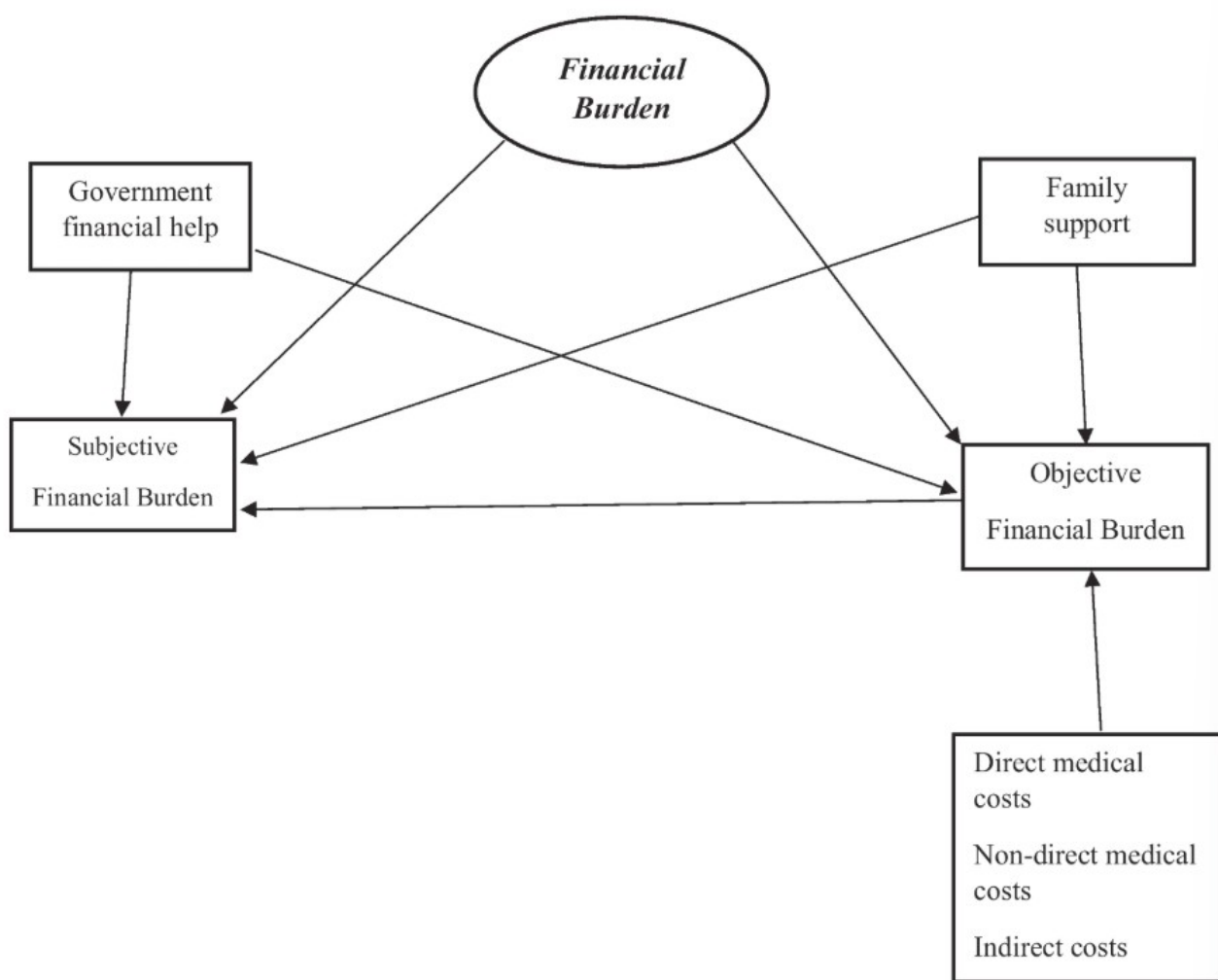
VI.3.1 Measurement Tools

We developed an ad hoc survey to investigate the FB experienced by families during NICU hospitalization and after discharge. Items were derived within a patient perspective framework and considering studies on financial burden in NICU parents (Lakshmanan et al., 2022; King et al. 2021). Both objective (i.e., effective costs) and subjective (i.e., individual perception) aspects of financial burden were considered (Chen et al., 2018). Inputs from neonatologists ($n=2$), NICU psychologists ($n=2$) and one health care management professor were collected to adapt the content of the survey to the Italian NICU context and healthcare system (Figure 16). The survey was preliminary reviewed and piloted for content and clarity by parents of NICU graduates referring to the Perinatal Infections centre of our University Hospital. Items were dichotomous (presence vs. absence), on a 4-level Likert scale (ranging from “none” to “high”) or open questions in which parents could write down the amount of expenses faced (e.g., monthly outgoings for vitamins). The survey was divided as follows:

- Section 1 (13 items) socio-demographic information of both parents (e.g., age, job, education level) and characteristics of the family (e.g., presence of siblings, type of house held). Jobs were then divided according to the classification of the Italian National Institute of Statistics (ISTAT, 2023).
- Section 2 (11 items) NICU infant characteristics (e.g., gestational age, birthweight, type of pregnancy) and outgoings faced by families during NICU hospitalization. Total expenses during NICU hospitalization were then calculated for every family multiplying mean daily costs reported from parents and their length of stay in NICU (i.e., number of days).
- Section 3 (12 items) encompassed infant neurodevelopmental outcome based on the developmental follow-up visit at the time of survey administration, numbers and types of further hospitalizations after NICU discharge and types of financial exemptions received due to infant pathology.

- Section 4 (15 items) provided information regarding infant need for special aids and therapy (e.g., physiotherapy, speech therapy) and the related expenses faced by families.
- Section 5 (8 items) informed about family monthly specific expenses (e.g., vitamins, drugs, dietary supplement) and costs related to routinely and specialized medical check-ups and transportation costs.
- Section 6 (7 items) regards occupational changes during NICU hospitalization and work leave needed for issues related to the infant's health after discharge.
- Section 7 (7 items) investigated the source of help received (e.g., grandparents, babysitter) type of help provided (e.g., economic help, handling other children and house) and the financial aids given from the government. Based on previous studies (Chongpison et al., 2016; Allsop et al., 2023), perceived FB experienced by families related to NICU hospitalization and after discharge was assessed using a single item created for the current study. This item was rated on a 4 point-Likert scale (1 = Not at all; 2 = Little; 3 = Moderate; 4 = High).

Figure 16. The application of the Patient Perspective framework to the study of financial burden in parents of NICU graduated infants.



VI.3.2 Data Analyses

Data analysis was performed using SPSS v.28 software (IBM). Quantitative variables were expressed as mean $\pm$ standard deviation (SD) and categorical variables as frequency and percentages. Chi-square test was used to examine associations among nominal variables. Wilcoxon test was run to examine perceived FB among families who had an infant with normal vs. adverse outcome and families who experienced financial help from the government vs. those who did not perceive it. Kruskal-Wallis test with Bonferroni correction for multiple comparisons was run to test differences among multiple groups stratified by gestational age, birthweight and COVID-19 pandemic periods. Spearman rho correlation was run to detect variables correlated with the FB experienced by families. Multivariable binary logistic regression to determine factors associated with the perception of family FB was run.

VI.4 Results

A total of 125 pairs of parents were approached during the routinely developmental follow-up visit. Two couples (1.6%) refused to participate due to lack of time and one couple (0.8%) did not fully complete the survey due to lack of fluency in Italian written form. The final sample included 122 pairs of parents (97.6%). Socio-demographic information of mothers and fathers are shown in Table 10. Half of both mothers and fathers graduated high-school. A large number of mothers were classified within the category “Unskilled professions” while most part of fathers belonged to the “Artisans, specialized workers and farmers” category.

Table 10. Descriptive statistics of enrolled mothers (N=122) and fathers (N=120).

		Mothers	Fathers
Age Mean (SD)		35.09(5.44)	38.68(6.56)
Nationality	Italian (%)	95.9%	96.7%
	Not Italian (%)	4.1%	3.3%
Education	<High school (%)	21.3%	29.2%
	High school (%)	48.4%	51.7%
	University degree (%)	30.3%	19.2%
Job category	Legislators, Entrepreneurs and Highly skilled professions (%)	13.2%	12.5%
	Technical professions (%)	12.3%	15%
	Qualified professions in commercial activities and services and executive professions in office work (%)	17.2%	25%
	Artisans, skilled and not skilled workers, farmers, and vehicle drivers (%)	4.9%	34.2%
	Unskilled professions (%)	50.8%	9.2%
	Armed forces (%)	1.6%	4.2%

A large number of families had their own house as compared to families who lived in a house for rent or at parent house. Detailed family characteristics can be found in Table 11.

Table 11. Family and household characteristics of the enrolled sample.

		% (N)
Other children	No	45.9% (56)
	1	41.0% (50)
	>1	13.1 (16)
Type of house	Owned house	57.4% (70)
	House for rent	30.3% (37)
	Living at family members' house	12.3 (15)
Residence	Naples and its district	74.6% (91)
	Other districts	25.4% (31)

During NICU hospitalization, 36.1% of mothers had to leave their job as compared to 20.5% of fathers. In total, 9.8% of parents were fired during NICU hospitalization (mothers = 4.9%; fathers = 4.9%).

Characteristics of the infants involved in the study are reported in Table 12. Median (range) length of stay in NICU was 50 days (5, 365). Median family daily expenses during NICU hospitalization were 15 euros (1.40, 60) encompassing travel expenses to NICU and personal expenses when needed (i.e., meals). The overall median cost of visiting infant during NICU hospitalization was 615 euros (42, 7320). A decreasing trend ($p = 0.051$) during COVID-19 pandemic (median = 495, range = 42, 3000) as compared to the pre-pandemic period (median = 825 euros, range = 90, 7320) was observed. Median costs after COVID-19 period raised to 600 euros (95, 4080). Mean costs of NICU hospitalization according to prematurity rate and birthweight category are shown in Table 13.

Table 12. The characteristics of the involved infants.

Infants (N=145)		% (N)
Sex	Female	41.8% (51)
	Male	58.2 % (94)
Type of pregnancy	Natural conception	86.9% (106)
	In vitro fertilization	13.1% (39)
Twin delivery	No	80.3% (125)
	Yes	19.7% (25)
Prematurity rate	Mean (SD)	31.23 (4.08)
	Range	22.50–42
Extremely preterm		13.9% (17)
Very preterm		45.9% (56)
Moderate preterm		22.1% (27)
Late preterm		6.6% (8)
Term		11.5% (14)
Birthweight	Mean(SD)	1461.8 (812.73)
	Range	400–4100

Birthweight category	
< 1000	27.9% (34)
1000–1499	43.4% (53)
1500–2500	17.2% (21)
> 2500	11.5% (14)

Table 13 Mean NICU hospitalization expenses (in euros) stratified by preterm severity and birthweight category.

Prematurity rate	Mean (SD)
Extremely preterm infants	1637.1 (1817.8)
Very preterm infants	1175 (1001.3)
Moderate preterm infants	705.9 (580.3)
Late preterm infants	662.1 (453.8)
Full-term infants	284.4 (181.8)
Birthweight category	
< 1000	1729.8 (1482.4)
1000–1499	759.9 (495.9)
1500–2499	851.9 (985.4)
≥ 2500	241.6 (124.4)

Differences in total expenses among groups stratified by gestational age were found ($H(4) = 24.174$, $\eta^2 = 0.218$, $p < 0.001$). In particular, parents of very preterm (mean rank = 65.83, $p < 0.001$) and extremely preterm infants (mean rank = 71.73, $p < 0.001$) had higher expenses as compared to full term infants (mean rank = 22.50). Those differences were kept after Bonferroni correction. Statistically significant differences were found according to birthweight category ($H(3) = 33.081$, $\eta^2 = 0.298$, $p < 0.001$). Parents of ELBW infants (mean rank = 78.48) faced higher costs due to NICU hospitalization as compared to the other birthweight categories. Parents of LBW (mean rank = 49.55, $p = 0.007$) and VLBW (mean rank = 55.52, $p < 0.001$) infants experienced higher costs as compared to parents of > 2500 g infants (mean rank = 18.38). No differences were found among LBW and VLBW infants ($p = 0.490$). Those differences survived after Bonferroni correction.

Forty-five percent of infants had health or development related issue and 21.3% of them had at least one comorbidity at the time of participation. Detailed infant developmental outcomes can be found in Table 14. Twenty-seven percent went for at least one new hospitalization after NICU discharge and 46.7% went for medical day hospital (18% within our hospital). Almost all the infants (94.2%) had outpatient check-ups (35.2% of them within our hospital) other than developmental follow-up visits. Number of medical check-ups per year were assessed according to infant age at the time of

administration of the survey (0–12 months = 35.24%; 13–24 months = 16.39%; ≥ 25 months = 48.36%). Almost the whole sample (97.67%) went for at least one medical visit within the first year after discharge. During the same period, most part of families (69.76%) went for more than 3 medical check-ups per year, frequency rate decreased to 60% within the second year of life. At 25 months of age, 69.48% of families went for more than one medical check-up per year and 49.15% for more than 3 medical check-ups. Twenty-one percent of families had exemptions due to low income while 14.8% of them received financial support for the pathology of the infant.

Table 14. Neurodevelopmental outcomes of the enrolled infants.

Outcome	% (N)
Typical development	56.5 (69)
Assisted ventilation	1.6 (2)
Plagiocephaly	2.5 (3)
Cerebral palsy	3.3 (4)
Growth deficits and diet issues	14 (17)
Intellectual disability	3.3 (4)
Autism spectrum disorder	1.6 (2)
Behavioural disorder	8.2 (10)
Global delay of psychomotor development	10.7 (13)
Language delay	12.3 (15)
Retinopathy of prematurity	5.7 (7)
Inguinal hernia	1.6 (2)
Heart disease	3.3 (4)
Deafness	1.6 (2)
Muscle tone anomalies	18 (22)
Broncho dysplasia	11.5 (14)

Most parents indicated that they needed less than 1 month (45%) of out-of-work days due to their own infant health-related issues while 18.5% of parents did not need out-of-work days as at least one parent did not work. Several families needed 1 month (10.7%) free from work to take care of their infant or more than 1 month (29.5%) per year. Out-of-work days were not paid as were superior to the contract rules for 28% of families.

Special aids were used by 14.8% of families. Among them, 63.63% paid for special aids with expenses ranging from 20 to 40 euros (median = 27.50). Infants who needed physiotherapy (18.9%) started the treatment at median age (range) = 7 (3, 48) months. Families who paid for physiotherapy (52.17%) faced a cost of median (range) = 160 (120, 400) euros per month. Infants who needed

therapies were 19.7%. Among them, 73.91% needed three therapies simultaneously and 17.39% needed two therapies. The most practiced therapies were speech (91.3%) and psychomotor therapy (86.95%). Therapy was started at median (range)=24 (6, 84) months. Seventy-one percent of families paid for therapies. Costs for therapy sessions was median (range)=300 (160, 600) per month while transportation at therapies reached median = 100 (2.40, 400) euros. Overall, 8.19% of infants started physiotherapy within the first year of life and at least one therapy within the following 2 years. Further expenses faced by families after discharge can be found in Table 15.

Table 15. Outgoings after NICU discharge (euro).

Monthly costs after discharge (<i>n</i>)	Mean (SD)	Median (range)
Lab exams (17)	104.12 (122.00)	50.00 (5–500)
Vitamins (95)	37.57 (24.06)	30.00 (7–150)
Drugs (64)	58.58 (64.52)	35.00 (7–300)
Milk and dietary supplement (29)	138.17 (100.87)	120.00 (20–450)
Medical visits (56)	81.65 (80.14)	67.50 (5–500)
Transportations at hospitals (107) ^a	105.10 (208.97)	40.00 (5–1300)
Costs out of region (3) ^b	2433.33 (2227.85)	1300.00

^awithin 1 year; ^btotal costs.

Parents felt supported by their own family (90.2%). Grandparents of the infant were the most frequent source of support (86.1%). Other helps found by families were nursery school (13.9%), babysitters (11.5%) and domestic workers (4.1%). Twenty-three percent of families needed more than one of the above-mentioned sources of help. Transportations (43.4%) and house handling (40.2%) were the most frequent helps received. Other children management was given to 29.5% of families. Twenty-nine percent of families received economic helps and 12.3% of parents received emotional support. Nine percent of families did not receive any kind of help and stated that their own partner was their only source of help. Nineteen percent of families indicated being supported by the government. Governmental economic helps frequently received were child support check (40.2%) and baby bonus (35.2%). Those checks were not helpful (50.8%) or only partially helpful (43.4%) for facing outgoings.

Overall, 87.7% of families experienced FB after NICU experience as impacting the whole family system. Sixty percent of families experienced moderate (50%) or high (10.7%) rate of FB due to NICU experience.

Families having infants with adverse outcome experienced more hospitalization after NICU discharge (Cramer's $V = 0.264$, $\chi^2 = 8.853$, $p = 0.004$) and higher rates of FB ($Z = -2.756$, $p = 0.006$; Figure 17). Significant high rates of perceived FB in family perceiving lack of support from the government were detected ($Z = -3.419$, $p = 0.001$; Figure 18). We did not find any statistical difference comparing before and during COVID-19 and during and after COVID-19 pandemics about private versus family paediatrician, costs of transportation at hospital and medical visits ($p > 0.05$).

Figure 17. Comparison of perceived FB rated divided by normal versus adverse outcome

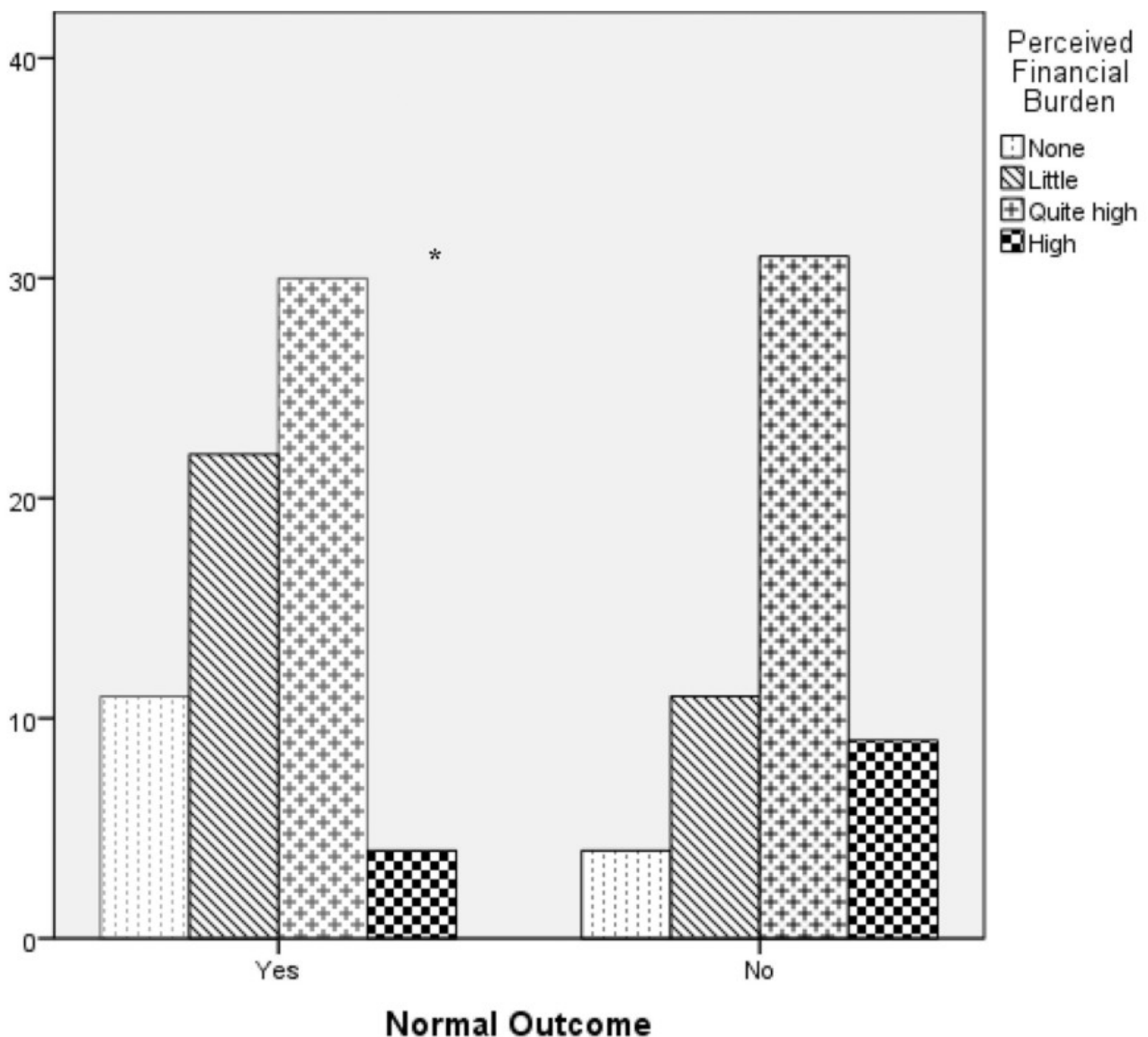
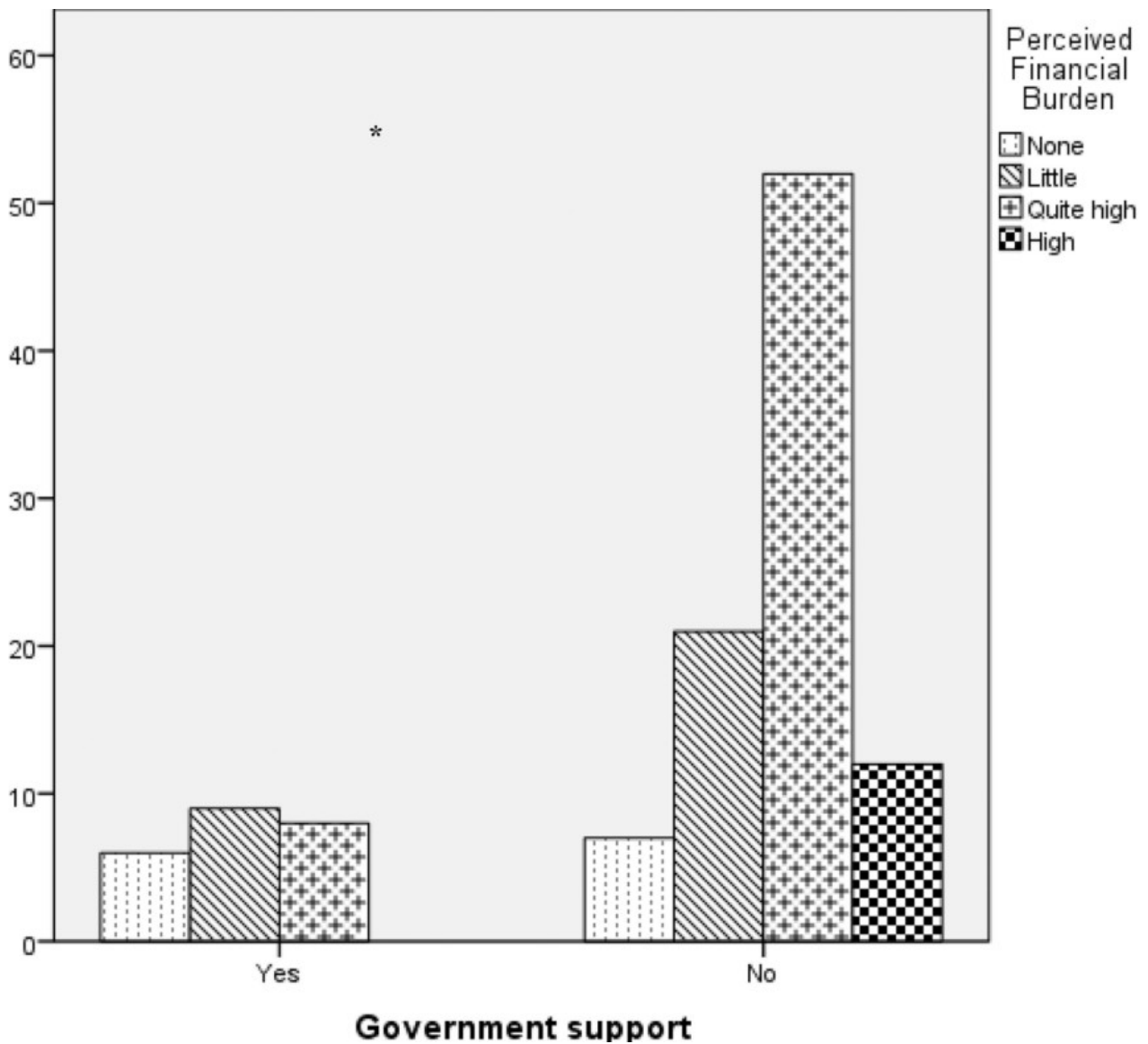


Figure 18. FB rates comparing presence vs. absence of government financial support.



Perceived FB correlated with costs of drugs ($\rho = 0.271, p < 0.05$), baby formula and dietary supplement ($\rho = 0.385, p < 0.05$). Infant adverse outcome ($\rho = 0.251, p < 0.01$) and comorbidities ($\rho = 0.206, p < 0.05$) were correlated with high rates of perceived FB. Among the infant developmental issues, presence of behavioural disorders ($\rho = 0.186, p < 0.05$) and language delay ($\rho = 0.243, p < 0.01$) were correlated with high rates of FB. Expenses linked to accompaniments at medical visits ($\rho = 0.329, p < 0.01$) and therapy sessions ($\rho = 0.271, p < 0.05$) correlated with higher FB rates. Lack of government support correlated with high FB perceived ($\rho = 0.320, p < 0.01$). Lack of government financial help was associated with the FB experienced by families ($\text{Exp(B)} = 5.705$, CI: [1.117, 29.127], $p < 0.05$).

VI.5 Summary, discussion, and implications

Our data show that most of the survey participants reported a significant impact of the birth of a premature child on the family finances.

Our results provide a clearer scenario of sources that can influence costs related to NICU hospitalization leading to better identify specific profiles of families at risk to experience large amount of expenses during this period. Families with extremely and very preterm infants have to face higher costs than parents of full-term babies. Considering birthweight, parents of babies with ELBW and VLBW face higher costs than parents of babies with adequate birthweight. This could be due to the severity and comorbidities associated with low gestational age and birthweight (Marzouk et al., 2017; Phibbs et al., 2019) which can increase NICU length of stay. Our findings add knowledge to the financial costs related to infant clinical severity within a patient perspective framework. We recommend screening all the families with preterm and low birthweight infants as increasing in infant length of stay could overwhelm parents' capacity to face costs during NICU hospitalization. Detection and implementation of policies for families with overwhelming costs is important to reduce inequalities.

COVID-19 pandemic restrictions did not influence expenses faced by families during NICU hospitalization. This could be since parents continued to visit NICU and asked for in person daily medical updates. Our sample also included families who were out of region during the preterm labour. They had dramatically high non-medical costs as they stayed in a hotel along the whole hospitalization. Preterm birth is frequently an unexpected event (Vogel et al., 2018) that leads to drastic changes of family lives (Roque et al., 2017; Salomè et al., 2022). NICU accommodations for parents could avoid cost transportations and improve their participation to the developmental care of their infant (Head Zauche et al., 2020; Lehtonen et al., 2020).

Importantly, rate of NICU graduate mothers who quitted their job after childbirth was double as compared to mothers of healthy newborns in our country (18%) (Bergamante & Mandrone, 2023). Our findings highlighted that mothers frequently left their job to take care of their infant in NICU while most fathers continued to work. During the hospitalization, 5% of mothers and 5% of fathers were also fired. Adverse childbirth and NICU hospitalization may be specific risk factors affecting the possibility for mothers to work. Those findings are particularly important as Italian mother unemployment rate is already one of the highest in Europe (Eurostat, 2023). Policies need to take care of the multifaceted consequences of having a baby hospitalized in NICU as this stressful event may exacerbate parent unemployment especially of mothers.

This study fills the gap regarding non-medical costs related to NICU hospitalization (King et al., 2021) and provide evidence of important side effects of the indirect costs (i.e., job loss) that influence family financial issues and disparities of parental experience during NICU hospitalization. In addition, our results provide a new perspective to further study factors influencing parental well-being, attachment to the baby and family experience during hospitalization (Roque et al., 2017; Flacking et al., 2012; Fernández Medina et al., 2018). Although all the families received at least one financial help from the government because of having a child, our findings prove that those helps are not sufficient to buffer the costs during NICU hospitalization and after discharge. Nowadays, policies do not consider neither NICU hospitalization nor its length of stay variability and their consequences on family income. Financial policies need to address direct non-medical and indirect costs faced by families and support them through the implementation of NICU accommodation services, ad hoc financial helps according to infant clinical condition and protect parents' job.

We argue that baby hospitalization within NICU needs to be considered as stressful multifaceted event impacting parents both psychologically and financially. Those two aspects may affect each other. All the consequences due to NICU hospitalization deserve to be accounted to implement a Family-Centered Care that considers specific sources and needs of families.

Almost all the families of NICU graduates experienced financial burden (FB) during the first years after NICU discharge. Among them, 60% experienced from moderate to high rates of FB. We highlighted that families of infants with adverse outcome experienced higher rates of FB as compared to families with typically developing infants. This could be due to the fact that parents of infants with developmental issues experience more frequent medical visits and hospitalizations as compared to parents with typically developing infants (Arim et al., 2017). Those medical procedures include additional non-medical costs (i.e., transportations) and indirect costs (i.e., free days from work that are superior to the ones established from the contract). Behavioural disorders and language delay were linked to high FB. As a result of the fact that psychomotor and speech therapy are not timely provided from the Italian National Health Service. Indeed, waiting lists for therapies can range from 2 to 48 months as confirmed from some families of our sample and websites of regional rehabilitation centres. The surveyed parents declared to spend median 300 euros for rehabilitation therapies per month when not provided from the National Health Service while transportation costs for therapies reached median 100 euros per month. Early intervention is essential to improve developmental trajectories of infants at risk for neurodevelopmental disorders (Hadders-Algra et al., 2021). Thus, National Health Service should timely match the needs for

rehabilitation therapies of families in order to both foster infant neurodevelopmental trajectories and reduce the FB experienced by parents.

Parental perception of lack of economic helps from the government was the only factor affecting their FB. Importantly, feelings of being neglected from the National Health Service may furtherly exacerbate parental stress (Yeom et al., 2023) leading them to be strictly focused on the disorder of their child (Larkin et al., 2021) and impact the whole family unit (Herridge & Azoulay, 2023). Pathology exemption was one of the few sources of help for families. It is provided from the National Health System to all those patients that require specific services for the purpose of monitoring the evolution of the disease and its complications (de Belvis et al., 2022). Pathology exemption buffers direct medical costs (e.g., developmental follow-up visits and clinical screening) for < 32 week preterm and/or with birthweight < 1500 g infants. Nevertheless, pathology exemption is valid up to the first 3 years of life of NICU graduates. This could influence FB of families as NICU graduates are at high-risk to develop neurocognitive issues across childhood (Squarza et al., 2016; Joseph et al., 2016; Lee & Glass, 2021).

Italian policies do not include any financial aid specific for family of NICU graduates infants and also maternity period do not match with the additional time that mothers and fathers need to stay close to the infant during hospitalization. On the contrary, other European countries approach to maternal and neonatal health differently. Some countries (e.g., Belgium, Austria, Germany) provide parents with additional free-from-work period starting since NICU discharge (European Foundation for the Care of the Newborn Infants, 2009). Financial aids are accorded to families whose NICU graduate infant develops neuro-motor abnormalities (e.g., cerebral palsy) homogenously across European countries (European Foundation for the Care of the Newborn Infants, 2009). However, prematurity itself as a risk condition, without any developmental issue, do not receive specific financial aids yet. Moreover, within countries differences emerge regarding both family facilities and services (e.g., developmental follow-up).

Most parents indicated they needed help to manage family. Grandparents of NICU graduates were the most important source to both alleviate financial expenses and emotional support. Dependency from grandparents ranged from handling other children to having the family of NICU graduate infant living with them. Those findings underline the important supporting role of grandparents as well as the limited financial resources of a number of families after NICU discharge. Indeed, families could experience difficulties to achieve their own economic autonomy. Those findings reflect important difficulties related to achieve economic independence due to additional costs along with the ones usually needed for infants (Federconsumatori, 2023). Policy makers should provide

economic helps across the first years after discharge, in order to foster financial autonomy of families. With regards to other sources of help, surveyed families asked more frequently for nursery schools as compared to families of both Southern Italy (2%) and the whole Italian country (11%) (ISTAT, 2022). Public nursery schools are not widely spread in Italy, especially in the Southern part of the country (ratio of public nursery schools and infants between 0 and 2 years is 15.2%) (ISTAT, 2022). Thus, a large part of those families has to face financial costs such as private nursery schools with a cost that can reach 850 euros per month. In addition, families who needed nursery schools could be underestimated due to scarce presence of services and poor family income. This could lead parents to ask for babysitters with costs ranging from 883.09 to 918.82 euros (Filcams-CGIL et al., 2021 INPS, 2023)

The strong points of our study include the investigation of a broad array of costs and the relative FB both during NICU hospitalization and after discharge within the Italian context towards the lens of the patient perspective.

Among the limits, our survey included only infants who satisfied the Italian National Guidelines (Gallini, Fumagalli & Romeo, 2022, Ancora, Pomero & Ferrari, 2012) to be enrolled to the developmental follow-up of the preterm or at-risk of disability infants (i.e., preterm new-borns with gestational age < 32 weeks and/or birthweight < 1500 g and infants who suffered for hypoxic-ischemic encephalopathy). Thus, our study did not clarify the FB experienced by families of late preterm infants and > 1500 g at birth. Parents who were not fluent in Italian written form were also excluded leading to a lack in understanding financial burden of families coming from different countries.

The adoption of a societal perspective and the comparison of parents from different sociocultural backgrounds could enlarge the framework of financial costs of all the subjects involved within the NICU setting (i.e., the National Health Service, parents) and the type of costs faced (i.e., direct, non-direct medical costs and indirect costs). This study provides new insights of financial burden experienced by Italian families of NICU graduates. This study highlighted sources (e.g., grandparents support) and difficulties (e.g., therapy costs) of NICU graduate families through the lens of patient perspective. Financial policies that could be implemented include NICU accommodations to reduce the costs due to transportation and let parents be more present to care of their own infant. Tailored financial aids that take into considerations infant clinical severity, its consequent length of stay and needs after discharge are necessary. Policies should also protect both mother and father jobs during NICU hospitalization and provide extra out-of-work days due to infant health-related issues during the first years after discharge. Timely provided therapies and

services are warranting to foster neurodevelopmental outcomes of NICU graduates as well as family management. The study promotes reflection on policies which should be adopted from the European governments that are similar to the Italian one in order to support NICU graduate families and reduce disparities.

Chapter VII

The Relationship among NICU Stressors and Irritable Bowel Syndrome in Parents during their infant stay: the mediating role of Anxiety

VII.1 Introduction

As previously underlined, individuals who appraise stressors as overwhelming their resources will experience stress (Lazarus & Folkman, 1984). The preterm distress model was specifically developed within the context of the Neonatal Intensive Care Unit (NICU; Holditch-Davis & Miles, 2000). This model detected the following as the most prominent stressors: Sights and Sounds, Infant's look and behaviour and Parental role alterations (Miles & Carter, 1983; Holditch-Davis & Miles, 2000). The preterm distress model guided most of the research on the experienced psychological distress of parents during NICU hospitalization (Caporali et al., 2020; Salomè et al., 2022). However, little attention was given to the somatic distress of parents during NICU hospitalization and the interplay among psychological and somatic distress.

Irritable bowel syndrome (IBS) is one of the most common disorders of gut-brain interaction (DGBI) ranging from 5-to-10% within the general population (Sperber et al., 2017). IBS is 1.5 times more common in women as compared to men (American College of Gastroenterology Task Force on Irritable Bowel Syndrome et al., 2009). It is a symptom-based condition defined by the presence of abdominal pain or discomfort, with altered bowel habits (Schmulson & Drossman, 2017). Recently, guidelines emphasized the understanding of IBS etiology and treatment within a biopsychosocial perspective (van der Veek et al., 2010; Barbara et al., 2023).

The biopsychosocial model underlines the interplay among biological and psychological factors in determining well-being (Blascovich et al., 2001; Borrell-Carrió, Suchman & Epstein, 2004). Several studies demonstrated that psychological distress influence IBS symptoms (O'Malley et al., 2011; Singh et al., 2012). Anxiety is one of the most determinant components of psychological distress leading to IBS onset (Zamani M, Alizadeh-Tabari S, Zamani, 2019). Therefore, adopting a biopsychosocial perspective including the context related NICU stressors, anxiety and IBS symptoms is important to expand knowledge on psychosomatic distress response in parents of NICU hospitalized infants (Drossman, 1998; Grunberg et al., 2023). To the best of our knowledge, no studies investigated IBS prevalence and severity in mothers and fathers of NICU hospitalized infants.

VII.2 Objectives

Therefore, the main objective of this study is to evaluate IBS symptoms in mothers and fathers of NICU infants during hospitalization.

According to the above-mentioned scientific literature on IBS and gender differences the following hypothesis was proposed:

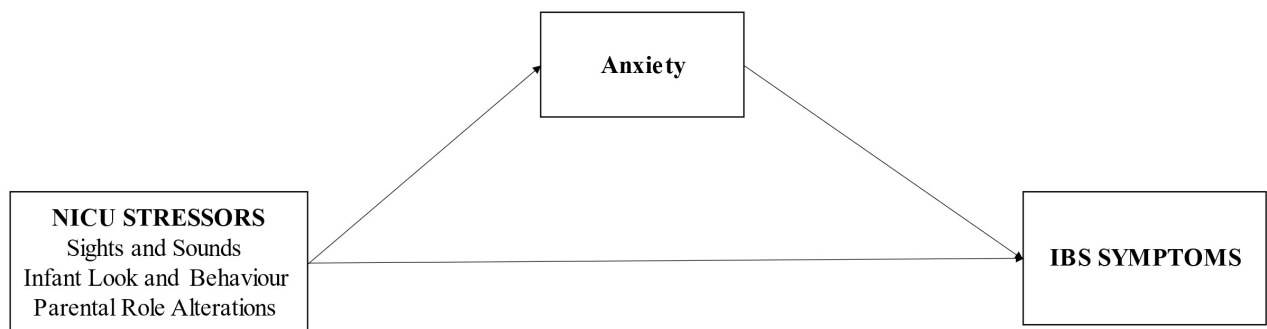
Hypothesis 1 (H1): Mothers will experience higher levels of IBS symptoms than fathers

Based on the above-mentioned literature investigating factors that influence IBS symptoms we stated the following hypothesis:

Hypothesis 2 (H2): NICU Stressors and Anxiety will exacerbate IBS symptoms in parents of NICU infants.

Hypothesis 3 (H3): Anxiety will mediate the effect among NICU stressors and IBS symptoms (Figure 19).

Figure 19. The hypothesized mediation models.



Mediating effect of the Mediator (M) among the Independent variable (X) and the dependent variable (Y).

VII.3 Methods: Sampling and Procedure

The Revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) guidelines were used to report this cross-sectional, single-centre study. The study was approved by the local Ethics Committee (protocol number: 126/24) and parents filled in written informed consent to participate to the study. The study was in accordance with the provisions of the 1995 Declaration of Helsinki and subsequent modifications. Parents were informed about the scope of the study by a research psychologist and asked to fill out standardized questionnaires from February to June 2024.

VII.3.1 Measurement Tools

Sociodemographic information about parents (i.e., parental age, education level, being first time parent and months from NICU admission to questionnaire administration) and infant characteristics (i.e., gestational age, birthweight, being twin) were collected.

The Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU; Miles, Funk & Carlson, 1993) encompasses 34 items divided into 3 subscales: Sights & Sounds ($\alpha = .83$; $\omega = .83$), Infant Look and Behaviour ($\alpha = .93$; $\omega = .93$) and Parental Role Alterations ($\alpha = .86$; $\omega = .86$) and a general stress item. Parents had to rate each item on a 5-point Likert scale ranging from 1 (not at all stressful) to 5 (extremely stressful) according to their stress at time of administration. An overall stress score is computed from the three subscales ranging from 0 to 5. PSS:NICU scores can be computed according to Miles et al. (1993), using two methods: (a) the Stress Occurrence Level (SOL) calculated including only experienced items and (b) the Overall Stress Level (OSL) scoring “not applicable items” with one point. As our focus of interest was related to parental real lived experience, we used the SOL method to capture the relationships among NICU stressors and the other study variables. For this study the SOL score had excellent internal reliability ($\alpha = .95$; $\omega = .95$).

Self-rating anxiety scale (SAS; Zung, 1971; $\alpha = .85$; $\omega = .82$) is 20-item-self-report questionnaire that evaluate anxious symptoms. The items are related to the week before questionnaire administration, with higher scores corresponding to higher levels of anxiety. Scores < 50 indicate absence of psychopathological disturbances, whilst anxiety based on the results of the questionnaires are labelled as mild (score ranging from 50–to-59), moderate (score ranging from 60–to-69) and severe (score > 70).

IBS-Symptom Severity (IBS-SSS; Francis, Morris & Whorwell, 1997) evaluates presence and severity of gastrointestinal symptoms. The IBS-SSS ($\alpha = .75$; $\omega = .85$) ranges from 0 to 500 with higher scores indicating more severe symptoms. Subjects can be categorized as having none (<75), mild (75-175), moderate (175-300), or severe (>300) IBS symptoms.

VII.3.2 Data Analyses

Data were analyzed with Statistical Package for the Social Sciences (SPSS v.29 software; IBM Corp, 2021). Data normal distribution was established evaluating Asymmetry and Kurtosis, values ranging from -1.5 to + 1.5 were considered for normally distributed variables (Tabachnick & Fidell, 2013). Two-tails correlations were computed using Pearson's coefficient r to test relationships among sociodemographic variables, infant characteristics NICU stressor, anxiety and IBS. Mean differences and prevalence between groups were computed respectively using t-test and Chi-square test. Cohen's d and Cramer's V were used to measure effect sizes. PROCESS macro 4.2 for SPSS (Hayes, 2022) was used to test mediation models among NICU stressors, anxiety and IBS. The statistical significance of the total indirect effect of mediating variables was examined using bootstrapping methods to estimate bias-corrected asymmetric confidence intervals (CIs) with 5000 resamples with replacement. In each mediation model, one NICU stressor (i.e., Sights and Sounds, Infant's Look and Behaviour and Parental Role Alterations) was alternatively chosen as the independent variable (X), Anxiety (M) was chosen as mediator while IBS was used as dependent variable (Y).

VII.4 Results

Eighty parents (mothers $N=44$; fathers $N=36$) of 51 infants participated to the study. Descriptive data of the included parents are reported in Table 16 while infant characteristics ($N = 51$) are displayed in Table 17.

Table 16. Comparisons among parental sociodemographic information.

	Mothers (N=44)	Fathers (N=36)	<i>p</i>
Age			
Mean (SD)	33.8 (6)	38.5 (8.6)	.19
Median	32	36	
Range	27;49	27;60	
Educational level			
Middle school	4 (9.1%)	4 (11.1%)	.91
High school	19 (43.2%)	14 (38.9%)	
University	8 (18.2%)	7 (19.4%)	
Missing	13 (29.5%)	11 (30.6%)	
Administration time (days)			
Mean (SD)	23.5 (24.5)	24.4 (26.2)	.87
Median	14	14	
Range	2;111	2;111	

Student's t test was used for mean differences. Chi-square test was used for frequencies.

Table 17. Infants (N = 51) characteristics and neurodevelopmental outcomes.

	N(%)	Mean (SD)	Median	range
Sex				
Female	16(31.3)			
Gestational age (GA)		31.4 (4.1)	32	22; 40
Full term	4(8.8)			
Late preterm	8(17.7)			
Moderate preterm	12(26.6)			
Very preterm	15(33.3)			
Extremely preterm	9(20)			
Birthweight		1525.8 (573)	1440	480; 3190
Normal birthweight	5(11.1)			
LBW	14(31.1)			
VLBW	15(33.3)			
ELBW	11(24.4)			
Twins	6(13.3)			

Preliminary analyses showed that the three NICU stressors correlated with anxiety (Sights and Sounds $r = .483$ $p < .001$; Infant Look and Behaviour $r = .453$ $p < .001$; Parental Role Alterations $r = .443$ $p < .001$) and IBS symptoms (Sights and Sounds $r = .277$ $p = .014$; Infant Look and

Behaviour $r = .339$ $p = .002$; Parental Role Alterations $r = .278$ $p = .014$). Anxiety positively correlated with IBS symptoms ($r = .372$ $p < .001$). No sociodemographic data or infant characteristics correlated with IBS ($p > .05$)

H1: Mothers scored above the clinical cut-off for IBS more frequently than fathers (59.1% vs. 44.6%). Mean IBS symptom scores were significantly higher in mothers as compared to fathers ($t(78) = 2.364$, Cohen's $D = .515$, 95% CI[.081;.978], $p = .021$). IBS-SSS item comparison (Table 18) revealed that mothers experienced significantly higher presence of abdominal pain (Cramer's $V = 0.306$, $\chi^2 = 7.480$, $p = .006$) and distension (Cramer's $V = 0.247$, $\chi^2 = 4.869$, $p = .027$) than fathers.

Table 18. Comparison of IBS score, severity, incidence and IBS-SSS items among mothers and fathers.

		Mothers (N = 44)	Fathers (N = 36)	<i>p</i>
IBS score	Mean (SD)	114 (90)	72.6 (59.6)	.02**
IBS ≥ 75		26 (59.1%)	16 (44.4%)	.19
IBS severity	Mild	16 (36.3%)	13 (36.1%)	
	Moderate	8 (18.8%)	3 (5.5%)	
	Severe	2 (4.5%)	0 (0%)	
Presence of abdominal pain N (%)		13 (29.5%)	2 (5.5%)	.00***
Severity of abdominal pain	Mean (SD)	49.2 (18.8)	40(14.1)	.51
Number of days suffering of abdominal pain out of 10 day-time period*				
	Mean (SD)	3.3 (2.4)	3.6 (3)	.07
Presence of abdominal distension N (%)		14 (31.8%)	4 (11.1%)	.03**
Severity of abdominal distension	Mean (SD)	49.8 (24)	41 (18.8)	.42
Bowel habits satisfaction	Mean (SD)	43.5 (29.8)	40.6 (30.6)	.67
IBS impact on life functioning	Mean (SD)	32.4 (25.8)	23.4(20.6)	.08

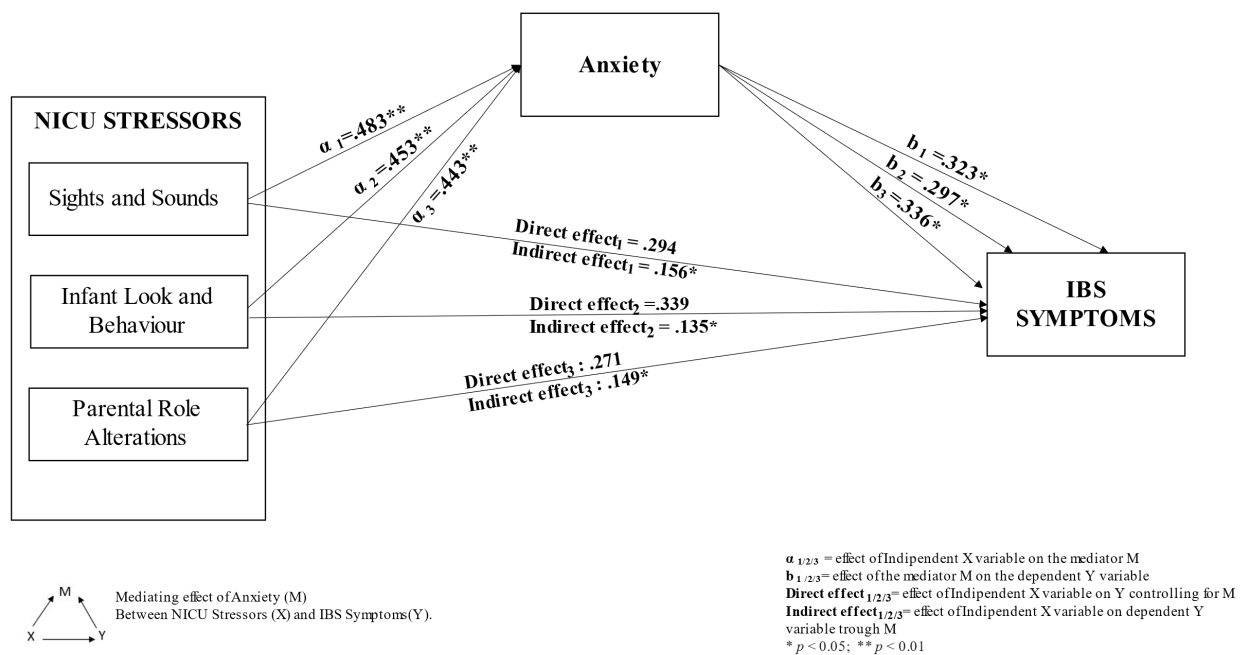
*Data reported refer to subjects who answered ≥ 1 day; ** $p < .05$; *** $p < .01$

H2: Sights and Sounds ($\beta = .483$, 95% CI:[3.204,7.841], $p = .00$), Infants Look and Behaviour ($\beta = .453$, 95% CI:[2.477,6.617], $p = .00$) and Parental Role Alterations ($\beta = .443$, 95% CI:[3.212,8.875], $p = .00$) predicted Anxiety. Moreover, Sights and Sounds ($R^2 = .077$, $\beta = .277$, 95% CI:[4.542,38.986], $p = .01$), Infants Look and Behaviour ($R^2 = .115$, $\beta = .339$, 95% CI:[8.653,38.652],

$p=.00$) and Parental Role Alterations ($R^2= .080$, $\beta=.278$, 95% CI:[5.525,46.612], $p=.01$) were associated with IBS symptoms as well. Finally, Anxiety was associated with IBS symptoms ($R^2= .138$, $\beta=.372$, 95% CI:[1.082,3.961], $p < .00$)

H3: As the assumptions for the mediation model were confirmed (i.e., $X \rightarrow Y$; $X \rightarrow M$; $M \rightarrow Y$) we could proceed to test the mediating effect of Anxiety among each NICU stressor (i.e., Sights and Sounds, Infant Look and Behaviour and Parental Role Alterations) and IBS symptoms. Confirming our hypothesis, a indirect association of Sights and Sounds ($\beta = .147$, SE = .058, 95% CI:[.046, .277]), Infant Look and Behaviour ($\beta = .117$, SE = .049, 95% CI:[.024, .215]) and Parental Role Alterations ($\beta = .132$, SE = .050, 95% CI:[.044, .241]) on IBS symptoms was found. The relationship was straightened and kept by anxiety. The summary of the three mediation models is displayed in Figure 20.

Figure 20. The summary of the mediation models among NICU stressors, anxiety and IBS symptoms in parents of NICU hospitalized infants.



VII.5 Summary, discussion, and implications

This study primary aimed to examine the prevalence, severity and characteristics of IBS in parents according to a biopsychosocial perspective sensitive to gender differences. To the best of our knowledge, our study demonstrated for the first time that NICU hospitalization can be a precipitating factor to IBS onset in parents of NICU infants.

Maternal IBS symptoms were higher than paternal ones and above the clinical cut-off. Our findings are in line with the epidemiology of IBS that is higher in females than males (Palsson et al., 2020). Importantly, somatic distress related to IBS may reflect the psychological distress that is usually higher in mothers as compared to fathers (Heidarzadeh et al., 2023; van Wyk et al., 2024).

Among the explaining factors, gender norms could play a key role to IBS development (Kym & Kym, 2018). In particular, the lack to achieve culturally accepted gendered norms as mothers (e.g., taking care of their infant better than anyone else; Cislighi & Heise, 2020) would contrast with the maternal feelings of exclusion from infant care experienced during NICU hospitalization (Wigert et al., 2006). This discrepancy may exacerbate maternal IBS symptoms during NICU hospitalization and activate a vicious circle of psychosomatic distress (Nelkowska, 2020) with cascading effects on family and work dynamics (Björkman et al., 2014).

Secondly, our study specifically investigated the relationship among NICU stressors, anxiety, and IBS. Importantly, we found that anxiety played a key role in the relationship among the effect of the three NICU stressors and IBS confirming that anxiety is a risk factor for IBS symptoms (Diao et al., 2023). Our findings enrich the comprehension of the interactions among NICU stressors and psychological distress leading to IBS development in parents of NICU infants. Targeting parental anxious symptoms due to NICU hospitalization using multi-layered interventions including Family-Centred Care practices, stress reduction strategies and cognitive-behavioural therapy may also stop the vicious circle of IBS symptom perpetuation (Hauser, Pletikosic & Tkalcic, 2014; Treyvaud et al., 2019).

Our study contributes to distinguish somatic experience among mothers and fathers during their infant NICU hospitalization. Psychoeducation and counselling on the psychological, somatic, and social consequences following admission (e.g., NICU environment, developmental care, and parental role expectations rather than actual possibilities) are warranting to inform and enable mothers and fathers to cope with the variety of reactions following NICU hospitalization. Moreover, education of healthcare providers is essential to enhance their understanding of the subtle gender norms that mothers and fathers must face to during NICU hospitalization in order to boost

the effectiveness of Family-Centred Care practices. Finally, policy makers and working managers should be aware of the potential family and work decrements experienced by parents during NICU hospitalization in order to avoid their financial distress (Lambiase et al., 2024).

Among the strengths of this study, we argue the description of IBS symptoms in both mothers and fathers of NICU hospitalized infants according to a biopsychosocial perspective sensitive to gender differences. Further, our study was able to capture the relationship among NICU stressors, anxiety and IBS improving mechanisms understanding and providing the opportunity to implement tailored interventions (Barbara et al., 2022). Among the limitations of our study, we acknowledge the relatively small sample size. Moreover, the cross-sectional design of the study implies that no causal relationship among the variables can be established. Future studies could investigate NICU stressors, anxiety and IBS at different time points during NICU hospitalization or after discharge to ensure the causal relationship among those variables. Further, research on factors mitigating IBS symptoms in mothers and fathers during NICU hospitalization are warranting to improve FCC practices.

For the first time this study explored IBS in parents of NICU hospitalized infants. Importantly, this study newly emphasizes a specific pattern for IBS development in parents during NICU hospitalization. Further, our findings contribute to elucidate the somatic distressful experience of mothers and fathers during NICU stay of their own infant and its interplay with psychological distress. This study also provides valuable suggestions to improve parent-staff interactions. NICU hospitalization deserves to be studied as a stressful life experience implying psychological and somatic distress in parents and changes in family and work dynamics within a biopsychosocial model. Implications of these findings include the need to provide tailored stress-reduction interventions sensitive to gender differences in order to reduce parental distress and support parental involvement during NICU hospitalization.

Chapter VIII

Irritable bowel syndrome in parents of NICU discharged infants: gender differences and the interplay with psychological distress and psychophysical well-being

VIII.1 Introduction

Irritable bowel syndrome (IBS) represents a common functional gastrointestinal disorder (FGD) ranging from 5-to-10% within the general population (Sperber et al., 2017). It is a symptom-based condition defined by the presence of abdominal pain or discomfort, with altered bowel habits, in the absence of any other disease to cause these symptoms (Schmulson & Drossman, 2017). IBS is 1.5 times more common in women as compared to men (American College of Gastroenterology Task Force on Irritable Bowel Syndrome et al., 2009) showing a high overlap with psychological symptoms. In particular, subjects suffering of IBS usually report higher rates of anxiety and depression as compared to the general population (Grover et al., 2021). Several studies have shown the complex bidirectional connection between the Central Nervous System (CNS) and the Enteric Nervous System (ENS) expressed through the gastrointestinal tract, namely the brain-gut axis (Rhee, Pothoulakis & Mayer, 2009; Tillisch, Mayer, Labus, 2011; Pellissier & Bonaz, 2017).

Recently, significant associations have been found between post-traumatic stress disorder (PTSD) due to both physical and psychological life stressors and IBS onset, supporting a holistic perspective that includes the influence of psychosocial aspects on IBS (Ng et al., 2019). Therefore, the fourth edition of the diagnostic manual of the Functional Gastrointestinal Disorders (i.e., the Rome IV) leads to a paradigm shift from FGD to gut-brain interaction disorders (GBID) underlying the importance to assume a multidimensional perspective (Drossman & Hasler, 2016) including elements like age and gender within a biopsychosocial framework that considers biological functions, psychological characteristics and social factors and their interplay to determine IBS onset (Van Oudenhove et al., 2016).

The birth of an infant requiring an admission to the Neonatal Intensive Care Unit (NICU) is frequently associated with parental anxiety, stress, depression, and PTSD symptoms both during hospitalization (McKeown et al., 2023) and after discharge (Malouf et al., 2022; Salomè et al., 2022; Sandnes et al., 2024). Such traumatic experience could strongly interfere with the normal transition into parenthood and lead to mental health concerns (Salomè et al., 2022) that in turn may

impact on child development (McLean et al., 2022). Therefore, adopting a biopsychosocial perspective (Grunberg et al., 2023) that examines the interplay among mind-body interactions (i.e., psychological, and physical distress) and environmental factors (i.e., infant neurodevelopment) within a sensitive-to-gender differences framework (Salomè et al., 2022] is important to deeply expand knowledge on psychophysical well-being in parents of NICU discharged infants. Moreover, up to date, to our knowledge, no studies evaluated IBS symptoms in parents of NICU graduated infants and their interplay with psychological distress to determine psychophysical well-being.

VIII.2 Objectives

To this aim, our primary outcome was examining IBS prevalence, characteristics, and the impact of IBS both in terms of symptom intensity and on perceived quality of life in mothers as compared to fathers of NICU discharged infants after 6-to-18 months since NICU admission. The secondary outcome was exploring associations among IBS, psychological distress (i.e., anxiety, depression, NICU-related stress, and PTSD symptoms) and psychophysical well-being in mothers and fathers of NICU discharged infants.

VIII.3 Methods: Sampling and Procedure

The Revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) guidelines were used to report this cross-sectional, single-centre study. The study was approved by the local Ethics Committee (protocol number: 126/24) and parents filled in written informed consent to participate to the study. The study was in accordance with the provisions of the 1995 Declaration of Helsinki and subsequent modifications. Parents were informed about the scope of the study by a research psychologist and asked to fill out standardized questionnaires online or in person according to their preference from February to June 2024. Inclusion criteria to be enrolled: being parents of NICU discharged infant who experienced admission from 6-to-18 months age. Exclusion criteria were a diagnosis of IBS prior to the NICU admission, the presence of a positive history of organic bowel disorders (i.e., inflammatory bowel disease, celiac disease, diverticular disease, and others), major gastrointestinal surgeries (excluding appendectomy) or any other systemic disorder with possible gastrointestinal involvement (excluding thyroid disorders in euthyroidism). All the questionnaires are validated tools with good psychometric proprieties. For this study questionnaires were firstly piloted to a subsample of NICU graduated parents to test content and clarity. Cronbach'

alpha values to test internal reliability were calculated for each questionnaire and reported below along with the description of the questionnaires.

VIII.3.1 Measurement Tools

Sociodemographic information about parents (i.e., parental age, education level, being first time parent and months from NICU admission to questionnaire administration) and *infant characteristics* (i.e., gestational age, birthweight, being twin, neurodevelopmental outcome and type of impairment).

IBS-Symptom Severity (IBS-SSS; Francis, Morris & Whorwell, 1997) evaluates presence and severity of gastrointestinal symptoms. The IBS-SSS ($\alpha = .72$) ranges from 0 to 500 with higher scores indicating more severe symptoms. Subjects can be categorized as having mild (75-175), moderate (175-300), or severe (>300) IBS.

IBS-Quality of Life (IBS-QoL; Patrick et al., 1998) consists of 8 subscales measuring aspects related to the quality of life impacted by IBS symptoms: Dysphoria (DY, $\alpha = .89$), Interference with Activity (IN, $\alpha = .89$), Body Image (BI, $\alpha = .83$), Health Worry (HW, $\alpha = .60$), Food Avoidance (FA, $\alpha = .66$), Social Reaction (SR, $\alpha = .60$), Sexual well-being (SX, $\alpha = .79$), Relationship (RL, $\alpha = .50$) and an Overall score ($\alpha = .96$). Items are rated on a 5-point Likert scale ranging from 1 = Not at all to 5 = Extremely. Overall and subscale scores were computed according to the reversing responses making 5=Not at all, 4=Slightly, 3=Moderately, 2=Quite a bit, and 1=Extremely, then calculating a summary total of the overall score and eight subscales by totalling up the reverse coded values of the component items in each of the 9 groups using the formula reported on the published guidelines [18;19].

The Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU; Miles, Funk & Carlson, 1993) encompasses 34 items divided into 3 subscales: Sights & Sounds ($\alpha = .82$), Infant Look and Behavior ($\alpha = .92$) and Parental Role Alterations ($\alpha = .89$) and a general stress item. Parents had to rate each item on a 5-point Likert scale ranging from 1 (not at all stressful) to 5 (extremely stressful) according to their stress at time of administration. An overall stress score is computed from the three subscales ranging from 0 to 5. PSS:NICU scores can be computed according to Miles et al. (1993), using two methods: (a) the Stress Occurrence Level (SOL) calculated including only experienced items and (b) the Overall Stress Level (OSL) scoring “not applicable items” with one point. As our focus of interest was related to parental real lived experience, we used the SOL

method to capture the relationships among NICU-related stressful memories and the other study variables. For this study the SOL score had excellent internal reliability ($\alpha = .94$).

Self-rating depression scale (SDS; Zung, 1965) and *Self-rating anxiety scale* (SAS; Zung, 1971) are two 20-item-self-report questionnaires that evaluate anxious and depressive symptoms. The items are related to the week before administering the questionnaires, with higher scores corresponding to higher levels of anxiety and depression. Scores < 50 indicate absence of psychopathological disturbances, whilst anxiety and depression based on the results of the questionnaires are labelled as mild (score ranging from 50–to-59), moderate (score ranging from 60–to-69) and severe (score > 70). Cronbach' alpha was $\alpha = .77$ for SDS and $\alpha = .61$ for SAS.

Impact of Event Scale- Revised (IES-R; Weis & Marmar, 1997) is a 22-item-self-report measure for PTSD following the DSM-IV criteria. It evaluates subjective distress caused by traumatic events. IES-R consists of three subscales encompassing the following psychopathological domains: avoidance ($\alpha = .83$), intrusive thoughts and mental images ($\alpha = .90$), and hyperarousal ($\alpha = .90$) and a PTSD total score ($\alpha = .94$). Each item is rated by the participants on a scale from 0 to 4 (0 = “not at all”, 1 = “a little bit”, 2 = “moderately”, 3 = “quite a bit” and 4 = “extremely”). We used mean scores for each subscale that range from 0 to 4 and the total mean score (ranging from 0 to 12) in order to compare PTSD psychopathological domains in parents. According to the latest guidelines, we considered a raw overall score > 32 as an index of suspicion for PTSD clinical diagnosis (Creamer, Bell & Failla, 2003).

Short Form Health Survey-36 (SF-36; Ware & Sherbourne, 1992) is a 36-item self-report survey measuring psychophysical well-being. It encompasses eight subscales: physical functioning (PF, $\alpha = .88$), role physical (RP, $\alpha = .90$), bodily pain (BP, $\alpha = .79$), general health (GH, $\alpha = .63$), vitality (VT, $\alpha = .74$), social functioning (SF, $\alpha = .72$), role emotional (RE, $\alpha = .81$), and mental health (MH, $\alpha = .79$). These subscales measure two distinct general factors: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). For this study only the subscales were used in order to examine what dimension of psychophysical well-being is influenced by IBS. Moreover, the Health Change index was used to explore any changes in health within the last year. The cut-off value < 50 was used in order to categorize parents with poor psychophysical well-being (Apolone & Mosconi, 1998).

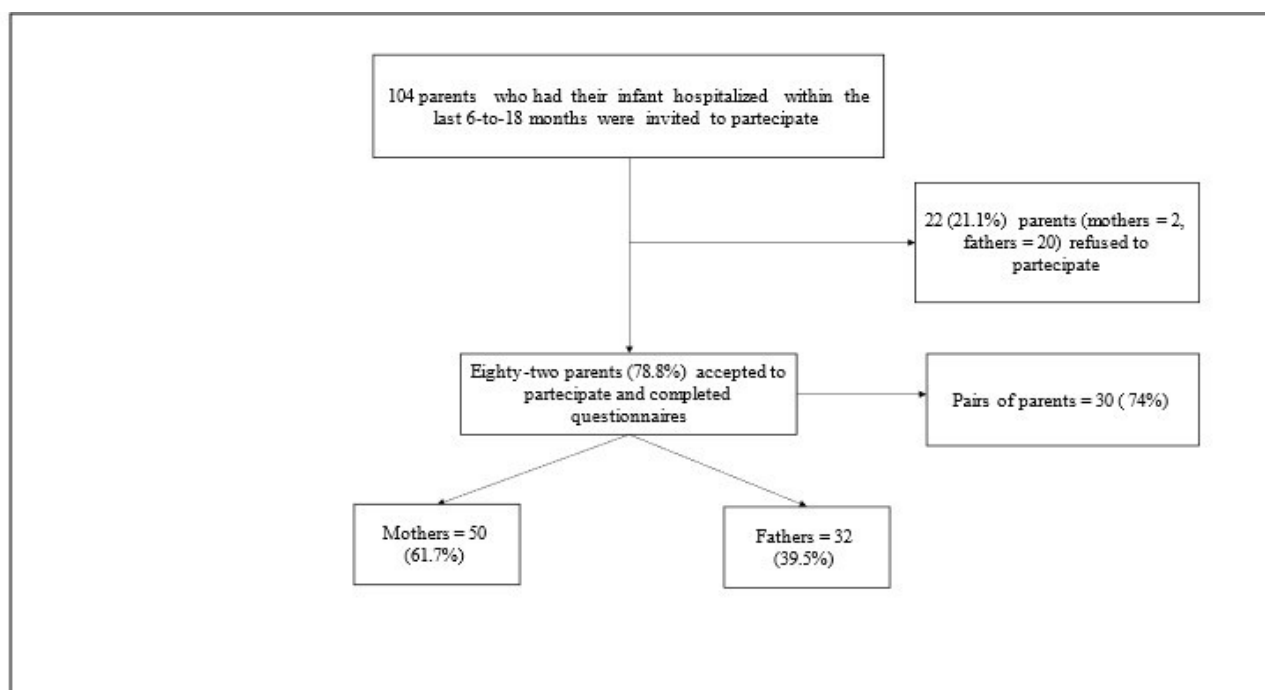
VIII.3.2 Data Analyses

Data were analyzed with SPSS Statistics v.29 software (IBM SPSS, 2024). Normal data distribution was tested checking for Skewness (range -2 to +2) and Kurtosis (range -7 to +7) according to the scientific literature (West, Finch & Curran, 1995; Hair et al., 2010; Ryu, 2011). All variables fell within those ranges. Thus, data were approximately normally distributed. Quantitative variables are presented as mean $\pm$ SD, categorical variables as frequencies and percentages. Quantitative variables were compared among mothers and fathers using Student's *t* test for independent samples while Chi-square test were used for categorical variables. Correlation analyses were performed using the Pearson correlation test in both mothers and fathers. Based on the correlations found binary logistic regression was run to test variables associated with IBS diagnosis in both mothers and fathers. Hierarchical linear regression analysis controlling for age were run to explore the contribution of psychological distress (i.e., NICU stressful memories, anxiety, depression, and PTSD) to irritable bowel syndrome and to test the impact of IBS on parental psychophysical well-being in both mothers and fathers. The level of significance was set at $p < .05$.

VIII.4 Results

A total of 104 (mothers = 52, fathers = 52) parents were asked to participate to the study during the routinely developmental follow-up visit of their infant. Figure 21 reports the flow diagram of participation route.

Figure 21. Flow diagram of participant recruitment.



Descriptive statistics for the final sample of the participating parents according to gender (i.e., mothers vs. fathers) are reported in Table 19.

Table 19. Comparisons among maternal and paternal sociodemographic information.

		Mothers (N=50)	Fathers (N=32)	<i>p</i>
Age	Mean (SD)	34.2 (6)	36.2 (7.4)	.19
	Median (range)	33 (19;49)	35 (21;54)	
Educational level N(%)	Middle school	4 (8%)	4 (12.5%)	.63
	High school	27 (54%)	19 (59.4%)	
	University	13 (26%)	6 (18.7%)	
	Missing	6 (12%)	3 (9.4%)	
Being first time parent		10 (20%)	8 (25%)	.59
Months from NICU admission (months)	Mean (SD)	12.3 (3.9)	12.1 (4)	.81
	Median (range)	13.5 (6;18)	12 (6;18)	

Student's t test was used for mean differences. Chi-square test was used for frequencies.

No statistically significant differences were found with regards to sociodemographic characteristics (i.e., age, education level, being first time parent and months at questionnaires administration since NICU admission). Characteristics of the recruited infants are reported in Table 20.

Table 20. Infants (N = 58) characteristics and neurodevelopmental outcomes.

	N (%)	Mean (SD)	Median (range)
Gestational age (GA)			
Full term	2(3.8)		
Late preterm	3(5.8)		
Moderate preterm	13(25)		
Very preterm	23(44.2)		
Extreme preterm	11(21.2)		
Birthweight			
Normal birthweight	2(3.8)		
LBW	10(19.2)		
VLBW	24(46.2)		
ELBW	16(30.8)		
Time spent in NICU (days)		61.6 (50.2)	45.5 (12; 223)
Twins	6(11.5)		
Developmental impairments	16 (27.8)		
Type of impairment			
Feeding issues	2 (16)		
Abnormal tone	6 (37.5)		
Language delay	1 (1.9)		
Global developmental delay	6 (6.2)		
Hyperactivity	3 (18.7)		
Irritability	1 (1.9)		
Social impairments	1 (1.9)		

Mothers reported higher IBS prevalence ($X^2_{1,82}= 4.728$, Cramer's $V=.240$, $p=.030$) and IBS score ($t(80) = 2.411$, Cohen's $D = .546$, $p=.018$; Table 21) than fathers.

Table 21. IBS-SSS mean score and item comparisons among mothers and fathers.

		Mothers (N = 50)	Fathers (N = 32)	<i>p</i>
IBS ≥ 75		34 (68%)	14 (46.9%)	.03
IBS score				
	Mean (SD)	103.2 (70.46)	65.78 (64.09)	.02
IBS severity	Mild	25 (50%)	13 (40.6%)	.31
	Moderate	9 (18%)	2 (6.2%)	
Presence of abdominal pain				
N (%)		11 (22%)	5 (15.6%)	.47
Severity of abdominal pain				
Mean (SD)		39.09 (24.37)	32 (13.04)	.55
Number of days suffering of abdominal pain out of 10 day-time period		2.5 (2.09)	3.67 (3.27)	.32
Presence of abdominal distension				
N (%)		16 (32%)	5 (15.6%)	.09
Severity of abdominal distension				
Mean (SD)		41.87 (18.15)	35 (14.14)	.45
Bowel habits satisfaction				
Mean (SD)		45 (26.55)	39.68 (30.95)	.41
IBS impact on life functioning				
Mean (SD)		32.90 (22.63)	24.68(20.82)	.10

Mothers also reported lower IBS-QoL than fathers to the overall score ($t(66)=-2.306$, Cohen's $D = -.474$, $p = .024$) and to the body image ($t(49)= 2.928$, Cohen's $D=.560$, $p=.005$), health worry ($t(63)= 2.353$, Cohen's $D=.482$, $p=.022$), social reaction ($t(63)=2.548$, Cohen's $D=.524$, $p=.013$) and sexual well-being subscales ($t(43)= 2.302$, Cohen's $D= .430$, $p = .026$; Table 22).

Table 22. IBS-QoL subscale mean comparisons among mothers and fathers.

	Mothers (N = 44)	Fathers (N = 24)	<i>p</i>
Overall	94.06 (10.51)	98.28 (4.46)	.02
Dysphoria	80.83 (8.82)	82.55 (4.60)	.37
Interference with Activity	95.94 (10.08)	97.91 (5.25)	.37
Body Image	92.61 (14.47)	99.22 (2.80)	.00
Health Worry	93.37 (12.90)	98.61 (5.30)	.02
Food Avoidance	90.15 (15.48)	94.09 (11.90)	.24
Social Reaction	93.60 (12.09)	98.95 (5.10)	.01
Sexual well-being	96.31 (10.64)	100 (.0)	.02
Relationship	96.40 (8.69)	98.95 (5.10)	.13

Mothers significantly scored higher than fathers in parental role alteration ($t(80) = 3.623$, Cohen's $D = .820$, $p < .001$). No other statistically significant difference was detected in NICU-related stressful memories. Mothers significantly scored higher than fathers with regards to depression ($t(80) = 2.202$, Cohen's $D = .498$, $p = .03$) but no difference was found among mothers and fathers in the clinical level of depressive symptoms (mothers = 50%, fathers = 53.12%, $p = .126$). No parents reported severe depressive symptoms. With regards to anxious symptoms, mothers scored higher than fathers ($t(80) = 4.441$, Cohen's $D = 1.005$, $p < .001$). Mothers showed a higher frequency of clinically significant anxiety levels as compared to fathers (mothers = 34% vs fathers = 6.2%; $\chi^2_{1,82} = 8.440$, Cramer's $V = .321$, $p = .004$). No parents reported severe anxious symptoms. Mothers significantly showed higher PTSD symptoms ($t(78) = 2.254$, Cohen's $D = .783$, $p = .01$) scoring above the clinical cut-off more frequently than fathers (56.2% vs. 21.9%; $\chi^2_{1,82} = 9.284$, $p = .002$). The former experienced significantly higher intrusive thoughts ($t(78) = 3.469$, Cohen's $D = .792$, $p < .001$) and hyperarousal activation ($t(78) = 2.284$, Cohen's $D = .521$, $p = .01$) than the latter.

IBS score correlated with child irritability ($r = -.361$, $p = .01$), total PTSD score ($r = .366$, $p = .01$) and its symptoms (Avoidance $r = .340$, $p = .02$; Intrusive thoughts $r = .337$, $p = .02$; Hyperarousal $r = .307$, $p = .03$) in mothers. Paternal IBS score correlated with anxiety ($r = .526$, $p = .002$) and depression ($r = .371$, $p = .04$). With regards to maternal IBS-QoL domains, dysphoria ($r = -.702$, $p < .001$), interference with activity ($r = -.702$, $p < .001$), body image ($r = -.587$, $p < .001$), food avoidance ($r = -.483$, $p < .001$), sexual ($r = -.671$, $p < .001$), relationship ($r = -.380$, $p = .011$), and IBS-QoL overall score ($r = -.517$, $p < .001$) negatively correlated with child irritability. Social reaction correlated with birthweight ($r = -.363$, $p = .016$) and child irritability ($r = -.556$, $p < .001$), while health worry correlated with child hyperactivity ($r = -.314$, $p = .038$). Paternal education

level negatively correlated with IBS-QoL overall score ($r = .450, p = .031$) and food avoidance ($r = -.431, p = .040$). No correlations were found among IBS-QoL overall score or subscales and the psychological distress variables neither in mothers nor in fathers.

Regression analysis showed that, after controlling for age, child irritability ($R^2 = .251, \beta = -.349, CI: [-312.960, -35.797], p = .014$) and total PTSD symptoms ($\beta = .354, CI: [.251, 2.261], p = .015$) were associated with maternal IBS score. Paternal anxious symptoms were associated with their IBS score ($R^2 = .324, \beta = .572, CI: [1.699, 6.009], p = .001$) and their IBS diagnosis ($R^2 \text{ Nagelkerke} = .294, \text{Exp}(B) = .876, CI: [.779, .985], p = .026$).

After controlling for age, child irritability was negatively associated with IBS-QoL overall score ($R^2 = .268, \beta = -.519, CI: [-55.228, -17.233], p < .001$), dysphoria ($R^2 = .480, \beta = -.716, CI: [-55.071, -28.832], p < .001$), interference with activity ($R^2 = .504, \beta = -.716, CI: [-62.938, -32.951], p < .001$), body image ($R^2 = .359, \beta = -.571, CI: [-79.306, -30.412], p < .001$), food avoidance, ($R^2 = .233, \beta = -.482, CI: [-78.101, -20.849], p = .001$) and relationship ($R^2 = .153, \beta = -.393, CI: [-39.522, -5.756], p = .010$) in mothers. Birthweight ($\beta = -.345, CI: [-.014, -.003], p < .006$) and child irritability ($\beta = -.539, CI: [-62.792, -23.617], p < .001$) jointly explained the 42.8% of variance of social reaction linked to IBS in mothers.

No significant differences were found in any of the psychophysical well-being of SF-36 indices among mothers and fathers. The health change index revealed that 20% of mothers and 21.8% of fathers assessed their health as quite worse than one year ago, while 32% of mothers and 43.7% of fathers experienced no change in their health. In total, 48% of mothers and 34.4% of fathers experienced an improvement in their general health as compared to the previous year.

IBS score negatively correlated with maternal general health ($r = -.380, p < .01$) and with vitality scores in fathers ($r = -.474, p < .01$). Maternal general health perception correlated with the IBS-QoL overall score ($r = .327, p = .030$), dysphoria ($r = .315, p = .037$), interference with activity ($r = .315, p = .037$), body image ($r = .305, p = .044$), health worry ($r = .325, p = .031$), social reaction ($r = .345, p = .022$). No correlation was found among paternal IBS-QoL subscales and their SF-36 psychophysical well-being indices.

Regression analysis showed that maternal age ($\beta = .441, CI: [.472, 1.880], p = .003$) and IBS score ($\beta = -.358, CI: [-144, -.023], p = .008$) jointly explained 32.4% of general health perception variance. Paternal IBS score was associated with vitality ($R^2 = .250, \beta = -.499, CI: [-.254, -.050], p = .005$).

VIII.5 Summary, discussion, and implications

Our findings highlight a significant difference in IBS prevalence in mothers (68%) than fathers (46.9%) one year after NICU discharge. This is in line with the data from the general population where prevalence is higher in females than males (Almario et al., 2023).

Moreover, with regards to mothers, being young and with elevated IBS symptoms increased the risk to experience worse psychophysical well-being while elevated IBS symptoms increased perception of low vitality in fathers. Notably, QoL was more affected by IBS in mothers than fathers. Our data are in line with a study on IBS patients, in which females show low levels of QoL than males (Trindade et al., 2022). Maternal experience of IBS particularly affects areas linked to both individual (i.e., their own body image perception and health worry) and relational dimensions (i.e., worries concerning social reaction to their own IBS symptoms and sexual well-being). Those gender differences call for a holistic perspective that include IBS to address specific needs of mothers encompassing changes in their multiple roles both after childbirth (being woman, partner, and mother; Delicate et al., 2018) and NICU discharge (being worker; Lambiase et al., 2024).

Our findings showed that there were no differences among mothers and fathers in any dimension of the psychophysical well-being. Our results are in line with the literature focusing on parents of NICU infants (Amorim et al., 2018).

Furthermore, the Health Change index showed that around one-half of mothers and one third of fathers experienced an improvement than NICU hospitalization. These results expand the process of adjustment of NICU graduated parents that in some cases might reach levels of well-being like those of parents of healthy full-term infants already after 4-to-6 months since childbirth (Alves et al., 2023).

On the contrary, a quarter of parents went for a worsening of their own perceived health. These findings suggest that NICU parents could follow different health-related paths due to a wide range of difficulties that have to face after discharge (Lambiase et al., 2024; Shaw et al., 2023).

With regards to the relationship among psychological distress and IBS our results showed that while paternal IBS is related to anxious symptoms (Fond et al., 2014), PTSD symptoms after NICU discharge is associated with IBS in mothers. Gender differences in comorbidities among parents with IBS need to be considered in order to design targeted interventions.

Moreover, child irritability was linked to maternal IBS. Notably, IBS and child irritability affecting each other may disrupt the mother-infant relationship during the first year of life leading to increase

maternal perception of their own child as difficult to handle (Horwitz et al., 2015) and the adoption of maladaptive parenting (Poehlmann et al., 2012). Those behaviours can in turn reinforce child behavioural issues (Wittig & Rodriguez, 2019) leading to a vicious circle of alterations in the mother-child dyad. Importantly, while several studies investigated parenting stress related to children with neurodevelopmental disorders (Valicenti-McDermott et al., 2015; Craig et al., 2016; Ilchena et al., 2023), more subtle interactive disruptions of mother-child relationship related to child irritability might be underestimated from child doctors and nurses (Reijneveld et al., 2008). Therefore, adopting a Family-Centered Care approach extended to the period after discharge, the neurodevelopmental follow-up visits should aim to verify the presence of early disruptions in the mother-child relationship and provide focused interventions.

Among the strengths of this study, we argue the description of IBS symptoms in both mothers and fathers of NICU discharged infants. Further, the adoption of a biopsychosocial perspective sensitive to gender differences was able to capture the relationship among IBS and psychological distress and its role on psychophysical well-being. Among the limitations of our study, we acknowledge the relatively small sample size and the lack of parents of healthy full-term infants as control group. Finally, lack of a longitudinal study design from NICU hospitalization to the first years after discharge do not permit to establish causal relationships among psychological and somatic variables.

Importantly, our findings outline that IBS symptoms is another aspect of parenting stress that may be increased from child irritability. Those data call for screening parenting difficulties and both their psychological (i.e., PTSD in mothers and anxiety in fathers) somatic (i.e., IBS) and environmental (i.e., child behaviour) associated dimensions. Early detection and interventions focused on positive mother-father-infant bonding development since NICU hospitalization are promising to promote parental self-efficacy after discharge (Gerstein, Poehlmann-Tynan & Clark, 2015; Shoghi, Sohrabi & Rasouli, 2018; Yu et al., 2022). Moreover, developmental follow-up visits may be beneficial to early detect disruptions in parent-child relationship and provide targeted trainings to promote positive mother-father-child interactions and the whole family well-being (Gonzales et al., 2023).

For the first time this study explored IBS in parents of NICU discharged infants. Importantly, this study newly emphasizes specific relationships among psychological factors and IBS according to gender. In particular, maternal IBS was related to traumatic NICU experience and child current behavioural issues while anxious symptoms were linked to paternal IBS after NICU discharge. Furthermore, the interplay among maternal IBS and child irritability could play a pivotal role to

affect the subsequent mother-child interactions. Examining the interplay among psychological and physical distress including environmental factors within a biopsychosocial perspective sensitive-to-gender differences framework is pivotal to capture both psychological and physical dimensions related to psychophysical well-being in parents of NICU discharged infants. Those findings can be useful to implement tailored interventions for mothers and fathers after NICU discharge and improve family well-being.

Part 4:

**From the other side of the incubator: specifiers of nursing critically ill
infants**

Chapter IX

Caring till the end: psychological impact, mediating, and moderating factors of nursing death or dying patients in Adult and Neonatal Intensive Care Unit

IX.1 Introduction

Work-related stress in health care settings is widely studied (Gabeyehu & Zeleke, 2019; Yesuf et al., 2022). In this context, nurses are the frontline health care providers across the wards. Therefore, nurses are at higher risk to experience stress and adverse psychological health (Birgit, Gunnevi & Ann, 2013) as compared to the other health care professionals (Salyers et al., 2017).

Importantly, World Health Organization (WHO) estimated that shortage of nurses would reach 9 million by 2030 (WHO, 2016). Indeed, several stress management interventions have been developed in order to promote occupational health in nurses (Alkhawaldeh et al., 2020a; Alkhawaldeh et al., 2020b; Hasani et al., 2022).

As nursing is increasingly regarded as one of the most challenging and emotionally demanding occupations (Della Bella et al., 2022; Xiao et al., 2022; Zhang et al., 2024), and this is particularly true for nurses working in Intensive Care Units (ICUs) (Azadi et al., 2020;; Preto & Pedrão, 2009), who are indeed required not only to provide highly qualified medical assistance, but also to manage—often without any training or support—the emotional burden of dealing with patients under life-threatening conditions along with the emotional load of patients’ relatives (Kynoch et al., 2016; Lief et al., 2018; Rodriguez-Ruiz, Latour, van Mol, 2025).

From this perspective, research has clearly demonstrated that nurses’ duties and tasks—both the formal and the informal (relational) ones—continuously challenge them with a wide set of specific stressors (Abu Safieh et al., 2024; Saedpanah, Salehi, Moghaddam, 2016), such as high workload (Lucchini, de Souza Nogueira, & Bambi, 2025), perceived inadequate emotional and technical preparation (Mohamedkheir et al., 2016; Chatzigianni et al., 2018; Zhao et al., 2024), along with the management of relationships/potential conflicts within the wards, i.e., with supervisors, with/between nurses, physicians, and patients and their relatives (Mulcahy et al., 2024).

However, above all, research highlighted the emotional demands of dealing with death and dying/suffering patients as being one of the main stressors threatening nurses’ wellbeing (Mealer et al., 2007; Mohamedkheir et al., 2016; Chatzigianni et al., 2018]. Dealing with death and

dying/suffering patients is—indeed—the sole unavoidable source of stress repeatedly and inherently featuring the daily life of nurses [Saedpanah, Salehi, Moghaddam, 2016; Bloomer et al., 2023], “silently” threatening their psychological health conditions repeatedly over each work-shift, beyond the working unit. This, however, can be particularly/differently challenging in ICU, in which nurses deal with critically ill, unstable, and/or dying adult patients [10,20–24] and, even more, in Neonatal Intensive Care Units (NICUs) (Almeida, Moraes, Cunha, 2016; Köktürk et al., 2022; Gibson, Homeyer, Warland, 2018), where it is a potential and very fragile new life that is ‘suspended’, and nurses are also required—to a greater extent—to take charge of the emotional containment (fears/hopes) of the patient’s relatives. From this perspective, the requests of dealing with the fragility of new born babies in life-threatening/unstable conditions (often for a prolonged period)—along with the requests for information and reassurances from the family members—could potentially exacerbate the burden of NICU nursing staff, who need to reckon with the reality that—despite all the efforts and the rigorous following of the “gold standard” of care—the new born could not survive.

Despite the clear psychological costs of dealing with death and dying patients in ICU (Lief et al., 2018; , Hafifah, Wisesrith & Ua-Kit, 2025; Ozga, Woźniak, Gurowiec, 2020; Shorter, Stayt, 2010; Todaro-Franceschi, 2013; Velarde-García, 2016) and NICU (Almeida, Moraes, Cunha, 2016; Köktürk et al., 2022; Gibson, Homeyer, Warland, 2018), there is still a lack of studies that explore—from a comprehensive and more complex perspective—the psychological impact of this stressor, namely by also considering the role of further factors potentially intervening in this well-demonstrated relationship. In other words, there is a need to develop research aimed at understanding the mechanisms underlying the relationship between Death-and-Dying-Stressor and nurses’ psychological health conditions by identifying further and—most importantly—modifiable factors that can exacerbate or mitigate the detrimental effects of this unmodifiable stressor. This could indeed support the development of targeted interventions fostering the psychological health of nurses working in ICU and NICU (Kynoch et al., 2016), who need to be provided with adequate resources for adjusting to highly demanding work duties and the routine experiences with death and the dying.

In this direction, recently, research has provided a statistically valid multidimensional transactional model, namely the Demands Resources and Individual Effects (DRIVE)-Nurses-Model (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018), This model allows researchers and practitioners to assess and monitor the impact of a wide range of factors influencing nurses’ psychophysical health conditions. This is by accounting for the effects of the complex

interplay among risks and resources (i.e., exploring and identifying main/mediating/moderating effects), reflecting real-life circumstances in which nurses are simultaneously exposed to multiple hazards yet they could also possess different resources to deal with them (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018). In this perspective, previous research applications of the DRIVE-Nurses-Model underlined risk profiles and vicious circles undermining nurses' psychological health, yet also identifying specific coping strategies (Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024), along with work-resources (i.e., job control, social support, rewards), that are able to significantly counteract the detrimental effects of risk factors on nurses' wellbeing (Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024; Vallone & Zurlo, 2024; Zurlo, Vallone & Smith, 2020).

Therefore, it can be hypothesized that the application of the DRIVE-Nurses-Model to improve the experience of nurses working in ICU and NICU would also advance the understanding of the mechanisms underlying the relationship between the main and unavoidable stressor of Death-and-Dying and nurses' psychological health conditions by identifying further risk and protective factors (i.e., Stressors in Nursing, Work-Resources and Coping-Strategies) intervening in this association and potentially targeting them through tailored interventions.

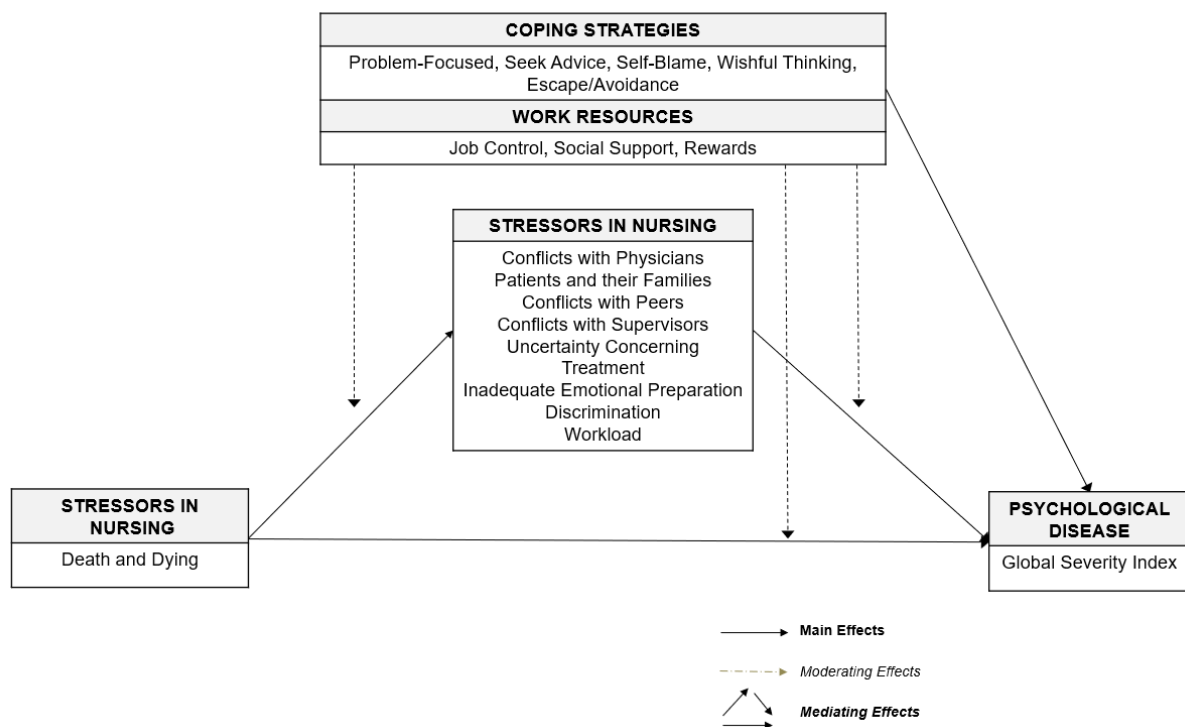
IX.2 Objectives

The present study proposed a research application of the DRIVE-Nurses-Model (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024; Vallone & Zurlo, 2024; Zurlo, Vallone & Smith, 2020) to achieve a more comprehensive understanding of the experience of nurses working in ICU and NICU, with a particular focus on the psychological impact of dealing with death/critically ill/unstable patients. Specifically, this study aims to firstly explore and compare the experiences of nurses working in ICU and NICU by investigating the effects of the interplay (main/mediating effects) between the specific and unavoidable Stressor in Nursing of Death-and-Dying with further potential Stressors in Nursing (Conflicts-with-Physicians, Peers, Supervisors, Patients/their families, Uncertainty-Concerning-Treatment, Inadequate-Emotional-Preparation, Discrimination, Workload) on nurses' psychological health conditions, according to the working unit (ICU and NICU). Also, given the interest in identifying potential individual and work-related resources able to further intervene in this association, the potential moderating role of Coping-Strategies (Problem-focused, Seek-Advice,

Self-Blame, Wishful Thinking, Escape/Avoidance) and Work-Resources (Job-Control, Social-Support, Rewards) was explored and compared according to the working unit.

In line with the study aims, the following research questions have been developed, graphically illustrated (Figure 22), and originally tested:

Figure 22. Conceptual framework.



Research Question One (RQ1)—Preliminary Differences in Study Variables: Are there differences in Background Information, in perceived levels of Stressors in Nursing, in the recourse to Coping Strategies, and in perceived levels of Work-Resources and Psychological Disease reported by nurses according to the working unit (ICU and NICU)?

Research Question Two (RQ2)—Main Effects: Are there differences in the associations between perceived Stressors in Nursing, Coping-Strategies, and Work-Resources respectively, with Psychological Disease according to the working unit (ICU and NICU)?

Research Question Three (RQ3)—Mediating Effects: Is the relationship between Death-and-Dying-Stressor and Psychological Disease mediated by further Stressors in Nursing across the two working units (ICU and NICU)?

Research Question Four (RQ4)—Moderating Effects: Do Coping-Strategies and Work-Resources serve as significant moderators of the relationships between Death-and-Dying-Stressor, further Stressors in Nursing, and Psychological Disease, respectively, across the two working units (ICU/NICU)?

IX.3. Methods: Sampling and Procedure

This cross-sectional study is reported in accordance with the EQUATOR Network-guidelines (STROBE-checklist). The study was conducted in a sample of sixty-two nurses working in Intensive Care Units (ICU and NICU), recruited from five Hospitals of the Public Health Service in Southern Italy between January 2024 and October 2024, as part of a larger project targeting Stress-in-Nursing (Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024; Vallone & Zurlo, 2024; Zurlo, Vallone & Smith, 2020). Preliminarily, chairpersons/managers were asked to provide permission for proposing the survey to the staff. Therefore, nurses were approached by a trained psychologist—always available during the paper-and-pencil in-person administration to answer any doubts/questions and to support the completion of the questionnaire—and nurses were provided with a standardized introduction of the project and with informed consent. To be included in the study, nurses needed to work in ICUs of the Italian Public Health Service. Those working in different wards were not included in this study. Overall, sixty-two nurses working in ICUs provided informed consent and completed the survey. The total sample comprised both men (40.3%) and women (59.7%). Also, the sample covered staff members of the nursing workforce representative of different ages/stage careers, from the younger and newly enrolled nurses to the elderly/more experienced nurses (Age Mean = 42.9, SD = 9.9; Range = 23–61 years). There was no missing data. The study was approved by the Ethics Committee of Psychological Research of University of Naples Federico II (Protocol Number: 33/2019).

IX.3.1 Measurement Tools

The survey comprised a section for assessing nurses' background information, along with validated measures for the assessment of perceived Stressors in Nursing (French et al., 2000), Work-Resources (Karasek et al., 1998; Siegrist, 1996; Zurlo, Pes & Siegrist, 2010), Coping-Strategies (Vitaliano et al., 1985), and Psychological Disease (Derogatis, 1994; Prunas et al., 2010) Table 23 illustrates the description of measures.

Table 23. Description of dimensions, measures, and variables included in the present study.

DIMENSIONS	MEASURES	VARIABLES
Background Information	<i>Single item Questions</i> (5 items)	• Sex (Men = 0; Women = 1); Age (in years); Working Seniority (in years); Type of Contract (Fixed-term contract = 0; Permanent contract = 1); Performing Night Shifts (No = 0; Yes = 1)
Stressors in Nursing	<i>Expanded Nursing Stress Scale</i> ENSS (French et al., 2000) 57 items on 4-point Likert scale (1 = “never stressful”, 2 = “occasionally stressful”, 3 = “frequently stressful”, 4 = “always stressful”; 0 = “does not apply”^b) Nine subscales (<i>Death and Dying, Conflict with Physicians, Patients and their Families, Conflicts with Peers, Conflicts with Supervisors, Uncertainty Concerning Treatment, Inadequate Emotional Preparation, Discrimination, Workload</i>)	• Death and Dying (7 items; $\alpha = 0.77$) • Conflict with Physicians (5 items, $\alpha = 0.74$) • Patients and their Families (8 items, $\alpha = 0.78$) • Conflicts with Peers (6 items, $\alpha = 0.87$) • Conflicts with Supervisors (7 items, $\alpha = 0.80$) • Uncertainty Concerning Treatment (9 items, $\alpha = 0.85$) • Inadequate Emotional Preparation (3 items, $\alpha = 0.68$) • Discrimination (3 items $\alpha = 0.87$) • Workload (9 items, $\alpha = 0.81$).
Work Resources ^a	<i>Job Content Questionnaire</i> JCQ (Karasek et al., 1998) 27 items on a 4-point Likert scale (from 0 = “Often” to 3 = “Never”) Three subscales (<i>Job Demands, Social Support, and Job Control</i>). <i>Effort-Reward Imbalance Test</i> ERI-Test (Siegrist, 1996; Zurlo, Pes & Siegrist, 2010) 17 items on a 5-point Likert scale (from 1 = “Disagree” to 5 = “Agree, and I am very distressed”) Two subscales (<i>Effort, Rewards</i>)	• Social Support (4 items, $\alpha = 0.73$) • Job Control (14 items, $\alpha = 0.75$) • Rewards (11 items, $\alpha = 0.83$)
Coping Strategies	<i>Ways of Coping Checklist-Revised</i> WCCL-R (Vitaliano et al., 1985) 42 items on a 4-point Likert scale (from 0 = “Never used” to 3 = “Always used”) Five subscales (<i>Problem-focused, Seek-Advice, Self-Blame, Wishful Thinking, Escape/Avoidance</i>)	• Problem-focused (15 items, $\alpha = 0.80$) • Seek-Advice (6 items, $\alpha = 0.88$) • Self-Blame (3 items, $\alpha = 0.78$) • Wishful Thinking (8 items, $\alpha = 0.89$) • Escape/Avoidance (10 items, $\alpha = 0.72$).
Psychological Disease	<i>Symptom Checklist 90-Revised</i> SCL-90-R (Derogatis, 1994; Prunas et al., 2010) 90 items on a 5-point Likert scale (from 0 = “Not at all” to 4 = “Extremely”) Nine subscales (<i>Depression, Anxiety, Phobic Anxiety, Obsessive Compulsive Symptoms, Somatization, Hostility, Interpersonal Sensitivity, Paranoid Ideation, Psychoticism</i>).	• Global Severity Index^c (Cronbach’s $\alpha = 0.98$)

Notes. a In line with the DRIVE-Nurses Model (and also in order to avoid overlapping analyses and results for Job Demands and Efforts, respectively, with Workload—measured by the ENSS), “work-resources” were assessed by using the two subscales of Social Support and Job Control from the JCQ, and the Rewards subscale from the ERI-Test. b The option “0 = does not apply” was defined as a non-applicable value (calculation of the average value was performed excluding zero) to ensure that the data distinguished and reflected nurses’ lack of experience of that event rather than the lack of perceived stress linked to that experience. c Global Severity Index (GSI) is a Global Score given by the sum of all responses divided by 90 and it indicates both the number of symptoms and the intensity of the psychological disease. Clinical levels of psychological disease were calculated by using the cut-off scores for the GSI, that is, respectively, 0.97 for men and 1.24 for women. Cronbach’s α referred to the present study.

IX.3.2 Data Analyses

Firstly, to address RQ1 (Differences in Study Variables), descriptive statistics were computed, and cross-tabulations (χ^2) and Student’s t-test analyses were used to compare study variables according to the working unit (ICU and NICU). To judge the normality of data, the distribution of variables was explored by calculating Skewness and Kurtosis values, i.e., Skewness ± 2 and Kurtosis ± 7 were considered to be a violation of normality (Curran, West, Finch, 1996; Hair, Black & Babin, 2010; Ryu, 2011; West, 1995). Also, for study variables, Cohen’s d (along with 95% Confidence Interval) was used to inspect the effect sizes, with d values considered as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$) in line with Cohen’s rule of thumb.

Furthermore, for Psychological Disease, in order to clinically interpret the levels of psychological burden, frequencies and percentages of nurses reporting low (below the cut-off point scores) and high (clinically relevant) levels of psychopathological symptoms were also calculated (and compared according to the working unit) by using the cut-off scores for the Global Severity Index (GSI) provided by the Italian validation study of the SCL-90-R (Prunas et al., 2010), namely 0.97 for men and 1.24 for women, respectively. Since RQ1 involves multiple comparisons, the Bonferroni–Holm correction method was used to adjust the p-values ($\alpha = 0.05$), thus reducing the risk of Type I error.

Secondly, to address RQ2 (Main Effects), as well as to evaluate the feasibility of the testing of mediating and moderating analyses, Pearson’s correlations among study variables were conducted. Afterwards, correlations (Spearman’s rank correlation coefficient) between Background Information (Sex; Age; Working Seniority; Type of Contract; Night Shifts) and study variables were also conducted to verify whether background factors should be included as control variables in mediating and moderating analyses.

Therefore, to address RQ3 (Mediating Effects), Model 4 from Hayes-PROCESS-tool was used (bias-corrected-bootstrapped-test; 5000 replications, 95% Confidence Interval). Confidence Intervals with the lower and the upper bounds, both positive or both negative, were used to verify the significance of the effects (Hayes, 2017).

Finally, to address RQ4 (Moderating Effects), Model 1 from Hayes-PROCESS-tool was used. The statistical significance of interaction effects was inspected ($p < 0.05$), the delta R-sq values (ΔR^2) were reported to display that the inclusion of the interaction term resulted in a statistically significant increase in the variance explained in the outcome. Simple slopes were plotted to display moderating effects graphically. For diagnosing multicollinearity, the Variance Inflation Factor (VIF) and tolerance values were calculated and $VIF < 5$ and tolerance > 0.30 were used as cut-off points to identify multicollinearity issues (Allison, 1999). All the statistical analyses were conducted by using SPSS, Version-21.

IX.4 Results

Responding to RQ1, data highlighted statistically significant differences between sampled nurses according to the working unit. Specifically, for background information, data revealed statistically significant differences in the sample composition, except for type of contract and performing night shifts. Considering sex, most nurses working in ICU were men, while almost all the nurses working in NICU were women ($p < 0.001$). Moreover, nurses working in ICU were significantly older ($p < 0.001$) and had higher working seniority ($p < 0.05$) than those working in NICU (Table 24).

Table 24. Characteristics of study participants (N = 62) according to the working unit.

	Total Sample (N = 62)	ICU Nurses (n = 35)	NICU Nurses (n = 27)	Adjusted p-Values ^a
Sex, n (%)				
Women	37 (59.7)	11 (31.4)	26 (96.3)	
Men	25 (40.3)	24 (68.6)	1 (3.7)	0.000 ***
Age in years, Mean $\pm$ SD	42.90 $\pm$ 9.9	47.71 $\pm$ 6.2	36.67 $\pm$ 10.4	0.000 ***
Working Seniority in years, Mean $\pm$ SD	16.97 $\pm$ 9.5	20.94 $\pm$ 5.8	11.96 $\pm$ 10.8	0.02 *
Type of contract, n (%)				
Fixed-term contract	4 (6.5)	0 (0.0)	4 (14.8)	
Permanent contract	58 (93.5)	35 (100.0)	23 (85.2)	0.32
Night shifts, n (%)				
No	3 (4.8)	1 (2.9)	2 (7.4)	
Yes	59 (95.2)	34 (97.1)	25 (92.6)	1.00

Notes. Differences are calculated by χ^2 -Analyses [n (%)] and Student's t-test (Mean $\pm$ Standard deviations). a Adjusted p-values calculated via Holm–Bonferroni correction method. Statistically significant values (* $p \leq 0.05$; ** $p < 0.01$; *** $p < 0.001$) are highlighted in bold.

Considering the study variables, firstly, Skewness (range -0.41 to $+1.87$) and Kurtosis values (range -0.77 to $+4.70$) indicated that data were approximately normally distributed. Therefore, comparing ICU and NICU nurses, data revealed they did not differ in terms of perceived levels of Stressors in Nursing, neither in terms of perceived stress related to Death-and-Dying nor in terms of the further stressors ($p > 0.05$ for all the comparisons).

Differently, nurses working in ICU perceived higher Work-Resources (with large effect sizes for both Job-Control $d = 0.892$, 95% CI [0.362 to 1.41] and Rewards $d = 0.834$, CI [0.308 to 1.35]) as well as lower Psychological Disease (with medium effect size $d = 0.719$, CI $[-1.23$ to $-0.198]$) than nurses working in NICU (Table 25).

Furthermore, considering clinically relevant levels of Psychological Disease identified by using the cut-off scores provided by the Italian validation study of the SCL-90-R (Prunas et al., 2010), data showed that 14.3% of ICU nurses and 33.3% of NICU nurses reported clinically relevant psychological burden, yet no statistically significant differences between the working units was found ($\chi^2 = 3.16$; $p = 0.07$)

Table 25. Means and standard deviations of the study variables according to the working unit (N = 62).

	Total Sample (N = 62)	ICU Nurses (n = 35)	NICU Nurses (n = 27)	Adjusted p-Values^a	Cohen's d^b	
	<i>M $\pm$ SD</i>	<i>M $\pm$ SD</i>	<i>M $\pm$ SD</i>		Effect Size	95% CI
Stressors in Nursing						
Death and Dying	14.66 $\pm$ 6.04	14.34 $\pm$ 6.96	15.07 $\pm$ 4.68	1.00	-0.120	[-0.622, 0.383]
Conflicts with Physicians	9.56 $\pm$ 4.29	9.08 $\pm$ 4.27	10.18 $\pm$ 4.31	1.00	-0.256	[-0.759, 0.249]
Patients and Families	15.79 $\pm$ 7.14	17.00 $\pm$ 7.51	14.22 $\pm$ 6.43	0.91	0.393	[-0.115, 0.898]
Conflicts with Peers	8.82 $\pm$ 5.34	8.03 $\pm$ 5.69	9.85 $\pm$ 4.75	1.00	-0.344	[-0.848, 0.164]
Conflicts with Supervisors	14.08 $\pm$ 6.18	13.20 $\pm$ 6.50	15.22 $\pm$ 5.66	1.00	-0.329	[-0.833, 0.178]
Uncertainty concerning treatment	18.40 $\pm$ 7.67	17.25 $\pm$ 8.40	19.89 $\pm$ 6.46	1.00	-0.345	[-0.849, 0.162]
Inadequate emotional preparation	5.48 $\pm$ 2.64	5.14 $\pm$ 3.07	5.93 $\pm$ 1.92	1.00	-0.297	[-0.801, 0.209]
Discrimination	3.79 $\pm$ 4.10	4.20 $\pm$ 4.21	3.25 $\pm$ 3.96	1.00	0.229	[-0.276, 0.732]
Workload	17.43 $\pm$ 7.16	17.00 $\pm$ 7.53	18.03 $\pm$ 6.77	1.00	-0.148	[-0.650, 356]
Work Resources						
Job Control	37.03 $\pm$ 6.47	39.34 $\pm$ 5.29	34.03 $\pm$ 6.72	0.02 *	0.892	[0.362, 1.41]
Social support	11.29 $\pm$ 2.95	11.37 $\pm$ 3.37	11.18 $\pm$ 2.35	1.00	0.073	[-0.435, 0.580]
Rewards	40.87 $\pm$ 8.84	43.85 $\pm$ 8.12	37.00 $\pm$ 8.33	0.02 *	0.834	[0.308, 1.35]
Coping Strategies						
Problem-focused	24.00 $\pm$ 6.55	25.34 $\pm$ 7.47	22.25 $\pm$ 4.69	0.52	0.480	[-0.031, 0.988]
Seek Advice	9.53 $\pm$ 4.15	8.85 $\pm$ 4.14	10.40 $\pm$ 4.09	0.96	-0.376	[-0.881, 0.132]

Self-blame	3.80 ± 2.07	3.65 ± 2.09	4.00 ± 2.06	1.00	−0.165	[−0.667, 0.339]
Wishful Thinking	9.41 ± 5.59	8.48 ± 5.47	10.63 ± 5.61	0.96	−0.387	[−0.893, 0.121]
Escape/Avoidance	9.53 ± 4.37	9.05 ± 4.30	10.14 ± 4.47	1.00	−0.249	[−0.752, 0.256]
Psychological Disease						
Global Severity Index	0.70 ± 0.73	0.48 ± 0.72	0.98 ± 0.66	0.05 *	−0.719	[−1.23, −0.198]

Notes. Differences are calculated by Student's t-test (Mean ± Standard deviations). a Adjusted p-values are calculated via Holm–Bonferroni correction method. Statistically significant values (* $p \leq 0.05$); ** $p < 0.01$; *** $p < 0.001$) are highlighted in bold. b Cohen's d values and 95% Confidence Interval (CI).

Responding to RQ2, commonalities and specificities in the associations between perceived Stressors in Nursing, Work-Resources, and Coping-Strategies, respectively, with Psychological Disease according to the working unit were found (Table 4A).

Specifically, perceived Workload and the recourse to Self-Blame and Wishful Thinking coping strategies (risk factors) and perceived Rewards (protective factors) emerged as common factors significantly associated with Psychological Disease across the working units (ICU and NICU).

Otherwise, perceived stress related to Death-and-Dying and Conflicts-with-Supervisors, and the recourse to Seek-Advice and Escape/Avoidance coping strategies emerged as specific risk factors significantly associated with Psychological Disease in nurses working in ICU.

Differently, perceived stress related to Conflicts-with-Peers, Conflicts-with-Physicians, and Uncertainty-concerning-Treatment (risk factors) and perceived levels of Job-Control and Social-Support (protective factors) emerged as specific factors significantly associated with Psychological Disease in nurses working in NICU.

Preliminarily to testing mediating (RQ3) and moderating analyses (RQ4), Spearman's rank correlation between Background Information and study variables were conducted according to the working unit to verify whether and which background factors should be included as control variables.

Therefore, responding to RQ3, data revealed that Death-and-Dying-Stressor was associated indirectly—through the association with specific Stressors in Nursing—with Psychological Disease. Also, these Stressors in Nursing varied according to the working units (Table 26; Figure 23). Specifically, for nurses working in ICU, after controlling for Age (due to the significant correlation between Age and Death-and-Dying-Stressor $r_s(33) = 0.43$, $p < 0.05$), data from mediation analyses revealed that Death-and-Dying-Stressor was associated indirectly with Psychological Disease, through the association with Conflicts-with-Supervisors (full mediation) (Table 26; Figure 23). Considering the diagnosis for multicollinearity, the Variance Inflation Factor (VIF) and tolerance

values for the variables included in the mediation model (with Psychological Disease as outcome), namely Age (VIF = 1.25; Tolerance = 0.80), Death-and-Dying-Stressor (VIF = 2.52; Tolerance = 0.40), and Conflicts-with-Supervisors (VIF = 2.16; Tolerance = 0.46), indicated the lack of multicollinearity issues.

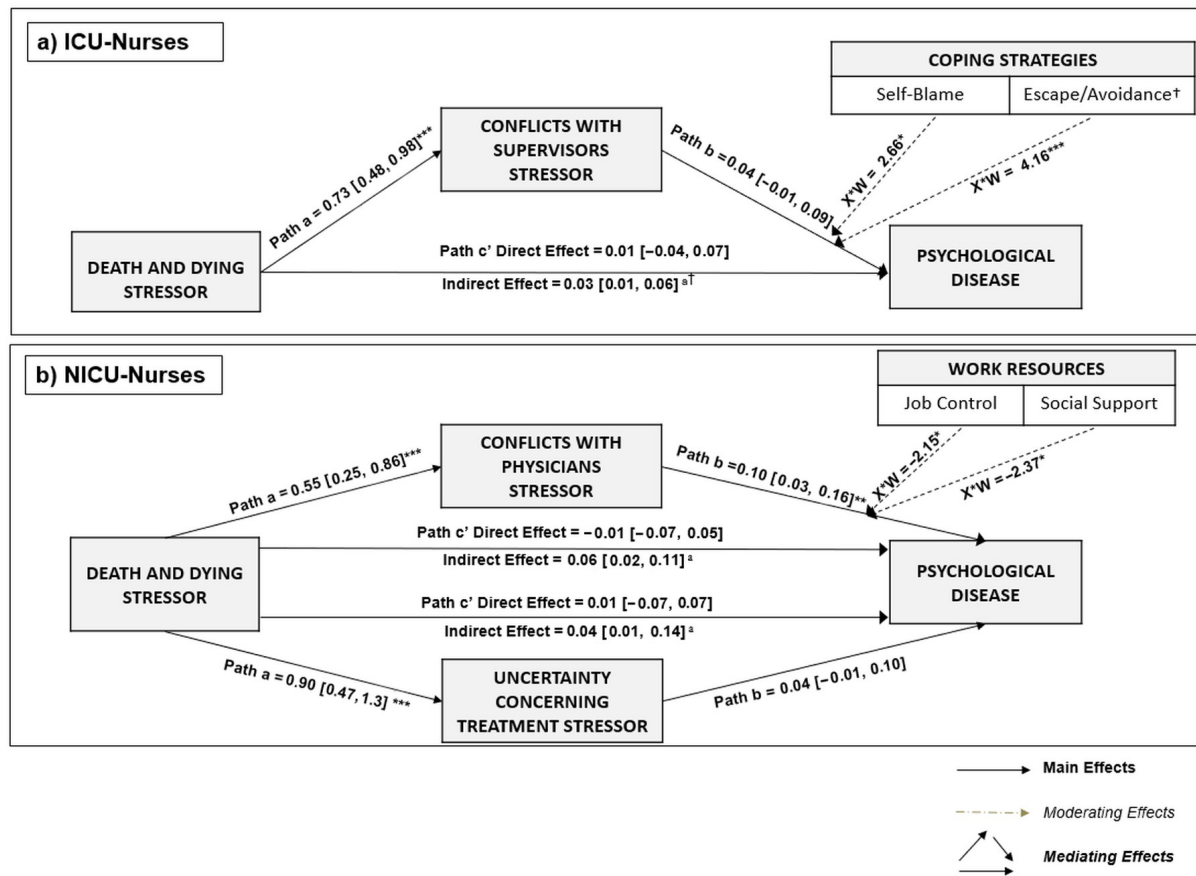
For nurses working in NICU, data from mediation analyses revealed that Death-and-Dying-Stressor was associated indirectly with Psychological Disease, through the association with both Conflicts with Physicians and Uncertainty Concerning Treatment (full mediations), respectively (Table 26; Figure 23). Also in such cases, the VIF and tolerance values for the variables included in the mediation models comprising Conflicts-with-Physicians (VIF = 1.56; Tolerance = 0.64) and Uncertainty Concerning Treatment (VIF = 1.73; Tolerance = 0.58) indicated the lack of multicollinearity issues. For the analyses carried out with the sampled nurses working in NICU, no background variables were included in the mediation models as control variables due to the lack of significant correlations with the relevant study variables underpinning the models. No other statistically significant mediating effects were found.

Table 26. Mediating analyses: path coefficients according to the working unit.

	Independent Variable (X)	Mediator (M)	Dependent Variable (Y)	Path a [95% C.I.]	Path b [95% C.I.]	Path c' Direct Effect [95% C.I.]	Indirect Effect [95% C.I.]
ICU Nurses †	Death Dying	Conflicts with Supervisors	Psychological Disease	0.73 [0.48, 0.98] ***	0.04 [−0.01, 0.09]	0.01 [−0.04, 0.07]	0.03 [0.01, 0.06] ^a
NICU Nurses	Death Dying	Conflicts with Physicians	Psychological Disease	0.55 [0.25, 0.86] ***	0.10 [0.03, 0.16] **	−0.01 [−0.07, 0.05]	0.06 [0.02, 0.11] ^a
	Death Dying	Uncertainty Concerning Treatment	Psychological Disease	0.90 [0.47, 1.3] ***	0.04 [−0.01, 0.10]	0.01 [−0.07, 0.07]	0.04 [0.01, 0.14] ^a

Notes. Path a = Effect of independent variable on mediator; Path b = Effect of mediator on dependent variable; Path c': Direct effect = effect of independent variable on dependent variable controlling for the mediator; Indirect effect = Effect of independent variable on dependent variable through the mediator. ^a Full mediation effects due to the non-significance of the path c' (Direct Effects). † Model controlled by Age. Only significant mediation models are displayed. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Figure 23. Summary: statistically significant mediating and moderating effects among (a) ICU nurses and (b) NICU nurses.



Notes. Only significant models were displayed. ^aFull mediation effects due to the non-significance of the Direct Effects. [†]Controlled by Age. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

Path a = Effect of independent variable on mediator.

Path b = Effect of mediator on dependent variable.

Path c' - Direct effect = effect of independent variable on dependent variable controlling for the mediator

Indirect effect = Effect of independent variable on dependent variable through the mediator.

X*W = interaction effect between independent variable (X) and moderating variable (W) on dependent variable.

Responding to RQ4, data supported the moderating role of Work-Resources and Coping-Strategies, also highlighting specificities according to the working unit (Figure 23). Specifically, for nurses working in ICU, data revealed the statistically significant conditional effects of Self-Blame and Escape/Avoidance coping strategies (the latter model controlled by Age due to the significant correlation between Age and Escape/Avoidance coping strategies $r(33) = 0.40$, $p < 0.05$) in the associations between Conflicts-with-Supervisors and Psychological Disease (Figure 24; Figure 25). Furthermore, the VIF and tolerance values for the variables included in the moderation models comprising Self-Blame (VIF = 1.04; Tolerance = 0.95) and Escape/Avoidance (Age VIF = 1.14;

Tolerance = 0.87; Conflicts-with-Supervisors VIF = 1.08; Tolerance = 0.92; Escape/Avoidance VIF = 1.21; Tolerance = 0.83) indicated the lack of multicollinearity issues.

Figure 24. The moderation effect of Self-Blame strategy in the association among Conflicts with Supervisors and Psychological Disease.

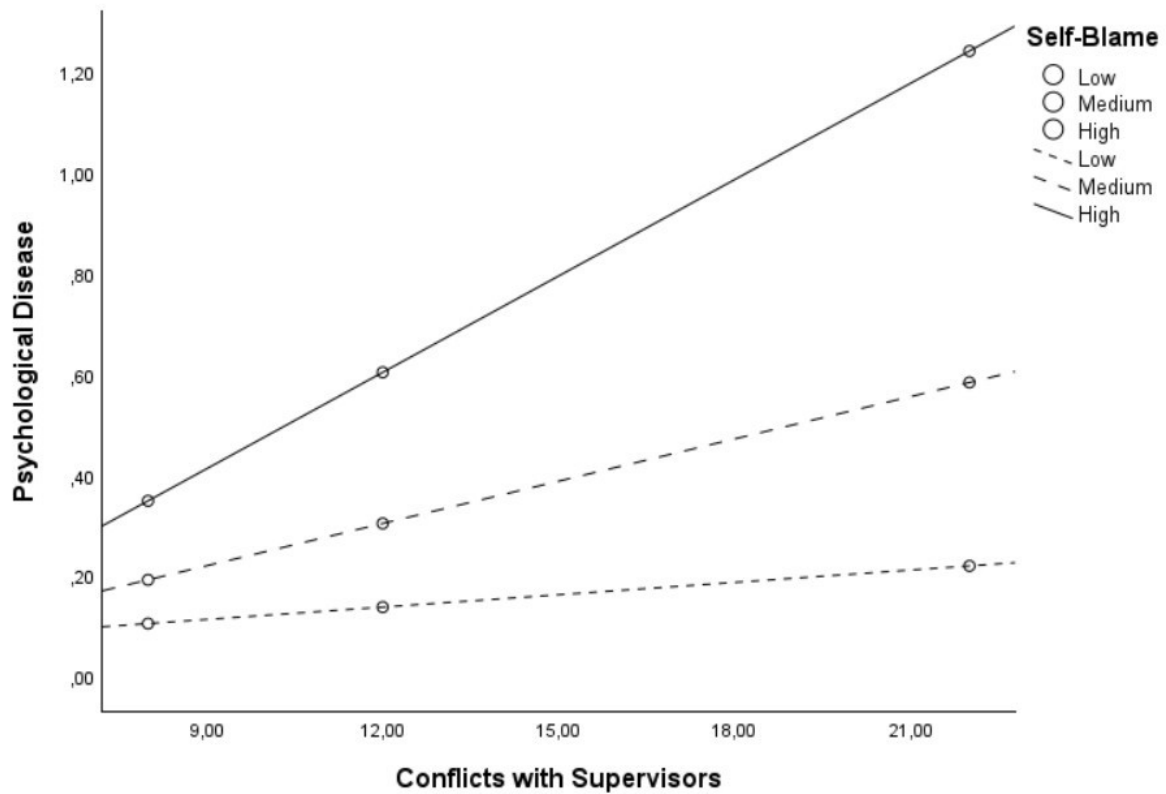
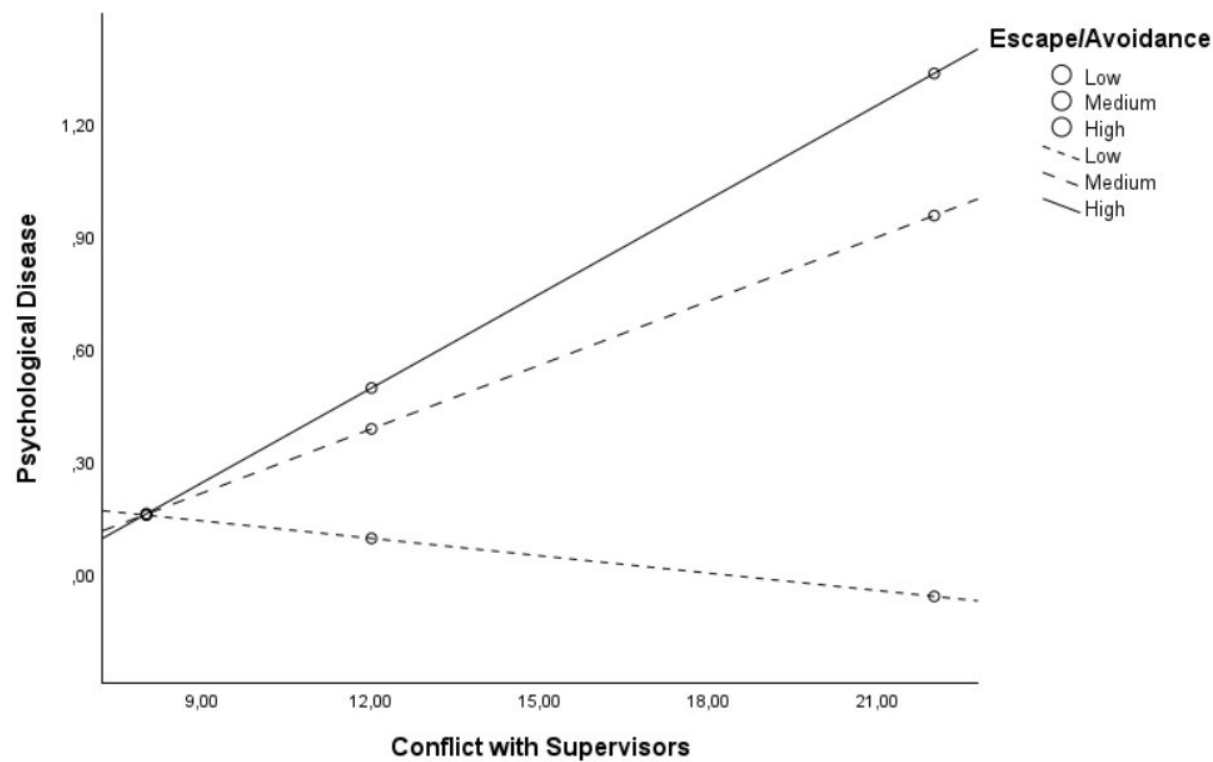


Figure 25. The moderation effect of Escape/Avoidance strategy in the associations between Conflicts with Supervisors and Psychological Disease among nurses working in ICU.



For nurses working in NICU, data revealed the statistically significant conditional effects of Job-Control and Social-Support in the associations between Conflicts-with-Physicians and Psychological Disease (Table 27; Figure 26; Figure 27). Also in such cases, the VIF and tolerance values for the variables included in the moderation models comprising Job-Control (VIF = 1.16; Tolerance = 0.86) and Social-Support (VIF = 1.07; Tolerance = 0.93) indicated the lack of multicollinearity issues. As for mediation analyses, for the moderation analyses carried out with the sampled nurses working in NICU, no background variables were included as control variables due to the lack of significant correlations with the relevant study variables underpinning the models. No other statistically significant moderating effects were found.

Table 27. Moderation analyses: regression coefficients according to the ward.

	Independent Variable (X)	Moderator (W)	Dependent Variable (Y)	Interaction Effects X*W							Model Summary		
				b	se	t	[95% C.I.]	ΔR^2	F	p	R ²	F	p
ICU Nurses	Conflicts with Supervisors	Self-Blame Coping	Psychological Disease	0.02	0.01	2.66	[0.01, 0.03]	0.11	7.07	0.012 *	0.52	11.29	0.000 ***
	Conflicts with Supervisors	Escape/Avoidance coping †	Psychological Disease	0.01	0.00	4.16	[0.01, 0.02]	0.19	17.33	0.000 ***	0.67	15.17	0.000 ***
NICU Nurses	Conflicts with Physicians	Job Control	Psychological Disease	-0.01	0.00	-2.15	[-0.02, -0.01]	0.10	4.66	0.041 *	0.50	7.57	0.001 ***
	Conflicts with Physicians	Social Support	Psychological Disease	-0.02	0.01	-2.37	[-0.04, -0.01]	0.11	5.63	0.026 *	0.55	8.98	0.000 ***

Notes. X*W = interaction effect between independent variable (X) and moderating variable (W) on dependent variable (Y). † Model controlled by Age. Only significant models are displayed. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Figure 26. The moderation effect of Social Support in the association among Conflicts with Physicians and Psychological Disease in NICU Nurses.

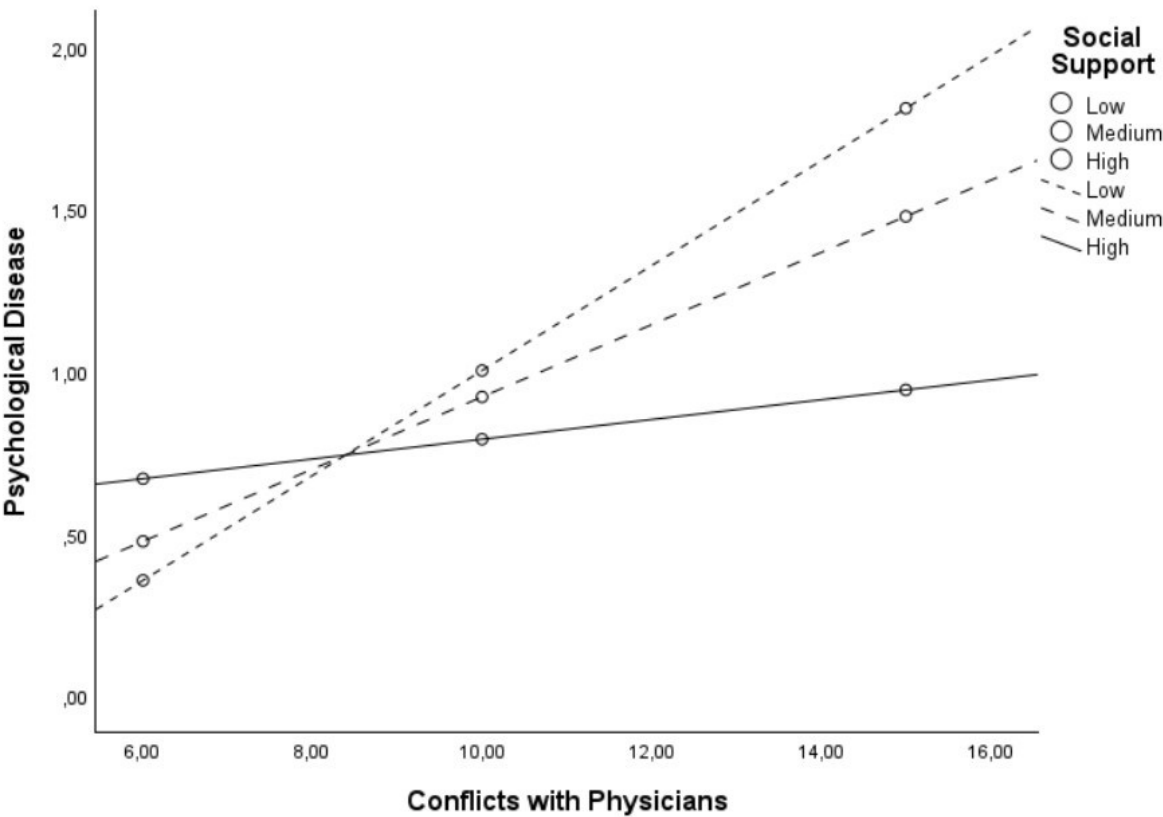
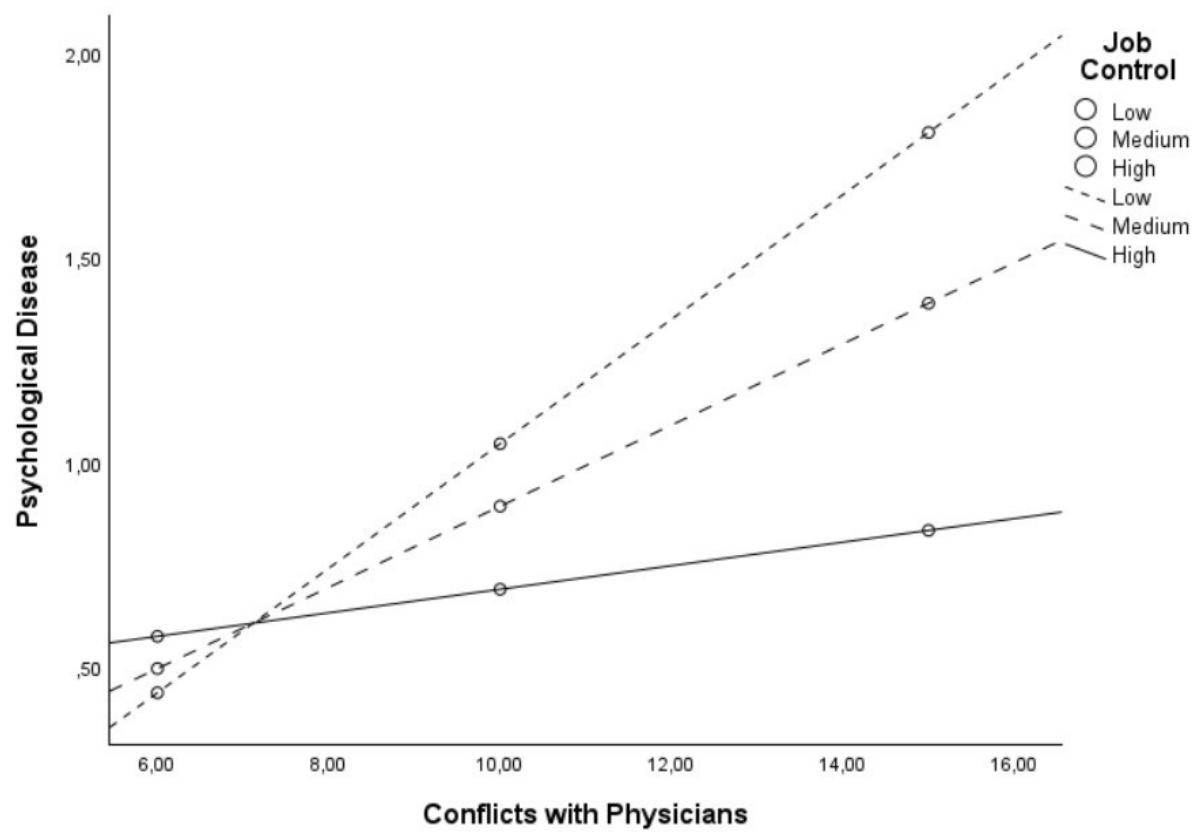


Figure 27. Moderation effect of Job Control in the associations between Conflicts With Physicians and Psychological Disease among nurses working in NICU.



IX.5 Summary, discussion, and implications

The study applied the DRIVE-Nurses-Model (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024; Vallone & Zurlo, 2024; Zurlo, Vallone & Smith, 2020) to explore and compare the experience of nurses working in ICU and NICU, by mainly focusing on examining the mechanisms underlying the relationship between Death-and-Dying-Stressor and nurses' psychological health. This is to identify tailored risk profiles and protective factors to be accounted for in defining interventions fostering wellbeing in such highly demanding work environments as Intensive Care Units.

Firstly, considering preliminary comparisons (RQ1), findings indicated that sampled nurses statistically differed in terms of sex distribution, i.e., most nurses working in ICUs were men—somewhat reflecting the recent global efforts to increase the number of male nurses (Boniol et al., 2019)—yet all but one of the nurses working in NICU were women. These data seem to add empirical evidence which endorse the presence of still-operating stereotyped views of gender-specific roles and specialties, attributing neonatal care to female nurses (Cudé & Winfrey, 2007).

Additionally, still considering RQ1, data revealed that sampled nurses working in NICU were overall younger and less steady/experienced than those working in ICU. This can also be discussed by considering the data highlighting that sampled nurses working in NICU perceived lower work-resources and reported higher psychological disease than nurses working in ICU. Indeed, research has suggested that less experienced nurses working in Intensive Care Units reported higher levels of stress and psychological suffering than those with higher seniority, training, and experience (Chen, Ogata & Sasaki, 2025; Turner, Chur-Hanse & Winefield, 2014; Yang & Mcilpatrick, 2001).

However—somewhat in contrast with research suggesting higher burden and workload among nurses working in NICU if compared with other ICUs (Azadi et al., 2020)—data revealed that sampled nurses did not differ in terms of perceived levels of Stressors in Nursing, not even for perceived stress related to Death-and-Dying. Nonetheless, findings on main/mediating/moderating effects (RQ2-RQ4) identified commonalities and specificities in risk and protective factors to be accounted for promoting adjustment processes and psychological wellbeing among nurses working in ICU and NICU.

Considering commonalities, data aligned with research warning about the high challenges and demands characterizing work life in ICUs (Azadi et al., 2020; Mealer et al., 2007; Preto, V.A.; Pedrão, 2009; Vahedian-Azimi et al., 2019; Van Mol, 2015; Kynoch et al., 2016; Lief et al., 2018; Rodriguez-Ruiz, E.; Latour, J.M.; van Mol, 2025), highlighting the detrimental role of perceived

Workload, yet also revealing the protective role of perceived rewards/recognition within the work context (Liu et al., 2022; Teutsch, Frick & Kubitza, 2025; Zhan, Lei & Yang, 2024). Furthermore—interestingly and somewhat in contrast with the literature (Almeida, Moraes & Cunha, 2015; Köktürk et al., 2022; Gibson, Hofmeyer, Warland, 2018)—the potential burden of the relationship with patients and their families does not seem to play a role in influencing nurses’ psychological health in ICU or in NICU.

However, data also suggested the need to carefully consider the coping strategies adopted by nurses for dealing with such high levels of burden (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018). Indeed, considering the burden of working with critically ill, unstable, and precarious patients “on the edge between life and death”, the recourse by nurses to Self-Blame (i.e., dealing with stress by feeling disproportionate sense of responsibility and guilt) or, conversely, to Wishful Thinking strategies (i.e., relying on hope/detaching from reality) represented two opposite ways that could, however, equally impair nurses’ wellbeing and the quality of care provided in both ICU and NICU.

Otherwise, considering specificities by working units—for nurses working in ICU—data underlined the psychological costs of the detrimental interplay between perceived Death-and-Dying-Stressor and Conflict with Supervisors, so that perceived stress linked to dealing with end-of-life experiences may impair—and be exacerbated by—the perceived relationship with supervisors/managers (the latter experienced as a further source of stress rather than a source of support). This dynamic can also be reflected by discussing data showing that the recourse by ICU nurses to seeking-support coping strategies may be ineffective and even counterproductive. From this perspective, findings suggest carefully monitoring the coping profile of ICU nurses, since our data emphasized that nurses’ attempts to manage stress and conflicts by relying on Self-blame (Vallone, Cattaneo Della Volta & Zurlo, 2024; Barr, 2024) or, on the opposite pole, on Escape/Avoidance—to detach from extremely burdening work-related experiences (Todaro-Franceschi, 2013; De Villers & DeVon, 2013; Zhang et al., 2024)—can only heighten their psychological suffering, potentially increasing the sense of isolation, frustration, and discomfort due to the perceived lack of support from supervisors.

Differently, considering nurses working in NICU, data underlined the psychological costs of perceived stress related to Conflicts with Peers, along with the detrimental interplay between Death-and-Dying-Stressor and perceived Conflicts with Physicians and Uncertainty concerning Treatment, respectively. However, whether data clearly indicated the need to foster communication and collaboration among NICU staff members, the negative role of perceived uncertainty could either

reflect the higher perceived fragility of the “suspended” newborn (when compared to adult ill patients hanging between life and death). Yet this finding may also be due to our sample composition (i.e., comprising overall less experienced nurses than those working in ICU; Chen, Ogata & Sasaki, 2025; Turner, Chur-Hansen & Winefield, 2014; Yang & Mcilfattrick, 2001).

Nonetheless, for NICU nurses, data also supported the protective role of work-resources (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024; Vallon & Zurlo, 2024; Zurlo, Vallone & Smith, 2020; Teutsch, Frick & Kubitz, 2025), specifically highlighting that perceived Job-Control and Social-Support could overwhelm the detrimental effects of perceived interpersonal conflicts with physicians. In other words, findings suggested the possibility of fostering nurse–physician relationships, by enhancing nurses’ skill-discretion/autonomy, without neglecting the different—yet not foremost—role of physicians, and sustaining reciprocity, respect, and mutual support.

In summary, the application of the DRIVE-Nurses-Model to explore and compare the experience of nurses working in ICU and NICU provided preliminary evidence to advance the understanding of the mechanisms underlying the relationship between Death-and-Dying-Stressor—unavoidable source of stress repeatedly featuring nursing daily life—and nurses’ psychological health, suggesting tailored risk profiles and key protective factors to account for to provide nurses with the necessary resources for adjusting to their intrinsically challenging work-related duties and experiences.

Findings should be interpreted with caution due to some limitations. Firstly, the study was carried out with a cross-sectional design. Therefore, despite this design being considered efficient and appropriate for exploring our research questions (Spector, 2019), no inferences concerning the temporal associations between predictors and outcomes was made, and causality cannot be established. Therefore, future research could be designed with a longitudinal design to further explore the relationships featuring the complex dynamics that emerged (main/mediating/moderating effects). Secondly, since the use of self-report measures, the risk of social desirability bias could be high and common method variance cannot be ruled out. Nevertheless, although research has demonstrated that this limitation could not influence the validity of our findings (Fuller et al., 2016), future research could also be designed to include a wider range of sources of data.

Moreover, although the population being studied is inherently small and narrow (Indrayan & Mishra, 2021) since it is a defined and limited work group (nurses working in Intensive Care Units, rather than the nursing workforce), the sample consists of a convenience sample of nurses working exclusively in Intensive Care Units from five Hospitals of the Public Health Service in a restricted

geographical area (Southern Italy)—and participating voluntarily—thus limiting the generalizability of research results. Further studies on larger/nationally representative samples—or comparative studies including ICUs from other countries—are needed to generalize these results. Nonetheless, the small sample size does not weaken the clear advantages of adopting a transactional multidimensional and statistically valid model, such as the DRIVE-Nurses-Model, to be used by researchers and healthcare managers to assess and monitor the psychological health conditions of nursing staff to define tailored evidence-based interventions accordingly. In this direction, due to the flexibility of the DRIVE-Nurses-Model-framework, future research could also include/test the role of further potential resources (e.g., personality characteristics; job satisfaction) able to counteract the psychological costs of Death-and-Dying-Stressor and foster nurses' wellbeing. Furthermore, considering that this is a delicate situation “on the borderline between life and death”, our data did not show—from the nursing staff's perspective alone—that ‘the management of patients and their families’ represents a source of stress impacting nurses' psychological health. Further research could be extended to all the medical staff (including physicians) and family members, to identify potential similarities and differences in the management of death and the dying.

The application of the DRIVE-Nurses-Model (Mark & Smith, 2012; Vallone, Smith & Zurlo, 2020; Zurlo, Vallone & Smith, 2018; Vallone, Cattaneo Della Volta & Zurlo, 2024; Vallon & Zurlo, 2024; Zurlo, Vallone & Smith, 2020) allowed for advancing knowledge on the experiences of nurses working in Intensive Care Units (ICU and NICU), who are routinely exposed to the burden of dealing with critically ill/unstable/dying patients. The study provides preliminary evidence on specific risks and resources to be accounted for when defining customized evidence-based training and programs to target and intervene on those aspects of nursing working life that are amenable to change/can be improved (rather than on unmodifiable aspects, i.e., dealing with death/dying patients), such as interpersonal relationships within the wards, technical preparedness, work-resources, along with providing coping strategies to deal with work-related stress.

Specifically, for nurses working in ICU, the findings highlighted the need to primarily consider and address the psychological risk linked to perceived lack of support from supervisors (i.e., perceived isolation), the recourse to excessive guilt/blaming and/or the defensive detachment from work-related experiences. Accordingly, interventions fostering adjustment processes and psychological health among nurses working in ICU should be implemented by mainly targeting the relationship with supervisors and fostering—at the same time—adaptive ways of managing conflicts within the wards and stress related to the burden of nursing work.

For nurses working in NICU, instead, findings highlighted the need to primarily consider the psychological risk linked to perceived lack of competence/training and the lack of perceived support from direct co-workers, thus providing specific training and opportunities for professional development, autonomy, and growth, yet also fostering a reciprocal/mutual supportive work environment that recognizes the voices of all the professionals in the management of critically ill new-borns.

Overall, healthcare policymakers and hospital managers should consider these findings, thus openly recognizing the “invisible” burden of routinely working with death and the dying, which challenges nurses’ lives daily. This can be achieved by providing adequate evidence-based interventions that prevent the denial of such burden and the escalation of psychological suffering while fostering individual, relational, and organizational resources within the healthcare contexts. This can be facilitated through psycho-educational training (Sawyer, Tao, & Bailey, 2023), psychodynamic-oriented interventions (Manalu, 2024), and integrated approaches, such as the “Psycho-Educational Defusing Intervention” (Tommasi et al., 2024)—the latter of which has been proven to be effective for preventing trauma and sustaining recovery and wellbeing among healthcare workers belonging to Emergency and Critical Care Units— since they promote nurses’ awareness and knowledge along with their psychosocial competencies by building/strengthening relational resources, fostering peer-supporting (e.g., defusing), and boosting the recourse to adequate coping strategies for dealing with such highly emotionally demanding work environments as the healthcare context.

Chapter X

Final summary, implications, limitations, and further research

X.1 Introduction

The last Chapter will provide a presentation of the thesis proposed, starting from the final summary of our findings. The present chapter will also attempt to discuss the results focusing on the possible theoretical and practical implications. The limitations of the study and the future steps designed will be provided.

X.2 Final Summary

The present section aims at describing the development of this thesis, illustrating our findings and the contribution of the research based on the objectives set out regarding each chapter.

This summary will give a clearer portrait of the design of the study, exploring our hypotheses within each chapter and addressing how the achievement of those has influenced the development of the thesis and its potential implications for Family-Centered Care practices.

The first chapter illustrated an overview of the whole thesis briefly providing the ratio of each chapter, the theoretical background, and the objectives. The second and the third chapter reviewed the theoretical background from which the thesis project had been developed and the hypothesis of the other chapters were tested. Specifically, the first chapter highlighted the characteristics of the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) and its field of applications. In particular, the chapter described the dynamic view of the stress as a process that is situation-specific and the result of the transaction among the individual and the stressors. Then, it was described the role of the coping strategies as a specific individual resource that is activated after the evaluation of the stressor's threat. The Transactional Model of Stress and Coping is an eclectic theoretical framework able to capture the maximum numbers of factors that potentially intervene in each situation. That characteristic also permits to move from a theoretical basis to a practical one leading to implement tailored interventions for both individuals and contexts.

The second chapter also overviewed the most used models for parental stress, addressing their current strengths and limitations. In the parental stress field, the Parent-Child Relationship Model

(Abidin, 1992) emerged as the most dominant. Importantly, the Parent-Child Relationship Model has been derived from the Transactional Model of Stress and Coping and demonstrated to be a valid framework to study parental stress in the context of both typically and atypically developing children (Fang et al., 2024). In line with those findings, the chapter then explored the studies regarding parental stress related to a sick or with a disability child. Moving from the theoretical background gained from the Abidin' model (1992), the chapter reviewed the interaction among the parental characteristics, the child features, and the parent-child relationship to determine parental stress outcomes.

After this general overview on parental stress with a sick child, the chapter focused the attention on the specific challenges faced by parents within the Pediatric Intensive Care Unit (PICU) setting. The traumatization of both parents and children into this context was underlined (Yagiela et al., 2019). Moreover, the importance of the potential secondary traumatization from parents to children due to the PICU experience (Long et al., 2024) emerged as an important factor to consider for developing early and prolonged interventions to support parents, children, and their relationship adjustment during the hospitalization and after discharge (Riley et al., 2021). Focusing on the parent-child relationship, the chapter aimed to illustrate the characteristics of this relationship within the Neonatal Intensive Care Unit (NICU). In this case, the relationship among mother and the infant is only into the maternal thoughts (Stern, 1985) and the sudden birth of an infant before the due date (i.e., preterm) that is at risk of surviving can be a traumatic event for both mothers and fathers (Salomè et al., 2022). The chapter showed the epidemiology, comorbidities, and long-term development of preterm infants and the other NICU infants.

Then, the emotional constellation of parents following NICU admission has been reviewed. In this context, the Preterm Parental Distress Model (Holditch-Davis et al., 2000) that is a transactional model of stress, is the most used to investigate parental stress within the NICU context. This confirmed our use of the Transactional Model of Stress and Coping as theoretical basis to study parental stress in the NICU. Moreover, the elevated number of studies conducted using the Preterm Parental Distress Model (Holditch-Davis et al., 2000) is important for this thesis project. Indeed, on one hand the thesis project has been able to move from a solid theoretical framework inspired by the Transactional Model of Stress and Coping. On the other hand, the project had the opportunity to investigate new aspects related to the experience of parents of NICU infants (e.g., the dyadic dimension to face stressors, the financial burden, the somatic dimension). This has been possible thanks to the interaction of Transactional Model of Stress and Coping and other theoretical

frameworks (e.g., the Biopsychosocial model, the Systemic Transactional Model) able to expand the knowledge from different perspectives.

The final part of the second chapter is dedicated to stress in the nursing profession: Nurses are fundamental actors within the NICU setting. However, they are also at risk of psychopathological diseases due to the physical and emotional burden of their caring profession (Achour et al., 2019). Therefore, the chapter overviewed the most used models of occupational stress in nursing and, in line with the above-mentioned theoretical background for parents, focused its attention to the Demands-Resources and Individual Effects applied to Nurses Model (DRIVE-Nurses Model; Vallone et al., 2020). The DRIVE-Nurses Model include the dimensions derived from both the Job Demand-Control-Support (JDCS; Karasek, 1979) and the Effort-Reward Imbalance model (ERI; Siegrist, 1996) to determine psychological health of nurses. The final focus of the chapter was on the stressor related to death and dying patients in affecting the psychological health in nurses working in the emergency and critical care wards.

The Chapter III reviewed the difference among “*to treat the disease*” (i.e., medical model), “*to cure the patient*” (i.e., Patient-Centered Care Model) and “*to care for the person*” (i.e., Humanization of Care). Those models were then translated into the NICU context and specific applications were reviewed. Specifically, the chapter started with describing the development from a medical model exclusively focused on the disease to a person-centered model focused on the person who experience the disease (Borbasi et al., 2012). In this perspective, the steps towards the humanization of care and its relative clinical implications were described. The focus on the individual characteristics of the person experiencing the disease (Patient-Centered Care), was then linked to the disease inserted into the specific moment of the individual history (i.e., Person-Focused Care; Starfield, 2011). In this context the Humanization of Care was a modification of the way to take care for patients that included relational (empathy of the clinicians and participation of the patient to the decision-making process), structural (building healthcare settings specifically to welcome individuals and not only treat diseases) and organizational (healthcare leaderships able to assure an environment of care sensitive to the individual needs). Subsequently, the chapter focused on the specific characteristic of the pediatric hospitalization, underlying its potential consequences on both parents and children. Parents mental health can be affected by pediatric hospitalization as this event lead to delegate some tasks related to take care of the child to the healthcare staff with changes of the parental role. Further, pediatric hospitalization can disrupt child psycho-emotional growth leading to regressions or arrest of the development (DeMaso & Snell, 2013; Perrin & Shipman, 2009). To avoid this disruption, family-based care has been introduced. They consist in the

integration of parental care improve pediatric patient's health outcome (Hickson et al., 2006; Renfrew et al., 2009) and parental satisfaction of the healthcare system with positive effects on both child and parental well-being (Çamur & Sarıkaya Karabudak, 2021). Family-based care were then reviewed in the NICU context. Following the conceptualization of Frank & O'Brien (2019) the Parent-support interventions (first level, targeting parents), the Parent-delivered interventions (second level, targeting parent-infant interaction), models of parent-partnered neonatal care (third level, it is the theoretical framework describe the actors, sources, and organization to adopt in order to implement the specific model of care). The evolution from the first applications of the Kangaroo Mother Care to deprived contexts to the principles of Family-Centered Care (FCC) up to the complete integration of parents in infant care with the Family-Integrated Care Model (Moreno-Sanz et al., 2024) were described. Finally, barriers along with available tool to implement FCC practices were reviewed from the perspective of NICU nurses and other healthcare staff members.

The Chapter IV aimed to test the role of individual and dyadic coping strategies and their role in the relationship among NICU-related stress and Psychophysical health conditions (i.e., Anxiety, Depression and Somatization) within the Transactional Model of Stress and coping theoretical framework. Further, a gender differences perspective was adopted in deepening the rate of coping strategies, NICU-related stress, and psychophysical health conditions in mothers than fathers. Firstly, literature concerning the impact of NICU-related stressors (Sights and Sounds, Infant Behaviour and Appearance and Parental Role Alterations) on parents was reviewed. Secondly, individual coping strategies construct was introduced and gender differences in their use among parents of NICU babies was examined. Then, alongside the FCC that promote both mothers and fathers' involvement in caring for their infant, the chapter newly proposed the exploration of dyadic coping (i.e., the strategies with which couples face stressors together (Bodenmann, 1995; Lyons et al., 1998). Therefore, the chapter proposed a connection among the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) usually focused on the individual coping strategies and the Systemic Transactional model that is a comprehensive approach examining the process of each partner reaction to a stressor as an attempt to establish a new homeostatic equilibrium within the couple system after a stressful perturbation (Bodenmann, 1995). In this context, the chapter proposed to test the gender differences and the comparison with the clinical cut-off values and the mean validation values of mothers and fathers in NICU-related stress, psychophysical health conditions, and the individual and dyadic coping strategies. Moreover, this chapter also tested the role of individual and dyadic coping strategies to buffer/exacerbate the relationship among NICU-related stress and each psychophysical health outcome (i.e., Anxiety, Depression, and Somatization).

Table 28. Summary of the Hypothesis and Results of the Chapter IV.

HYPOTHESIS	Mothers will experience higher levels of NICU-related Stress than fathers. Parents of NICU infants will experience higher psychological distress than parents of healthy infants	Mothers will experience higher levels of Anxiety, Depression and Somatization as compared to fathers.	Mothers will use more individual coping strategies than fathers	NICU-related Stress will increase Anxiety, Depression and Somatization scores in parents.
RESULTS	Regarding NICU-related stress and psychophysical health conditions, mothers scored higher in Parental Role Alterations than fathers. Mothers reported both higher mean scores and clinical significance in Parental Role Alterations as compared to fathers. Parents of NICU infants experienced higher levels of psychological distress than parents of healthy infants early after birth.	Mothers scored higher than fathers in Anxiety, Depression and Somatization.	Mothers reported to use more individual coping strategies related to Turning to religion than fathers	NICU-related stress increased Anxiety, Depression and Somatization in parents.

Table 29. Summary of the Research Questions and Results of the Chapter IV

RESEARCH QUESTION S	Do self-and-other perception of dyadic coping strategies are different in mothers than fathers (i.e., interindividual level) and within both mothers and fathers (i.e., intraindividual level)?	Will sociodemographic , individual, and dyadic coping strategies play a direct role on Anxiety, Depression, and Somatization scores in parents?	Will individual and dyadic coping strategies moderate the relationship among NICU-related stress and Anxiety, Depression and Somatization in parents.	Do and in which percentage mothers and fathers will score above the clinical cut-off/validation mean values for Anxiety, Depression and Somatization, NICU related Stress and individual coping strategies?
RESULTS	Mothers reported higher self-perceived stress communication scores than fathers. Self-perception of stress communication was higher than the other perception of stress communication in mothers. Whereas fathers reported higher other perception stress communication as compared to self-perception stress communication strategies	The final predictive model for Depression, Anxiety and Somatization included being mother, perceived total NICU Stress, and recurring to Avoiding coping strategy, as risk factors, and recurring to Positive Attitude, as protective factor.	The relationship among NICU-related Stress and Depression was moderated by the other perception of Stress communication, Problem-focused support, Emotion-focused support and Delegate. Delegate-other perception and Efficacy of the dyadic coping functioning buffered the effect of NICU Stress on Anxiety. Efficacy perception of the dyadic coping functioning moderated the relationship among NICU Stress and Somatization	Mothers scored higher in Parental Role Alterations than fathers. Both maternal and paternal scores were above the clinical cut-off in this subscale. Mothers scored above the clinical cut-off ranging from 26.3% of Somatization to 33.3% of Anxiety, while fathers scored above the clinical cut-off score ranging from 17.4% of Somatization to 26.1% of Anxiety. More than the half of both mothers and fathers use strategies based on seeking social support (mothers= 72.4%, fathers= 52.2%), positive attitude (mothers=62.1% fathers=58.7%), and turning to religion (mothers=79.3% fathers=69.6%) than the validation population. On the contrary, less than the half of our sample used strategies based on problem solving (mothers=48.3%, fathers=43.5%), and avoiding (mothers=41.4%, fathers=39.1%).

Our findings confirmed the predominant role of Parental Role alterations as the main source of NICU-related stress in both mothers and fathers (Salomè et al., 2022). Importantly, this result underlines the importance to actively work on interventions promoting parental role during NICU hospitalization. Parents are early separated from their infant and the NICU setting potentially obstacle the parent-infant relationship instauration (Flacking et al., 2021). FCC practices should promote active participation of both mothers and fathers since the first days after birth. Importantly, healthcare staff need to take into account differences in mothers and fathers situations at the moment of NICU admission. Indeed, father is the first one to see the infant after birth and is the mediator among the NICU staff, mother and the whole family. Therefore, focusing on paternal needs during hospitalization can lead to improve whole family experience and partially facilitate parental role adaptation in mothers.

Mothers also experienced significantly higher symptoms of Anxiety, Depression and Somatization than fathers. Literature confirmed that finding underlying the importance to

The results also showed a considerable number of both mothers and fathers scored above the clinical cut-off for Anxiety, Depression and Somatization. This is to consider in order to activate psychological support interventions sensitive to maternal needs and aimed to reduce those symptoms. Specifically, mothers could experience feelings of inadequateness related on one hand to the shame for not having been able to keep their infant in the womb. On the other hand, and the fragile aspect of their infant, the separation following birth and the NICU setting may disrupt the mother-infant relationship and amplify feelings of not being a good mother. Importantly NICU healthcare staff, should take into account for cultural gender norms that usually, and in specifically in the Italian context, underscore that mothers are always and immediately able to take care of their infant since the first moment after birth and better than anyone else (Cislaghi et al., 2021). With regards to the individual coping strategies our results found slight differences among mothers and fathers. The findings of this study highlighted that mothers and fathers use considerably higher proportion of individual coping strategies than the general population. Specifically, Turning to Religion was the most used coping strategy in both mothers and fathers. Whereas, while maternal coping was more focused on seeking social support, fathers adopted more frequently a Positive attitude-based strategy. On the contrary, problem-solving was less used, probably because actively modification of the stressful situation is rarely possible during NICU hospitalization. Notably, Avoidance was the less used strategy to cope with NICU stressful situation. Our results describe how coping strategies use may be also mediated by the stressful situation that individuals are facing. Considering both the frequencies found in both mothers and fathers when compared to the mean

values of the validation population and regression analysis results, tailored interventions improving meaning making strategies (i.e., positive reframing) could be more useful to face psychophysical health exacerbation due to the impossibility to change the stressful situation at the individual level.

The findings of the Chapter IV also underlined the importance to consider the NICU hospitalization as a “*we experience*” (Bodenmann, 1995), The Family-Integrated Care Model promotes the active involvement of both mothers and fathers in the care and decision-making process for their infants (Moreno-Sanz et al., 2025). To this aim, the dyadic coping strategies are determinant to find out the strategies to help the couple to cope with the NICU experience and engage in all the aspects of infant’s care. Finally, the Chapter IV showed that while parents cannot actively modify the situation, they can do a lot to support their own partner. Emotion sharing, helping him/her to solve problems that can be beside the NICU hospitalization, and assuming some of his/her tasks on her/his own are factors that can promote the psychophysical health of both mothers and fathers. Overall, given the unique nature of the NICU hospitalization, the partner can be among the very few persons that can understand this lived experience. Therefore, psychological counselling should work on two subsequent levels. On one hand, a sense of common lived experience among the partners of the couple should be promoted (“*we experience*”). The understanding that the partner is living almost the same feelings of inadequateness can buffer the feeling of loneliness. On the other hand, psychological interventions should aim to encourage the view of the couple as a team that work together to balance the life in and the life out of the NICU. Overall, the Chapter IV underlined both commons and differences among mothers and fathers to implement tailored interventions within the Family-Integrated Care practices.

The Chapter V focused on the cultural dimension of parenting a very preterm infant and the interplay among NICU-related stressors and sources of unformal social support (i.e., family, friends, and significant others). The chapter firstly reviewed prevalence and characteristics of a very preterm birth in Italy and Portugal along with the elevated stress levels in parenting this category of infants. Then, the role of social support including both emotional and instrumental aids provided by their own personal system of relationships (i.e., family, friends and significant other; Finfgeld-Connett, 2005; Rossman, Greene & Meier, 2015) was examined in parents of NICU infants. The recent importance given by the Family-Centered Care model to the examination and the potential involvement of the unformal relational systems to support parents during NICU hospitalization was underlined. The role of Person-Centered approach to study the classes of risks and resources considering the three NICU stressors and the three sources of Social Support was employed.

Table 30. Summary of Research Questions and Results of Chapter V.

RESEARCH QUESTIONS	How many classes are identifiable from the combination of NICU stressors and sources of social support? How are the classes characterized?	Are the emerged classes valid both for the Italian and the Portuguese parents?	Do sociodemographic variables influence the membership to the classes?
RESULTS	Three classes have been identified. Class 1 named Beneficial Supported System (with low NICU stressor scores and high rates of Social Support sources), Class 2 as Stressed and Supported System (with medium/high scores for NICU stressors and high Social Support sources) and Class 3 as Parental Role Alterations with Family-Supported System (medium/low scores to Sights and Sounds and Infant Behaviour and Appearance subscales, medium/high scores to Parental Role Alterations subscale with medium/high scores to Significant Other and Family subscales and medium/low scores to Friends subscale).	The three classes were valid across the two samples of parents.	Sociodemographic variables influence class membership. Specifically, Being Italian and mother was associated with Class 2 and Class 3 membership. Young age increased the likelihood of Class 2 membership. An interaction effect among Country and Age was found. Specifically, with increasing of the age, Italian parents had higher likelihood to be part of the Class 2. Advanced age and having other children increased the likelihood of Class 3 membership.

The results provided three distinct classes. Class 1, named the Beneficial and Supported System, that identified those parents who are protected by their social support system. Class 2, named Stressed and Supported System, underlines the ambivalence of informal social support for whom being close to parents does not mean being supportive (Kainiemi et al., 2025). On the contrary, support and aids provided to parents may not be adequate to face the experience they are living. Class 3, named Parental Role Alterations with Family-Supported System, defined a very specific pattern in which stressor related to parenting within the NICU setting is lived as a unique experience that other people cannot understand.

Importantly, those classes can serve to screen for parents who are at enhanced risk to experience elevated stress. According to FCC model, NICU healthcare staff should provide adequate support to the extended support system of parents making it able to help parents in the best way possible. Further, the three merged classes were valid in both the Italian and Portuguese context. This could be a first step to provide standardized screening practices across Countries (). While the three classes can serve as theoretical basis for caring for parents, according to the study findings, NICU staff members should consider sociodemographic factors that could exacerbate the dynamic relationship among NICU stressors and sources of social support. Specifically, considering cultural factors, age-related differences, and family characteristics (e.g., having other children). This can

lead to create tailored support for parents and their families and friends to improve their NICU experience.

The Chapter VI aimed to investigate a broad array of costs and perceived financial burden (FB) faced by families of NICU graduates both during hospitalization and after discharge. A survey was developed based on the scientific literature concerning both objective and subjective financial burden, and on the financial burden experienced by families of NICU infants. Specifically, the survey aimed to investigate direct medical costs (e.g., medical check-ups), non-direct medical costs (e.g., transportation costs towards the medical appointments and for visiting the NICU) and indirect costs (e.g., being fired during the hospitalization or after the discharge) concerning both the hospitalization period and the first year after the discharge. Since this was the first attempt to measure financial burden in Italian parents of NICU graduated infants, we tried to capture the broad array of objective and subjective factors related to the NICU hospitalization and after discharge period that could determine the experience of financial distress in parents. The study aimed to explore both objective costs (i.e., direct medical costs, non-direct medical costs, and indirect costs), economic aids (i.e. financial aids from the government), subjective perceptions (i.e., related to the perceived financial burden of the NICU hospitalization experience and after discharge period; perception of government financial help) and resources (e.g., presence of grandparents or babysitters) and their relative functions (e.g., helping with transportation, caring for other children) and other government economic aids.

Table 31. Summary of Research Questions and Results of Chapter VI.

Research Question	How much parents spent during NICU hospitalization ?	Which factors correlate with the perceived FB?	Who is the main source of help for parents?	Do neurodevelopmental status of the is related with the perceived FB?	What element is associated with the perceived FB?
Results	The median cost of visiting infant during NICU admission was 615 euros.	FB correlated with cost for drugs, dietary supplement, behavioural disorders, language delay and comorbidities. Transportation costs due to medical visits and therapy sessions correlated with higher FB.	Grandparents of the infant were the most frequent source of help.	Families having infants with adverse outcome experienced more hospitalizations after NICU discharge and higher FB than families with typically developing infant.	Lack of government financial help was associated with higher perceived FB.

Becoming parents is a joyful event usually. However, there are several outgoings to care for a baby, especially in the first years. Given that, this study underlined the financial burden as experienced by parents of NICU infants. Findings indicated that parents of NICU infants have to face additional expenses both during hospitalization and after discharge. Moreover, differences within this group of parents have been found. In particular parents of extremely preterm infants experience higher costs both during hospitalization and up to one year after discharge. On one hand elevated length of stay can determine prolonged financial costs for transportation towards the NICU and daily meals. This situation could be exacerbated when parents live far from the NICU (Amorim et al., 2019). Providing accommodations for parents that let parents rest close to the NICU ward may improve their general well-being and permit them to be actively involved in caring for their infant. On the other hand, differences in financial expenses linked to prematurity category were still present up to one year after discharge. Notably, extremely preterm infants are at the highest risk for severe neurodevelopmental impairments (Gallini et al., 2021). This includes outcomes like autism spectrum disorder, cerebral palsy, and language delay (Veirmisch et al. 2021). In this case, early rehabilitation interventions are essential to improve the long-term neurodevelopmental outcome (Gallini et al., 2021). Indeed, elevated delay in rehabilitation therapies provision may lead parents to pay for them privately facing additional elevated costs just like in the case of some part of the considered sample.

According to these findings, social disparities and health inequalities are increased not only among parents of NICU infants as compared to parents of healthy full-term infants, but even within the group of parents of NICU infants. Policy makers and healthcare managements should screen for and address parental financial burden to reduce inequalities and promote wellbeing. Importantly, financial aids need to be targeted and differentiated according to the needs experienced during NICU hospitalization (e.g., accommodations and transportation costs) than after discharge (e.g., rehabilitation therapies, costs for drugs and milk). Further, parents of extremely preterm infants need to receive additional financial aids both during hospitalization and after discharge, due to the elevated medical complexity of their infant.

Chapter VII focused on the somatic distress experience starting from the Preterm Parental Distress Model (Holditch-Davis & Miles, 2000) considering Sights and Sounds, Infant Behaviour and appearance and Parental Role Alterations as the most prominent stressors in NICU (Miles & Carter, 1983; Holditch-Davis & Miles, 2000).

The chapter particularly targeted the examination of the interplay among psychological distress (i.e., anxiety) and irritable bowel syndrome (IBS). IBS is one of the most common disorders of gut-

brain interaction (DGBI) ranging from 5-to-10% within the general population (Sperber et al., 2017). IBS is 1.5 times more common in women as compared to men (American College of Gastroenterology Task Force on Irritable Bowel Syndrome et al., 2009). Notably, recent guidelines emphasized the understanding of IBS etiology and treatment within a biopsychosocial perspective (van der Veek et al., 2010; Barbara et al., 2023). This perspective underline the interplay among biological , psychological and social factors in determining heallth outcomes (Borrell-Carrió, Suchman & Epstein, 2004). Importantly the biopsychosocial perspective can lead to adopt individualized treatments that are more effective in caring for parents. This is particularly recommended by the Family-Centered Care principles (Goolding et al., 2011). Based on the above-mentioned literature the chapter illustrated the following hypothesis and obtained the following results:

Table 32. Summary of the Hypothesis and Results of Chapter VII.

HYPOTHESIS	Mothers will experience higher levels of IBS symptoms than fathers	NICU Stressors and Anxiety will exacerbate IBS symptoms in parents of NICU infants.	Anxiety will mediate the effect among NICU stressors and IBS symptoms
RESULTS	Mothers scored above the clinical cut-off for IBS more frequently than fathers. Symptoms were significantly higher in mothers as compared to fathers.	Both NICU stressors and Anxiety increased IBS symptoms.	Anxiety fully mediated the effect of Sights and Sounds, Infant Behaviour and appearance, and Parental Role Alterations on IBS symptoms.

Parents of NICU infants usually experience elevated psychological distress. However, stress is a reaction that include cognitive, emotional, and bodily symptoms (Chu et al., 2024). The chapter illustrated the potential implications of the findings. Firstly, given the resulted gender differences in IBS symptoms among mothers and fathers, the chapter used the gender roles expectations to explain why mothers, and women in general, may suffer more frequently of IBS as compared to fathers and men (Cislaghi & Heise, 2020). Specifically, maternal feelings of exclusion from the infant care during NICU hospitalization may create a mismatch among cultural expectations of “caring mother” and the actual situation (Wigert et al., 2006), activating a vicious circle of psychosomatic distress (Nelkowska, 2020). Then, the chapter highlighted the evidence-base interventions: psychoeducation on the psychological, somatic, and social consequences following admission (e.g., NICU environment, developmental care, and parental role expectations rather than actual possibilities), cognitive-behavioural therapy (i.e., cognitive reframing) and stress-reduction strategies (Hauser, Pletikosic & Tkalcic, 2014; Treyvaud et al., 2019). The chapter concluded with

implications for the Family-Centered Care practices to enhance the psychological and somatic health of parents during NICU hospitalization.

In line with the conceptualization of the previous study, chapter VIII used the Biopsychosocial model to investigate IBS and IBS-related quality of life (IBS-QoL) and their connection with psychological distress (i.e., anxiety and depression) and psychophysical health (i.e., physical, mental, and social health) after NICU discharge. Specifically, the role of gender differences was particularly taken into account for this study as both mothers, and women in general, usually score higher than fathers and men in anxiety, depression, and IBS symptoms (Salomè et al., 2022; Yang et al. 2021). Furthermore, the general health changes as perceived by parents than the NICU hospitalization period was studied. Within this theoretical framework, the focus on the child neurodevelopment was also included as potential additional burden for families.

Table 33. Summary of the Research Questions and Results of Chapter VIII.

RESEARCH QUESTIONS	Are there any changes in health perception among mothers and fathers with respect to the NICU hospitalization period?	Are there any differences among mothers and fathers in IBS symptoms and QoL?	Are there any associations among IBS, psychological distress, psychophysical well-being and child neurodevelopment in mothers and fathers of NICU discharged infants?
RESULTS	One-half of mothers and one third of fathers experienced an improvement of general health than NICU hospitalization period.	Mothers reported higher IBS prevalence than fathers and lower levels of IBS-QoL.	PTSD symptoms and child irritability increased maternal IBS symptoms. Paternal anxiety worsened their IBS symptoms and predicted IBS diagnosis. IBS symptoms affected maternal general health and paternal vitality scores.

Findings have several implications. On one hand, while most of mothers and fathers experienced general health improvements, others perceived no or little improvement. These results may account for the several pathways experienced by parents after NICU discharge (Holditch-Davis et al., 2015) and serve as a cost-effective screening method to evaluate parents during neurodevelopmental follow-up visits. Moreover, gender differences were found in almost all the variables investigated. Considering patterns of health and distress sensitive to gender differences is warranting to care for both mothers and fathers (Darwin et al., 2021). Moreover, after screening procedure, healthcare

staff should evaluate several aspects of psychological and physical health of parents and their relationship with the NICU graduated child. Mothers and fathers may experience IBS as a somatic manifestation due to different sources of distress. Specifically elevated maternal PTSD symptoms and paternal anxiety related to the previous NICU hospitalization could exacerbate IBS symptoms. Tailored interventions should be recommended and when possible, carried out within the context of the neurodevelopmental follow-visits to reduce the burden on families. Importantly, parental health can also influence child development (e.g., irritability) and create vicious circle of maladaptive parenting and distress in both parents and children (Horwitz et al., 2015; Poehlmann et al., 2012). The biopsychosocial model can be a valid framework to study psychological, somatic, and social factors specifically relevant to maternal and paternal health and well-being after discharge.

Finally, the chapter invites to adopt a holistic vision of care for parents that go beyond the NICU hospitalization period, considering both parental psychophysical well-being and parent-child relationship within and extended Family-Centered Care perspective.

Chapter IX went to the other side of the incubator. Given the daily close contact among nurses, parents and NICU infants during hospitalization, caring for nursing professionals is essential to care for the parent and infant well-being. Nurses' turnover is higher than other industries (Duffield et al., 2014; Japanese Nursing Association & JNA News Release, 2017). The World Health Organization (WHO) estimated that shortage of nurses would reach 9 million by 2030 (International Council of Nurses, 2019). This can lead to high workload, inadequate care for patients and their families and maladaptive functioning of the whole healthcare system (Aiken, Clarke & Sloane, 2002). Therefore, caring for those who daily care is essential. Among the tasks that nurses must handle there is the good death provision. Good death is a concept that promotes the optimal standard of care for both patients and their families from the dying process to the death (Meier et al., 2016; Watts, 2012). This theme is particularly relevant in critical care wards such as adult Intensive Care Unit (ICU; Society of Critical Care Medicine, 2022) and Neonatal Intensive Care Unit (NICU; Chow et al., 2015). While the death and the dying process remain unavoidable for nurses, other work-and-relational-related factors, other stressors in nursing, and individual coping strategies are modifiable. Within the Demands Resources and Individual Effects-Nurses Model (DRIVE-Nurses Model; Vallone et al., 2020), chapter IX wanted to examine risks and resources that can occur while caring for a patient that is dying/death. In addition, the chapter explored the potential differences among nurses caring for dying/death adults in ICU as compared to nurses caring for dying/death infants in NICU.

Table 34. Summary of the Research Questions and Results of Chapter IX.

RESEARCH QUESTION S	Are there differences in Background Information among ICU and NICU nurses?	Are there differences in perceived levels of Stressors in Nursing, in the recourse to Coping Strategies, and in perceived levels of Work-Resources and Psychological Disease among ICU and NICU nurses?	Are there differences in the associations between perceived Stressors in Nursing, Coping-Strategies, and Work-Resources respectively, with Psychological Disease according to the working unit (ICU and NICU)?	Is the relationship between Death-and-Dying-Stressor and Psychological Disease mediated by further Stressors in Nursing across ICU and NICU?	Do Coping-Strategies and Work-Resources serve as significant moderators of the relationships between Death-and-Dying-Stressor, further Stressors in Nursing, and Psychological Disease, respectively, across the two working units (ICU/NICU)?
RESULTS	Background information: Most nurses working in ICU were men, while almost all the nurses working in NICU were women. ICU Nurses were significantly older and had higher working seniority than those NICU nurses	ICU nurses perceived higher Job Control and Rewards and lower psychological disease than NICU nurses. No significant differences in the clinical levels of psychological disease was found.	ICU nurses: Death-and-Dying and Conflicts-with-Supervisors, and the recourse to Seek-Advice and Escape/Avoidance coping strategies (risk factors) were significantly associated with Psychological Disease NICU nurses: Conflicts-with-Peers, Conflicts-with-Physicians, and Uncertainty-concerning-Treatment (risk factors) and perceived levels of Job-Control and Social-Support (protective factors) were associated with Psychological Disease.	ICU nurses: Death-and-Dying-Stressor was associated indirectly with Psychological Disease, through the association with Conflicts-with-Supervisors (full mediation). NICU nurses: Death-and-Dying-Stressor was associated indirectly with Psychological Disease, through the association with both Conflicts with Physicians and Uncertainty Concerning Treatment (full mediations)	ICU nurses: Self-Blame and Escape/Avoidance moderated the relationship among Conflicts with the supervisors and psychological disease. NICU nurses: Job-Control and Social-Support moderated the relationship among Conflicts with physicians and psychological disease.

Death and dying stressor demonstrated to play a key role influencing psychological disease of both ICU and NICU nurses. DRIVE-Nurses Model fruitfully provided several risks and resources to implement interventions according to the working unit.

Specifically, ICU nurses experienced less psychological disease as compared to NICU ones. This could be due to multiple factors potentially influencing high psychological disease in NICU nurses: less years of experience (Chen, Ogata & Sasaki, 2025; Turner, Chur-Hanse & Winefield, 2014) and specific higher burden related to caring for neonates as patients as compared to adult ones (Nabwera et al., 2021). Training specifically focused on the ICU and NICU setting are important to improve nurses' skills.

Regarding commonalities, workload and rewards seem to be the main risk and protective factors respectively across the two wards (Lief et al., 2018; Rodriguez-Ruiz, E.; Latour, J.M.; van Mol, 2025). Considering the balance among those two factors can improve work-related wellbeing in ICUs nurses (Azadi et al., 2020; Mealer et al., 2007; Preto, V.A.; Pedrão, 2009; Vahedian-Azimi et al., 2019). From the individual point of view different coping strategies have been identified across the wards. Specifically, this study only found maladaptive coping strategies (i.e., Escape/Avoiding and Self-blame) playing as moderators in the relationship among Conflict with the Supervisors stressor and Psychological Disease. Although, those strategies are at the opposite pole, they can be two reactions related to the excessive burden linked to the conflicts with the supervisors. Carefully monitoring these strategies and implementing new ways to find out a new adjustment with supervisors is important. The “Psycho-Educational Defusing Intervention” (Tommasi et al., 2024) has been proven to be effective for preventing trauma and sustaining recovery and wellbeing among healthcare workers belonging to Emergency and Critical Care Units— since they promote nurses' awareness and knowledge along with their psychosocial competencies by building/strengthening relational resources, fostering peer-supporting (e.g., defusing), and boosting the recourse to adequate coping strategies.

With respect to NICU nurses, interventions to attenuate the detrimental relationship among Conflicts with Physicians stressor and psychological disease should target both the individual and the relational level. On one hand, improving nurses' skills and capacity to handle their tasks effectively. On the other hand, creating a supportive environment in which colleagues can help each other to emotionally handle conflicts situations and promoting mutual respect among different professionals working in the NICU.

X.3 Research and Practical Implications

This section will underscore the clinical and research implications of the emerged findings from this thesis project following the taxonomy developed by Franck & O'Brien (2019) that recognize three levels of care: Parent-supporting interventions, parent-delivered interventions, and parent-partnered models of care.

The interaction among different models that characterized this thesis provided interesting findings relate to several aspects of parenting and nursing in the NICU particularly for the level of parent-supporting interventions. Notably, this level is the basis for the other two levels, and the essential starting point to promote the involvement of parents in infant's caring practices (Franck & O'Brien, 2019).

This thesis project provided several insights and different target levels. In accordance with the Family-Integrated Care Model, fostering reciprocal help among mothers and fathers living the NICU experience emerged as an important factor for promoting their psychophysical health. On one hand, their own partner is the person that know the NICU experience better than anyone else because he/she is living the experience parenting the same infant, receiving the same daily updates, and feeling the same emotions. Fostering reciprocal support among partners promoting emotion sharing processes, alternative perspective of the situation and reciprocal help with tasks that are both in and out of the NICU can both mothers and fathers to face with the hospitalization experience. Importantly, NICU staff must apply the principles of Family-Centered Care for both mothers and fathers. On the one hand, this can lead parents to feel that they are really living the same experience, feeling themselves welcomed as parents and important caretakers of the infant (Moreno-Sanz et al., 2024). Moreover, couple dynamics may also compensate individual weaknesses and help each parent to positively reframing the whole experience. On the other hand, addressing specific social, cultural, and gendered roles have the potential to target specific needs across parents (Fegran, Helseth & Fagermoen, 2008).

This thesis project also attempted to reach homogeneous caring practices for parents of very preterm infants across Italy and Portugal. Specifically, according to the recent evolutions of Family-Centered Care (Franck et al., 2021), social support systems may play an important role in reducing parental stress during NICU stay. Therefore, using a person-centered approach combining NICU stressors and sources of social support (i.e., family, friends and significant other) three classes, one of resources and two of risk, have been detected. Importantly, those classes are valid across the two countries and connected with specific sociodemographic factors (e.g., having other children,

advanced age). Importantly, this lead to improve screening practices (Grunberg et al., 2022) of parents who can be at high risk and implement early tailored interventions to support them and positively activate their social support system implementing more friendly models of care.

Furthermore, along with screening for social support, identifying parents who may have more difficulties to sustain the financial burden of NICU experiences is important as well. Indeed, policy makers should implement facilities (e.g., accommodations for parents) to reduce the financial burden of parents of NICU infants both during the hospitalization and after discharge. Tailored financial helps from NICU admission up to one year after discharge may help the family adjustment in caring practices and work-life balance.

Parent-supporting interventions need to be implemented also for the somatic distress of parents during hospitalization after discharge. Considering parental health within a holistic perspective connecting mind and body is essential to completely care of their well-being and integrate them as active partner of the decision-making process of the NICU infant.

On the one hand, thesis findings move towards a Family-Centered Care that is able to establish some reference point across different cultural settings and providing tailored interventions to support parents and infants' well-being. On the other hand, the results underscore the need to implement a Family-Centered Care extended to the period after discharge. Following parents and infants and supporting them at individual, dyadic and community level. This proposed model needs to integrate gender issues, psychosomatic elements, parent-infant interaction factors, financial initiatives, and individual and dyadic ways to cope through the path.

The focus on the nursing profession in NICU is important, even if it might be more difficult to collocate. NICU nurses are the primary providers of all the models of care. Improving both technical and emotional skills of nurses is fundamental to create more inclusive and respectful and evidence-based models of care in NICU. Although NICU and ICU technological advancement highly reduced the mortality risk, death remains an unavoidable challenge for those nurses. Therefore, it is important to build up sensitive environments and skilled ICU and NICU professionals able to handle the burden of dying patients and fostering care for both patients and their family.

Overall, this thesis project highlight how NICU hospitalization is a specific context in which clinicians and researchers need to consider the interplay among different dimensions that contribute to shape the experience. Family-Centered Care could benefit from the different dimensions emerged

in this thesis work to foster the health of parents and NICU nurses using evidence-based integrated and context-sensitive approaches.

X.4 Study Limitations

This section will address the limitations of the studies conducted within this thesis project. Among the limitations we acknowledge the relatively small sample size that is due to several factors. On one hand, the narrowed nature of the targeted populations (i.e., parents of NICU babies and ICU and NICU nurses). On the other hand, almost all the study subjects of this project were recruited within only one centre, on voluntary basis, in Southern Italy. This can limit the generalizability of the findings. Furthermore, this thesis project did not stratified parents according to the prematurity rate as some part of the research studies. Although some studies demonstrated the scarce effect of prematurity severity on the parental distress, other comorbidities of the prematurity could lead to increased psychological burden in parents. Considering those factors as potential stressors and how they are faced both the individual and couple level should be investigated in future studies. Finally, the cross-sectional design of the studies presented in this thesis project limit causality conclusions. Although, the findings emerged can be a valid starting point to promote reflections on future studies aiming to implement tailored interventions sensitive to both gender, somatic, financial, and cultural dimensions for both parents and nurses of the NICU.

X. 4 Future steps and further research

Future studies could test interventions aimed to foster dyadic strategies among mothers and fathers of NICU infants. Moreover, interventions aimed to reduce somatic distress targeting the connected factors are important and need to be adapted to the specific NICU context. Financial initiatives aimed to design new NICU environments to welcome parents and their social support systems should be developed and tested. Future studies should also focus on implementing internationally valid screening practices for parents' mental health across different gestational ages and in relation to other psychological distress dimensions (e.g., anxiety and depression) frequently experienced by parents of NICU infants. This could lead to improve the decision-making process in implementing specific paths of intervention. Further studies may also test the longitudinally effect of a series of tools to improve parental quality of life and fostering parent-infant relationship from preparation for NICU discharge up to the first year at home, within a Family-Centered Care extended framework.

Finally, future research could be extended to all the medical staff (including physicians) and family members, to identify potential similarities and differences in the management of death and the dying experience.

References

- Abidin, R. R., Jenkins, C.L. & McGaughey, M.C. (1992). The relationship of early family variables to children's subsequent behavioural adjustment. *Journal of Clinical Child Psychology*, 21, 60-69.
- Abidin, R.R. (1992). The determinants of parenting behavior. *Journal of Clinical Child Psychology*, 21(4):407–412
- Abu Safieh, A.M.; Malak, M.Z.; Abu-Sharour, L.M.; Shehadeh, A. (2024). Job-related stress, quality of work life, and quality of nursing care among critical care nurses. *J. Workplace Behav. Health*, 40, 195–212. <https://doi.org/10.1080/15555240.2024.2429487>.
- Achour, N., Munokaran, S., Barker, F., Soetanto, R. (2018). Staff stress: the sleeping cell of healthcare failure. *Procedia Eng.* 212(2017):459-466. 10.1016/j.proeng.2018.01.059.
- Aftyka, A., Rybojad, B., Rosa, W., Wróbel, A., & Karakuła-Juchnowicz, H. (2017). Risk factors for the development of post-traumatic stress disorder and coping strategies in mothers and fathers following infant hospitalisation in the neonatal intensive care unit. *Journal of clinical nursing*, 26(23-24), 4436–4445. <https://doi.org/10.1111/jocn.13773>.
- Aiello, A., Garman, A., & Morris, S. B. (2003). Patient satisfaction with nursing care: a multilevel analysis. *Quality management in health care*, 12(3), 187–190. <https://doi.org/10.1097/00019514-200307000-00009>
- Aiken, L. H., Clarke, S. P., & Sloane, D. M. (2002). Hospital staffing, organization, and quality of care: Cross-national findings. *Nursing outlook*, 50(5), 187–194. <https://doi.org/10.1067/mno.2002.126696>.
- Aita, M., De Clifford Faugère, G., Lavallée, A., Feeley, N., Stremler, R., Rioux, É., & Proulx, M. H. (2021). Effectiveness of interventions on early neurodevelopment of preterm infants: a systematic review and meta-analysis. *BMC pediatrics*, 21(1), 210. <https://doi.org/10.1186/s12887-021-02559-6>.
- Akister J, Johnson K (2004). The parenting task: parent's concerns and where they would seek help. *J Fam Soc Work*, 8(2):53–64.
- Al Barmawi, M. A., Subih, M., Salameh, O., Sayyah Yousef Sayyah, N., Shoqirat, N., & Abdel-Azeez Eid Abu Jebbeh, R. (2019). Coping strategies as moderating factors to compassion fatigue among critical care nurses. *Brain and behavior*, 9(4), e01264. <https://doi.org/10.1002/brb3.1264>

- Alharbi, H., & Alshehry, A. (2019). Perceived stress and coping strategies among ICU nurses in government tertiary hospitals in Saudi Arabia: a cross-sectional study. *Annals of Saudi medicine*, 39(1), 48–55. <https://doi.org/10.5144/0256-4947.2019.48>
- Aliabadi, F., Kamali, M., Borimnejad, L., Rassafiani, M., Rasti, M., Shafaroodi, N., Rafii, F., & Askary Kachoosangy, R. (2014). Supporting-emotional needs of Iranian parents with premature infants admitted to Neonatal Intensive Care Units. *Medical journal of the Islamic Republic of Iran*, 28, 53.
- Alkhawaldeh, J. M. A., Soh, K. L., Mukhtar, F. B. M., & Ooi, C. P. (2020). Effectiveness of stress management interventional programme on occupational stress for nurses: A systematic review. *Journal of nursing management*, 28(2), 209–220. <https://doi.org/10.1111/jonm.12938>.
- Allison, P.D. (1999). *Multiple Regression: A Primer*; Pine Forge Press: Newbury Park, CA, USA.
- Allsop, D. B., Péloquin, K., Saxey, M. T., Rossi, M. A., & Rosen, N. O. (2023). Perceived financial burden is indirectly linked to sexual well-being via quality of life among couples seeking medically assisted reproduction. *Frontiers in psychology*, 14, 1063268. <https://doi.org/10.3389/fpsyg.2023.1063268>.
- Almalki, M., Gildea, A. & Boyle, B. (2025). Parents' experiences of family-centred care in neonatal intensive care units: A qualitative thematic synthesis. *Journal of Neonatal Nursing*, Volume 31, Issue 3.
- Almario, C. V., Sharabi, E., Chey, W. D., Lauzon, M., Higgins, C. S., & Spiegel, B. M. R. (2023). Prevalence and Burden of Illness of Rome IV Irritable Bowel Syndrome in the United States: Results From a Nationwide Cross-Sectional Study. *Gastroenterology*, 165(6), 1475–1487. <https://doi.org/10.1053/j.gastro.2023.08.010>.
- Almeida, F.deA., Moraes, M. S., & Cunha, M. L. (2016). Taking care of the newborn dying and their families: Nurses' experiences of neonatal intensive care. *Revista da Escola de Enfermagem da U S P*, 50 Spec, 122–129. <https://doi.org/10.1590/S0080-623420160000300018>.
- Alomari, A. H., Collison, J., Hunt, L., & Wilson, N. J. (2021). Stressors for emergency department nurses: Insights from a cross-sectional survey. *Journal of clinical nursing*, 30(7-8), 975–985. <https://doi.org/10.1111/jocn.15641>
- Als, H. (1986). A synactive model of neonatal behavioral organization: framework for the assessment of neurobehavioral development in the premature infant and for support of infants and parents in the neonatal intensive care environment. *Phys Occup Ther Pediatr*; 6:3–55.

Altimier, L., Kenner, C., & Damus, K. (2015). The Wee Care Neuroprotective NICU Program (Wee Care): the effect of a comprehensive developmental care training program on seven neuroprotective core measures for family-centered developmental care of premature neonates. *Newborn and infant Nursing reviews*, 15(1), 6-16.

Alvarado, L. E., Bretones, F. D., & Rodríguez, J. A. (2021). The Effort-Reward Model and Its Effect on Burnout Among Nurses in Ecuador. *Frontiers in psychology*, 12, 760570. <https://doi.org/10.3389/fpsyg.2021.760570>.

Alves, E., Amorim, M., Fraga, S., Barros, H., & Silva, S. (2014). Parenting roles and knowledge in neonatal intensive care units: protocol of a mixed methods study. *BMJ open*, 4(7), e005941. <https://doi.org/10.1136/bmjopen-2014-005941>.

Alves, E., Amorim, M., Nogueira, C., & Silva, S. (2023). Quality of Life of Mothers and Fathers 4 to 6 Months After Birth: The Effect of a Very Preterm Delivery. *Maternal and child health journal*, 27(10), 1719–1725. <https://doi.org/10.1007/s10995-023-03739-9>.

American Academy of Pediatrics, Council of International Neonatal Nurses, International Council of Nurses, International Confederation of Nurse Midwives, American College of Obstetricians and Gynecologists, International Federation of Gynecology and Obstetrics, & American College of Nurse Midwives. (2016). International Policy Statement for Universal Use of Kangaroo Mother Care for Preterm and Low Birthweight Infants.

American College of Gastroenterology Task Force on Irritable Bowel Syndrome, Brandt, L. J., Chey, W. D., Foxx-Orenstein, A. E., Schiller, L. R., Schoenfeld, P. S., Spiegel, B. M., Talley, N. J., & Quigley, E. M. (2009). An evidence-based position statement on the management of irritable bowel syndrome. *The American journal of gastroenterology*, 104 Suppl 1, S1–S35. <https://doi.org/10.1038/ajg.2008.122>.

Amorim, M., Alves, E., Kelly-Irving, M., & Silva, S. (2019). Needs of parents of very preterm infants in Neonatal Intensive Care Units: A mixed methods study. *Intensive & critical care nursing*, 54, 88–95. <https://doi.org/10.1016/j.iccn.2019.05.003>.

Amorim, M., Alves, E., Kelly-Irving, M., Ribeiro, A. I., & Silva, S. (2018). Quality of life of parents of very preterm infants 4 months after birth: a mixed methods study. *Health and quality of life outcomes*, 16(1), 178. <https://doi.org/10.1186/s12955-018-1011-y>.

Ancora G, Pomero G, Ferrari F. (2012). *Raccomandazioni per l'assistenza al neonato con encefalopatia ipossico-ischemica candidato al trattamento ipotermico*. 2. Milano: Biomedica s.r.l;

- Apolone, G., & Mosconi, P. (1998). The Italian SF-36 Health Survey: translation, validation and norming. *Journal of clinical epidemiology*, 51(11), 1025–1036. [https://doi.org/10.1016/s0895-4356\(98\)00094-8](https://doi.org/10.1016/s0895-4356(98)00094-8).
- Arasteh, N., Moghimian Shahrabaki, R., Nematollahi, M., Ahmadi, A., & Bagherian, B. (2025). The effect of a mindfulness-based cognitive therapy program on the spiritual health of mothers of infants admitted to the neonatal intensive care unit. *Frontiers in psychology*, 15, 1346661. <https://doi.org/10.3389/fpsyg.2024.1346661>.
- Arim, R. G., Miller, A. R., Guèvremont, A., Lach, L. M., Brehaut, J. C., & Kohen, D. E. (2017). Children with neurodevelopmental disorders and disabilities: a population-based study of healthcare service utilization using administrative data. *Developmental medicine and child neurology*, 59(12), 1284–1290. <https://doi.org/10.1111/dmcn.13557>.
- Aucott, S., Donohue, P. K., Atkins, E., & Allen, M. C. (2002). Neurodevelopmental care in the NICU. *Mental retardation and developmental disabilities research reviews*, 8(4), 298–308. <https://doi.org/10.1002/mrdd.10040>.
- Azadi, M.; Azimian, J.; Mafi, M.; Rashvand, F. (2020). Evaluation of Nurses' Workload in the Intensive Care Unit, Neonatal Intensive Care Unit and Coronary Care Unit: An Analytical Study. *J Clin Diagn Res.*, 14, LC5–LC7. <https://doi.org/10.7860/JCDR/2020/44824.14181>.
- Babamiri, M., Bashirian, S., Khazaei, S., Sohrabi, M. S., Heidarimoghadam, R., Mortezaipoor, A., & Zareian, S. (2022). Burnout and Mental Health of COVID-19 Frontline Healthcare Workers: Results from an Online Survey. *Iranian journal of psychiatry*, 17(2), 136–143. <https://doi.org/10.18502/ijps.v17i2.8903>.
- Badr H, Herbert K, Bonnen MD, Asper JA and Wagner T (2018) Dyadic Coping in Patients Undergoing Radiotherapy for Head and Neck Cancer and Their Spouses. *Front. Psychol.* 9:1780. doi: 10.3389/fpsyg.2018.01780.
- Bagaajav, A., Myagmarjav, S., Nanjid, K., Otgon, S., & Chae, Y. M. (2011). Burnout and job stress among mongolian doctors and nurses. *Industrial health*, 49(5), 582–588. <https://doi.org/10.2486/indhealth.ms1256>.
- Baía, I., Amorim, M., Silva, S., Kelly-Irving, M., de Freitas, C., & Alves, E. (2016). Parenting very preterm infants and stress in Neonatal Intensive Care Units. *Early human development*, 101, 3–9. <https://doi.org/10.1016/j.earlhumdev.2016.04.001>.

Baider, L., Walach, N., Perry, S., & Kaplan De-Nour, A. (1998). Cancer in married couples: higher or lower distress? *Journal of psychosomatic research*, 45(3), 239–248. [https://doi.org/10.1016/s0022-3999\(98\)00016-6](https://doi.org/10.1016/s0022-3999(98)00016-6).

Balint E. (1969). The possibilities of patient-centered medicine. *The Journal of the Royal College of General Practitioners*, 17(82), 269–276.

Barbara, G., Cremon, C., Bellini, M., Corsetti, M., Di Nardo, G., Falangone, F., Fuccio, L., Galeazzi, F., Iovino, P., Sarnelli, G., Savarino, E. V., Stanghellini, V., Staiano, A., Stasi, C., Tosetti, C., Turco, R., Ubaldi, E., Zagari, R. M., Zenzeri, L., & Marasco, G. (2023). Italian guidelines for the management of irritable bowel syndrome: Joint Consensus from the Italian Societies of: Gastroenterology and Endoscopy (SIGE), Neurogastroenterology and Motility (SINGEM), Hospital Gastroenterologists and Endoscopists (AIGO), Digestive Endoscopy (SIED), General Medicine (SIMG), Gastroenterology, Hepatology and Pediatric Nutrition (SIGENP) and Pediatrics (SIP). *Digestive and liver disease: official journal of the Italian Society of Gastroenterology and the Italian Association for the Study of the Liver*, 55(2), 187–207. <https://doi.org/10.1016/j.dld.2022.11.015>.

Barcala Gomez, D., Pessa Valente, E., Dalena, P., Mariani, I., Arruda Vidal, S., Gonçalves Mello, M. J., Lima, G., Barradas Souza, J., Brandão Neto, W., Tenório Rodrigues, V., Malta Castro, B., Pessoa, M. L., Medeiros Cisneiros, E., Lazzerini, M., & EPINICU Study Group (2025). Parental Stress, Depression, Anxiety, and Participation in Neonatal Care in a Referral Brazilian NICU over Different Phases of the COVID-19 Pandemic. *Children (Basel, Switzerland)*, 12(4), 496. <https://doi.org/10.3390/children12040496>.

Barr, P. (2024). Dispositional stress coping styles and mental health in NICU nurses. *J. Neonatal Nurs.* 30, 283–287. <https://doi.org/10.1016/j.jnn.2023.10.009>.

Behruz, R., Hatem, M., Goulet, L. & Fraser, W.D. (2014). Perception of humanization of birth in a highly specialized hospital: let's think differently. *Health Care Women Int* 35:127–48

Belsley, D.A., Kuh, E. & Welsch, R.E. (2005). *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*; John Wiley & Sons: Hoboken, NJ, USA

Bergamante F, Mandrone E (2023) Rapporto Plus 2022. Comprendere la complessità del lavoro. Inapp Report

Betrian, F., & Kongsuwan, W. (2020). Grief reactions and coping strategies of Muslim nurses dealing with death. *Nursing in critical care*, 25(5), 277–283. <https://doi.org/10.1111/nicc.12481>.

- Bhattacharya, S., Maheshwari, A., & Mollison, J. (2013). Factors associated with failed treatment: an analysis of 121,744 women embarking on their first IVF cycles. *PloS one*, 8(12), e82249. <https://doi.org/10.1371/journal.pone.0082249>.
- Biggs, A., Brough, P., & Drummond, S. (2017). Lazarus and Folkman's Psychological Stress and Coping Theory. In C. L. Cooper, & J. Campbell Quick (Eds.), *The Handbook of Stress and Health: A Guide to Research and Practice* (pp. 351-364). John Wiley & Sons.
- Birgit, E., Gunnevi, S., & Ann, Ö. (2013). Work experiences among nurses and physicians in the beginning of their professional careers - analyses using the effort-reward imbalance model. *Scandinavian journal of caring sciences*, 27(1), 36–43. <https://doi.org/10.1111/j.1471-6712.2012.00997.x>
- Björkman, I., Dellenborg, L., Ringström, G., Simrén, M., & Jakobsson Ung, E. (2014). The gendered impact of Irritable Bowel Syndrome: a qualitative study of patients' experiences. *Journal of advanced nursing*, 70(6), 1334–1343. <https://doi.org/10.1111/jan.12294>.
- Blascovich, J., Mendes, W. B., Hunter, S. B., Lickel, B., & Kowai-Bell, N. (2001). Perceiver threat in social interactions with stigmatized others. *Journal of personality and social psychology*, 80(2), 253–267. <https://doi.org/10.1037/0022-3514.80.2.253>.
- Blencowe, H., Cousens, S., Chou, D., Oestergaard, M., Say, L., Moller, A. B., Kinney, M., Lawn, J., & Born Too Soon Preterm Birth Action Group (2013). Born too soon: the global epidemiology of 15 million preterm births. *Reproductive health*, 10 Suppl 1(Suppl 1), S2. <https://doi.org/10.1186/1742-4755-10-S1-S2>.
- Bloomer, M. J., Ranse, K., Adams, L., Brooks, L., & Coventry, A. (2023). "Time and life is fragile": An integrative review of nurses' experiences after patient death in adult critical care. *Australian critical care: official journal of the Confederation of Australian Critical Care Nurses*, 36(5), 872–888. <https://doi.org/10.1016/j.aucc.2022.09.008>
- Boadu, M., Ohene, L. A., & Senoo-Dogbey, V. E. (2025). "More than medical care": a qualitative study on family support systems in the neonatal intensive care unit in Ghana. *BMC pediatrics*, 25(1), 577. <https://doi.org/10.1186/s12887-025-05912-1>.
- Bodenmann, G. (2000). *Stress Und Coping Bei Paaren [Stress and Coping in Couples]*. Göttingen: Hogrefe.
- Bodenmann, G. (2005). "Dyadic coping and its significance for marital functioning," in *Couples Coping with Stress: Emerging Perspectives on Dyadic Coping*, eds T. Revenson, K. Kayser, and G.

Bodenmann (Washington, DC: American Psychological Association), 33–50. doi: 10.1037/11031-002.

Bodenmann, G., Randall, A. K., and Falconier, M. K. (2016). “Coping in couples: the systemic transactional model (STM),” in *Couples Coping with Stress: A Cross-Cultural Perspective*, eds M. K. Falconier, A. K., Randall, and G. Bodenmann (New York, NY: Routledge), 5–22.

Boniol, M.; McIsaac, M.; Xu, L.; Wuliji, T.; Diallo, K.; Campbell, J. *Gender Equity in the Health Workforce: Analysis of 104 Countries*; Workingpaper 1; World Health Organization: Geneva, Switzerland, 2019; (WHO/HIS/HWF/Gender/WP1/2019.1); Licence: CC BY-NC-SA 3.0 IGO.

Boonchooduang, N., Jidmahawong, N., Kungsuwan, S., Seetaboot, S., Likhitweerawong, N., & Louthrenoo, O. (2025). Parental resilience and child quality of life following paediatric hospitalisation: a prospective cohort study. *BMJ paediatrics open*, 9(1), e003669. <https://doi.org/10.1136/bmjpo-2025-003669>.

Borbasi, S., Galvin, K. T., Adams, T., Todres, L., & Farrelly, B. (2013). Demonstration of the usefulness of a theoretical framework for humanising care with reference to a residential aged care service in Australia. *Journal of clinical nursing*, 22(5-6), 881–889. <https://doi.org/10.1111/j.1365-2702.2012.04256.x>.

Borrell-Carrió, F., Suchman, A. L., & Epstein, R. M. (2004). The biopsychosocial model 25 years later: principles, practice, and scientific inquiry. *Annals of family medicine*, 2(6), 576–582. <https://doi.org/10.1370/afm.245>.

Bourbonnais, R., Comeau, M., & Vézina, M. (1999). Job strain and evolution of mental health among nurses. *Journal of occupational health psychology*, 4(2), 95–107. <https://doi.org/10.1037//1076-8998.4.2.95>.

Braid, S., & Bernstein, J. (2015). Improved Cognitive Development in Preterm Infants with Shared Book Reading. *Neonatal network: NN*, 34(1), 10–17. <https://doi.org/10.1891/0730-0832.34.1.10>.

Braun M., Gordon D. & Uziely, B. (2010). Associations between oncology nurses’ attitudes toward death and caring for dying patients. *Oncol Nurs Forum*.;37(1): E43YE49.

Brelsford, G. M., Ramirez, J., Veneman, K., & Doheny, K. K. (2016). Sacred Spaces: Religious and Secular Coping and Family Relationships in the Neonatal Intensive Care Unit. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 16(4), 315–322. <https://doi.org/10.1097/ANC.0000000000000263>

- Buchan, J., & Aiken, L. (2008). Solving nursing shortages: a common priority. *Journal of clinical nursing*, 17(24), 3262–3268. <https://doi.org/10.1111/j.1365-2702.2008.02636.x>.
- Cammarata, C., Bujoreanu, S. & Wohlheiter, K. (2020). Hospitalization and Its Impact: Stressors Associated with Inpatient Hospitalization for the Child and Family. In: Carter, B.D., Kullgren, K.A. (eds) *Clinical Handbook of Psychological Consultation in Pediatric Medical Settings*. Issues in Clinical Child Psychology. Springer, Cham. https://doi.org/10.1007/978-3-030-35598-2_4.
- Çamur, Z., & Sarıkaya Karabudak, S. (2021). The effect of parental participation in the care of hospitalized children on parent satisfaction and parent and child anxiety: Randomized controlled trial. *International. Journal of nursing practice*, 27(5), e12910. <https://doi.org/10.1111/ijn.12910>
- Canzi E, Donato S, Ferrari L, Parise M, Pagani AF, Lopez G, Rosnati R and Ranieri S (2019) “What Makes Us Strong?”: Dyadic Coping in Italian Prospective Adoptive Couples. *Front. Psychol.* 10:399. doi: 10.3389/fpsyg.2019.00399.
- Capasso, R., Zurlo, M. C., & Smith, A. P. (2018). Ethnicity, work-related stress and subjective reports of health by migrantworkers: A multi-dimensional model. *Ethnicity & Health*, 23,174–193 <https://doi.org/10.1080/13557858.2016.1258041>
- Caporali, C., Pisoni, C., Gasparini, L., Ballante, E., Zecca, M., Orcesi, S., & Provenzi, L. (2020). A global perspective on parental stress in the neonatal intensive care unit: a meta-analytic study. *Journal of perinatology: official journal of the California Perinatal Association*, 40(12), 1739–1752. <https://doi.org/10.1038/s41372-020-00798-6>.
- Carver, C. S., & Connor-Smith, J. (2010). Personality and Coping. *Annual Review of Psychology*, 61(Volume 61, 2010), 679–704. <https://doi.org/10.1146/annurev.psych.093008.100352>.
- Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, 56(2), 267–283. <https://doi.org/10.1037/0022-3514.56.2.26>.
- Cassiano, A.N., Araujo, M.G., Holanda, C.S.M. & Costa, R.K.S. (2015). Perception of nurses on humanization in nursing care in immediate puerperium. *J Res Fundam Care*; 7:2051–60.
- Cevik, B., & Kav, S. (2013). Attitudes and experiences of nurses toward death and caring for dying patients in Turkey. *Cancer nursing*, 36(6), E58–E65. <https://doi.org/10.1097/NCC.0b013e318276924c>

- Chan, G.K., 2006. End-of-life and palliative care in the emergency department: a call for research, education, policy and improved practice in this frontier area. *J. Emerg. Nurs.* 32, 101–103
- Chaplin, T. M., & Sinha, R. (2013). Stress and parental addiction. In N. E. Suchman, M. Pajulo, & L. C. Mayes (Eds.), *Parenting and substance abuse: Developmental approaches to intervention* (pp. 24–43). Oxford University Press. <https://doi.org/10.1093/med:psych/9780199743100.003.0002>.
- Chatzigianni, D., Tsounis, A., Markopoulos, N., & Sarafis, P. (2018). Occupational Stress Experienced by Nurses Working in a Greek Regional Hospital: A Cross-sectional Study. *Iranian journal of nursing and midwifery research*, 23(6), 450–457. https://doi.org/10.4103/ijnmr.IJNMR_120_17.
- Chen, G., Ogata, Y., & Sasaki, M. (2025). Factors associated with burnout among internationally educated nurses: A scoping review. *International nursing review*, 72(1), e13073. <https://doi.org/10.1111/inr.13073>.
- Chen, J. E., Lou, V. W., Jian, H., Zhou, Z., Yan, M., Zhu, J., Li, G., & He, Y. (2018). Objective and subjective financial burden and its associations with health-related quality of life among lung cancer patients. *Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer*, 26(4), 1265–1272. <https://doi.org/10.1007/s00520-017-3949-4>.
- Chen, X., Zhang, Y., Arber, A., Huo, X., Liu, J., Sun, C., Yuan, L., Wang, X., Wang, D., Wu, J., & Du, J. (2022). The training effects of a continuing education program on nurses' knowledge and attitudes to palliative care: a cross sectional study. *BMC palliative care*, 21(1), 56. <https://doi.org/10.1186/s12904-022-00953-0>.
- Chongpison, Y., Hornbrook, M. C., Harris, R. B., Herrinton, L. J., Gerald, J. K., Grant, M., Bulkley, J. E., Wendel, C. S., & Krouse, R. S. (2016). Self-reported depression and perceived financial burden among long-term rectal cancer survivors. *Psycho-oncology*, 25(11), 1350–1356. <https://doi.org/10.1002/pon.395711>.
- Chourasia, N., Surianarayanan, P., Adhisivam, B., & Vishnu Bhat, B. (2013). NICU admissions and maternal stress levels. *Indian journal of pediatrics*, 80(5), 380–384. <https://doi.org/10.1007/s12098-012-0921-7>.
- Chow, S., Chow, R., Popovic, M., Lam, M., Popovic, M., Merrick, J., Stashefsky Margalit, R. N., Lam, H., Milakovic, M., Chow, E., & Popovic, J. (2015). A Selected Review of the Mortality Rates of Neonatal Intensive Care Units. *Frontiers in public health*, 3, 225. <https://doi.org/10.3389/fpubh.2015.00225>.

- Cislaghi B, Heise L. (2020). Gender norms and social norms: differences, similarities and why they matter in prevention science. *Sociol Health Illn.*;42(2):407-422. doi:10.1111/1467-9566.13008.
- Clark, D. (2007). From margins to centre: a review of the history of palliative care in cancer. *Lancet Oncol.* 8, 430–438.
- Clarke, R. (2008). Improving end-of-life care in Emergency Departments. *Emerg. Nurse* 16, 34–37.
- Coats, H., Bourget, E., Starks, H., Lindhorst, T., Saiki-Craighill, S., Curtis, J. R., Hays, R., & Doorenbos, A. (2018). Nurses' Reflections on Benefits and Challenges of Implementing Family-Centered Care in Pediatric Intensive Care Units. *American journal of critical care: an official publication, American Association of Critical-Care Nurses*, 27(1), 52–58. <https://doi.org/10.4037/ajcc2018353>.
- Collins & Lanza (2009). *Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences. (1st Ed.)*. Wiley.
- Connor-Smith, J. K., Compas, B. E., Wadsworth, M. E., Thomsen, A. H., & Saltzman, H. (2000). Responses to stress in adolescence: Measurement of coping and involuntary stress responses. *Journal of Consulting and Clinical Psychology*, 68(6), 976–992. <https://doi.org/10.1037/0022-006X.68.6.976>.
- Corchia, C., & Orlando, S. M. (2012). Level of activity of neonatal intensive care units and mortality among very preterm infants: a nationwide study in Italy. *The journal of maternal-fetal & neonatal medicine: the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians*, 25(12), 2739–2745. <https://doi.org/10.3109/14767058.2012.703721>.
- Costello J. (2006). Dying well: nurses' experiences of 'good and bad' deaths in hospital. *Journal of advanced nursing*, 54(5), 594–601. <https://doi.org/10.1111/j.1365-2648.2006.03867.x>.
- Cousino, M. K., & Hazen, R. A. (2013). Parenting stress among caregivers of children with chronic illness: a systematic review. *Journal of pediatric psychology*, 38(8), 809–828. <https://doi.org/10.1093/jpepsy/jst049>.
- Craig, F., Operto, F. F., De Giacomo, A., Margari, L., Frolli, A., Conson, M., Ivagnes, S., Monaco, M., & Margari, F. (2016). Parenting stress among parents of children with Neurodevelopmental Disorders. *Psychiatry research*, 242, 121–129. <https://doi.org/10.1016/j.psychres.2016.05.016>.

- Creamer, M., Bell, R., & Failla, S. (2003). Psychometric properties of the Impact of Event Scale - Revised. *Behaviour research and therapy*, 41(12), 1489–1496. <https://doi.org/10.1016/j.brat.2003.07.010>.
- Cudé, G. & Winfrey, K. (2007). The hidden barrier: Gender bias: Fact or fiction? *Nurs. Women's Health*, 11, 254–265. <https://doi.org/10.1111/j.1751-486X.2007.00165.x>.
- Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*, 1(1), 16–29. <https://doi.org/10.1037/1082-989X.1.1.16>.
- Dahan, M., Rotteau, L., Higazi, S., Kwayke, O., Lai, G., Moulds, W., Sampson, L., Stannard, J., Church, P. T., & O'Brien, K. (2023). Understanding the Family Context: A Qualitative Descriptive Study of Parent and NICU Clinician Experiences and Perspectives. *Children*, 10(5), 896. <https://doi.org/10.3390/children10050896>.
- Dall'Oglio, I., Mascolo, R., Tiozzo, E., Portanova, A., Fiori, M., Gawronski, O., Dotta, A., Piga, S., Offidani, C., Alvaro, R., Rocco, G., Latour, J. M., & FCC Italian NICUs Study Group (2019). The current practice of family-centred care in Italian neonatal intensive care units: A multicentre descriptive study. *Intensive & critical care nursing*, 50, 36–43. <https://doi.org/10.1016/j.iccn.2018.07.005>.
- Daykin, N., Byrne, E., Soteriou, T., & O'Connor, S. (2008). The impact of art, design, and environment in mental healthcare: a systematic review of the literature. *The journal of the Royal Society for the Promotion of Health*, 128(2), 85–94. <https://doi.org/10.1177/1466424007087806>.
- De Villers, M. J., & DeVon, H. A. (2013). Moral distress and avoidance behavior in nurses working in critical care and noncritical care units. *Nursing ethics*, 20(5), 589–603. <https://doi.org/10.1177/0969733012452882>.
- Deater-Deckard KPS (2004). *Parenting stress*. Yale University Press, New Haven
- Delicate, A., Ayers, S., Easter, A., & McMullen, S. (2018). The impact of childbirth-related post-traumatic stress on a couple's relationship: a systematic review and meta-synthesis. *Journal of reproductive and infant psychology*, 36(1), 102–115. <https://doi.org/10.1080/02646838.2017.1397270>.
- Della Bella, V., Fiorini, J., Gioiello, G., Zaghini, F., & Sili, A. (2022). Towards a new conceptual model for nurses' organizational well-being: An integrative review. *Journal of nursing management*, 30(7), 2833–2844. <https://doi.org/10.1111/jonm.13750>

- Delnord, M., Blondel, B., & Zeitlin, J. (2015). What contributes to disparities in the preterm birth rate in European countries? *Current opinion in obstetrics & gynecology*, 27(2), 133–142. <https://doi.org/10.1097/GCO.0000000000000156>.
- Delnord, M., Hindori-Mohangoo, A. D., Smith, L. K., Szamotulska, K., Richards, J. L., Deb-Rinker, P., Rouleau, J., Velebil, P., Zile, I., Sakkeus, L., Gissler, M., Morisaki, N., Dolan, S. M., Kramer, M. R., Kramer, M. S., Zeitlin, J., & Euro-Peristat Scientific Committee (2017). Variations in very preterm birth rates in 30 high-income countries: are valid international comparisons possible using routine data? *BJOG : an international journal of obstetrics and gynaecology*, 124(5), 785–794. <https://doi.org/10.1111/1471-0528.14273>.
- DeMaso, D. R., & Snell, C. (2013). Promoting coping in children facing pediatric surgery. *Seminar Pediatric Surgery*, 22(3), 134–138. <https://doi.org/10.1053/j.sempedsurg.2013.04.004>.
- Deng X., Fang R., Cai Y. (2021). Evaluation of the correlation between effort-reward imbalance and sleep quality among community health workers. *BMC Health Serv. Res.* 21:490. [10.1186/s12913-021-06526-w](https://doi.org/10.1186/s12913-021-06526-w).
- Derogatis LR. (1994). *Symptom checklist 90–R: Administration, scoring, and procedures manual (3rd ed.)*. NCS Pearson.
- Derogatis, L.R. (1994). *Symptom Checklist 90–R: Administration, Scoring, and Procedures Manual*; National Computer System: Minneapolis, MN, USA.
- DeVader, T. E., Albrecht, R., & Reiter, M. (2012). Initiating palliative care in the emergency department. *The Journal of emergency medicine*, 43(5), 803–810. <https://doi.org/10.1016/j.jemermed.2010.11.035>
- Diao, Z., Xu, W., Guo, D., Zhang, J., Zhang, R., Liu, F., Hu, Y., & Ma, Y. (2023). Causal association between psycho-psychological factors, such as stress, anxiety, depression, and irritable bowel syndrome: Mendelian randomization. *Medicine*, 102(34), e34802. <https://doi.org/10.1097/MD.00000000000034802>.
- Diehl, E., Rieger, S., Letzel, S., Schablon, A., Nienhaus, A., Escobar Pinzon, L. C., & Dietz, P. (2021). The relationship between workload and burnout among nurses: The buffering role of personal, social and organisational resources. *PloS one*, 16(1), e0245798. <https://doi.org/10.1371/journal.pone.0245798>.

- Doering, L. V., Dracup, K., & Moser, D. (1999). Comparison of psychosocial adjustment of mothers and fathers of high-risk infants in the neonatal intensive care unit. *Journal of Perinatology*, 19(2), 132–137.
- Donato, S., Iafrate, R., Barni, D., Bertoni, A., Bodenmann, G., and Gagliardi, S. (2009). Measuring dyadic coping: The factorial structure of Bodenmann’s “Dyadic Coping Questionnaire” in an Italian sample. *TPM* 16, 25–47.
- Douglas, C. H., & Douglas, M. R. (2005). Patient-centred improvements in health-care built environments: perspectives and design indicators. *Health expectations: an international journal of public participation in health care and health policy*, 8(3), 264–276. <https://doi.org/10.1111/j.1369-7625.2005.00336.x>.
- Drossman D. A. (1998). Presidential address: Gastrointestinal illness and the biopsychosocial model. *Psychosomatic medicine*, 60(3), 258–267. <https://doi.org/10.1097/00006842-199805000-00007>.
- Drossman, D. A., & Hasler, W. L. (2016). *Rome IV-Functional GI Disorders: Disorders of Gut-Brain Interaction*. *Gastroenterology*, 150(6), 1257–1261. <https://doi.org/10.1053/j.gastro.2016.03.035>.
- Drossman, D. A., Patrick, D. L., Whitehead, W. E., Toner, B. B., Diamant, N. E., Hu, Y., Jia, H., & Bangdiwala, S. I. (2000). Further validation of the IBS-QOL: a disease-specific quality-of-life questionnaire. *The American journal of gastroenterology*, 95(4), 999–1007. <https://doi.org/10.1111/j.1572-0241.2000.01941.x>.
- Duffield, C. M., Roche, M. A., Homer, C., Buchan, J., & Dimitrelis, S. (2014). A comparative review of nurse turnover rates and costs across countries. *Journal of advanced nursing*, 70(12), 2703–2712. <https://doi.org/10.1111/jan.12483>.
- Easterlin, M. C., Berdahl, C. T., Rabizadeh, S., Spiegel, B., Agoratus, L., Hoover, C., & Dudovitz, R. (2020). Child and Family Perspectives on Adjustment to and Coping with Pediatric Inflammatory Bowel Disease. *Journal of pediatric gastroenterology and nutrition*, 71(1), e16–e27. <https://doi.org/10.1097/MPG.0000000000002693>.
- Ellershaw, J., Dewar, S., & Murphy, D. (2010). Achieving a good death for all. *BMJ (Clinical research ed.)*, 341, c4861. <https://doi.org/10.1136/bmj.c4861>.

- Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling*, 8(3), 430–457. https://doi.org/10.1207/S15328007SEM0803_5.
- Eo Y-S & Kim J-S (2018). Parenting stress and maternal-child interactions among preschool mothers from the Philippines, Korea, and Vietnam: a cross-sectional, comparative study. *J Transcult Nurs* 29(5):449–4567.
- Erbaba, H. & Pinar, G. (2021). Association of perceived social support and maternal adaptation with postpartum depression in mothers of infants hospitalized in neonatal intensive care units. *Journal of Neonatal Nursing*, Volume 27, Issue 4, pp. 251-256. <https://doi.org/10.1016/j.jnn.2020.11.005>.
- Erker, C., Yan, K., Zhang, L., Bingen, K., Flynn, K. E., & Panepinto, J. (2018). Impact of pediatric cancer on family relationships. *Cancer medicine*, 7(5), 1680–1688. <https://doi.org/10.1002/cam4.1393>.
- Esser, K., Barreira, L., Miller, D., Church, P., Major, N., Cohen, E., & Orkin, J. (2020). Exploring Acceptance and Commitment Therapy for parents of preterm infants. *Paediatrics & child health*, 26(1), e1–e3. <https://doi.org/10.1093/pch/pxaa003>.
- European Foundation for the Care of the Newborn Infants (2009) European Benchmarking report: too late, too soon? Why Europe should do more for preterm infants. https://www.efcni.org/wp-content/uploads/2019/06/EFCNI_report_too_little_too_late_light.pdf. Accessed 14 Nov 2023.
- Euro-Peristat project with SCPE and EUROCAT, European Perinatal Health Report. Core indicators of the health and care of pregnant women and babies in Europe from 2015 to 2019. <https://www.europeristat.com/publications/european-perinatal-health-report-2015-2019/> accessed 13 Sep 2025.
- Eurostat. Employment and presence of children broken down by sex and educational attainment. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Statistics_on_employment_characteristics_of_households&oldid=568074#Overview_of_employment_in_EU_households. Accessed 1 August 2023
- Falconier, M. K., Nussbeck, F., and Bodenmann, G. (2013a). Immigration stress and relationship satisfaction in Latino couples: the role of dyadic coping. *J. Soc. Clin. Psychol.* 32, 813–843. doi: 10.1521/jscp.2013.32.8.813.

Fang, Y., Luo, J., Boele, M., Windhorst, D., van Grieken, A., & Raat, H. (2024). Parent, child, and situational factors associated with parenting stress: a systematic review. *European child & adolescent psychiatry*, 33(6), 1687–1705. <https://doi.org/10.1007/s00787-022-02027-1>.

Federconsumatori (2023) Caro bimbo: mantenere un bambino nel primo anno di vita costa sempre di più. <https://www.federconsumatori.it/caro-bimbo-mantenere-un-bambino-nel-primo-anno-di-vita-costa-sempre-di-piu/#:~:text=%E2%80%93%20Osservatorio%20Nazionale%20Federconsumatori%2C%20che%20ha,massimo%20di%2017.030%2C33%20%E2%82%AC>. Accessed 17 July 2023.

Fegran, L., Helseth, S., & Fagermoen, M. S. (2008). A comparison of mothers' and fathers' experiences of the attachment process in a neonatal intensive care unit. *Journal of clinical nursing*, 17(6), 810–816. <https://doi.org/10.1111/j.1365-2702.2007.02125.x>.

Fei Y., Yang S., Zhu Z., Lv M., Yin Y., Zuo M., et al. (2023). Workplace violence and burnout among Chinese nurses during the COVID-19 pandemic: does the sense of coherence mediate the relationship? *BMC Psychiatry* 23:573. doi: 10.1186/s12888-023-05060-9.

Felinhofer, A., Kernreiter, J., Klier, C. et al. Anonymous birth: Biographical knowledge and dyadic coping in adoptive mothers and fathers. *Curr Psychol* 42, 2719–2732 (2023). <https://doi.org/10.1007/s12144-021-01620-y>.

Fernández Medina, I. M., Granero-Molina, J., Fernández-Sola, C., Hernández-Padilla, J. M., Camacho Ávila, M., & López Rodríguez, M. D. M. (2018). Bonding in neonatal intensive care units: Experiences of extremely preterm infants' mothers. *Women and birth: journal of the Australian College of Midwives*, 31(4), 325–330. <https://doi.org/10.1016/j.wombi.2017.11.008>.

Fieß, A., Hartmann, A., Schuster, A. K., Grabitz, S. D., Wackernagel, D., Urschitz, M. S., Tesarz, J., Beutel, M. E., Ernst, M., Mildenerger, E., & Gißler, S. (2025). Impact of Premature Birth and Delayed Cuddling on Maternal Support Needs and Satisfaction with Postnatal Care and Changes in Support Over Time. *Child: care, health and development*, 51(6), e70170. <https://doi.org/10.1111/cch.70170>.

Filcams-CGIL, Fisascat-CISL, UILTuCS, Federcolf (2021) Contratto Collettivo Nazionale di Lavoro Colf e Badanti. Ebilboba.https://www.filcams.cgil.it/page/lavoro_domestico. Accessed 28 Jun 2023.

Finfgeld-Connett, D. (2005). Clarification of social support. *J Nurs Scholarsh*; 37(1):4–9.

- Firth P. (2006). Patients and their families. Recent results in cancer research. *Fortschritte der Krebsforschung. Progres dans les recherches sur le cancer*, 168, 61–71. https://doi.org/10.1007/3-540-30758-3_6
- Fiske E. (2018). Nurse Stressors and Satisfiers in the NICU. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 18(4), 276–284. <https://doi.org/10.1097/ANC.0000000000000514>.
- Flacking, R., Ewald, U., Nyqvist, K. H., & Starrin, B. (2006). Trustful bonds: a key to "becoming a mother" and to reciprocal breastfeeding. Stories of mothers of very preterm infants at a neonatal unit. *Social science & medicine* (1982), 62(1), 70–80. <https://doi.org/10.1016/j.socscimed.2005.05.026>.
- Flacking, R., H. Haslund-Thomsen, R. Jónsdóttir, S. Poropudas, and A. Axelin. (2022). “Parents' Friends and Families in Neonatal Intensive Care Units: A Cross-National Qualitative Study on Staff Perceptions and Experiences.” *Journal of Clinical Nursing*, 31, no. 21–22: 3120–3129. <https://doi.org/10.1111/jocn.16139>.
- Flacking, R., Lehtonen, L., Thomson, G., Axelin, A., Ahlqvist, S., Moran, V. H., Ewald, U., Dykes, F., & Separation and Closeness Experiences in the Neonatal Environment (SCENE) group (2012). Closeness and separation in neonatal intensive care. *Acta paediatrica (Oslo, Norway: 1992)*, 101(10), 1032–1037. <https://doi.org/10.1111/j.1651-2227.2012.02787.x>.
- Fletcher, R., May, C., Liackman, R., StGeorge, J., Regan, C., & Stark, M. (2025). Facilitating family centred care: the co-design development of text messages for fathers with an infant in NICU. *Informatics for health & social care*, 1–13. Advance online publication. <https://doi.org/10.1080/17538157.2025.2542123>.
- Folkman, S., & Lazarus, R.S. (1980). An Analysis of Coping in a Middle-Aged Community Sample. *Journal of Health and Social Behavior*, 21, 219–231. <http://dx.doi.org/10.2307/2136617>.
- Folkman, S. & Moskowitz, J.T. (2004). Coping: pitfalls and promise. *Annu Rev Psychol*, 55:745–774, <https://doi.org/10.1146/annurev.psych.55.090902.141456>.
- Fond, G., Loundou, A., Hamdani, N., Boukouaci, W., Dargel, A., Oliveira, J., Roger, M., Tamouza, R., Leboyer, M., & Boyer, L. (2014). Anxiety and depression comorbidities in irritable bowel syndrome (IBS): a systematic review and meta-analysis. *European archives of psychiatry and clinical neuroscience*, 264(8), 651–660. <https://doi.org/10.1007/s00406-014-0502-z>.

Francis, C. Y., Morris, J., & Whorwell, P. J. (1997). The irritable bowel severity scoring system: a simple method of monitoring irritable bowel syndrome and its progress. *Alimentary pharmacology & therapeutics*, 11(2), 395–402. <https://doi.org/10.1046/j.1365-2036.1997.142318000.x>.

Franck, L. S., & O'Brien, K. (2019). The evolution of family-centered care: From supporting parent-delivered interventions to a model of family integrated care. *Birth defects research*, 111(15), 1044–1059. <https://doi.org/10.1002/bdr2.1521>.

Franck, L. S., Cormier, D. M., Hutchison, J., Moore, D., Bisgaard, R., Gay, C., Ngo, S., Kriz, R. M., Lin, C., Ekno, M., Ribero, D., & Sun, Y. (2021). A Multisite Survey of NICU Healthcare Professionals' Perceptions About Family-Centered Care. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 21(3), 205–213. <https://doi.org/10.1097/ANC.0000000000000805>.

French, S. E., Lenton, R., Walters, V., & Eyles, J. (2000). An empirical evaluation of an expanded Nursing Stress Scale. *Journal of nursing measurement*, 8(2), 161–178.

Frisman, G. H., Eriksson, C., Pernehed, S., & Mörelius, E. (2012). The experience of becoming a grandmother to a pre-mature infant: A balancing act, influenced by ambivalent feelings. *Journal of Clinical Nursing*, 21(21–22), 3297–3305. <https://doi.org/10.1111/j.1365-2702.2012.04204.x>.

Fuller CM, Simmering MJ, Atinc G, Atinc Y, Babin BJ (2016) Common methods variance detection in business research. *J Bus Res* 69(8):3192–3198. <https://doi.org/10.1016/j.jbusres.2015.12.008>.

Gagliardi, L., Corchia, C., Bellù, R., Coscia, A., Zangrandi, A., Zanini, R., & SONAR study investigators (2016). What we talk about when we talk about NICUs: infants' acuity and nurse staffing. *The journal of maternal-fetal & neonatal medicine: the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians*, 29(18), 2934–2939. <https://doi.org/10.3109/14767058.2015.1109618>.

Gallini F, Fumagalli M, Romeo DM eds (2022) *Il Follow-up del Neonato Pretermine. I primi sei anni di vita*. IdeaCpaEditore.

García-López, C., Sarriá, E., Pozo, P., and Recio, P. (2016). Supportive dyadic coping and psychological adaptation in couples parenting children with Autism spectrum disorder: the role of relationship satisfaction. *J. Autism Dev. Disord.* 46, 3434–3447. doi: 10.1007/s10803-016-2883-5.

- Gebeyehu, S., & Zeleke, B. (2019). Workplace stress and associated factors among healthcare professionals working in public health care facilities in Bahir Dar City, Northwest Ethiopia, 2017. *BMC research notes*, 12(1), 249. <https://doi.org/10.1186/s13104-019-4277-1>.
- Geiser, C., Lehmann, W., & Eid, M. (2006). Separating "Rotators" From "Nonrotators" in the Mental Rotations Test: A Multigroup Latent Class Analysis. *Multivariate Behavioral Research*, 41(3), 261–293.
- Gelsema, T. I., van der Doef, M., Maes, S., Janssen, M., Akerboom, S., & Verhoeven, C. (2006). A longitudinal study of job stress in the nursing profession: causes and consequences. *Journal of nursing management*, 14(4), 289–299. <https://doi.org/10.1111/j.1365-2934.2006.00635.x>.
- Gerstein, E. D., Poehlmann-Tynan, J., & Clark, R. (2015). Mother-child interactions in the NICU: relevance and implications for later parenting. *Journal of pediatric psychology*, 40(1), 33–44. <https://doi.org/10.1093/jpepsy/jsu064>.
- Gibson, K., Hofmeyer, A., & Warland, J. (2018). Nurses Providing End-of-Life Care for Infants and Their Families in the NICU: A Review of the Literature. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 18(6), 471–479. <https://doi.org/10.1097/ANC.0000000000000533>.
- Ginsberg, K. H., Alsweiler, J., Alyami, M., & Serlachius, A. (2023). Mindfulness and Relaxation-Based Interventions to Reduce Parental Stress, Anxiety and/or Depressive Symptoms in the Neonatal Intensive Care Unit: A Systematic Review. *Journal of clinical psychology in medical settings*, 30(2), 387–402. <https://doi.org/10.1007/s10880-022-09902-8>.
- Giulio de Belvis, A., Meregaglia, M., Morsella, A., Adduci, A., Perilli, A., Cascini, F., Solipaca, A., Fattore, G., Ricciardi, W., Maresso, A., & Scarpetti, G. (2022). Italy: Health System Review. *Health systems in transition*, 24(4), 1–236.
- Gómez-Cantarino, S., García-Valdivieso, I., Moncunill-Martínez, E., Yáñez-Araque, B., & Ugarte Gurrutxaga, M. I. (2020). Developing a Family-Centered Care Model in the Neonatal Intensive Care Unit (NICU): A New Vision to Manage Healthcare. *International journal of environmental research and public health*, 17(19), 7197. <https://doi.org/10.3390/ijerph17197197>.
- Gonzalez, J. C., Klein, C. C., Barnett, M. L., Schatz, N. K., Garoosi, T., Chacko, A., & Fabiano, G. A. (2023). Intervention and Implementation Characteristics to Enhance Father Engagement: A Systematic Review of Parenting Interventions. *Clinical child and family psychology review*, 26(2), 445–458. <https://doi.org/10.1007/s10567-023-00430-x>.

- Granda-Cameron, C., & Houldin, A. (2012). Concept analysis of good death in terminally ill patients. *The American journal of hospice & palliative care*, 29(8), 632–639. <https://doi.org/10.1177/1049909111434976>
- Green, J., Fowler, C., Petty, J. & Whiting, L. (2021). The transition home of extremely premature babies: An integrative review. *J Neonatal Nurs*.27:26–32. <https://doi.org/10.1016/j.jnn.2020.09.011>
- Greydanus, D. E., Rimsza, M. E., & Newhouse, P. A. (2002). Adolescent sexuality and disability. *Adolescent medicine (Philadelphia, Pa.)*, 13(2), 223–v.
- Griffiths, N., Spence, K., Loughran-Fowlds, A., & Westrup, B. (2019). Individualised developmental care for babies and parents in the NICU: Evidence-based best practice guideline recommendations. *Early human development*, 139, 104840. <https://doi.org/10.1016/j.earlhumdev.2019.104840>.
- Grover, M., Kolla, B. P., Pamorthy, R., Mansukhani, M. P., Breen-Lyles, M., He, J. P., & Merikangas, K. R. (2021). Psychological, physical, and sleep comorbidities and functional impairment in irritable bowel syndrome: Results from a national survey of U.S. adults. *PloS one*, 16(1), e0245323. <https://doi.org/10.1371/journal.pone.0245323>.
- Grunberg, V. A., Geller, P. A., Hoffman, C., & Patterson, C. A. (2023). A biopsychosocial model of NICU family adjustment and child development. *Journal of perinatology: official journal of the California Perinatal Association*, 43(4), 510–517. <https://doi.org/10.1038/s41372-022-01585-1>.
- Gugliandolo, M. C., Liga, F., Larcan, R., & Cuzzocrea, F. (2023). Parents of children with developmental disorders: Family hardiness and resilience. *Journal of intellectual & developmental disability*, 48(3), 334–339. <https://doi.org/10.3109/13668250.2022.2079056>.
- Guillaume, S., Michelin, N., Amrani, E., Benier, B., Durrmeyer, X., Lescure, S., Bony, C., Danan, C., Baud, O., Jarreau, P. H., Zana-Taïeb, E., & Caeymaex, L. (2013). Parents' expectations of staff in the early bonding process with their premature babies in the intensive care setting: a qualitative multicenter study with 60 parents. *BMC pediatrics*, 13, 18. <https://doi.org/10.1186/1471-2431-13-18>.
- Guntupalli, K. K., Wachtel, S., Mallampalli, A., & Surani, S. (2014). Burnout in the intensive care unit professionals. *Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine*, 18(3), 139–143. <https://doi.org/10.4103/0972-5229.128703>.

- Hadders-Algra M. (2021). Early Diagnostics and Early Intervention in Neurodevelopmental Disorders-Age-Dependent Challenges and Opportunities. *Journal of clinical medicine*, 10(4), 861. <https://doi.org/10.3390/jcm10040861>.
- Hafifah, I., Wisesrith, W., & Ua-Kit, N. (2025). Factors associated with good death for end-of-life patients in the intensive care unit based on nurses' perspectives: A systematic review. *Intensive & critical care nursing*, 87, 103930. <https://doi.org/10.1016/j.iccn.2024.103930>.
- Hagan, J., Walden, M., & Brand, M. C. (2022). Fewer Patients per Nurse Does Not Offset Increased Nurse Stress Related to Treatment Uncertainty and Mortality in the Neonatal Intensive Care Unit. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 22(5), E152–E158. <https://doi.org/10.1097/ANC.0000000000000930>
- Hagen, I. H., Iversen, V. C., Nessel, E., Orner, R., & Svindseth, M. F. (2019). Parental satisfaction with neonatal intensive care units: a quantitative cross-sectional study. *BMC Health Services Research*, 19(1), 37. <https://doi.org/10.1186/s12913-018-3854-7>.
- Hair J, Black WC, Babin BJ, Anderson RE. (2010). *Multivariate Data Analysis (7th Edition)*. New York: Pearson Educational International.
- Hamilton, A., Mazzucchelli, T. G., & Sanders, M. R. (2015). Parental and practitioner perspectives on raising an adolescent with a disability: a focus group study. *Disability and rehabilitation*, 37(18), 1664–1673. <https://doi.org/10.3109/09638288.2014.973969>.
- Hamric, A. B., & Blackhall, L. J. (2007). Nurse-physician perspectives on the care of dying patients in intensive care units: collaboration, moral distress, and ethical climate. *Critical care medicine*, 35(2), 422–429. <https://doi.org/10.1097/01.CCM.0000254722.50608.2D>
- Han, H., Ye, Y., Xie, Y., Liu, F., Wu, L., Tang, Y., Ding, J., & Yue, L. (2023). The impact of death attitudes on death education needs among medical and nursing students. *Nurse education today*, 122, 105738. <https://doi.org/10.1016/j.nedt.2023.105738>
- Hasani, H., Zarei, B., Danaei, Z., & Mahmoudirad, G. (2022). Comparing the Effect of Resilience Skills Training and Metacognitive Therapy on Job Stress in Nurses: An Experimental Study. *Iranian journal of nursing and midwifery research*, 27(5), 377–384. https://doi.org/10.4103/ijnmr.ijnmr_59_21.
- Hauser, G., Pletikosic, S., & Tkalcic, M. (2014). Cognitive behavioral approach to understanding irritable bowel syndrome. *World journal of gastroenterology*, 20(22), 6744–6758. <https://doi.org/10.3748/wjg.v20.i22.6744>.

- Hayes, A.F. (2022) *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*; The Guilford Press: New York, NY, USA, Volume 3.
- Head Zauche, L., Zauche, M. S., Dunlop, A. L., & Williams, B. L. (2020). Predictors of Parental Presence in the Neonatal Intensive Care Unit. *Advances in neonatal care : official journal of the National Association of Neonatal Nurses*, 20(3), 251–259. <https://doi.org/10.1097/ANC.0000000000000687>.
- Heidarzadeh M, Heidari H, Ahmadi A, Solati K, Sadeghi N. (2023). Evaluation of parental stress in neonatal intensive care unit in Iran: a national study. *BMC Nursing*; 22(1):41. doi:10.1186/s129.
- Hendson, L., & Reis Nicholas, D.B. (2015). Health care providers' perspectives of providing culturally competent care in the NICU. *J Obstet Gynecol Neonatal Nurs.*;44:17–27. <https://doi.org/10.1111/1552-6909.12524>.
- Hendy, A., El-Sayed, S., Bakry, S., Mohammed, S. M., Mohamed, H., Abdelkawy, A., Hassani, R., Abouelela, M. A., & Sayed, S. (2024). The Stress Levels of Premature Infants' Parents and Related Factors in NICU. *SAGE open nursing*, 10, 23779608241231172. <https://doi.org/10.1177/23779608241231172>.
- Henry, S. G., Fuhrel-Forbis, A., Rogers, M. A., & Eggly, S. (2012). Association between nonverbal communication during clinical interactions and outcomes: a systematic review and meta-analysis. *Patient education and counseling*, 86(3), 297–315. <https://doi.org/10.1016/j.pec.2011.07.006>.
- Herridge, M. S., & Azoulay, É. (2023). Outcomes after Critical Illness. *The New England journal of medicine*, 388(10), 913–924. <https://doi.org/10.1056/NEJMra2104669>.
- Higashibata, T., Hamano, J., Nagaoka, H., Sasahara, T., Fukumori, T., Arahata, T., Kazama, I., Maeno, T., & Kizawa, Y. (2023). Work environmental factors associated with compassion satisfaction and end-of-life care quality among nurses in general wards, palliative care units, and home care settings: A cross-sectional survey. *International journal of nursing studies*, 143, 104521. <https://doi.org/10.1016/j.ijnurstu.2023.104521>.
- Hitzler, M., Behnke, A., Gündel, H., Ziegenhain, U., Kindler, H., Kolassa, I. T., & Zimmermann, J. (2022). Sources of social support for postpartum women with a history of childhood maltreatment: Consequences for perceived stress and general mental health in the first year after birth. *Child abuse & neglect*, 134, 105911. <https://doi.org/10.1016/j.chiabu.2022.105911>.

- Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive symptoms: a 10-year model. *Journal of consulting and clinical psychology*, 73(4), 658–666. <https://doi.org/10.1037/0022-006X.73.4.658>
- Holditch-Davis, D., & Miles, M. S. (2000). Mothers' stories about their experiences in the neonatal intensive care unit. *Neonatal network: NN*, 19(3), 13–21. <https://doi.org/10.1891/0730-0832.19.3.13>.
- Horwitz, S. M., Storfer-Isser, A., Kerker, B. D., Lilo, E., Leibovitz, A., St John, N., & Shaw, R. J. (2015). A model for the development of mothers' perceived vulnerability of preterm infants. *Journal of developmental and behavioral pediatrics: JDBP*, 36(5), 371–380. <https://doi.org/10.1097/DBP.0000000000000173>.
- Huang, H., Tao, J., Lei, Y., Chen, R., & Fang, H. (2024). Assessing the needs of grandparents of preterm infants in neonatal intensive care units: a cross-sectional study. *Frontiers in psychology*, 15, 1433391. <https://doi.org/10.3389/fpsyg.2024.1433391>.
- Hutchfield K. (1999). Family-centred care: a concept analysis. *Journal of advanced nursing*, 29(5), 1178–1187. <https://doi.org/10.1046/j.1365-2648.1999.00987.x>.
- IBM Corp. IBM SPSS Statistics for Windows, Version 28.0. Released. IBM Corp: Armonk, NY, USA, 2021
- IBM SPSS Statistics for Windows [software], Version 29.0. Armonk, NY: IBM Corp; Released 2024. <https://www.ibm.com/it-it/products/spss-statistics>.
- Ilchena, C., Slayen, C., Rennie, S., Cheung, K., Gaulke, T., & Theule, J. (2023). Parenting stress and FASD: A scoping review. *Research in developmental disabilities*, 137, 104498. <https://doi.org/10.1016/j.ridd.2023.104498>.
- Indrayan, A., & Mishra, A. (2021). The importance of small samples in medical research. *Journal of postgraduate medicine*, 67(4), 219–223. https://doi.org/10.4103/jpgm.JPGM_230_21.
- INPS (2023) Nuovo Contratto Collettivo e Nazionale Colf e Badanti. https://servizi2.inps.it/docallegati/Mig/Allegati/701Nuovo_CCNL_colf_badanti_Ebilocba.pdf. Accessed 28 Jun 2023.
- International Council of Nurses, 2019. <https://www.icn.ch/resources/publications-and-reports/icn-annual-report-2019-leading-nursing-past-present-and-future> accessed 26 September 2025.

Ionio, C., Mascheroni, E., Colombo, C., Castoldi, F., & Lista, G. (2019). Stress and feelings in mothers and fathers in NICU: identifying risk factors for early interventions. *Primary health care research & development*, 20, e81. <https://doi.org/10.1017/S1463423619000021>.

ISTAT (2022) Offerta di nidi e servizi integrativi per la prima infanzia: Anno educativo 2020/2021. <https://www.istat.it/it/files//2022/10/report-asili-nido-2020-2021.pdf>. Accessed 22 Jun 2023.

ISTAT. Nomenclatura e classificazione delle Unità Professionali <https://professioni.istat.it/sistemainformativoprofessioni/cp2011/>. Accessed 15 May 2023

Jalilian, H., Shouroki, F. K., Azmoon, H., Rostamabadi, A., & Choobineh, A. (2019). Relationship between Job Stress and Fatigue Based on Job Demand-control-support Model in Hospital Nurses. *International journal of preventive medicine*, 10, 56. https://doi.org/10.4103/ijpvm.IJPVM_178_17.

Japanese Nursing Association & JNA News Releas, 2017 <http://www.nurse.or.jp/jna/english/> accessed 26 September, 2025.

Joaquim, P., Calado, G. & Costa, M. (2024). Benefits of reading to premature newborns in the neonatal intensive care unit: A scoping review. *Journal of Neonatal Nursing*, Volume 30, Issue 4, pp 325-330.

Johnson, J. V., & Hall, E. M. (1988). Job strain, workplace social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *American journal of public health*, 78(10), 1336–1342. <https://doi.org/10.2105/ajph.78.10.1336>.

Joseph, R. M., O'Shea, T. M., Allred, E. N., Heeren, T., Hirtz, D., Jara, H., Leviton, A., Kuban, K. C., & ELGAN Study Investigators (2016). Neurocognitive and Academic Outcomes at Age 10 Years of Extremely Preterm Newborns. *Pediatrics*, 137(4), e20154343. <https://doi.org/10.1542/peds.2015-4343>.

Kainiemi, E., Axelin, A., Haslund-Thomsen, H., Jonsdottir, R. B., & Flacking, R. (2025). Parents' Need for Support from Family and Friends During Their Preterm Infants' Hospitalization: A Cross-National Qualitative Study. *Journal of advanced nursing*, 81(8), 4989–4999. <https://doi.org/10.1111/jan.16707>.

Kappes, M., Romero-Garcia, M., Sanchez, M., & Delgado-Hito, P. (2024). Coping trajectories of intensive care nurses as second victims: A grounded theory. *Australian critical care: official*

journal of the Confederation of Australian Critical Care Nurses, S1036-7314(24)00006-7. Advance online publication. <https://doi.org/10.1016/j.aucc.2024.01.001>

Karasek Jr., R. A. (1979). Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. *Administrative Science Quarterly*, 24, 285-308.

Karasek, R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The Job Content Questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of occupational health psychology*, 3(4), 322–355. <https://doi.org/10.1037//1076-8998.3.4.322>.

Kawafha, M., Al Maghaireh, D., Al-saqer, K., Sheyab, H., Al kofahi, A., Khanfar, S., Al-Mushasha, R. A. (2025). Stressors experienced by parents of hospitalized infants in the Neonatal intensive care unit. *Journal of Neonatal Nursing*, Volume 31, Issue 2.

Kayode, G., Howell, A., Burden, C., Margelyte, R., Cheng, V., Viner, M., Sandall, J., Carter, J., Brigante, L., Winter, C., Carroll, F., Thilaganathan, B., Anumba, D., Judge, A., Lenguerrand, E., & Tommy's National Centre for Maternity Improvement (2024). Socioeconomic and ethnic disparities in preterm births in an English maternity setting: a population-based study of 1.3 million births. *BMC medicine*, 22(1), 371. <https://doi.org/10.1186/s12916-024-03493-x>.

Kestler-Peleg, M., Lavenda, O., Stenger, V., Bendett, H., Alhalel-Lederman, S., Maayan-Metzger, A., & Strauss, T. (2020). Maternal self-efficacy mediates the association between spousal support and stress among mothers of NICU hospitalized preterm babies. *Early human development*, 146, 105077. <https://doi.org/10.1016/j.earlhumdev.2020.105077>.

Kim J. H. (2019). Multicollinearity and misleading statistical results. *Korean journal of anesthesiology*, 72(6), 558–569. <https://doi.org/10.4097/kja.19087>.

Kim, H., & Kwon, S. H. (2023). Effects of Death Anxiety and Perceived End-of-Life Care Competencies on Fear of Terminal Care among Clinical Nurses. *Journal of hospice and palliative care*, 26(4), 160–170. <https://doi.org/10.14475/jhpc.2023.26.4.160>.

Kim, Y. S., & Kim, N. (2018). Sex-Gender Differences in Irritable Bowel Syndrome. *Journal of neurogastroenterology and motility*, 24(4), 544–558. <https://doi.org/10.5056/jnm18082>.

Kim, Y., Chung, H. (2021). glca: An R Package for Multiple-Group Latent Class Analysis. (Version 1.3.3) [R package]. URL <https://CRAN.R-project.org/package=glca>.

- King, B. C., Mowitz, M. E., & Zupancic, J. A. F. (2021). The financial burden on families of infants requiring neonatal intensive care. *Seminars in perinatology*, 45(3), 151394. <https://doi.org/10.1016/j.semperi.2021.151394>.
- Kisorio, L. C., & Langley, G. C. (2016). Intensive care nurses' experiences of end-of-life care. *Intensive & critical care nursing*, 33, 30–38. <https://doi.org/10.1016/j.iccn.2015.11.002>.
- Köktürk Dalcalı, B., Can, Ş., & Durgun, H. (2022). Emotional Responses of Neonatal Intensive Care Nurses to Neonatal Death. *Omega*, 85(2), 497–513. <https://doi.org/10.1177/0030222820971880>.
- Körner, A., Würz, J., Brosseau, D. C., Brähler, E., Kapellen, T., and Kiess, W. (2013). Parental dyadic coping in families of children and adolescents with type 1 diabetes. *J. Pediatr. Endocrinol. Metabol.* 26, 867–875. doi: 10.1515/jpem-2012-0410.
- Kostka, A. M., Borodziej, A., & Krzemińska, S. A. (2021). Feelings and Emotions of Nurses Related to Dying and Death of Patients - A Pilot Study. *Psychology research and behavior management*, 14, 705–717. <https://doi.org/10.2147/PRBM.S311996>.
- Kynoch, K., Chang, A., Coyer, F., & McArdle, A. (2016). The effectiveness of interventions to meet family needs of critically ill patients in an adult intensive care unit: a systematic review update. *JBI database of systematic reviews and implementation reports*, 14(3), 181–234. <https://doi.org/10.11124/JBISRIR-2016-2477>.
- Lakshmanan, A., Song, A. Y., Belfort, M. B., Yieh, L., Dukhovny, D., Friedlich, P. S., & Gong, C. L. (2022). The financial burden experienced by families of preterm infants after NICU discharge. *Journal of perinatology: official journal of the California Perinatal Association*, 42(2), 223–230. <https://doi.org/10.1038/s41372-021-01213-4>.
- Lambiase, C. V., Mansi, G., Salomè, S., Conelli, M. L., Vendemmia, M., Zurlo, M. C., Raimondi, F., & Capasso, L. (2024). The financial burden experienced by families during NICU hospitalization and after discharge: A single center, survey-based study. *European journal of pediatrics*, 183(2), 903–913. <https://doi.org/10.1007/s00431-023-05352-y>
- Landry, M. A., Kumaran, K., Tyebkhan, J. M., Levesque, V., & Spinella, M. (2022). Mindful Kangaroo Care: mindfulness intervention for mothers during skin-to-skin care: a randomized control pilot study. *BMC pregnancy and childbirth*, 22(1), 35. <https://doi.org/10.1186/s12884-021-04336-w>.

- Lansford J. E. (2022). Annual Research Review: Cross-cultural similarities and differences in parenting. *Journal of child psychology and psychiatry, and allied disciplines*, 63(4), 466–479. <https://doi.org/10.1111/jcpp.13539>.
- Larkin, F., Hayiou-Thomas, M. E., Arshad, Z., Leonard, M., Williams, F. J., Katseniou, N., Malouta, R. N., Marshall, C. R. P., Diamantopoulou, M., Tang, E., Mani, S., & Meins, E. (2021). Mind-Mindedness and Stress in Parents of Children with Developmental Disorders. *Journal of autism and developmental disorders*, 51(2), 600–612. <https://doi.org/10.1007/s10803-020-04570-9>.
- Lasheras, G., Farré-Sender, B., Porta, R., & Mestre-Bach, G. (2022). Risk factors for postpartum depression in mothers of newborns admitted to neonatal intensive care unit. *Journal of reproductive and infant psychology*, 40(1), 47–61. <https://doi.org/10.1080/02646838.2020.1775793>
- Lavanco, G., and Romano, F. (2008). Perché e come formare educatori nella gestione dell'umanizzazione pediatrica. In Perrione, G., Di Maio, M.T. & Romana Nuccio, F. (2008). *Raccontando Aladino... Vincoli e possibilità del lavoro psico-socio-educativo in pediatria*. Franco Angeli Editore. Milano.
- Lawn, J. E., Wilczynska-Ketende, K., & Cousens, S. N. (2006). Estimating the causes of 4 million neonatal deaths in the year 2000. *International journal of epidemiology*, 35(3), 706–718. <https://doi.org/10.1093/ije/dyl043>.
- Lazarus, R.S. (1966). *Psychological stress and the coping process*. New York, NY: McGraw-Hill.
- Lazarus, R. S. (1990). Stress, coping, and illness. In H. S. Friedman (Ed.), *Personality and disease* (pp. 97–120). John Wiley & Sons.
- Lazarus, R. S., & Alfert, E. (1964). Short-circuiting of threat by experimentally altering cognitive appraisal. *Journal of Abnormal Psychology*, 69(2), 195–205. <https://doi.org/10.1037/h0044635>.
- Lazarus, R., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. New York: Springer.
- Lazzerini, M., Barcala Coutinho do Amaral Gomez, D., Azzimonti, G., Bua, J., Brandão Neto, W., Brasili, L., Travan, L., Barradas de Souza, J., D'Alessandro, M., Plet, S., de Souza Lima, G. M., Ndile, E. A., Ermacora, M., Valente, E. P., Dalena, P., Mariani, I., & EPINICU study group (2024). Parental stress, depression, anxiety and participation to care in neonatal intensive care units: results of a prospective study in Italy, Brazil and Tanzania. *BMJ paediatrics open*, 8(Suppl 2), e002539. <https://doi.org/10.1136/bmjpo-2024-002539>.

- Lee, B. L., & Glass, H. C. (2021). Cognitive outcomes in late childhood and adolescence of neonatal hypoxic-ischemic encephalopathy. *Clinical and experimental pediatrics*, 64(12), 608–618. <https://doi.org/10.3345/cep.2021.00164>.
- Lehtonen, L., Lee, S. K., Kusuda, S., Lui, K., Norman, M., Bassler, D., Håkansson, S., Vento, M., Darlow, B. A., Adams, M., Puglia, M., Isayama, T., Noguchi, A., Morisaki, N., Helenius, K., Reichman, B., Shah, P. S., & International Network for Evaluating Outcomes of Neonates (iNeo) (2020). Family Rooms in Neonatal Intensive Care Units and Neonatal Outcomes: An International Survey and Linked Cohort Study. *The Journal of pediatrics*, 226, 112–117.e4. <https://doi.org/10.1016/j.jpeds.2020.06.009>.
- Levin A. (1994). The Mother-Infant unit at Tallinn Children's Hospital, Estonia: a truly baby-friendly unit. *Birth (Berkeley, Calif.)*, 21(1), 39–46. <https://doi.org/10.1111/j.1523-536x.1994.tb00914.x>.
- Lief, L., Berlin, D. A., Maciejewski, R. C., Westman, L., Su, A., Cooper, Z. R., Ouyang, D. J., Epping, G., Derry, H., Russell, D., Gentzler, E., Maciejewski, P. K., & Prigerson, H. G. (2018). Dying Patient and Family Contributions to Nurse Distress in the ICU. *Annals of the American Thoracic Society*, 15(12), 1459–1464. <https://doi.org/10.1513/AnnalsATS.201804-284OC>.
- Lindley, L. C., & Mark, B. A. (2010). Children with special health care needs: Impact of health care expenditures on family financial burden. *Journal of child and family studies*, 19(1), 79–89. <https://doi.org/10.1007/s10826-009-9286-6>.
- Little, R. J. A. (1988). A Test of Missing Completely at Random for Multivariate Data with Missing Values. *Journal of the American Statistical Association*, 83(404), 1198–1202. <https://doi.org/10.1080/01621459.1988.10478722>.
- Litzelman, K., Berghoff, A., Stevens, J., & Kwekkeboom, K. (2023). Predictors of psychoneurological symptoms in cancer caregivers over time: Role of caregiving burden, stress, and patient symptoms. *Supportive care in cancer: official journal of the Multinational Association of Supportive Care in Cancer*, 31(5), 274. <https://doi.org/10.1007/s00520-023-07741-3>.
- Liu, S., Duan, X., Han, P., Shao, H., Jiang, J., & Zeng, L. (2022). Occupational benefit perception of acute and critical care nurses: A qualitative meta-synthesis. *Frontiers in public health*, 10, 976146. <https://doi.org/10.3389/fpubh.2022.976146>.
- Long, D. A., Gilholm, P., Le Brocq, R., Kenardy, J., Gibbons, K., & Dow, B. L. (2024). Post-traumatic stress and health-related quality of life after admission to paediatric intensive care:

Longitudinal associations in mother-child dyads. *Australian critical care: official journal of the Confederation of Australian Critical Care Nurses*, 37(1), 98–105. <https://doi.org/10.1016/j.aucc.2023.10.004>

Loutfy, A., Zoromba, M. A., Mohamed, M. A., El-Gazar, H. E., Andargeery, S. Y., El-Monshed, A. H., Van Belkum, C., & Ali, A. S. (2024). Family-centred care as a mediator in the relationship between parental nurse support and parental stress in neonatal intensive care units. *BMC Nursing*, 23(1), 572. <https://doi.org/10.1186/s12912-024-02258-4>.

Lucchini, A. de Souza Nogueira, L. & Bambi, S. (2025). The ongoing challenge: ICU and beyond-managing nursing workload. *Intensive Crit. Care Nurs.*, 87, 103917. <https://doi.org/10.1016/j.iccn.2024.103917>.

Lyons, R. F., Mickelson, K. D., Sullivan, M. J. L., and Coyne, J. C. (1998). Coping as a communal process. *J. Soc. Pers. Relat.* 15, 579–605. doi: 10.1177/ 0265407598155001.

Mäkelä, H., Axelin, A., Feeley, N., & Niela-Vilén, H. (2018). Clinging to closeness: The parental view on developing a close bond with their infants in a NICU. *Midwifery*, 62, 183–188. <https://doi.org/10.1016/j.midw.2018.04.003>.

Malouf, R., Harrison, S., Burton, H. A. L., Gale, C., Stein, A., Franck, L. S., & Alderdice, F. (2021). Prevalence of anxiety and post-traumatic stress (PTS) among the parents of babies admitted to neonatal units: A systematic review and meta-analysis. *EClinicalMedicine*, 43, 101233. <https://doi.org/10.1016/j.eclinm.2021.101233>.

Manalu, F.L. (2024). The Impact of Psychodynamic Theory-Based Resilience Training on Occupational Stress and Resilience Among Nurses. *Enrichment*, 2, 1-9. <https://journalenrichment.com/index.php/jr/article/view/101#:~:text=https%3A%2F%2Fdoi.org%2F10.55324%2Fenrichment.v2i1.10>

Mark, G., & Smith, A. P. (2012). Occupational stress, job characteristics, coping, and the mental health of nurses. *British Journal of Health Psychology*, 17, 505–521. <https://doi.org/10.1111/j.2044-8287.2011.02051.x>.

Marsack-Topolewski, C. N., & Church, H. L. (2019). Impact of Caregiver Burden on Quality of Life for Parents of Adult Children with Autism Spectrum Disorder. *American journal on intellectual and developmental disabilities*, 124(2), 145–156. <https://doi.org/10.1352/1944-7558-124.2.145>.

- Marzouk, A., Filipovic-Pierucci, A., Baud, O., Tsatsaris, V., Ego, A., Charles, M.-A., Goffinet, F., Evain-Brion, D. & Durand-Zaleski, I. (2017). Prenatal and post-natal cost of small for gestational age infants: a national study. *BMC Health Serv Res* 17, 221. <https://doi.org/10.1186/s12913-017-2155-x>.
- Matricardi, S., Agostino, R., Fedeli, C., & Montirosso, R. (2013). Mothers are not fathers: differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta paediatrica (Oslo, Norway : 1992)*, 102(1), 8–14. <https://doi.org/10.1111/apa.12058>.
- McGilton, K. S., Hall, L. M., Wodchis, W. P., & Petroz, U. (2007). Supervisory support, job stress, and job satisfaction among long-term care nursing staff. *The Journal of nursing administration*, 37(7-8), 366–372. <https://doi.org/10.1097/01.nna.0000285115.60689.4b>
- McKeown, L., Burke, K., Cobham, V. E., Kimball, H., Foxcroft, K., & Callaway, L. (2023). The Prevalence of PTSD of Mothers and Fathers of High-Risk Infants Admitted to NICU: A Systematic Review. *Clinical child and family psychology review*, 26(1), 33–49. <https://doi.org/10.1007/s10567-022-00421-4>.
- Mclean, M. A., Scoten, O. C., Yu, W., Ye, X. Y., Petrie, J., Church, P. T., Soraisham, A. S., Mirea, L. S., Weinberg, J., Synnes, A. R., O'Brien, K., & Grunau, R. E. (2022). Lower Maternal Chronic Physiological Stress and Better Child Behavior at 18 Months: Follow-Up of a Cluster Randomized Trial of Neonatal Intensive Care Unit Family Integrated Care. *The Journal of pediatrics*, 243, 107–115.e4. <https://doi.org/10.1016/j.jpeds.2021.12.055>.
- McMeekin, Dawn E.; Hickman, Ronald L.; Douglas, Sara L.; Kelley, Carol G. (2017). Stress and Coping of Critical Care Nurses After Unsuccessful Cardiopulmonary Resuscitation. *American Journal of Critical Care*, 26(2), 128–135. doi:10.4037/ajcc2017916
- McVicar A. (2003). Workplace stress in nursing: a literature review. *Journal of advanced nursing*, 44(6), 633–642. <https://doi.org/10.1046/j.0309-2402.2003.02853.x>.
- Mealer, M. L., Shelton, A., Berg, B., Rothbaum, B., & Moss, M. (2007). Increased prevalence of post-traumatic stress disorder symptoms in critical care nurses. *American journal of respiratory and critical care medicine*, 175(7), 693–697. <https://doi.org/10.1164/rccm.200606-735OC>.
- Meert, K. L., Clark, J., & Eggly, S. (2013). Family-centered care in the pediatric intensive care unit. *Pediatric clinics of North America*, 60(3), 761–772. <https://doi.org/10.1016/j.pcl.2013.02.011>.
- Meier, E. A., Gallegos, J. V., Thomas, L. P., Depp, C. A., Irwin, S. A., & Jeste, D. V. (2016). Defining a Good Death (Successful Dying): Literature Review and a Call for Research and Public

- Dialogue. *The American journal of geriatric psychiatry: official journal of the American Association for Geriatric Psychiatry*, 24(4), 261–271. <https://doi.org/10.1016/j.jagp.2016.01.135>.
- Miles, M. S., Funk, S. G., & Carlson, J. (1993). Parental Stressor Scale: neonatal intensive care unit. *Nursing research*, 42(3), 148–152.
- Mirlashari, J., Brown, H., Fomani, F. K., de Salaberry, J., Zadeh, T. K., & Khoshkhou, F. (2020). The Challenges of Implementing Family-Centered Care in NICU from the Perspectives of Physicians and Nurses. *Journal of pediatric nursing*, 50, e91–e98. <https://doi.org/10.1016/j.pedn.2019.06.013>.
- Mohamedkheir, R.A. Amara, Z.M. Balla, S.A. & Mohamed, H.A. (2016). Occupational stress among nurses working in intensive care units in Public Hospitals of Khartoum State, Sudan 2016. *Am. J. Health Res.* 4, 166–171. <https://doi.org/10.11648/j.ajhr.20160406.13>.
- Montirosso, R., Provenzi, L., Calciolari, G., Borgatti, R., & NEO-ACQUA Study Group (2012). Measuring maternal stress and perceived support in 25 Italian NICUs. *Acta paediatrica (Oslo, Norway: 1992)*, 101(2), 136–142. <https://doi.org/10.1111/j.1651-2227.2011.02440.x>.
- Moreno-Sanz, B., Alferink, M. T., O'Brien, K., & Franck, L. S. (2025). Family integrated care: State of art and future perspectives. *Acta paediatrica (Oslo, Norway: 1992)*, 114(4), 710–730. <https://doi.org/10.1111/apa.17272>.
- Mosallam, R., Hamidi, S. & Elrefaay, M. (2015). Turnover intention among intensive care unit nurses in Alexandria, Egypt. *J Egypt Public Health Assoc.* 90(2):46–51.
- Mulcahy, M., Tuqiri, K., Hoban, K.E., & Levett-Jones, T. (2024). Dear Diary—Shining a light on the work of 200 nurses. *Collegian* 31, 28–33. <https://doi.org/10.1016/j.colegn.2023.10.004>.
- Nelkowska D. D. (2020). Treating irritable bowel syndrome through an interdisciplinary approach. *Annals of gastroenterology*, 33(1), 1–8. <https://doi.org/10.20524/aog.2019.0441>.
- Newell, S., & Jordan, Z. (2015). The patient experience of patient-centered communication with nurses in the hospital setting: a qualitative systematic review protocol. *JBIC database of systematic reviews and implementation reports*, 13(1), 76–87. <https://doi.org/10.11124/jbisrir-2015-1072>.
- Ng, Q. X., Soh, A. Y. S., Loke, W., Venkatanarayanan, N., Lim, D. Y., & Yeo, W. S. (2019). Systematic review with meta-analysis: The association between post-traumatic stress disorder and irritable bowel syndrome. *Journal of gastroenterology and hepatology*, 34(1), 68–73. <https://doi.org/10.1111/jgh.14446>.

- Nibras, S., Kentor, R., Masood, Y., Price, K., Schneider, N. M., Tenenbaum, R. B., & Calarge, C. (2022). Psychological and Psychiatric Comorbidities in Youth with Serious Physical Illness. *Children* (Basel, Switzerland), 9(7), 1051. <https://doi.org/10.3390/children9071051>.
- Nissanholtz Gannot, R., Hamama Raz, Y., Stein, I., & Hochwald, O. (2022). Secondary Traumatic Stress and Vigor Among Neonatal Intensive Care Unit Personnel: The Moderator Role of Coping Flexibility. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 22(3), E86–E93. <https://doi.org/10.1097/ANC.0000000000000924>.
- Noergaard, B., Ammentorp, J., Fenger-Gron, J., Kofoed, P. E., Johannessen, H., & Thibeau, S. (2017). Fathers' Needs and Masculinity Dilemmas in a Neonatal Intensive Care Unit in Denmark. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 17(4), E13–E22. <https://doi.org/10.1097/ANC.0000000000000395>.
- Noergaard, B., Ammentorp, J., Garne, E., Fenger-Gron, J., & Kofoed, P. E. (2018). Fathers' Stress in a Neonatal Intensive Care Unit. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 18(5), 413–422. <https://doi.org/10.1097/ANC.0000000000000503>
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal*, 14, 535–569. <https://doi.org/10.1080/10705510701575396>.
- O'Dean, S., Spry, E., Evans-Whipp, T., Mansour, K., Glauert, R., Olsson, C. A., Slade, T., & Australian Early Relational Health Network (2025). Scientific Progress in Mapping the Relational Ecology of Early Child Development: A Systematic Scoping Review. *Clinical child and family psychology review*, 10.1007/s10567-025-00522-w. Advance online publication. <https://doi.org/10.1007/s10567-025-00522-w>.
- Obeidat, H. M., Bond, E. A., & Callister, L. C. (2009). The parental experience of having an infant in the newborn intensive care unit. *The Journal of perinatal education*, 18(3), 23–29. <https://doi.org/10.1624/105812409X461199>
- Obispo, B., Cruz-Castellanos, P., Fernández-Montes, A., Coca-Membrives, S., Rogado, J., Antoñanzas, M., Castillo-Trujillo, O. A., López-Ceballos, H., Rodríguez-González, A., Jiménez-Fonseca, P., & Calderon, C. (2023). Coping strategies as mediators of uncertainty and psychological distress in patients with advanced cancer. *Psycho-oncology*, 32(11), 1694–1701. <https://doi.org/10.1002/pon.6219>.

- O'Malley, D., Quigley, E. M., Dinan, T. G., & Cryan, J. F. (2011). Do interactions between stress and immune responses lead to symptom exacerbations in irritable bowel syndrome? *Brain, behavior, and immunity*, 25(7), 1333–1341. <https://doi.org/10.1016/j.bbi.2011.04.009>.
- Ostberg M. (1998). Parental stress, psychosocial problems and responsiveness in help-seeking parents with small (2-45 months old) children. *Acta paediatrica (Oslo, Norway: 1992)*, 87(1), 69–76. <https://doi.org/10.1080/08035259850157903>.
- Ozga, D., Woźniak, K., & Gurowiec, P. J. (2020). Difficulties Perceived by ICU Nurses Providing End-of-Life Care: A Qualitative Study. *Global advances in health and medicine*, 9, 2164956120916176. <https://doi.org/10.1177/2164956120916176>.
- Palsson, O. S., Whitehead, W., Törnblom, H., Sperber, A. D., & Simren, M. (2020). Prevalence of Rome IV Functional Bowel Disorders Among Adults in the United States, Canada, and the United Kingdom. *Gastroenterology*, 158(5), 1262–1273.e3. <https://doi.org/10.1053/j.gastro.2019.12.021>.
- Park, J. Y., & Oh, J. (2019). Influence of Perceptions of Death, End-of-Life Care Stress, and Emotional Intelligence on Attitudes towards End-of-Life Care among Nurses in the Neonatal Intensive Care Unit. *Child health nursing research*, 25(1), 38–47. <https://doi.org/10.4094/chnr.2019.25.1.38>.
- Parker, C., Berkovic, D., Ayton, D., Zomer, E., Liew, D., & Wei, A. (2022). Patient Perceived Financial Burden in Haematological Malignancies: A Systematic Review. *Current oncology (Toronto, Ont.)*, 29(6), 3807–3824. <https://doi.org/10.3390/curroncol29060305>.
- Parkes, K. R., Mendham, C. A., & von Rabenau, C. (1994). Social support and the demand-discretion model of job stress: Tests of additive and interactive effects in two samples. *Journal of Vocational Behavior*, 44(1), 91–113. <https://doi.org/10.1006/jvbe.1994.1006>.
- Pascal, A., Govaert, P., Oostra, A., Naulaers, G., Ortibus, E., & Van den Broeck, C. (2018). Neurodevelopmental outcome in very preterm and very-low-birthweight infants born over the past decade: a meta-analytic review. *Developmental medicine and child neurology*, 60(4), 342–355. <https://doi.org/10.1111/dmcn.13675>.
- Patrick, D. L., Drossman, D. A., Frederick, I. O., DiCesare, J., & Puder, K. L. (1998). Quality of life in persons with irritable bowel syndrome: development and validation of a new measure. *Digestive diseases and sciences*, 43(2), 400–411. <https://doi.org/10.1023/a:1018831127942>.

- Pellissier, S., & Bonaz, B. (2017). The Place of Stress and Emotions in the Irritable Bowel Syndrome. *Vitamins and hormones*, 103, 327–354. <https://doi.org/10.1016/bs.vh.2016.09.005>.
- Penninx, B. W., van Tilburg, T., Boeke, A. J., Deeg, D. J., Kriegsman, D. M., & van Eijk, J. T. (1998). Effects of social support and personal coping resources on depressive symptoms: different for various chronic diseases? *Health psychology: official journal of the Division of Health Psychology, American Psychological Association*, 17(6), 551–558. <https://doi.org/10.1037//0278-6133.17.6.551>.
- Perrin, E. C., & Shipman, D. (2009). Hospitalization, surgery, and medical and dental procedures. In W. B. Carey et al. (Eds.), *Developmental-behavioral pediatrics* (4th ed., pp. 329–336). Philadelphia, PA: Saunders/Elsevier.
- Persson, C., Ericson, J., Salari, R., Eriksson, M. H., & Flacking, R. (2023). NICU parents' mental health: A comparative study with parents of term and healthy infants. *Acta paediatrica (Oslo, Norway: 1992)*, 112(5), 954–966. <https://doi.org/10.1111/apa.16735>.
- Peters, L., Cant, R., Payne, S., O'Connor, M., Mc Dermott, F., Hood, K., Morphet, J., Shimoinaba, K., (2013). How death anxiety impacts nurses' caring for patients at the end of life: a review literature. *Open Nurs. J.* 7, 14–21.
- Phibbs, C. S., Schmitt, S. K., Cooper, M., Gould, J. B., Lee, H. C., Profit, J., & Lorch, S. A. (2019). Birth Hospitalization Costs and Days of Care for Mothers and Neonates in California, 2009-2011. *The Journal of pediatrics*, 204, 118–125.e14. <https://doi.org/10.1016/j.jpeds.2018.08.041>.
- Phillips R. (2024). Bonding and Attachment with Baby in the Womb or in the Neonatal Intensive Care Unit: The Critical Role of Early Emotional Connections. *Critical care nursing clinics of North America*, 36(2), 157–165. <https://doi.org/10.1016/j.cnc.2023.11.002>.
- Pimenta Lopes Ribeiro, O. M., de Lima Trindade, L., Silva Fassarella, C., de Abreu Pereira, S. C., Figueiredo Cabral Teles, P. J., Gomes da Rocha, C., da Silva Leite, P. C., Almeida Ventura-Silva, J. M., & Neves Sousa, C. (2022). Impact of COVID-19 on professional nursing practice environments and patient safety culture. *Journal of nursing management*, 30(5), 1105–1114. <https://doi.org/10.1111/jonm.13617>
- Pineda, R., Bender, J., Hall, B., Shabosky, L., Annecca, A., & Smith, J. (2018). Parent participation in the neonatal intensive care unit: Predictors and relationships to neurobehavior and developmental outcomes. *Early human development*, 117, 32–38. <https://doi.org/10.1016/j.earlhumdev.2017.12.008>.

- Pinelli, J. M. (1998). The effects of family coping and family resources on family adjustment and parental stress in the acute phase of the neonatal intensive care unit experience 1101. *Pediatric Research*, 43, 189. <http://dx.doi.org/10.1891/0730-0832.19.6.27>.
- Pinheiro, R. L., Areia, A. L., Mota Pinto, A., & Donato, H. (2019). Advanced Maternal Age: Adverse Outcomes of Pregnancy, A Meta-Analysis. *Acta medica portuguesa*, 32(3), 219–226. <https://doi.org/10.20344/amp.11057>.
- Poehlmann, J., Hane, A., Burnson, C., Maleck, S., Hamburger, E., & Shah, P. E. (2012). Preterm infants who are prone to distress: differential effects of parenting on 36-month behavioral and cognitive outcomes. *Journal of child psychology and psychiatry, and allied disciplines*, 53(10), 1018–1025. <https://doi.org/10.1111/j.1469-7610.2012.02564.x>.
- Pratt, M., Kerr, M., & Wong, C. (2009). The impact of ERI, burnout, and caring for SARS patients on hospital nurses' self-reported compliance with infection control. *The Canadian journal of infection control: the official journal of the Community & Hospital Infection Control Association-Canada = Revue canadienne de prevention des infections*, 24(3), 167–174.
- Preto, V. A., & Pedrão, L. J. (2009). O estresse entre enfermeiros que atuam em Unidade de Terapia Intensiva [Stress among nurses who work at the intensive care unit]. *Revista da Escola de Enfermagem da U S P*, 43(4), 841–848. <https://doi.org/10.1590/s0080-62342009000400015>.
- Price, J., Kassam-Adams, N., Alderfer, M. A., Christofferson, J., & Kazak, A. E. (2016). Systematic Review: A Reevaluation and Update of the Integrative (Trajectory) Model of Pediatric Medical Traumatic Stress. *Journal of pediatric psychology*, 41(1), 86–97. <https://doi.org/10.1093/jpepsy/jsv074>.
- Prunas A, Sarno I, Preti E, Madeddu F. (2010). *SCL-90-R. Symptom Checklist-90-R*. Firenze: Giunti OS: Florence, Italy, 2010.
- Rabiepoor, S., Vatankhah-Alamdary, N., & Khalkhali, H. R. (2020). The Effect of Expressive Writing on Postpartum Depression and Stress of Mothers with a Preterm Infant in NICU. *Journal of clinical psychology in medical settings*, 27(4), 867–874. <https://doi.org/10.1007/s10880-019-09688-2>.
- Rahmani F, Behshid M, Zamanzadeh V & Rahmani F. (2010). Relationship between general health, occupational stress and burnout in critical care nurses of Tabriz teaching hospitals. *IJN*;23(66):54-63

- Raiskila, S., Axelin, A., Toome, L., Caballero, S., Tandberg, B. S., Montiroso, R., Normann, E., Hallberg, B., Westrup, B., Ewald, U., & Lehtonen, L. (2017). Parents' presence and parent-infant closeness in 11 neonatal intensive care units in six European countries vary between and within the countries. *Acta paediatrica (Oslo, Norway: 1992)*, 106(6), 878–888. <https://doi.org/10.1111/apa.13798>.
- Raiskila, S.; Lehtonen, L.; Tandberg, B.S.; Normann, E.; Ewald, U.; Caballero, S.; Varendi, H.; Toome, L.; Nordhøv, M.; Hallberg, B., Westrup, B., Montiroso, R., Axelin, A. (2017). Corrigendum to “Parent and nurse perceptions on the quality of family-centered care in 11 European NICUs” [Aust. Crit. Care 29 (4) (2016) 201–209]. *Aust. Crit. Care*, 30, 53–54.
- Ramezani, T., Hadian Shirazi, Z., Sabet Sarvestani, R., & Moattari, M. (2014). Family-centered care in neonatal intensive care unit: a concept analysis. *International journal of community-based nursing and midwifery*, 2(4), 268–278.
- Raza, M.A., Khan, M.M. & Mujtaba, B.G. (2018). The Impact of Organizational Change on Employee Turnover Intention: Does Stress Play a Mediating Role? *Public Organiz Rev* 18, 313–327. <https://doi.org/10.1007/s11115-017-0380-8>.
- Reijneveld, S. A., de Meer, G., Wiefferink, C. H., & Crone, M. R. (2008). Parents' concerns about children are highly prevalent but often not confirmed by child doctors and nurses. *BMC public health*, 8, 124. <https://doi.org/10.1186/1471-2458-8-124>
- Rentscher KE (2019) Communal Coping in Couples with Health Problems. *Front. Psychol.* 10:398. doi: 10.3389/fpsyg.2019.00398.
- Rhee, S. H., Pothoulakis, C., & Mayer, E. A. (2009). Principles and clinical implications of the brain-gut-enteric microbiota axis. *Nature reviews. Gastroenterology & hepatology*, 6(5), 306–314. <https://doi.org/10.1038/nrgastro.2009.35>.
- Riley, A. R., Williams, C. N., Moyer, D., Bradbury, K., Leonard, S., Turner, E., Holding, E., & Hall, T. A. (2021). Parental Posttraumatic Stress Symptoms in the Context of Pediatric Post Intensive Care Syndrome: Impact on the Family and Opportunities for Intervention. *Clinical practice in pediatric psychology*, 9(2), 156–166. <https://doi.org/10.1037/cpp0000399>.
- Rio, L., Donadeo Fadda, M., Lambert, S., & Ramelet, A. S. (2022). Beliefs and needs of fathers of newborns hospitalised in a neonatal unit: A descriptive correlational study. *Australian critical care: official journal of the Confederation of Australian Critical Care Nurses*, 35(2), 167–173. <https://doi.org/10.1016/j.aucc.2021.02.012>.

- Rodriguez-Ruiz, E., Latour, J. M., & van Mol, M. M. C. (2025). Promoting an inclusive and humanised environment in the intensive care unit: Shift happens. *Intensive & critical care nursing*, 86, 103856. <https://doi.org/10.1016/j.iccn.2024.103856>.
- Rodwell, J., & Munro, L. (2013). Relational regulation theory and the role of social support and organisational fairness for nurses in a general acute context. *Journal of clinical nursing*, 22(21-22), 3160–3169. <https://doi.org/10.1111/jocn.12385>.
- Roncallo, C. P., Barreto, F. B., & de Miguel, M. S. (2018). Promotion of child development and health from the perinatal period: an approach from positive parenting. *Early Child Development and Care*, 188(11), 1540–1552. <https://doi.org/10.1080/03004430.2018.1495630>.
- Roque, A. T. F., Lasiuk, G. C., Radünz, V., & Hegadoren, K. (2017). Scoping Review of the Mental Health of Parents of Infants in the NICU. *Journal of obstetric, gynecologic, and neonatal nursing: JOGNN*, 46(4), 576–587. <https://doi.org/10.1016/j.jogn.2017.02.005>.
- Rossmann B, Greene MM, Meier PP. (2015). The role of peer support in the development of maternal identity for “NICU Moms”. *J Obstet Gynecol Neonatal Nurs*. 44(1):3–16.
- Roué, J. M., Kuhn, P., Lopez Maestro, M., Maastrup, R. A., Mitanchez, D., Westrup, B., & Sizun, J. (2017). Eight principles for patient-centred and family-centred care for newborns in the neonatal intensive care unit. *Archives of disease in childhood. Fetal and neonatal edition*, 102(4), F364–F368. <https://doi.org/10.1136/archdischild-2016-312180>.
- Royal College of Paediatrics and Child Health, National Neonatal Audit Programme (2017) Annual Report on 2016 data. https://www.rcpch.ac.uk/sites/default/files/NNAP_National_Annual_report_2017.pdf. Accessed 24 July 2025.
- Rusu, P. P., Candel, O. S., Bogdan, I., Ilciuc, C., Ursu, A., & Podina, I. R. (2025). Parental Stress and Well-Being: A Meta-analysis. *Clinical child and family psychology review*, 28(2), 255–274. <https://doi.org/10.1007/s10567-025-00515-9>.
- Ryu E. (2011). Effects of skewness and kurtosis on normal-theory based maximum likelihood test statistic in multilevel structural equation modeling. *Behavior research methods*, 43(4), 1066–1074. <https://doi.org/10.3758/s13428-011-0115-7>.
- Saedpanah, D., Salehi, S., & Moghaddam, L. F. (2016). The Effect of Emotion Regulation Training on Occupational Stress of Critical Care Nurses. *Journal of clinical and diagnostic research: JCDR*, 10(12), VC01–VC04. <https://doi.org/10.7860/JCDR/2016/23693.9042>.

- Salem, E. A., & Ebrahim, S. M. (2018). Psychosocial work environment and oxidative stress among nurses. *Journal of occupational health*, 60(2), 182–191. <https://doi.org/10.1539/joh.17-0186-OA>.
- Salomè, S., Mansi, G., Lambiase, C. V., Barone, M., Piro, V., Pesce, M., Sarnelli, G., Raimondi, F., & Capasso, L. (2022). Impact of psychological distress and psychophysical wellbeing on posttraumatic symptoms in parents of preterm infants after NICU discharge. *Italian journal of pediatrics*, 48(1), 13. <https://doi.org/10.1186/s13052-022-01202-z>.
- Salyers, M. P., Bonfils, K. A., Luther, L., Firmin, R. L., White, D. A., Adams, E. L., & Rollins, A. L. (2017). The Relationship Between Professional Burnout and Quality and Safety in Healthcare: A Meta-Analysis. *Journal of general internal medicine*, 32(4), 475–482. <https://doi.org/10.1007/s11606-016-3886-9>
- Sanders, M. R., & Hall, S. L. (2018). Trauma-informed care in the newborn intensive care unit: promoting safety, security and connectedness. *Journal of perinatology: official journal of the California Perinatal Association*, 38(1), 3–10. <https://doi.org/10.1038/jp.2017.124>.
- Sandnes, R., Le Floch, M., Riquin, E., Nocus, I., Müller, J. B., & Bacro, F. (2024). Parental stress and mental health outcomes following very preterm birth: A systematic review of recent findings. *Journal of affective disorders*, 355, 513–525. <https://doi.org/10.1016/j.jad.2024.03.154>.
- Sarafis, P., Rousaki, E., Tsounis, A., Malliarou, M., Lahana, L., Bamidis, P., Niakas, D., & Papastavrou, E. (2016). The impact of occupational stress on nurses' caring behaviors and their health-related quality of life. *BMC nursing*, 15, 56. <https://doi.org/10.1186/s12912-016-0178-y>
- Sawyer, A. T., Tao, H., & Bailey, A. K. (2023). The Impact of a Psychoeducational Group Program on the Mental Well-Being of Unit-Based Nurse Leaders: A Randomized Controlled Trial. *International journal of environmental research and public health*, 20(11), 6035. <https://doi.org/10.3390/ijerph20116035>.
- Schmulson, M. J., & Drossman, D. A. (2017). What Is New in Rome IV. *Journal of neurogastroenterology and motility*, 23(2), 151–163. <https://doi.org/10.5056/jnm16214>.
- Scibelli, F., Fucà, E., Guerrera, S., Lupi, E., Alfieri, P., Valeri, G., & Vicari, S. (2021). Clinical and individual features associated with maternal stress in young adolescents with autism spectrum disorder. *Autism research: official journal of the International Society for Autism Research*, 14(9), 1935–1947. <https://doi.org/10.1002/aur.2539>.

- Seol, H. (2025). snowLatent: Latent Class Analysis for jamovi. (Version 2.5.3) [jamovi module]. URL <https://github.com/hyunsooseol/snowLatent>.
- Shao, Z., Zhu, T., Zhang, P., Wen, Q., Li, D., & Wang, S. (2017). Association of financial status and the quality of life in Chinese women with recurrent ovarian cancer. *Health and quality of life outcomes*, 15(1), 144. <https://doi.org/10.1186/s12955-017-0714-9>.
- Shaw, R. J., Bernard, R. S., Storfer-Isser, A., Rhine, W., & Horwitz, S. M. (2013). Parental coping in the neonatal intensive care unit. *Journal of clinical psychology in medical settings*, 20(2), 135–142. <https://doi.org/10.1007/s10880-012-9328-x>.
- Shaw, R. J., Deblois, T., Ikuta, L., Ginzburg, K., Fleisher, B., & Koopman, C. (2006). Acute stress disorder among parents of infants in the neonatal intensive care nursery. *Psychosomatics*, 47(3), 206–212. <https://doi.org/10.1176/appi.psy.47.3.206>.
- Shaw, R. J., Givrad, S., Poe, C., Loi, E. C., Hoge, M. K., & Scala, M. (2023). Neurodevelopmental, Mental Health, and Parenting Issues in Preterm Infants. *Children (Basel, Switzerland)*, 10(9), 1565. <https://doi.org/10.3390/children10091565>.
- Shetty, A. P., Halemani, K., Issac, A., Thimmappa, L., Dhiraaj, S., K, R., Mishra, P., & Upadhyaya, V. D. (2024). Prevalence of anxiety, depression, and stress among parents of neonates admitted to neonatal intensive care unit: a systematic review and meta-analysis. *Clinical and experimental pediatrics*, 67(2), 104–115. <https://doi.org/10.3345/cep.2023.00486>.
- Shoghi, M., Sohrabi, S., & Rasouli, M. (2018). The Effects of Massage by Mothers on Mother-Infant Attachment. *Alternative therapies in health and medicine*, 24(3), 34–39.
- Shorter, M., & Stayt, L. C. (2010). Critical care nurses' experiences of grief in an adult intensive care unit. *Journal of advanced nursing*, 66(1), 159–167. <https://doi.org/10.1111/j.1365-2648.2009.05191.x>
- Sica, C., Magni, C., Ghisi, M., Altoé, G., Sighinolfi, C., Chiri, L. R., & Franceschini, S. (2008). Coping Orientation to Problems Experienced--Nuova Versione Italiana (COPE-NVI): uno strumento per la misura degli stili di coping. *Psicoterapia Cognitiva e Comportamentale*, 14(1), 27–53.
- Siegrist J. (2008). Chronic psychosocial stress at work and risk of depression: evidence from prospective studies. *European archives of psychiatry and clinical neuroscience*, 258 Suppl 5, 115–119. <https://doi.org/10.1007/s00406-008-5024-0>.

- Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, 1, 27–41. <https://doi.org/10.1037/1076-8998.1.1.27>.
- Singh, P., Agnihotri, A., Pathak, M. K., Shirazi, A., Tiwari, R. P., Sreenivas, V., Sagar, R., & Makharia, G. K. (2012). Psychiatric, somatic and other functional gastrointestinal disorders in patients with irritable bowel syndrome at a tertiary care center. *Journal of neurogastroenterology and motility*, 18(3), 324–331. <https://doi.org/10.5056/jnm.2012.18.3.324>.
- Slade, A., Sadler, L., De Dios-Kenn, C., Webb, D., Currier-Ezepchick, J., & Mayes, L. (2005). Minding the baby a reflective parenting program. *The Psychoanalytic study of the child*, 60, 74–100. <https://doi.org/10.1080/00797308.2005.11800747>
- Society of Critical Care Medicine. Critical Care Statistics (2022). Available from: <https://www.sccm.org/Communications/Critical-Care-Statistics>.
- Soleimani, F., Azari, N., Ghiasvand, H., & Fatollahierad, S. (2020). Effects of Developmental Care on Neurodevelopment of Preterm Infants. *Iranian journal of child neurology*, 14(2), 7–15.
- Soliday, E., McCluskey, F.K. & O' Brien, M. (1999). Postpartum affect and depressive symptoms in mothers and fathers. *American Journal of Orthopsychiatry*, 69 (1), 30-38.
- Sorrentino, G., Thekkan, K. R., Genna, C., Aite, L., Ragni, A., Bevilacqua, F., Dall'Oglio, I., Roberti, M., Tiozzo, E., & Gawronski, O. (2025). The implementation and impact of narrative diaries in neonatal intensive care units: A scoping review. *Nursing in critical care*, 30(2), e13281. <https://doi.org/10.1111/nicc.13281>.
- Spector, P.E. (2019). Do not cross me: Optimizing the use of cross-sectional designs. *J. Bus. Psychol.* 34, 125–137. <https://doi.org/10.1007/s10869-018-09613-8>.
- Sperber, A. D., Dumitrascu, D., Fukudo, S., Gerson, C., Ghoshal, U. C., Gwee, K. A., Hungin, A. P. S., Kang, J. Y., Minhu, C., Schmulson, M., Bolotin, A., Friger, M., Freud, T., & Whitehead, W. (2017). The global prevalence of IBS in adults remains elusive due to the heterogeneity of studies: a Rome Foundation working team literature review. *Gut*, 66(6), 1075–1082. <https://doi.org/10.1136/gutjnl-2015-311240>.
- Squarza, C., Picciolini, O., Gardon, L., Gianni, M. L., Murru, A., Gangi, S., Cortinovia, I., Milani, S., & Mosca, F. (2016). Learning Disabilities in Extremely Low Birth Weight Children and Neurodevelopmental Profiles at Preschool Age. *Frontiers in psychology*, 7, 998. <https://doi.org/10.3389/fpsyg.2016.00998>.

- Stacey, S., Osborn, M., Salkovskis, P. (2015). Life is a rollercoaster...What helps parents cope with the Neonatal Intensive Care Unit (NICU)? *Journal of Neonatal Nursing*, Volume 21, Issue 4, pp. 136-141. <https://doi.org/10.1016/j.jnn.2015.04.006>.
- Stange K. C. (2009). The problem of fragmentation and the need for integrative solutions. *Annals of family medicine*, 7(2), 100–103. <https://doi.org/10.1370/afm.971>.
- Starfield B. (2011). Is patient-centered care the same as person-focused care? *The Permanente journal*, 15(2), 63–69. <https://doi.org/10.7812/TPP/10-148>.
- Steinberg, Z., & Patterson, C. (2017). Giving voice to the psychological in the NICU: A relational model. *Journal of Infant, Child & Adolescent Psychotherapy*, 16(1), 25–44. <https://doi.org/10.1080/15289168.2016.1267539>.
- Strine, S., Karuri, S., Fry, J. T., Bean, K., Horner, S., & Machut, K. Z. (2025). Culture of Family-Centered Care in the NICU. *Advances in neonatal care: official journal of the National Association of Neonatal Nurses*, 25(3), 293–300. <https://doi.org/10.1097/ANC.0000000000001249>.
- Strine, T. W., Kroenke, K., Dhingra, S., Balluz, L. S., Gonzalez, O., Berry, J. T., & Mokdad, A. H. (2009). The associations between depression, health-related quality of life, social support, life satisfaction, and disability in community-dwelling US adults. *The Journal of nervous and mental disease*, 197(1), 61–64. <https://doi.org/10.1097/NMD.0b013e3181924ad8>.
- Sutton, P. S., & Darmstadt, G. L. (2013). Preterm birth and neurodevelopment: a review of outcomes and recommendations for early identification and cost-effective interventions. *Journal of tropical pediatrics*, 59(4), 258–265. <https://doi.org/10.1093/tropej/fmt012>.
- Tabachnick, B., & Fidell, L. (2013). *Using Multivariate Statistics*. Boston, MA: Pearson Education Inc.
- Teutsch, D., Frick, E., & Kubitz, J. (2025). What motivates critical care nurses to stay in their job? - Structural aspects for empowering intrinsic motivation in permissive professional contexts: A scoping review. *Intensive & critical care nursing*, 88, 103929. <https://doi.org/10.1016/j.iccn.2024.103929>.
- The jamovi project (2024). jamovi. (Version 2.6) [Computer Software]. Retrieved from <https://www.jamovi.org>.

- Theorell, T., & Karasek, R. A. (1996). Current issues relating to psychosocial job strain and cardiovascular disease research. *Journal of occupational health psychology*, 1(1), 9–26. <https://doi.org/10.1037//1076-8998.1.1.9>.
- Tillisch, K., Mayer, E. A., & Labus, J. S. (2011). Quantitative meta-analysis identifies brain regions activated during rectal distension in irritable bowel syndrome. *Gastroenterology*, 140(1), 91–100. <https://doi.org/10.1053/j.gastro.2010.07.053>.
- Todaro-Franceschi V. (2013). Critical care nurses' perceptions of preparedness and ability to care for the dying and their professional quality of life. *Dimensions of critical care nursing: DCCN*, 32(4), 184–190. <https://doi.org/10.1097/DCC.0b013e31829980af>.
- Tomei, G., Ricci, S., Fidanza, L., Sacco, C., De Cesare, D. P., Ricci, P., Pimpinella, B., Giubilati, R., Suppi, A., Anzelmo, V., Tomei, F., Casale, T., & Rosati, M. V. (2016). Work-related stress in healthcare workers. *Annali di igiene: medicina preventiva e di comunità*, 28(1), 36–49. <https://doi.org/10.7416/ai.2016.2083>.
- Tommasi, F., Tommasi, P., Panato, M., Cordioli, D., & Sartori, R. (2024). Preventing Trauma and Grief in Emergency and Critical Care Units: A Mixed Methods Study on a Psycho-Educational Defusing Intervention. *Healthcare (Basel, Switzerland)*, 12(17), 1800. <https://doi.org/10.3390/healthcare12171800>.
- Traa, J. M., De Vries, J., Bodenmann, G., and Den Oudsten, B. L. (2015). Dyadic coping and relationship functioning in couples coping with cancer: a systematic review. *Br. J. Health Psychol.* 20, 85–114. doi: 10.1111/bhjp.12094
- Trajkovski, S., Al-Dabbas, M. A., Raman, S., Giannoutsos, N., Langman, M., & Schmied, V. (2025). Immigrant and minority parents' experiences in a neonatal intensive care unit: A meta-ethnography review. *Journal of clinical nursing*, 34(3), 737–753. <https://doi.org/10.1111/jocn.17402>.
- Treyvaud, K., Spittle, A., Anderson, P. J., & O'Brien, K. (2019). A multilayered approach is needed in the NICU to support parents after the preterm birth of their infant. *Early human development*, 139, 104838. <https://doi.org/10.1016/j.earlhumdev.2019.104838>.
- Trindade, I. A., Melchior, C., Törnblom, H., & Simrén, M. (2022). Quality of life in irritable bowel syndrome: Exploring mediating factors through structural equation modelling. *Journal of psychosomatic research*, 159, 110809. <https://doi.org/10.1016/j.jpsychores.2022.110809>.

- Trousselard, M., Dutheil, F., Naughton, G., Cosserant, S., Amadon, S., Dualé, C., & Schoeffler, P. (2016). Stress among nurses working in emergency, anesthesiology and intensive care units depends on qualification: a Job Demand-Control survey. *International archives of occupational and environmental health*, 89(2), 221–229. <https://doi.org/10.1007/s00420-015-1065-7>
- Turner, M., Chur-Hansen, A., & Winefield, H. (2014). The neonatal nurses' view of their role in emotional support of parents and its complexities. *Journal of clinical nursing*, 23(21-22), 3156–3165. <https://doi.org/10.1111/jocn.12558>.
- Turner, M., Chur-Hansen, A., Winefield, H., & Stanners, M. (2015). The assessment of parental stress and support in the neonatal intensive care unit using the Parent Stress Scale - Neonatal Intensive Care Unit. *Women and birth: journal of the Australian College of Midwives*, 28(3), 252–258. <https://doi.org/10.1016/j.wombi.2015.04.001>.
- Tzeli, M., Alexiou, M., Sarantaki, A., Kyrkou, G., Charalampopoulos, D., Biti, S., Antoniadis, M., Fotiou, A., Daskalaki, A., Siahianidou, T., Nanou, C., & Metallinou, D. (2025). Psychometric Validation of the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU) in a Greek Cohort of Parents of Hospitalized Neonates. *Healthcare (Basel, Switzerland)*, 13(21), 2750. <https://doi.org/10.3390/healthcare13212750>.
- United States Institute for Kangaroo Care. (2018). The learner's module. Cleveland, OH: US Institute for Kangaroo Care Available from www.kangaroocareusa.org Accessed 3 March 2024.
- Üstükuş, A., & Eskimez, Z. (2021). The effect of death anxiety in nurses on their approach to dying patients: A cross-sectional study. *Perspectives in psychiatric care*, 57(4), 1929–1936. <https://doi.org/10.1111/ppc.12768>
- Vahedian-Azimi, A., Hajiesmaeili, M., Kangasniemi, M., Fornés-Vives, J., Hunsucker, R. L., Rahimibashar, F., Pourhoseingholi, M. A., Farrokhvar, L., & Miller, A. C. (2019). Effects of Stress on Critical Care Nurses: A National Cross-Sectional Study. *Journal of intensive care medicine*, 34(4), 311–322. <https://doi.org/10.1177/0885066617696853>.
- Valicenti-McDermott, M., Lawson, K., Hottinger, K., Seijo, R., Schechtman, M., Shulman, L., & Shinnar, S. (2015). Parental Stress in Families of Children with Autism and Other Developmental Disabilities. *Journal of child neurology*, 30(13), 1728–1735. <https://doi.org/10.1177/0883073815579705>.

- Vallone, F., & Zurlo, M. C. (2024). Stress, interpersonal and inter-role conflicts, and psychological health conditions among nurses: vicious and virtuous circles within and beyond the wards. *BMC Psychology*, 12(1), 197. <https://doi.org/10.1186/s40359-024-01676-y>.
- Vallone, F., Cattaneo Della Volta, M.F.; & Zurlo, M.C. (2024). Stress dimensions, patterns of coping, and psychopathological risk among nurses: A person-centred approach. *BMC Nursing* 23, 569. <https://doi.org/10.1186/s12912-024-02250-y>.
- Vallone, F., Smith, A. P., & Zurlo, M. C. (2020). Work-related stress and wellbeing among nurses: Testing a multi-dimensional model. *Japan journal of nursing science: JJNS*, 17(4), e12360. <https://doi.org/10.1111/jjns.12360>.
- van der Veek, P. P., Dusseldorp, E., van Rood, Y. R., & Masclee, A. A. (2010). Testing a biobehavioral model of irritable bowel syndrome. *European journal of gastroenterology & hepatology*, 22(4), 412–419. <https://doi.org/10.1097/MEG.0b013e328332f83f>.
- van Mol, M. M., Kompanje, E. J., Benoit, D. D., Bakker, J., & Nijkamp, M. D. (2015). The Prevalence of Compassion Fatigue and Burnout among Healthcare Professionals in Intensive Care Units: A Systematic Review. *PloS one*, 10(8), e0136955. <https://doi.org/10.1371/journal.pone.0136955>.
- Van Oudenhove, L., Crowell, M. D., Drossman, D. A., Halpert, A. D., Keefer, L., Lackner, J. M., Murphy, T. B., Naliboff, B. D., & Levy, R. L. (2016). Biopsychosocial Aspects of Functional Gastrointestinal Disorders. *Gastroenterology*, S0016-5085(16)00218-3. Advance online publication. <https://doi.org/10.1053/j.gastro.2016.02.027>.
- Van Schoors M, Loeys T, Goubert L, Berghmans G, Ooms B, Lemiere J, Norga K and Verhofstadt LL (2019) Couples Dealing with Pediatric Blood Cancer: A Study on the Role of Dyadic Coping. *Front. Psychol.* 10:402. doi: 10.3389/fpsyg.2019.00402.
- van Wyk, L., Majiza, A. P., Ely, C. S. E., & Singer, L. T. (2024). Psychological distress in the neonatal intensive care unit: a meta-review. *Pediatric research*, 96(6), 1510–1518. <https://doi.org/10.1038/s41390-024-03599-1>.
- Velarde-García, J. F., Pulido-Mendoza, R., Moro-Tejedor, M. N., Cachón-Pérez, J. M., & Palacios-Ceña, D. (2016). Nursing and End-of-Life Care in the Intensive Care Unit. *Journal of Hospice & Palliative Nursing*, 18(2), 115–123. doi:10.1097/njh.0000000000000217

- Vitaliano, P. P., Russo, J., Carr, J. E., Maiuro, R. D., & Becker, J. (1985). The Ways of Coping Checklist: Revision and Psychometric Properties. *Multivariate behavioral research*, 20(1), 3–26. https://doi.org/10.1207/s15327906mbr2001_1.
- Vogel, J. P., Chawanpaiboon, S., Moller, A. B., Watananirun, K., Bonet, M., & Lumbiganon, P. (2018). The global epidemiology of preterm birth. Best practice & research. *Clinical obstetrics & gynaecology*, 52, 3–12. <https://doi.org/10.1016/j.bpobgyn.2018.04.003>.
- Ware, J. E., Jr, & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical care*, 30(6), 473–483.
- Watts T. (2012). End-of-life care pathways as tools to promote and support a good death: a critical commentary. *European journal of cancer care*, 21(1), 20–30. <https://doi.org/10.1111/j.1365-2354.2011.01301.x>.
- Weiss, D. S., & Marmar, C. R. (1997). The Impact of Event Scale-Revised. In J. P. Wilson and T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399-411). New York: The Guilford Press.
- Weißflog, G., Hönig, K., Gündel, H., Lang, D., Niederwieser, D., Döhner, H., et al. (2016). Associations between dyadic coping and supportive care needs: findings from a study with hematologic cancer patients and their partners. *Support. Care Cancer* 25, 1445–1454. doi: 10.1007/s00520-016-3541-3.
- West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural Equation Models with Nonnormal Variables: Problems and Remedies. In R. H. Hoyle (Ed.), *Structural Equation Modeling: Concepts, Issues, and Applications* (pp. 56-75). Thousand Oaks, CA: Sage Publications.
- Wickramaratne, P. J., Yangchen, T., Lepow, L., Patra, B. G., Glicksburg, B., Talati, A., Adekkanattu, P., Ryu, E., Biernacka, J. M., Charney, A., Mann, J. J., Pathak, J., Olfson, M., & Weissman, M. M. (2022). Social connectedness as a determinant of mental health: A scoping review. *PloS one*, 17(10), e0275004. <https://doi.org/10.1371/journal.pone.0275004>.
- Wigert, H., Johansson, R., Berg, M., & Hellström, A. L. (2006). Mothers' experiences of having their newborn child in a neonatal intensive care unit. *Scandinavian journal of caring sciences*, 20(1), 35–41. <https://doi.org/10.1111/j.1471-6712.2006.00377.x>.
- Winnicott, D. W. (1965) *The Maturation Processes and the Facilitating Environment: Studies in the Theory of Emotional Development*. London: The Hogarth Press and the Institute of Psycho-Analysis.

- Wittig, S. M. O., & Rodriguez, C. M. (2019). Emerging behavior problems: Bidirectional relations between maternal and paternal parenting styles with infant temperament. *Developmental psychology*, 55(6), 1199–1210. <https://doi.org/10.1037/dev0000707>.
- World Health Organization (2020). Standards for improving the quality of care for small and sick newborns in health facilities.
- Xiao, Q., Cooke, F.L. & Chen, L. (2022). Nurses' well-being and implications for human resource management: A systematic literature review. *Int. J. Manag. Rev.* 24, 599–624. <https://doi.org/10.1111/ijmr.12295>.
- Yang, M.H. & Mcilpatrick, S. (2001). Intensive care nurses' experiences of caring for dying patients: A phenomenological study. *Int. J. Palliat. Nurs.* 7, 435–441. <https://doi.org/10.12968/ijpn.2001.7.9.9302>.
- Yeom, J. S., Kim, R. B., Cho, J. Y., Park, J. S., Park, E. S., Seo, J. H., Lim, J. Y., & Woo, H. O. (2023). Parenting stress and interactive engagement behaviors in children with developmental delay. *Clinical and experimental pediatrics*, 66(6), 252–261. <https://doi.org/10.3345/cep.2023.00101>.
- Yesuf, S. M., Derseh, B. T., Girma, D., & Dejene, T. M. (2022). Work-related stress and associated factors among health professionals in zone 1, Afar region, Ethiopia. *Heliyon*, 8(12), e12167. <https://doi.org/10.1016/j.heliyon.2022.e12167>.
- Younge, T., Jacobs, M., Tuchman, L., Streisand, R., Soghier, L., & Fratantoni, K. (2023). Sociodemographic risk factors, parental stress, and social support in the neonatal intensive care unit. *Archives of disease in childhood. Fetal and neonatal edition*, 108(2), 165–169. <https://doi.org/10.1136/archdischild-2022-324119>.
- Yu, W. C., Chiang, M. C., Lin, K. C., Chang, C. C., Lin, K. H., & Chen, C. W. (2022). Effects of maternal voice on pain and mother-Infant bonding in premature infants in Taiwan: A randomized controlled trial. *Journal of pediatric nursing*, 63, e136–e142. <https://doi.org/10.1016/j.pedn.2021.09.022>.
- Yu, Y., & Sherman, K. A. (2015). Communication avoidance, coping and psychological distress of women with breast cancer. *Journal of behavioral medicine*, 38(3), 565–577. <https://doi.org/10.1007/s10865-015-9636-3>.

- Zafirir Priel, A., Possick, C., & Even-Zohar, A. (2022). Boundary issues in the experience of grandparenting a preterm grandchild. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*, 71(4), 1817–1833. <https://doi.org/10.1111/fare.12687>.
- Zamani, M., Alizadeh-Tabari, S., & Zamani, V. (2019). Systematic review with meta-analysis: the prevalence of anxiety and depression in patients with irritable bowel syndrome. *Alimentary pharmacology & therapeutics*, 50(2), 132–143. <https://doi.org/10.1111/apt.15325>.
- Zeitlin, J., Alexander, S., Barros, H., Blondel, B., Delnord, M., Durox, M., Gissler, M., Hindori-Mohangoo, A. D., Hocquette, A., Szamotulska, K., Macfarlane, A., & Euro-Peristat Scientific Committee (2019). Perinatal health monitoring through a European lens: eight lessons from the Euro-Peristat report on 2015 births. *BJOG: an international journal of obstetrics and gynaecology*, 126(13), 1518–1522. <https://doi.org/10.1111/1471-0528.15857>.
- Zhang, P., Li, S., Li, Y., Zhang, B., Liang, F., Li, J., & Zhang, H. (2024). Survey of role stress among specialty nurses working in tertiary general hospitals across China: a cross-sectional descriptive study. *BMC psychiatry*, 24(1), 589. <https://doi.org/10.1186/s12888-024-06042-1>.
- Zhang, Y., Lei, S., & Yang, F. (2024). Incidence of effort-reward imbalance among nurses: a systematic review and meta-analysis. *Frontiers in psychology*, 15, 1425445. <https://doi.org/10.3389/fpsyg.2024.1425445>.
- Zhang, Z., Gao, M., Fang, Z., Chen, X., Shen, Q., & Gao, Y. (2024). The Coping Strategies and Cumulative Changes in Intensive Care Unit Nurses after Experiencing Professional Grief: A Hermeneutic Phenomenological Study. *Journal of nursing management*, 2024, 3682609. <https://doi.org/10.1155/2024/3682609>.
- Zhao, T., Yan, H., Wang, H. & Guo, M. (2024). The chain mediating role of negative emotions at work and meaning in life between interpersonal conflict at work and depressive symptoms among nurses: A multicenter cross-sectional study. *BMC Nursing* 23, 598. <https://doi.org/10.1186/s12912-024-02276-2>.
- Zięba, M., Wiecheć, K., Wójcik, N. E., & Zięba, M. J. (2022). Prioritizing Positivity, Styles of Rumination, Coping Strategies, and Posttraumatic Growth: Examining Their Patterns and Correlations in a Prospective Study. *Frontiers in psychology*, 13, 842979. <https://doi.org/10.3389/fpsyg.2022.842979>.

- Zimet, G. D., Powell, S. S., Farley, G. K., Werkman, S., & Berkoff, K. A. (1990). Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. *Journal of personality assessment*, 55(3-4), 610–617. <https://doi.org/10.1080/00223891.1990.9674095>.
- Zung W. W. (1965). A self-rating depression scale. *Archives of general psychiatry*, 12, 63–70. <https://doi.org/10.1001/archpsyc.1965.01720310065008>.
- Zung W. W. (1971). A rating instrument for anxiety disorders. *Psychosomatics*, 12(6), 371–379. [https://doi.org/10.1016/S0033-3182\(71\)71479-0](https://doi.org/10.1016/S0033-3182(71)71479-0).
- Zurlo, M. C., Cattaneo Della Volta, M. F., & Vallone, F. (2020). Infertility-Related Stress and Psychological Health Outcomes in Infertile Couples Undergoing Medical Treatments: Testing a Multi-dimensional Model. *Journal of clinical psychology in medical settings*, 27(4), 662–676. <https://doi.org/10.1007/s10880-019-09653-z>.
- Zurlo, M. C., Vallone, F., & Smith, A. P. (2018). Effects of Individual Differences and Job Characteristics on the Psychological Health of Italian Nurses. *Europe's journal of psychology*, 14(1), 159–175. <https://doi.org/10.5964/ejop.v14i1.1478>.
- Zurlo, M. C., Vallone, F., & Smith, A. P. (2020). Work-family conflict and psychophysical health conditions of nurses: Gender differences and moderating variables. *Japan journal of nursing science: JJNS*, 17(3), e12324. <https://doi.org/10.1111/jjns.12324>.
- Zurlo, M.C., Pes, D. & Siegrist, J. (2010). Validity and reliability of the effort-reward imbalance questionnaire in a sample of 673 Italian teachers. *Int. Arch. Occup. Environ. Health* 83, 665–674. <https://doi.org/10.1007/s00420-010-0512>.

Abbreviations

BI	Body Image
BP	Bodily Pain
CNS	Central Nervous System
DY	Dysphoria
ELBW	Extremely Low Birthweight
ENS	Enteric Nervous System
FA	Food Avoidance
FB	Financial Burden
FGD	Functional Gastrointestinal Disorder
GA	Gestational Age
GBID	Gut-Brain Interaction Disorders
GH	General Health
HW	Health Worry
LBW	Low Birthweight
IBS	Irritable Bowel Syndrome
IBS- QoL	Irritable Bowel Syndrome-Related Quality of Life
IBS-SSS	IBS-Symptom Severity
ICU	Intensive Care Unit
IES-R	Impact of Event Scale- Revised
IN	Interference with Activity
MCS	Mental Component Summary
MH	Mental Health
NICU	Neonatal Intensive Care Unit
OSL	Overall Stress Level

PCS	Physical Component Summary
PF	Physical Functioning
PSS:NICU	Parental Stressor Scale: Neonatal Intensive Care Unit
PTSD	Post Traumatic Stress Disorder
QoL	Quality of Life
RE	Role Emotional
RL	Relationship
RP	Role Physical
SAS	Self-rating Anxiety Scale
SDS	Self-rating Depression Scale
SF	Social Functioning
SF-36	Short Form Health Survey-36
SOL	Stress Occurrence Level
SX	Sexual well-being
SR	Social Reaction
VLBW	Very Low Birthweight
VT	Vitality

Appendix

Table 1A. Psychophysical health mean comparisons among Neonatal ward parents and NICU after birth.

	NICU (N=103)	Neonatal ward (N=55)	<i>p</i>	<i>Cohen's D</i>
Somatization	.903	.636	0.022	-0.341
Depression	.981	.696	0.017	-0.356
Anxiety	.900	.591	0.007	-0.418

Independent sample t-test.

Table 2A. Psychophysical health mean comparisons among Neonatal ward parents and NICU six months after birth.

	NICU (N=28)	Neonatal ward (N=13)	<i>p</i>	<i>Cohen's D</i>
Somatization	.845	1.019	0.559	0.197
Depression	1.098	.988	0.697	-0.125
Anxiety	.811	.677	0.616	-0.167

Independent sample t-test.

Table 3A. Correlation analysis between the study variables of parents of NICU infants.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 Gender	-																							
2 Age	.170	-																						
3 Education	-.091	.204*	-																					
3 Employment	.382**	.229*	.324**	-																				
4 Previous Pregnancy loss	-.008	.223*	-.061	.035	-																			
<i>Individual Coping Strategies</i>																								
5 Seeking Social Support	-.171	-.093	-.053	-.157	-.053	-																		
6 Avoidance	-.097	-.115	-.101	-.152	-.006	.238*	-																	
7 Positive Attitude	-.035	-.015	-.079	-.014	-.100	.197*	.110	-																
8 Problem Solving	-.004	.125	-.075	-.055	.267**	.267**	-.062	.444**	-															
9 Turning to Religion	-.256**	-.140	.018	-.107	.127	.127	-.034	.025	-.069	-														
<i>Dyadic Coping Strategies</i>																								
10 Stress communication-SP	-.308*	-.089	.165	.138	-.134	.362**	.024	.037	.244*	.247*	-													
11 Stress communication-OP	.113	-.129	.006	.103	-.019	.017	.097	.260**	.113	.060	.243*	-												
12 Emotion-focused-SP	-.051	-.203*	-.183	-.074	-.234*	.027	.050	.303**	.168	.201*	.189	.382**	-											
13 Emotion-focused-OP	.013	-.041	-.009	-.072	-.244*	.041	-.034	.268**	.190	.156	.252*	.305*	.577**	-										
14 Problem-focused-SP	-.086	-.089	-.062	-.111	-.270**	.170	.026	.333*	.288*	.257**	.362**	.380**	.616**	.554**	-									
15 Problem-focused-OP	-.150	-.157	-.115	-.073	-.166	.139	-.018	.202*	.165	.310**	.253**	.202*	.532**	.667**	.452**	-								
16 Delegate-SP	-.048	.278*	.075	-.012	.031	.009	.000	.170	.220*	.156	.159	.480**	.508**	.374**	.448**	.344**	-							
17 Delegate-OP	-.193	.007	.030	-.197*	-.136	.098	.021	.186	.166	.214*	.394**	.157	.442**	.559**	.470**	.593**	.452**	-						
18 Negative-SP	-.164	-.145	-.072	-.021	-.134	-.095	-.288**	-.005	.005	.261**	.274**	.148	.318**	.294**	.156	.327**	.214*	.237*	-					
19 Negative-OP	-.164	-.088	-.183	-.085	-.023	.013	-.253**	.243*	.049	.201*	.122	.275**	.351**	.597**	.378**	.453**	.213*	.376**	-					
20 Common DC	-.047	-.153	-.105	-.175	.160	.014	.306**	.215*	.175	.343**	.301**	.449**	.475**	.488**	.558**	.468**	.543**	.287**	.209*	-				
<i>Stress and Psychophysical health</i>																								
21 NICU-related Stress	-.083	-.219*	-.005	.035	.061	.160	.196*	.088	.002	.180	.052	.158	.049	-.034	.033	.013	.099	-.048	.014	-.123	-			
22 Anxiety	-.186	.069	.019	-.064	.053	.277**	.394**	-.113	.015	.033	.445	-.100	-.113	-.175	-.103	-.118	-.076	-.196*	-.226*	-.347**	.414**	-		
23 Depression	-.291**	.106	.067	-.125	.021	.276**	.436**	-.097	.018	-.021	.081	-.054	-.116	-.134	-.074	-.176	-.057	-.181	-.215*	-.268**	.283**	.879**	-	
24 Somatization	-.258**	-.028	.027	-.186	-.025	.264**	.356**	-.038	.062	.165	.145	-.059	.011	-.085	.019	-.003	-.020	.026	-.084	-.157	.329**	.749**	.760**	-

Table 4A. Inter-correlations between study variables according to the working unit (ICU and NICU).

NICU ICU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stressors in Nursing																		
1. Death and Dying	1	.60**	.59**	.34	.48*	.65**	.66**	.42*	.15	-.33	-.32	-.24	.05	.07	.32	-.02	-.03	.30
2. Conflicts with Physicians	.86**	1	.66**	.76**	.65**	.81**	.56**	.42*	.60**	-.38*	-.26	-.43*	.07	.17	.41*	.24	.32	.59**
3. Patients and Families	.80**	.81**	1	.60**	.64**	.70**	.24	.55**	.61**	-.27	-.06	-.30	.20	.06	.26	.01	.15	.26
4. Conflicts with Peers	.66**	.68**	.48**	1	.75**	.70**	.31	.37	.80**	-.46*	-.09	-.48*	.34	.33	.42*	.37	.35	.60**
5. Conflicts with Supervisors	.72**	.56**	.67**	.40*	1	.79**	.26	.42*	.83**	-.24	-.09	-.55**	.22	.23	.33	.33	.22	.36
6. Uncertainty concerning treatment	.90**	.89**	.79**	.68**	.53**	1	.52**	.44*	.66**	-.41*	-.13	-.40*	.19	.29	.39*	.21	.24	.44*
7. Inadequate emotional preparation	.76**	.80**	.69**	.73**	.36*	.78**	1	-.05	.10	-.37	-.40*	-.16	-.01	.07	.14	.09	.07	.37
8. Discrimination	.44**	.45**	.27	.36*	.38*	.39*	.25	1	.26	.09	.28	-.25	-.34	.46*	.40*	-.01	.18	.16
9. Workload	.78**	.74**	.82**	.68**	.78**	.65**	.64**	.36*	1	-.28	-.02	-.56**	.26	.16	.31	.41*	.37	.48*
Work Resources																		
10. Job Control	-.15	-.09	.06	-.31	-.11	-.06	-.18	-.27	-.29	1	.29	.39*	-.08	-.13	-.43*	-.30	-.22	-.41*
11. Social support	.02	.03	-.06	-.10	.13	-.10	-.14	-.12	.06	.29	1	.24	.43*	.04	-.19	-.30	.10	-.42*
12. Rewards	-.11	-.10	-.13	-.12	-.34*	-.08	-.09	-.34*	-.21	.20	.41*	1	-.14	-.15	-.54**	-.49**	-.54**	-.65**
Coping Strategies																		
13. Problem-focused	-.02	-.17	-.04	-.01	.15	-.02	-.13	-.06	-.07	.15	-.24	-.41*	1	.51**	.31	.07	.04	.11
14. Seek Advice	.04	.00	-.00	.15	.01	.05	.08	-.09	.01	.00	-.11	-.19	.61**	1	.36	.41*	.14	.27
15. Self-Blame	.22	.23	.19	.16	.21	.30	.17	.11	.18	-.17	-.18	-.32	.17	.28	1	.56**	.52**	.53**
16. Wishful Thinking	.38*	.37*	.26	.35*	.34*	.31	.32	.24	.43*	-.36*	-.03	-.26	.12	.53**	.49**	1	.56**	.46*
17. Escape/Avoidance	.38*	.39*	.25	.34*	.27	.37*	.47**	.09	.31	-.17	.03	-.26	.10	.35*	.72**	.33	1	.33
Psychological Disease																		
18. Global Severity Index	.36*	.29	.26	.32	.42*	.28	.27	.33	.43**	-.32	-.14	-.34*	.19	.40*	.56**	.55**	.62**	1

Note. * $p < 0.05$; ** $p < 0.01$