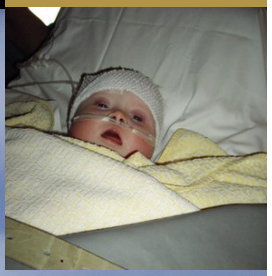
Learning the ropes

Origins, counterbalances, and consequences for learning of stress among pediatric residents

Ids Dijkstra

UMCG, Beatrix Kinderziekenhuis
Rijksuniversiteit Groningen,
Human Resource Management



Groningen, augustus 2010

Studentenbureau UMCG

Universitair Medisch Centrum Groningen

Learning the ropes

Origins, counterbalances, and consequences for learning of stress among pediatric residents

Groningen, augustus 2010

Auteur	Ids Dijkstra
Studentnummer	1271202
Afstudeerscriptie in het kader van	Human Resource Management Faculteit Economie en Bedrijfskunde RUG
Opdrachtgever	dr. G. Koppelman Beatrix Kinderziekenhuis, UMCG
Begeleiders	dr. P.H. van der Meer Human Resource Management, RUG
Begeleider UMCG	dr. J. Pols Studentenbureau UMCG

ISBN 978-90-8827-082-6
NUR 774 Organisatie Psychologie
Trefw stress, AIOS, leren

Omslag: Wenckebach Instituut, Universitair Medisch Centrum Groningen

Preface

This thesis forms the concluding piece of my master Human Resource Management at the Rijksuniversiteit Groningen. Moreover it signals the end of a long but enjoying time as a student.
When I was first informed by the objective to study the relation of stress and learning abilities among pediatric residents I initially thought it was a quite straightforward topic. Yet in reality it appeared to be a very fuzzy and intertwined subject. Hence hours and hours were spend thinking without apparent progress. Only after I started interviewing things started to get clearer. Eventually it has lead to a result with which I am quite satisfied.
But as with much in life, I could not have done it alone. Special acknowledgment goes to my supervisor at the ontwikkelplatform, Jan Pols, who was able to withstand my torrent of ideas, gave clear guidance and very helpful comments. Furthermore I want to thank originator Gerard Koppelman for his devoted support and above all for developing an interesting and challenging research topic. Obviously special thanks goes to Peter van der Meer, supervisor from university, for awarding my thesis with a pleasant grade. Furthermore I want to thank the residents I interviewed for arranging valuable time to deliver me most indispensable data. And last but not least I want to thank family and friends for supporting me. In the end, every new beginning comes from some other beginnings end.

Table of content

Abstract

Pediatric residents are frequently found to score high on burnout measures. Though many models are developed to explain stress, most are too general to apply to specific situations. Hence present research used 7 semi-structured interviews to examine the sources of stress among pediatric residents. This has ultimately led to five main categories of demand: content demand, organizational demand, emotional demand, personal demand and general demand. Yet apart from demands, five categories of resources were found to counterbalance stress: skills, job control, social supports, personal characteristics and general resources. The present study furthermore aimed to explore the relation between stress and learning Residents are primarily supposed to develop medical knowledge and skills, which is however difficult to achieve in the stressful situation of residency. Several explanations are given. The differentiation between challenge stress and hindrance stress and the balance between effort and reward appeared to be important links to unravel why some demanding situations lead to motivation while others lead to frustration. A final line of research investigated the route from novice to expert. Do novices devote their attention to different things than experienced residents and are competences developed in a hierarchical order. Novices were in contrast to experienced residents found to spend most of their time at learning to organize and communicate, leaving little time to develop medical knowledge and skills. Ultimately the results are discussed. The report ends with practical implications and suggestions for further research.

1 Introduction

Employees report a growing feeling of stress resulting from their job (European Foundation for the improvement of Living and Working Conditions, 2004). According to a survey of Blatter, Houtman, van den Bosche, Kaan & van den Heuvel (2005), approximately 4% of the Dutch labor force in 2005 has taken a sick leave as a result of psychosocial strain, while .75 % has been absent for more than 13 weeks. According to the same survey the costs of work related stress and burnout in the Netherlands amounted to 6.1 billion euro in 2005. This was equal to 1% of the GDP and similar to the costs related to the consequences of traffic accidents. Research in the last decade shows that burnout is growing as a serious health threat for medical professionals (Fothergill, Edwards, & Burnard, 2004; McManus, Winder, & Gordon, 2002). Stress levels moreover appear to be particularly high among medical residents. In their review, Prins et al. (2007a) reported that the prevalence rate of at least moderately burned-out medical residents varied between 17.6 % to as high as 82%.

During residency a stoic work ethic is generally part of a dominant culture where personal needs are of secondary importance relative to that of patients, superiors and organization (Willcock, Daly, Tennant & Allard, 2004). It is a period of enormous change, both personal as well as professional. Residents furthermore face many new experiences which challenge their adaptive capacity and have to withstand considerable responsibilities. Moreover new task are to be performed and learned upon and new colleagues, superiors and demanding patients have to be dealt with. In some specialisms it is furthermore a period where till then relatively unfamiliar confrontations with issues of life and death are part of the job.

Although there is a wealth of scientific information and knowledge about (occupational) stress and burnout, the models that explain stress are general by nature and not specific to any given situation. Studies on stress among medical residents are furthermore for the greater part incomparable since medical systems and medical education differ between countries. Stress among residents in the United States of America may for example for the greater part be caused by long shifts and a lack of sleep, while stress among Dutch residents could mainly be originated in insurmountable piles of administrative and bureaucratic workload. Moreover there are cultural differences which influence the way work is experienced, since demands of patients, supervisors and colleagues vary across locations. Finally also differences between specialties stonewall generalization across studies. The work of a radiologist has different challenges than the work of a pediatrician or an orthopedic surgeon. For a thorough understanding of the specific circumstances of any occupation, tailor made research is indispensable. Against the background of these thoughts, present research is focused at disentangling the specific situation of pediatric residents at the University Medical Center Groningen. The first aim of this study is to provide a coherent picture of all relevant stressors inherent to pediatric residency.

Apart from being perceived as stressful, work contains rewarding or supportive elements which work as counter-pressures against the pressures of work. Therefore the second aim of this study is to provide an overview of the counter-pressures which help residents to withstand the demands of their occupation. Why do some people experience stress while others do not?

Residents are primarily expected to learn from experience. The effectiveness of learning may however be negatively influenced by stress. A multitude of new experiences likely causes high cognitive loads and hence leaves little time to contemplate at the expense of optimal learning. Although the main focus lies at the sources and balances of stress, the third line of present research aims at exploring the relation between stress and learning among pediatric residents. Examined is why stress in some situations leads to learning and in other situations to mere exhaustion. Other topics are the aspects of the job that impede learning and the hierarchical development of competences. Do novices devote their attention to other things than experienced residents do?

2 Theory

2.1 Stress

2.1.1 Stress and burnout

Supposedly the chemical reactions of the stress response were originally meant to equip the human body to fight or flight by increasing blood pressure, metabolism rate and the production of cholesterol and adrenaline. Stress is therefore a state where individual's resources are exceeded (Lazarus & Folkman, 1984). In modern day society it is not as necessary to fight of flee as it was earlier in human evolution. The disruptions of everyday life still trigger the stress response cycle that was once necessary for survival, but the human body could not keep track with the rapid development of society. High stress levels are thus functional for a short period of time, on the long term however, prolonged exposure to excessive stress may cause burnout, a condition which eventually makes it temporarily impossible to work (Patel, 2008). Symptoms of burnout are emotional exhaustion, reduced personal accomplishment and depersonalization. Emotional exhaustion is about feelings of being overextended and depleted of one's resources. Reduced personal accomplishment is a decline in feeling competent in one's profession and accepting responsibility. Depersonalization refers to a negative, cynical and detached response to other people including patients and colleagues. Which in medical settings is an emotional separation from the patient's needs (Maslach, Jackson & Leiter, 1996; Pöhlmann, Jonas & Harzer, 2005).

2.1.2 Stress outcomes

The consequences of stress and burnout can be considerable for both the individual (patient as well as professional) and the organization. It affects the level of performance and the quality of interventions (Edwards, Burnard, Coyle, Fothergill & Hannigan, 2000b; Shanafelt, Bradley, Wipf & Black, 2002). The burden of burnout is not restricted to the person self, but may affect colleagues too, since remaining employees are saddled up with extra responsibilities and patient load when more personnel is unable to work (Tyssen, Vaglum, Gronvold & Ekeberg 2000). Furthermore, excessive occupational stress may transfer to the personal realm and cause a range of complaints like depression, substance abuse, sleep disturbances, reduced social initiative, gastrointestinal disorders, headaches and decreased resistance to flu (Leiter & Maslach, 2000; Blackmore et al., 2007; Jackson & Maslach, 1988). These reactions to occupational stress have been found to be correlated with multifarious job related responses including absenteeism, turnover, and low organizational commitment (Vahey, Aiken, Sloane, Clarke & Vargas, 2004; Maslach & Leiter, 2008).

2.1.3 Stress-models and stressors

The quest to explain stress and burnout has resulted in several useful models, identifying a wide range of potential stressors. According to Yerkes and Dodson (1908) stress increases arousal. Arousal increases performance to some point, after which there will be over arousal, stress and thus decreasing performance. This suggests an inverted-U relationship with optimal performance on both ends of the stress-continuum. Although appealing, this theory has not received much empirical support (Teigen, 1994). Nor has an extension of the same rationale to the relationship between job demand and stress been confirmed, in which low and high levels of job demand were believed to lead to the highest levels of stress. Probably because work demands are generally just found at the high end of the continuum it is difficult to investigate the full range of the relation (Holman & Wall, 2002).
Examples of other models are the Michigan-model (Kahn, Wolff, Quinn, Snoek & Rosenthal, 1964), the effort-reward imbalance theory (Siegrist, 1996), the model for Work, Stress, and Health (Kompier & Marcellissen, 1990), the Conservation of Resources theory (Hobfoll & Freedy, 1993) and the Demand-Control-Support model (Karasek & Theorell, 1990; Houkes, Janssen de Jonge & Nijhuis, 2001). A theory that for the greater part integrates the concepts of

these theories is the Job-Demands-Resources (JD-R) model (Demerouti, Bakker, Nachreiner & Schaufeli, 2001).
Central to the JD-R-model is the idea that although every occupation has its own unique composition of characteristics making it more or less stressful, these factors can be classified in two outlining categories; job demands and job resources. This makes the model suitable for applying it do different contexts, regardless of their specific situation.
Job demands refer to those characteristics of the job that potentially cause strain. More precise it is about those psychological, social or organizational factors of the job that require enduring physical or mental energy and are therefore associated with physical or mental costs (Bakker, Demerouti & Verbeke, 2004; Bakker, Hakanen, Demerouti & Xanthopoulou, 2007). Examples of general job demands are emotional overload, role conflicts and long working hours. (Edwards et al. 2000a; Prins et al., 2007a; Halbesleben & Buckley, 2004; Ogínska-Bulik, 2006). The work of Eckleberry-Hunt et al. (2009) shows however that the list of job specific stressors may accumulate to forthwith indefinite. In their study 395 American residents of 13 specialties completed a questionnaire. 27 Predictors were significantly associated with at least one burnout factor. Examples of these predictors are: Lack of recognition, excessive paperwork, poor relationships with colleagues, complicated patients, bad alcohol or drug habits and conflicting responsibilities between home, family and work.
Job resources on the other hand refer to the physical, psychological, social or organizational aspects of the job that help employees to achieve their goals, counterbalance job demands and their associated mental and physical costs and stimulate personal growth and development (Bakker et al., 2004). Resources are thus not only functional in coping with demands but they are important in their own right because resourceful work strengthens the motivation to dedicate energy and abilities to the task (Meijman & Mulder, 1998). According to the Conservation of Resources theory people invest their resources to deal with threatening challenges en prevent negative outcomes. People not only aim to protect their resources, they also strive to stack them. Resources in a sense tend to create new resources resulting in a positive spiral with better coping and well-being (Hobfoll, 1989).
Resources can be located at different levels. Examples of organizational resources are job control, task variety and career opportunities. Social resources however are about the support received by superiors, coworkers, customers and family. Support from colleagues can be instrumental in getting the work done in time, thus reducing workload or psychological, confining emotional strain. Support from supervisors can for example be helpful to receive guidance and feedback, consequently reducing uncertainty.
Originally personal resources were left out of the JD-R model since they are harder to change than resources embedded in the organization. Nevertheless individual and personality factors have been found to influence susceptibility to stress and burnout. Why do some people experience stress and others in the same occupation and environment do not? People who have an external locus of control tend to attribute events or achievements to chance or others rather than to their own ability. People with an external locus of control will consequently experience a reduced feeling of accomplishment relative to people with an internal locus of control. This finding is coherent with the established relationship between coping styles and burnout. People who cope with stressful events in a proactive and confronting way experience relative low levels of burnout, while people who react to stressful events in a passive and defensive manner have a higher chance of becoming burned out (Rowe, 1997). Van Yperen & Snijders (2000) showed that self-efficacy moderates the relation between job demands en psychological well being. Furthermore Luthans, Avey, Avolio, Norman & Combs (2006) found that resourceful work activates employees' psychological well-being (e.g., optimism, hope and efficacy). This finding implies that resourceful work stimulates psychological well-being through personal resources resulting in positive outcomes for employee and organization. Personal resources are however not only stimulated by resourceful work, they also determine the way people perceive their work and how they react to it (Judge, Bono & Locke, 2000; Xanthopoulou, Bakker, Demerouti & Schaufeli, 2007).

It seems thereafter that personal resources play a key role in employee well-being.
Though the various stress related studies altogether give a voluminous description of possible sources of stress and its processes, the picture still remains very fragmented and above all quite static Moreover, Prins et al. (2007b), Thomas (2004) and Ekleberry-Hunt et al. (2009) conclude that a theoretical framework is missing that links all potential stressors (occupational, personal, physical and social) to burnout and stress among medical residents. It seems that the overarching concepts of popular theories like the JD-R model are to broad to apply to specific situations, while more focused approaches like the study of Ekleberry-Hunt et al. (2009) are to specific to generalize across occupations. None of the models or studies thus specifically illustrate what happens to people when they enter their pediatric residency. Consequently there is a need for a more in-depth approach to draw a vivid picture of the origins and counter-pressures of stress among pediatric residents. In order to achieve this, sub-questions are formulated:

– Which aspects of the job are perceived as stressful?
– Which aspects of the job counterbalance the experience of stress?

2.2 Learning

2.2.1 Stress and learning

Stress negatively influences maze learning of both animals and humans (Freedman, 1966). Therefore it intuitively sounds convincing that stress negatively influences on the job learning too. Surprisingly however the relationship between stress and learning in occupational settings has derived relatively little attention with above all ambiguous results. Proof for the expected connection between stress and learning originates mainly from fields other than work psychology. Two important dimensions of stress are anxiety and depression. Anxiety for example reduces the effectiveness of information processing, inhibits experimentation with new ideas and has a negative relationship with course grades, test scores, extent of declarative knowledge and skill acquisition (Eysenck & Calco, 1992; Warr & Downing, 2000; Entwistle & Ramsden, 1981; Martocchio, 1994; Colquitt, LePine & Noe, 2000 in Holman & Wall, 2002). Depression on the other hand is associated with the avoidance of challenges, reduced skill development and lower self-efficacy (Frese & Stewart, 1984; Poulton, 1971; Bandura, 1997).
Though there is a great deal of research devoted to both learning and stress, intentions to integrate both concepts in a theoretical framework are scarce (LePine, LePine & Jackson, 2004). The most prominent model in this respect is the Demand-Control-model (Karasek, 1979). At the heart of the model lies the assumption that the psychological work environment can be described by a combination of the demands of the job and the size of control one has to deal with these demands independently within the job. The model is build around two hypotheses, the strain hypothesis and the active learning hypothesis. Strain occurs in 'high strain' jobs when job demands are high while job control is low, because individuals cannot respond adequately to situational demands. Learning will occur in 'active' jobs when both control and demands are high. These jobs bring a challenge which employees are able to cope with. This consequently leads to the development of skills and increased competence. The resulting feelings of mastery and self-efficacy moreover reduce perceptions of stress (Karasek & Theorell, 1990). In low demand/low control or 'passive' jobs, employees experience low levels of strain since demands are low. Passive jobs are assumed to offer little opportunity for learning. 'Low strain' jobs with low demands and high control are expected to lead to low levels of strain as a result of the low demands but lead to moderate levels of learning, because employees can explore different ways of dealing with job demand (Taris, Kompier, de Lange, Schaufeli & Schreurs, 2003).
While however the strain hypothesis has received widespread attention and has repeatedly been confirmed, little research has tested the learning predictions of the demand-control-model. Taris & Kompier (2004) reviewed studies on the active learning hypothesis. In 18 of the found studies, 30 hypotheses were tested. 19 Tests supported the suspected relations between demand, control and learning. In the remaining 11 tests a positive relation was found be-

tween control and learning, but were demands found to be irrelevant. Control thus seems to be the most important factor of learning. There are however some remarks to be made. The first problem is the validity of the outcome variable. Variables used to conceptualize learning differ considerably (Weststar, 2009). Some have focused at learning measuring skill utilization (Holman & Wall, 2002), others used outcomes such as efficacy and mastery (Parker & Sprigg, 1999) or learning measures specific to the occupation (Kwakman, 2001). It is therefore questionable whether the full domain of work based learning has been captured. Putting aside this limitation, the relation between work characteristics and learning seems reasonably well understood. Stress and learning are however mostly considered as different outcomes of the same predictors. After all the fact that some combinations of demand and control lead to stress and other combinations to learning does not tell much about how stress influences learning. The work of LePine et al. (2004) might be an important stepping stone to a better understanding of the relation between stress and learning. As mentioned before, findings on the relation between stress and performance are not equivocal. Negative relations between stress and performance have been associated with role conflict, role ambiguity and hassles. Yet positive relations between stress and performance have occasionally been connected to the level of task related demand or workload (Spector & Miles, 2001; Jex, 1998; Sargent & Terry, 2000; Villanova, 1996 in LePine et al., 2004). This has led researchers to suppose a differentiation between challenge stress and hindrance stress. According to LePine et al. (2004) Challenge stress poses a positive threat. People are motivated to master and learn from this challenge because the situation is perceived as changeable. Hindrance stress on the other hand is about situations perceived as insurmountable, negative and stable. People are thus less motivated to act and inclined to cope cognitively resulting in exhaustion and cynism. Learners who experience stress with ambiguous expectations in the learning environment may distance themselves from the situation because they believe that effort aimed at meeting the expectations will have low utility (LePine et al., 2004)."

In the end very few studies examined the relation between stress and learning. Taris, Kompier & Wielenga-Meijer (2006) conclude that, in spite of ambiguous findings, stress and learning are connected, but for the present the precise dynamic remains unclear. As a result the following research question is formulated:

– How does stress among pediatric residents influence learning?

2.2.2 Development of generic professional competence

Transitions to new occupations are frequently accompanied by stress. Therefore medical residents at the beginning of their career are at the highest risk for burnout (Prins et al., 2007). Beginners are confronted with discrepancies between theory and practice, which Boshuizen (1996) illustrative calls "the shock of practice." Although residents possess much medical knowledge, acceptance of the outcome of professional decisions is something that can only be learned from practice. Another explanation might be the discrepancies between their expectancies and reality.
Above all it seems however that the start of residency is characterized by tremendous cognitive loads. Residents not only have to master new tasks, they also have to get familiar with organizational values, norms, expectations, responsibilities and reality.
The confrontation with large amounts of new information and situations poses a heavy load on the cognitive system. According to the cognitive load theory (Sweller, 1988) the human working memory has only limited capacity. In order to do multiple cognitive calculations at once, tasks or thoughts have to be automated first by being transferred from working memory to the long-term procedural memory. To avoid cognitive overload residents thus have to make (un)conscious choices of attention between many new situations and stimuli.
In their study on the role of information acquisition in reducing uncertainty among newcomers, Ostroff & Kozlowski (1992) found that newcomers, in contrast to experienced members, focus their attention at information about their group first above respectively information about task and organization. This finding suggests that newcomers shift their focus to the source that appears to be of greatest sig-

nificance. Seemingly some aspects of the job may receive little attention until relatively more important aspects have become familiar. Boshuizen (1996) furthermore established a dip in medical knowledge of medical students at the transition from theory to practice. Though explanations are given concerning the integration of cognitive concepts and protocols, the role of excessive cognitive load may be significant. The newness of the clinical situation may attract their attention and hence cognitive capacity at the cost of explicit medical knowledge.

In order to deal with the various challenges of their work effectively, residents need many different skills. The work demands more than just diagnosing illnesses and installing therapy. Residents for example need to make appointments with other specialists, have to cooperate with nursing staff and deal with many tasks and demands simultaneously. Hence, besides medical knowledge, supportive skills like communication, planning and time-management are of great importance. Onstenk (1997) coined the term *generic professional competence*[1] to describe the interplay between supportive and job specific core competencies. The work of Onstenk has been used as a starting point by ACOA[2] (1999) to divide competencies among four overarching categories: professional and methodic competences, managerial-organizational and strategic competences, social-communicative and normative competences and finally learning and shaping competences. The development of these competencies may however not always go without a struggle. For example novice car drivers first devote their attention to throttle, brake and clutch before shifting their attention to traffic rules and unforeseen pedestrians. Extending the same rationale to residents makes it reasonable that residents have to learn the ropes of pediatric profession in a certain order and commute between competencies accordingly. To reduce stress among newcomers it is very helpful to know in which order competences are generally acquired. A better understanding may aid introduction, training and support. This leads to a final research question:

– Which competences receive most attention at the start and how does it change during residency?

[1] Free translation of the Dutch term 'brede vakbekwaamheid
[2] Dutch advise commission for education and labor market

3 Method

3.1 Design

The main research question is aimed at disentangling the demands, resources and influences of stress on learning among pediatric residents. The goal was to describe a very specific situation. No quantitative measures were found to be specifically suited to answer the research questions with respect to the destined population. Hence qualitative research was best suitable to examine, explore and vividly display experiences, emotions and thoughts of pediatric residents without being restricted to predestinated constructs and opinions. Semi-structured interviews enabled residents to freely talk about their own experiences and pone new ideas and directions without impeding development of key research topics.

3.2 Respondents

Respondents were first approached and presented by the head of post graduate pediatric training. Subsequently respondents were further informed about the background, goal and procedures of present research and guaranteed of absolute anonymity. Only one of the approached residents has not been interviewed since it appeared impossible to make an appointment. Eventually 7 respondents have been interviewed during one hour at average.
Theoretical sampling was used to cover all possible sources of variance in experience. Therefore four residents were senior and at the fourth or fifth year of residency. Three residents were in the first year. Six were women, one man. Although this seems to be a skewed sample with respect to gender, the total population of pediatric residents is predominantly formed by women. The sampled respondents were hence able to deliver a representative picture of the actual situation. Saturation was used to determine the amount of residents to be interviewed. In the sixth interview no new information emerged. To exclude coincidence, a final seventh interview was held which again gave no new information at the desired level of aggregation.

3.3 Data collection

For the interviews a protocol with starting questions and major topics was used. These topics were derived from relevant literature about work related stress and experiences of residents during their training. Along the way the protocol was further developed and refined based on previous findings. Every interview started with a question regarding the general experiences of residency. The order of topics was not fixed but dependent on information given by respondents. Yet eventually all topics were treated. Topics were: experience of stress, demands, resources, differentiation between challenge and hindrance, influences on learning and competence development.

3.4 Data analysis

All interviews were digitally recorded, transcribed verbatim and processed with the use of analytic software. The retrieved data was subsequently analyzed according to the principals of grounded theory (Strauss & Corbin, 1998). Eventually 70 codes were developed to demarcate relevant quotations. In order to guarantee inter-subjectivity, an independent researcher checked a completely coded interview. Differences in coding appeared to stem from misconceptions and ambiguities instead of different interpretations of the texts. The differences in coding were discussed until agreement was reached. After all relevant fragments were individually coded, some codes were divided into distinguishing sub codes. Most codes where furthermore grouped to other related codes, consequently leading to overarching main constructs. Based on these findings a comprehensive model of relations was drawn. The results of this method will be discussed in the next section.

4 Results

4.1 Stress

During the first interview it appeared that the term stress probably carries a negative load. To the question whether residents experienced their work as stressful, some explicitly called their job very stressful (1,2). But most respondents tended to tone their answer down (3). One respondent denied stress (4), others made remarks about the temporal characteristics of experienced stress (5,6). When the question was reframed to the experience of being very busy, answers were more equivocal. The answers moreover showed clear signs of experienced stress (6,7,8). Conclusively, not all interviewed respondents explicitly called their work stressful. Some call it stress, but most call it busy. From their answers to indirect questions it appears however that the work of a pediatric resident is very demanding in general and especially during the first period of residency (8).

1. *"It was very stressful. It was terrible; demands were put on me from many different directions. I had zero experience (…) When I had to take care of 20 patients, I was glad when I had just seen them all."*

2. *"(…) You feel responsible but you can't bear this responsibility to the full end, especially not at the start. This makes it very tough and stressful at the beginning. I really intended to quit, but I just carried on."*

3. *" Stress is of course a relative conception. When I do something for the first time, I feel a kind of stress, but I do not experience it as negative. Yet there is also stress in the sense of making long shifts and contact with people. "*

4. *"I find it hard to denominate stress, in general I go to my work with pleasure. I see my work as challenging."*

5. *"No, I do not experience residency as stressful. Sometimes it is very busy. I have certainly had some stressful times, but I find it hard to call stress. Stressful periods are mostly coupled to feelings of tiredness and co-occurring events, it has never been work alone. It was mostly the combination of things that made my brain feel overloaded."*

6. *"In my opinion it is a very demanding job in comparison to the occupations I held before. (…) I stand to the opinion that we work long hours, but it depends on who you compare with. I experience my work as enjoying but occasionally stressful."*

7. *"Of course you have feelings of being very busy. I regard work as stressful when there is no time to eat or drink, when you are rushing all day and still lose ground. If I talk to friends I notice that I have a different conception of being busy. I don't like it when I can't get everything done in time, and when I can't do everything perfectly; it is about patients after all."*

8. *´The first period was absolutely very tough. I had heard stories of colleagues who came home crying every day during the first weeks. Fortunately I did not have this experience."*

4.2 Demands

Now it has been established that residency is generally experienced as demanding, the questions turns to the causes of these experiences. Analysis of the interviews revealed that the sources of stress can be divided among several categories:, content demands, emotional demands, organizational demands personal demands and general demands. These categories will be treated separately in the following text.

4.2.1 General demands

Several demands of pediatric residency relatively general by nature. The term general demands therefore refers to demands which are not specific to the situation of pediatric residents. A key feature of the general demands of pediatric residents is **high workload**. Residents reported high levels of workload directly (9) or indirectly (10). They furthermore concordantly reported the occurrence of many simultaneous tasks to be demanding (9, 11).

9. *"Yes it is very busy. (…) You are continuously buzzed or called. It is hard to organize; you are busy with many things simultaneously. You will get a busy feeling then."*

10. *"I do know people who quitted. It was too busy for them, too much pressure, to many responsibilities.*

11. *"Especially when supervisors demanded al lot and had no time to support I thought: How do I get it all done in an hour while I'm persistently disturbed to do other tasks too."*

Another aspect of residency is the length of working days. Residents repeatedly reported to work long shifts in which overtime was rather rule than exception (12). Especially at the start of residency overtime is needed to compensate a lack of routine that seems present in later years (13). A specially demanding aspect of residency is the nightshift. Since residents are responsible for more departments than during dayshifts, long distances and more patients have to be covered (14, 15). Nightshifts are moreover coupled to higher degrees of responsibility since advice of specialists is only remotely available. The category that covers these aspects is called **temporal demands**.

12. *"In my opinion we work many hours, but it depends on who you compare with. I do make a lot of overtime, but that applies in my opinion to every resident. "*

13. *"At the start I was working till late to get everything done. Now I know which things can wait a day."*

14. *"I do feel responsible, especially during nightshifts. After nightshifts I come home more tired. You are above all busier since you are responsible for more departments and moreover covering longer distances, continuously running back and forward."*

15. *"It is tough. At some point I only lived at night for three months. It brings a different peace of mind than living by day. "*

Apart from the amount of tasks to be done and temporal considerations, the start of residency is especially characterized by many new task and experiences. The **newness of situations** causes initial delay and hence increases subjective demands (16, 17).

16. *"It is the amount of work to be done in combination with many syndromes you are insufficiently familiar with. "*

17. *"At the start of education you are confronted with many new things. You will try to do everything and be slow. Later on, you will recognize, know what will come and anticipate."*

At the start residents moreover experience **task ambiguity**. Since they are not yet aware of the extent of their tasks and duties, it is not always clear what is expected from them. The resulting confusion can be a stressor on its own. From the interviews it appears moreover that other healthcare professionals occasionally take advantage from this ambiguity. Several residents declared that nurses for example gave them orders which they eventually were not responsible for. Because fresh residents are not aware of the boundaries of responsibility and attach great importance to the fate of their patients, ambiguity about tasks consequently increases workload (18,19 and 20).

18. *"In the beginning there were moments at which I did not knew what I had to do. It is normal in a new job. If a task is at the responsibility of nurses and they are not motivated to do it, they try to shift it to me. If I do not know it is not my task, I will just do it. Everybody is busy and trying to lose some workload. Pediatricians are regarded as people who will do everything anyway. The fate of patients is of greatest importance to me. Other specialists are clearer about it."*

19. *"There are many things of which it is not described whose responsibility it is. It is a grey area. Nurses make clear that it is not their responsibility. Then we will just do it, otherwise nobody will do it and it is about patients after all. "*

20. *"In later years it occasionally happens too. There are always people who try to pass the buck.(…) Agreements are not clear about who does what."*

Residents actually fulfill two conflicting roles. At first they are employee, a medical professional of whom it is expected to run along with the system. Yet they are student too, from whom it is expected to learn from experiences and grow to be an independent pediatrician at the end of residency. When workloads increase it appears however that the role of students becomes inferior to the role of employee (21, 22). Performing medical tasks is preferred above dedicating time to learn from books, rehearse or think about certain situations. The experienced **role conflict** between student and employee can be stressful. Not only because of the conflict itself but because learning is frequently shifted to overtime and hence increasing workload (23, 24).

21. *"We really notice the tension between production and education and it gets worse to integrate because there are ever less people available for the same amount of work. When workload increases, there is less time to think about medical problems."*

22. *"During internship there were less patients to care for. I was more focused on medical knowledge. There was less stress and more time to talk with patients. Now we just have to realise production."*

23. *When there are more patients to care for, there is less time to gather knowledge, it gives me a sad feeling. In my opinion we need time to get to know patients and their illnesses which is sometimes not possible. Then we don't deliver optimal care. I'm quite a perfectionist so it does worry me."*

24. *"The more time I took to learn, the later I arrived at home. On average I worked till 7 o'clock in the evening those days."*

The final dimension of general demands is **balance between work and life**. Due to high workloads and long shifts residents reportedly come home relatively late or even continue working at home (25). It is therefore difficult to engage in private activities during the week. It seems that social life is partially abandoned or shifted to the weekend (26). Residents report however that this balance between work and life gets better distributed as experience increases (27). Nevertheless respondents frequently reported the balance to be unsatisfactory.

25. *"Last year I took thoughts about work home too many times. (..) At home I am often busy with work, balance between work and life is not yet as I intend it to be.*

26. *"As a student I stood in bars till late at night and suddenly I was at work in the morning. It was shocking. I do not mind to work hard. But the week is to short though. Therefore I have not much time to spend at home. You are always on duty; many things are thus not possible. I would like to work less, but I like work too. "*

27. *"Especially in the beginning private life was almost nonexistent. I was always home late, tired of course*

and the next day I had to get up early in the morning. In those days during the week I had no time for social life. (…) In later years it has changed somewhat, I do sport and engage in social activities again. The first half year I had not much private life."

4.2.2 Content demands.

Other than general demands like overall workload, several specific aspects of pediatric residential work were found to be demanding. Respondents were remarkably equivocal about the amount of tasks apparently not belonging to pediatric residents. In their opinion residents have to perform many **non-inherent tasks** that could also be done by nurses or other personnel, leaving more time available for other tasks and duties. A distinctive example of such tasks is blood withdrawal (28, 29). Other frequently named non-inherent tasks are administrative hassles (30, 31). Respondents reported frustrations about the many hours they spend at writing letters, patient records and reports. This consumes time at the expense of contact with patients and deepening medical knowledge (32, 33).

28. *"I do think that I do meaningful work, but few tasks like blood withdrawal could also bedone by nurse-practitioners and nurses, leaving more time to be doctor. "*

29. *"(…) We do many tasks for which we are not educated. There is relatively little thinking involved. It is not specific for the start but you will learn to manage."*

30. *"In my opinion we perform much secretarial work. I think we spend at least half of our time at tasks that could perfectly be done by others."*

31. *"What frustrates us are the things that do not belong to our profession, administrative tasks mostly."*

32. *"In my opinion some administrative things need to change. Time spent behind the computer can not be spent at thinking about medical problems or communication with parents.*

33. *"All administration is what I least like about my job, I would like to spend less time at it to be able to be near the beds more often."*

Coupled to non-inherent tasks but yet a distinct content demand are frustrations about **ICT**. The computer plays an important role in contemporary medicine. Although computers are designed to save time and relief people from secondary tasks, ill-designed systems apparently form frustrations on their own (34, 35).

34. *"What frustrates me is ICT. A digital request may deliver various problems like sluggish response time and refused log-on. Sometimes I have to wait ten minutes before the computer has booted. It is frustrating because medically I know exactly what needs to be done, but I am hindered as it is not possible or hard to effectuate using the computer system."*

35. *"At first I focused at learning to know the computer systems, it took a lot of time. But in the end I benefitted."*

Another demanding feature of residential work is the **organization of care**. It takes a lot of effort, energy and time to organize patient care. Residents dedicate much of their time at making appointments or arranging logistics. Again this time and effort is spent at the expense of the acquisition of medical knowledge and direct contact with patients. The organization of care is hence experienced as time consuming and frustrating other tasks (36, 37 and 38).

36. *"At the start you spend much time at arranging and organizing things. (…) With calling other people we lose too much time."*

37. *"Normally I have to take care of many patients. I have to perform radiological, lab and blood requests, write letters, command nurses and arrange medicines. Be-*

fore I get it done the day is over and there is no time to reflect on special situations.

38. *"Organizing to get things done takes a lot of time. Lab requests, figuring out who does what, how things go and what form to use. It is all logistics and takes a lot of time.*

An important aspect of the residential job is the **cooperation with other health care professionals**. This may cause stress when people whom residents depend on do not cooperate easily (39). Since residents are relatively inexperienced, relations with more experienced professionals can be unbalanced, resulting in stress and frustration (40, 41). Especially when the boundaries of responsibilities are vague, the risk of frustrated cooperation seems ubiquitous (42).

39. *"It is exhausting when I have to call a radiologist who always says no. (…) Commanding nurses can furthermore be pleasuring, but is frustrating when they do not do what you tell them to do or when they react aggravatingly."*

40. *"Some nurses have many years of experience. They are confronted with fresh residents every three months. It is hard for them to receive commands from rookies like me and accept that I call the shots. There are departments where you are really put to the test, were you have to earn your credits before you are accepted. Not so much in words, but you feel it when they test you."*

41. *"Continuously frustrating are the subspecialists. (…) When you have formed a plan it suddenly needs to be changed. Can't it be better integrated or at least do not come around at four o'clock in the afternoon. (…) When nothing has changed clinically you need to trust each other. They have to realize that the colleague of yesterday had a good idea too. It creates confusion among parents. It is frustrating and does not give me energy since there are more ways heading towards Rome."*

42. *"(…)Nurses pass the buck often. (…) I think they know very well who to shift to. It will not always be deliberately, but it happens. They won't call the pediatrician for the crap they call us sometimes."*

The final dimension of content demand is **contact with parents**. Residents work very hard to deliver optimal care. Results are however not always to the full satisfaction of parents. Especially when there is a discrepancy between the evaluation of performance between residents and parents it appears to be frustrating (43). Sometimes residents are allegedly even regarded as gold-diggers. They don't always receive appreciation for their effort and dedication (44). In some cases it may even lead to an official complaint, a situation which is self-evidently very stressful when no obvious mistakes have been made (45). Though these examples are compelling, respondents reported most contact with parents to be satisfactory.

43. *"It is very annoying when parents and patients are dissatisfied. We work as hard as we can, but when parents are unsatisfied it is very annoying. You have to ask yourselves whether you have done everything right, if so you need to let it go, but it is tough."*

44. *"Even when we do not make any mistakes we are jeered at. I do not like it when people pretend we are gold-diggers, while we are hardworking people with the best intentions."*

45. *"I have learned a lot from an official complaint I received. It taught me how it is like when someone questions my integrity and the way I wish to work. I was confronted with anger and sadness because it was totally different to what I would have done in such a position. In the end you need to get over it and make sure that the child receives the best possible care."*

4.2.3 Emotional demands

The work of a pediatric resident seems to be pre-eminently emotional demanding. Pediatricians are confronted with pain, death or suffering of children, baby's and their parents. Issues which residents yet have to get familiar with. When residents were asked after the most demanding aspects of their work, none of the respondents independently put forward experienced emotional demands. When they were explicitly asked about emotional aspects, **emotional experiences** however appeared to be perceived as strenuous (46, 47). Residents responded that they considered it to be a substantial element of their job which they consciously chose for (48). As it is an integral element of pediatric profession, overtly subjecting to emotional demands may even feel as incompetence. From the answers it shows that the work is occasionally emotional demanding, but most residents have found ways to cope with these demands (48, 49).

46. *"Yes, off course it still is emotionally heavy. It did not change in my opinion. There are still emotionally demanding situations, but I have always had the impression that my colleagues, nurses, superiors and family supported me."*

47. *"At neonatology things may get intense. When children die, it is discussed. Death touches you somehow though."*

48. *"It is definitely tough. On the other hand it is something I chose for, something of which I knew I had to face it someday. It does not mean I knew how I would response in advance, like it does not hit me. But it is a choice I made and does make work demanding sometimes. I do not regard it as normal when children die, but it is an element of our job, just like diagnosing illness."*

49. *"Sometimes I do take experiences home. But I cope with it relatively easy. On the same day as Sven Kramer took the wrong lane in his race to Olympic gold on the 10 kilometers speed skating, cancer disseminations were identified at a young boy. It was his death sentence, yet I lied awake in bed thinking about Kramer's unfortunate decision. It impressed me I did. But in a way it is a good sign, if I lied awake in bed thinking about suffering patients, it would become unbearable. Yet things like these do touch me."*

Another important aspect of emotional demands among pediatric residents is **responsibility**. Respondents indicate that responsibility is a major issue, especially at the start of residency (50, 51 and 52). Likely residents do not yet posses de necessary skills or are at least insecure about their capabilities. During the years skills and confidence grow and responsibility seems to decline as a significant stressor (50,51).

50. *"Especially at the start responsibility was very though, but you will get used to it."*

51. *"At the start I really had the idea that I bore many responsibilities really soon. Often the most inexperienced doctors do the toughest work. In the beginning it is intense to be the first responsible for very sick patients, but you get used to it."*

52. *"Friends in non-medical professions are amazed about the shifts we make and responsibilities we have. (…) You feel responsible, but can't bear it yet, especially not at the start. It makes work very demanding and stressful. I really considered quitting my job."*

Occurrences where respondents are overtly not taken seriously were reported several times. Not only residents themselves may be insecure about their capabilities and whether they can bare the responsibilities of their work (53). Demanding patients and parents are mostly aware of the status of residents too and may turn to specialists, putting residents aside (54). **The feeling of not be taken seriously** may even be present in the cooperation with other experienced health care professionals (40). Consider-

ing the large amounts of dedication, effort and care among residents it is obviously stressful to be not taken seriously (55).

53. *"It is confusing when someone higher in rank stands next to you while you are talking with parents. It makes you wonder whether you are the one to speak or not. "*

54. *"Some people want a conversation with the real doctor after I have spoken to them. It is a clear sign that they regard you differently. Some people have schemata of how a doctor looks like. Most residents are young female which contradicts with the general opinion of doctors being grey men in long white coats. Often they call us nurse too."*

55. *"A few times contact with patients was troublesome, especially with parents. It may even cause the most stress. When I entered the room, they turned their head. They accepted nothing I said, communication was terrible. "*

4.2.4 Organizational demands

Apart from general, content, and emotional demands, the way work and education are organized was found to be a stressor on its own. The most prominent factor of this kind is **understaffing**. Since there are ever less people available to do at least the same amount of work, workload has increased significantly at the expense of education (56, 57, 58). Understaffing may sometimes even lead to tension between residents and impede effective counseling because experienced mentors who are supposed to support novices experience the effects of understaffing too (59, 60).

56. *"Some departments are busier than others. It was generally accepted. I once worked at a department where normally two residents were present. Of course I was not ready at five o'clock in the afternoon then."*

57. *"The number of jobs declines and our job becomes more complex. In effect we have to deal with more workload with less people."*

58. *"The fragmentation of work coupled to understaffing is detrimental to educating skilled professionals."*

59. *"Most stress is due to understaffing and how we deal with it mutually. "*

60. *"We do have a mentoring system which generally works very well. Novices are ought to be coupled to experienced residents, however due to understaffing it is not always possible. "*

Residents furthermore concordantly reported frustrations about the way work is organized. These **frustrations about management** cover several aspects. Residents understand the consequences of cost reductions, the way management communicates about this issue seems to disturb them however. It causes commotion and affects job satisfaction since relations are disturbed and workload increased (61, 62). Some residents are even concerned about the quality of patient care (63). Others are more generally frustrated about the secondary role of education and the way it is organized (64).

61. *"I really notice the growing contrast between management and education and it becomes ever more troublesome to integrate both. Less people have to do the same amount of work and business gets priority at the cost of education. If there is more work to do, there is less time left to gather knowledge. It is something I really notice. I understand it is hard for management to integrate both roles when there is no money for residents. Then you will transfer the problem to someone else I suppose."*

62. *"It disturbs me how things are structured, how people communicate and patient care is arranged. At the moment it is quite tumultuous at the clinic. It worries me. Many things need to be changed be-*

cause of financial shortages and people therefore have to leave. I notice the unrest and it spoils my joy of work much more than other aspect of my job."

63. *"It is about the way management communicates with employees which make things frustrating. The way they communicate and what they expect from us do not correspond. It is a common frustration among my coworkers and it interferes with pleasure of work and patient care.*

64. *"My stress is mainly about the duty-roster. It should not depend on too many legislation and rules. It should be based on the same roster as pediatricians, but still guarantee good education. It is more than keeping the business going. Our interests are different of course. Hospital receives money for our appointment. It is partly meant for our salary but the rest can be used for other things. It is hard to bear sometimes that our annual educational budget only amounts to 200 euro's. It does not keep me awake at night, but I am dedicated to contribute to changing this subject."*

4.2.5 Personal demands

Demands do not come from external sources alone. Respondents also showed a few personal factors to be responsible for pressure and strain. **Differences between expectations and reality** play a significant role. It appears to be demanding when expectations about a job fall short of reality. Sometimes truth is less colorful than is it was expected to be (65). This could likely be the result of the fact that interns do not always get to see the less positive sides of the profession and hence form a distorted picture of residential tasks (66).

65. *"As an intern you can see something, but I more expected to be a real doctor. You just have to do lots of insignificant tasks. And many things I did not study for like secretarial tasks. I underestimated the amount of it."*

66. *"Sometimes I find it hard to assign tasks to interns. It is difficult when it is busy, because most things I need to do personally. But when I have to spend an hour at the phone, they do not learn anything from it by sitting next to me."*

People differ in the extent to which they push themselves to perform at an optimal level. Some people are better able to take things at a distance. When things have to be done perfectly, they take longer thus increasing total workload and decreasing time available to do other tasks (67, 23). Residents concordantly reported **perfectionism** to be a major cause of heightened workload. Apparently however residents learn by experience to lower expectations and demands (68, 69). Perfectionism does not only refer to the quality of work but also to quantity. Several residents declared that pediatrics posses a different mentality than other specialists. According to the respondents they are more agreeable than others, more willing to take on extra tasks (70, 18).

67. *"I want to do everything at an outstanding level. It is partly the result of what is expected, but also part of my personality. When you want to do things perfectly, working days get longer."*

68. *"At the beginning I had the feeling that I had to be able to do everything, later on I was better able to regulate. I do not need to know everything anymore, but it is personal of course."*

69. *"It depends of course on the degree of perfectionism. I wanted to control everything like writing patient reports extensively etc. I do notice a change however."*

70. *"There are less people, tasks are redistributed and workload is intensified. It is especially difficult to new residents. You want to do well, it is about people, children. It is not like a factory where you can stop production. The nature of pediatricians is influential too. In general they are more agreeable than other specialists. "*

An overview of all relevant demands is shown in Table 1.

.

General demands	Content demands	Emotional demands	Organizational demands	Personal demands
High Workload	Non-inherent tasks	Emot. Experience	Understaffing	Reality/expectations
Temporal demands	Organization of care	Responsibility	Frust. about management	Perfectionism
New situations	Coop. with other health prof.	Not be taken seriously		
Task ambiguity	Contact with parents			
Role conflict	ICT			
Balance work/life				

Table 1 Overview of demands

4.3 Resources

The previous section may erroneously lead the reader to conclude that residents continuously have to withstand forthwith unbearable situations. Though the overview of stressful or frustrating aspects is extensive and compelling, there are many counter pressures present which prevent these demands to become intolerable. The most prominent main categories of resources among pediatric residents are: Social support, Job control, General resources, Personal characteristics and Skills. These resources imbedded in both job and resident themselves will be discussed in the following paragraphs.

4.3.1 Social support

One of the most prominent resources that help residents to cope with the demands of their profession is social support. Though there are various sources of which support can be received, **support from co-workers** seems very important. Since workload can be extremely high, residents need each other's assistance to get the work done in time (71). Help from others is however not always possible since co-workers are frequently constrained by high workloads too (72). Co-workers are not just helpful with regard to workload, residents moreover reported their (more experienced) co-workers to be important sources to learn from (73). Above all co- workers are of great help when emotional experiences have to be dealt with. Residents conco rdantly reported their co-workers to be their most important sources of support when emotional experiences have to be coped with (74, 75).

71. *"Co-workers are very important. If they would not be around, it would become very challenging. (…) Demands are high, nurses and supervisors demand a lot, and hence we need to help each other."*

72. *"It is very useful to ask others for assistance. It is however tricky since everybody is busy and hardly anybody has time available to help others."*

73. *"It is enjoying to cooperate with other residents because I learn a lot from them and they are most suited to answer my questions.*

74. *"When work gets emotional I turn to co-workers to calm down and talk with."*

75. *"Support from co-workers is not just about tasks but also about emotional things. When somebody experiences several consecutive deaths we'll go to the bar for example. It is important to have the possibility to talk about these things."*

Supervisors are self-evidently a major source of support. They give valuable feedback, instructions and advice. This not only pertains to task related topics but also to supportive competencies (76). **Support from supervisors** may however not always be effective because supervisors have turned home while their residents are still working late. Some accompanying problems may hence stay unnoticed (77). Though most residents are very positive about their supervision, there are some reported remarks about the attainability of supervisory support (78, 79, and 80). When support from supervisors is difficult to attain, possible anxiety is likely to be amplified (81). High workloads are furthermore not confined to residents, supervisors have to work under pressure too. Residents acknowledge these demands and may hence feel restrained to call for support (82). Other remarks were made with respect to the way supervisory support is organized. Some supervisors come around at the end of the day, hence significantly lengthening the day, especially when much has to be discussed (83). Further remarks referred to the way feedback or advice should be given (84, 85). Especially when workload among supervisors is high, supervisors tend to take control instead of allowing residents to perform a task. This may consequently hamper learning and motivation (86, 87).

76. *"Supervisory support is very important. Supervisors should ask why residents are still working late and ask whether it is a matter of priorities or lack of assertiveness. It is more important than written instructions."*

77. *"Pediatric supervisors are very approachable. In comparison to other specialists they are willing to assist when we call them during the night. It is one aspect, does someone come to assist when asked to. But it is also important for them to approach residents when they continue working till late. They should ask what is going on. Not every supervisor will do this spontaneously, most supervisors have gone home then. They will not notice."*

78. *"My supervisor was very involved and open to questions, but it differs between departments."*

79. *"Supervisors are the ones to turn to for questions, but they have their own tasks and are thus less approachable.*

80. *"During my term at the intensive care we tried to make an appointment for more than a week. My supervisor agreed but had no time available. Time is a bottleneck."*

81. *"When I am insecure I can always call my supervisor. I regard it as the most stressful when I can't get in touch with them. "*

82. *"I know my supervisor is busy too. I do not mind to call for advice, but I do find it hard to call for physical assistance however. When there is a medical problem it is less of a problem to call for help, but to call for assistance because I am very busy is difficult."*

83. *"My supervisor helped a lot, but he came around at the end of duty to go through the day for an hour. But then I was at work very long and I could not take it anymore.*

84. *"The level of experienced stress depends on how my supervisor deals with situations. It influences me whether I receive a lot of comments or when my supervisor is very nervous."*

85. *"It is pleasant when a calm person stands next to me giving constructive critics which help me instead of blaming me without giving me advice when things go wrong."*

86. *"Some specialists come around and just tell what needs to be done and hence do not allow us to think for ourselves."*

87. *"We have to deal with many subspecialists. It is more fun to a resident to think about problems independently than when we are just told what to do."*

4.3.2 Job control

Job control is consistently described as an important resource in the literature. However job control among novice residents appears to be quite low, especially among beginning residents (88). The work of pediatric residents is characterized by a lack of structure. This does not only refer to control about the order of tasks but also to the amount of workload and the kind of work to be done (80, 90). The workload of residents depends for the greater part on sources outside their control. Especially for new residents this appears to be difficult. More experienced residents reported fewer problems with the unstructured character of their profession. As mentioned in the supervisory support section, residents moreover made remarks about the control they received from supervisors and specialists. In cases where they are not allowed to think about medical problems independently job control is in essence diminished and frustration enhanced (86, 87).

88. *"It was such an enormous chaos, I did everything I encountered. "*

89. *"It depends on which department you are at. At the policlinic we live according to a schedule and we have not much control. At departments we work according to what the work offers us. It is inherent to the job that we don't decide by ourselves in which order things happen."*

90. *"It is busy. (…) There is some kind of structure, but we are continuously buzzed or called. It is hard to organize, we are busy with many things simultaneously."*

4.3.3 General resources

Apart from social support and job control residents reported several general resources to be balancing the demands from their job. Though expectancies may sometimes fall short of reality, residents consciously chose to become a pediatric because of **affection for the profession**. All respondents reported they loved their job, thought they were privileged and had the best job in the world (91, 92 and 93). These thoughts and feelings likely function as great counter pressures to withstand the challenges of residency (94).

91. *"Work is not disappointing, I think I am very privileged."*

92. *"It is still the best job around."*

93. *"It is a fantastic profession and I definitely think I chose the right job."*

94. *"I would like to work less, but I do like my work too."*

Residency appears to be very demanding, residents are however aware of the fact that it is temporary and that it will end after five years. The **acknowledgement of temporariness** thus functions as a counter-pressure to bear the challenges of their work (95, 96). The acknowledgement of temporariness not only refers to the length of residency. Residents learn from their own experience and colleagues that the work will become less demanding as a result of increased skills, competences and experience (97).

95. *"Most times I am able to tone it down and find stress exaggerated. The acknowledgement of temporariness helps too. I know there is lot to improve, but I do see it does."*

96. *"I know education is something to invest in. It won't be better in every aspect when I am ready (…). I regarded the education as something I just had to do; it is the way it works."*

97. *"It went better bit by bit. It made me doubt, if it had to go on for five years like that…"*

4.3.4 Personal characteristics

Apart from resources embedded in the work itself, several personal characteristics were found to be important and explain why some people are better able to cope with the challenges of occupation. Residents have different backgrounds when they enter residency. Some come directly from university, others have done a research project or held another (medical) occupation. These differences in person-

al **background** cause differences in skills and competences. Residents with more clinical experience are familiar with basic tasks like placing an infusion and can hence spend their energy at other tasks and duties (98, 99). Though it seems beneficial to have clinical experience or to be familiar with the hospital, other backgrounds may bring some different advantages like developed managerial skills or self-knowledge (100, 101). Another problem of the variation in backgrounds pertains to hampered performance comparison between residents since it is difficult to estimate relative achievement (102).

98. *"It was very stressful. (…) My medical knowledge was diminished. When I had 20 patients I was glad when I had just seen them all. It took me very long to place an infusion. I ran behind, all little tasks took me very long.*

99. *"Fortunately I already had some clinical experience, it made a difference."*

100. *"I have been abroad for a while so I am used to adapt, moreover I was already familiar with the hospital."*

101. *"Previously I did a PhD and learned different things. I got to know my own pitfalls, know I want to do everything by myself and know I am a perfectionist."*

102. *"The various residents enter at different levels. We are supposed to reach the same level eventually. Individual differences are big; hence there are not very clear guidelines with regard to exams or testing relative achievement. It is quite vague."*

Experienced residents reported diminishing stress levels during residency. Through **experience** residents develop skills and competences which make it easier to cope with the demands of residency (103, 104 and 105). Experienced residents furthermore appear to be better able to restrict themselves to core-issues instead of spending too much time at irrelevant routines (106, 107). As they become more familiar with the organization, tasks and roles, work takes less effort and time at the benefit of cognitive/work capacity (107, 108). Experience thus functions as an important resource against the demands of residential work.

103. *"As education continued I got more tools to cope with things. I know more, where to ask for, which investigation to do."*

104. *"There is a learning curve. I know faster how much fluid a child needs for instance. I know the basics better now. In the beginning there is much to sort out since everything is new."*

105. *"Education takes 5 years and in that time we grow personally and develop with respect to content. I learned to be myself as a pediatrician. The role becomes more natural."*

106. *"Previously I wrote patient reports extensively and now I restrict myself to the core issues. (…) I was busier with writing patient reports than with patient care then."*

107. *"There is a difference between junior and senior residents. Juniors try to solve everything on their own. (…) Now I know better what to do and what others need to do and will return the request. In the beginning I did not dare to. I did not know very well, wanted to be liked and wanted to perform well. Later I knew who was responsible for what. I moreover learned to separate core and side issues."*

108. *"Standard clinical work gets easier. I am able to do more in less time, leaving more time to develop knowledge."*

4.3.5 Skills

Residents require a wide variety of skills and competences to cope with the demands of their profession. They have to cooperate effectively with colleagues, supervisors and patients, deal with the unstructured character of everyday work and stand up for their own interests. Several important skills and competences appeared from the interviews Residents with more of these essential skills and competences apparently experience less stress because they are better able to deal with the demands of their work. Since

the list of reported skills and competences is relatively long, only a list wise overview will be given: **communication**, **cooperation**, **pro-activeness**, **assertiveness**, **prioritizing**, **structuring**, **delegating**, **reflection**, **relativizing** and **time-management** (109-118 resp.).

109. *"Communication is very important in my organization. In the first year it is very important how people look at you. It is easier to arrange things when you are a good communicator, the impression you make on others is very important."*

110. *"It is very important to have a good cooperation with nurses, doctors and secretary."*

111. *"I regard my work as challenging and have the feeling I can control. I have quite a proactive mentality."*

112. *"If I do not know, I will just ask. If it is not my task I will just tell en at least suppose to do it together. It depends on your own mentality but it is important to demarcate your own boundaries, whether you can do it yourself or not, where you need help."*

113. *"Later I was better able to know who should do what. I moreover learned to separate the core issues from side issues. I was busy till late to get things done and now I know which things can wait for a day."*

114. *"By making arrangements with nurses and structuring the day I do not need to do things at the end of the day which should have been done during the day."*

115. *"First I did everything on my own, but then I realized some things can also be done by a secretary. It is something you will learn, just because there is very little time available."*

116. *"I do reflect on the big cases off course. I cycle to my home for 45 minutes every day; I have plenty of time to think then. Moreover sometimes I look things up in the evening."*

117. *"I don't want to make mistakes off course. Especially in the beginning you don't want to, but later on you learn to relativize."*

118. *"It is important to discuss it when you are short of time, work till late and have no time to lunch, it is not something to be ashamed of. It is important to learn time-management, it is part of the job. It is at least as important as medical knowledge which receives most attention. "*

An overview of the relevant resources is depicted in table 2.

Social support	**Job control**	**General resources**	**Personal characteristics**	**Skills**
Support co-worker	Job control	Affection for profession	Background	Communication
Support supervisor		Acknowledgement of temporariness	experience	Cooperation
				Pro-activity
				Assertiveness
				Prioritizing
				Structuring
				Delegating
				Reflection
				Relativizing
				Time-management

Table 2 Overview of resources

4.3.6 Overview of findings

Based on the interviews a model can be drawn which describes the main constructs of both origins and counter-pressures of stress among pediatric residents (figure 1). Several demands were found to cause stress. These demands were subdivided among five main categories: organizational-, emotional-, content-, personal- and general demands. Yet the work and residents themselves also contain elements which function as resources against the pressures of work. Resources were also found to be grouped among five main categories: job control, social support, skills, personal characteristics and general resources.

Figure 1 Stress-model

4.4 Learning

Now the demands and resources of pediatric residency have been treated the text turns to the relation between stress and learning. First the specific influences of stress on learning will be discussed, subsequently will be explained why stress leads to learning in some cases but to mere exhaustion in other situation. The section will end with results about the hierarchy of competence development.

4.4.1 Specific influences

From the interviews it appeared that several specific aspects of residency impede optimal learning. The most prominent aspect is **restrained knowledge collection**. As a result of tremendous workloads there is no or little time available at work to study about certain phenomena (119, 120 and 121). Learning is hence largely limited to experiential learning. Residents concordantly reported frustrations about the opportunities to use books or other sources to study about medical topics. Those who want to know more about certain topics frequently have to study at home (121). Some residents even questioned whether residents grasp the core of most medical problems they encounter. According to others residents consequently do not always deliver optimal care (122, 123).

119. *"It is very annoying there is no time available to improve medical knowledge. I do not at all, or very little. I do read something off course, but I would like to do it more."*

120. *"I would prefer to think about patients more and hence learn more. I expected it to be more like that. Probably it is intended the same way, but there is no time available."*

121. *"There are many practical things to arrange, knowledge collection and sorting things out has to be done in my own time. It partly depends on my own efficiency, hence I expect it to become better. But it is off course also a result of a shortage of residents causing us to be busy."*

122. *"We really need more time to disentangle a problem and gather knowledge about it, there is much more time needed. I absolutely do not think we always clearly comprehend the core of a problem. We do not have time and space to think about it thoroughly anyway."*

123. *"To my impression there is less time to collect knowledge when there are more patients to care for, which gives me an unpleasant feeling. In my opinion we need time to think about patients which is not always possible. We do not perform optimally then. I am quite a perfectionist, hence it feels uncomfortable."*

A different impeding element close to restricted knowledge collection is **restrained reflection**. Just as there is not much time to read books, there is also little time available to reflect on problems, thoughts and behavior (124, 125). Reflection seems an important element of learning because it enables people to think about what went wrong and good and how things can be improved for the future (126). Impaired possibilities to reflect therefore likely hamper optimal learning.

124. *"I can imagine it is hard to absorb things when you are under stress. There is furthermore not much time to search for information or reflect on what I did."*

125. *"No there are not many possibilities to reflect, though more nowadays. There is intuitively much to do, therefore I do not get round to reflection.*

126. *"I have had moments of which I afterwards thought: If I had been calmer or could have thought about it longer, it would have been better. It would have benefitted me for a next time too."*

Another important learning inhibiting feature is **non optimal supervision**. Supervisors experience the same work pressures as residents which makes it difficult to organize evaluations (127, 128). Residents acknowledge the busy schedules of their supervisors and are hence reserved to approach their supervisors for feedback or assistance (129). Busy schedules may furthermore lead supervisors or other instructing personnel to leave little room to residents to explore or come up with their own diagnosis or treatment (130). Finally, due to understaffing it appeared to be impossible to assign every new resident to an experienced mentor which will likely be negative to learning since expe-

rienced members carry valuable knowledge and experience (131).

127. *"Most supervisors are easy to contact and motivated to give supervision. But supervisors are very busy too due to all changes in tasks and activities. Residents are busy and have no time to learn and above it their supervisors have no time to guide them properly."*

128. *"Sometimes supervisors are very busy and hence difficult to reach."*

129. *"I know my supervisor is busy too. I do not find it hard to call for advice but I do find it difficult to ask for direct personal assistance."*

130. *"It is important to have some time to think.(…) It would be great to have 15 minutes to come up with your own solution. Then it is more fun to have a conversation with a subspecialist. Then you have already thought about it and know more than when they just tell what is wrong and what to do."*

131. *"We have a mentoring system which generally works very well. We are intended to be coupled to an experienced resident, but due to understaffing it is not always possible."*

Sometimes residents are busy with many different things simultaneously. This was found to be especially demanding among junior residents. They do not only have to perform simultaneous tasks, many of these tasks are relatively new and hence require considerable energy. This may eventually lead to **overload** in cases where cognitive limits are exceeded, consequently at the expense of optimal (medical) learning (132, 133). The relation between stress and learning is however not exclusively negative. Stress increases arousal and excitement and leads in many cases to positive outcomes (134, 135).

132. *"You are only able to learn when there is no time left. As long as you are busy with organizing which tube to go where you don't get round to learning."*

133. *"As long as we are busy with tasks like placing an infusion, blood withdrawal, computer requests and patient reports we do not get round to thinking about medical problems."*

134. *"I do not have very negative experiences but do have positive stress. It is good to feel tension because it makes me alert."*

135. *"When I perform an action for the first time, I experience a kind of stress, but I do not regard it as negative, it is something I learn form."*

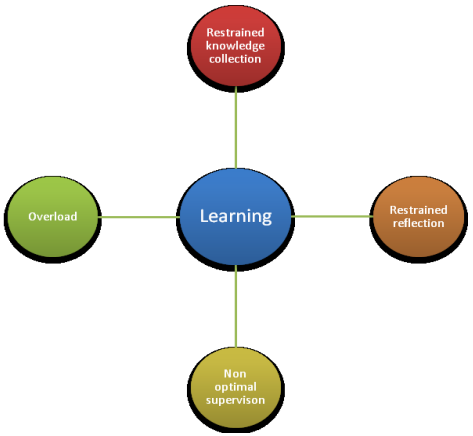


Figure 2 Influences on learning

Conclusively, learning appears to be hampered by four different aspects: restrained knowledge collection, restrained reflection, non optimal supervision and overload (see figure2). Learning may however consist of more than improving medical knowledge and skills, a statement which will be illustrated in paragraph 4.4.3.

4.4.2 Challenge versus Hindrance

Residents reported differences between hindrance and challenge. From the interviews it appeared that the most determining factor of **hindrance** is the balance between effort and reward (136, 137). Residents frequently perform tasks which take much effort and energy in proportion to the outcomes of these tasks. Residents are for example

frustrated about the redundant amount of time they spend at deliberating with other specialists (138, 139). Especially in an atmosphere where time and energy are scarce and pressures are high it is frustrating when relatively uncomplicated tasks appear to be complicated in a different sense. The time and energy spent at unrewarding tasks is experienced as a loss and frustration since the same time and energy could otherwise have been dedicated to other more rewarding tasks. This also follows from the finding that conceived side-issues are consequently found to be frustrating (140). Residents rather think about medical problems and work with patients directly than spending time and effort at organizational or managerial tasks. As certain tasks or situations constantly appear to be unrewarding, efforts will likely be decreased in order to restore the balance between effort and reward (137). Yet without effort (an important requirement for learning) the likelihood of consequential learning is severely hampered and mere exhaustion remains.

136. *"I want things to change even though the system is so rigid. It takes a lot of energy. In the beginning you will learn from it but it will soon end."*

137. *"Many times it is not easy to solve and you will get stuck in higher genetics or metabolic processes and I do not spend any energy anymore because I will not solve it anyway."*

138. *"I do not learn a &^*# from trying to arrange something with radiology or anesthesia for example. Making endless phone calls with people who do not want to communicate with each other in order to come to a mutual agreement or intervention. It is really frustrating, I know in advance it takes a lot of time and I do not learn a ^*&&* of it. It really consumes my time.(…) I did not chose this job to let people communicate with each other but because I want to cure people. This makes the latter more interesting and instructive."*

139. *"It is very frustrating when I have thought about a patient, discussed it with other people and the next day a subspecialist comes by and changes the whole plan. It does not make me happy. When nothing has changed clinically you need to trust each other. (…) It is frustrating and does not give me energy because there are more roads to Rome."*

140. *"Especially the side-issues are exhausting. When I need to call a radiologist who always says no. It is annoying when you do something and only get negative reactions in return. When I put energy into patients I get something back. While the energy spent at side-issues intuitively produces very little. "*

When asked after the **challenge** of residency, residents equivocally referred to the challenges of patient care. Though patient care may be at least as demanding as managerial tasks for example, patient care is conceived as central to the job and hence very rewarding (141, 142 and 143). Yet when energy spent at alleged side issues turns out positively, even side issues can be regarded as challenging or at least satisfying (144). Rewarded effort is likely to result in sustained or even increased effort and energy, leading to an upward spiral with enhanced learning as a result (145). **Conclusively**, some stresses are perceived as hindering core tasks and hence lead to exhaustion. Other tasks are regarded as essential elements of the job and are thus perceived as potentially rewarding. Those tasks which lead to the most rewards receive most attention, effort and energy. Since deliberate learning depends on at least attention and effort, stress form challenging situations is likely to lead to better learning outcomes than stress from hindering situations.

141. *"When things turn out well it is fun and to see others appreciate it gives energy too. It is challenging to deal with difficult situations. To give guidance in cases of death can be rewarding when I did everything to make the best of an unpleasant situation."*

142. *"Sometimes medical problems are very difficult, but it is the challenge too, the reason why I chose this profession."*

143. *"What is good is when a sick patient who I cared for does well. So some things take more energy than they intuitively produce."*

144. *"It gives me a lot of energy when I have been able to arrange things for a patient, have brought people to-*

gether in a right way, have been able to sort things out. Being responsible, it does not need to be totally correct, but I need to have formed an opinion on my own."

145. *"We have some very complex and puzzling patients. (…) When I have solved it relatively easy it is totally fantastic, then I have made a diagnosis, solved the case and learned a lot in the meantime. It stimulates"*

4.4.3 Development of generic professional competence

The last research question aims at the order of competence development. The quotations cited above clearly illustrate residency as a demanding and unstructured period. Residents have to learn how to best deal with these challenges. It has already been stipulated that the development of medical knowledge seems secondary to participating in the work process. Beginning residents consequently focus on those competences which most enable them to keep their head above water. From the interviews it shows that novice residents spend most of their time at learning who to ask what, which forms to use and hence at developing managerial-organizational and strategic competences (146, 147). Residents have to cooperate and communicate with patients, parents and various professionals, all with their own unique characteristics. It is therefore of invaluable importance to have excellent communicative skills. Residents reported social-communicative and normative competences to be of secondary importance yet essential (147, 148).

As a result of the dominating role of 'production' above learning, residents seem to spend minimal time at learning. As long as they are busy with organizing work and care there is little time available to deliberately develop medical knowledge (146). More experienced residents have however yet developed the necessary organizational and communicative competences. They are more familiar with both work and environment, have less trouble with the demands of their profession, work faster and will hence have some time left to study or develop other interest. Consequently, professional and methodological competences will receive their attention once organizational and communicative competences have enabled them to do so (149).

Notably learning and shaping competences are reported to receive no or minor attention (150). Apparently no priority is given to optimize learning skills which seems quite remarkable given the educational nature of residency (147). Conclusively the stresses of work seem to severely frustrate medical learning and knowledge development. A finding which contrasts with the conception that residency is primarily about developing medical knowledge (151). Yet much is learned. Residents learn to cope with the challenging nature of their organization, profession, patients, coworkers and above all themselves. To answer the question how stress influences learning one thus first has to wonder what contains learning. After all even though the development of medical knowledge might not be optimal, at least residents learn to cope with stress and challenges.

146. *"At the beginning I was exclusively busy with organizing and managing. Medically very basic but how to ask what and who. What does the secretary and what do I do. Organizational things take most of the time. It is off course what is the least fun about the education. When you are past the first year and know how things work you will just start learning. You can only learn when there is time left. As long as you are busy organizing which tube to go where you will not come round to it. And at home you will not either because you are still at work."*

147. *"Especially the insignificant tasks take a lot of time in the beginning. Lab requests, finding out who does what, how things go, what form to use for a infusion, all logistics which take lots of time. Later it shifts more to medical content. At the start the focus is at managing and organizing. The social-communicative with parental conversations and coping with nursing and supervisors is inherent to the first year to, but continues to be so. But in the beginning you are mainly busy with managerial and organizational aspects. Professional and methodological competences come third and learning and shaping competences last. Quite peculiar."*

148. *"Communication is very important in the organizations. In the first year it is very important how people regard you. It is easier to arrange things when you are a good communicator, the impression you make on others is very important."*

149. *"From the beginning you are busy with cooperation, communication and professionalism. They say that the medical content of education is supposed to decrease near the end while the end is more focused at professional and communicative development, but I do not experience it likewise. At the end, there is more time left to think about educating interns and scientific stuff."*

150. *" There is no attention for learning competences, but I think we know how to learn."*

151. *"It is important to learn time-management, it is part of the job, It is at least as important as medical content, while that is what is evaluated most."*

Conclusively respondents strongly pointed to a stepwise development in a predictable direction (see figure 3). In the first period residents are mostly busy with developing managerial, organizational and strategic competences. Only when social-communicative competences have been developed, time and energy is left to gather deliberate knowledge and train professional and methodic competences. Learning and shaping competences allegedly receive no or minor attention.

Figure 3 Hierarchy of competence development

5. Discussion

5.1 Main findings

This study aimed to explore the relation between stress and learning among pediatric residents. Since it is a very complex and broad topic, the main research question was divided into several sub questions and hence approached from different directions. The conducted semi-structured interviews have ultimately led to comprehensive and detailed results. In the interest of readability, the answers to the sub questions will not be independently treated and discussed in this section. Nevertheless the main findings will be treated as parts of the bigger picture.

Due to its explorative and moreover specific nature it is difficult to compare the results of present research with other studies. Yet in agreement with the work of Prins et al. (2007), pediatric residency appears to be very demanding. Although residents do not usually call their work stressful but 'busy', the signs of stress are abundant. New residents experience enormous changes which are simultaneously accompanied by tremendous workloads. They have to treat many patients and are supposed to work along with the system. In the mean time they have to get used to the routines of residency, learn to organize, communicate and cooperate and above all improve medical skills and knowledge. However due to both cognitive and physical limits this almost self-evidently leads to a trade-off between interests. Ultimately residents prioritize patient-care above learning and development. Yet a trade-off means losing valued interest and may thus lead to frustration and disappointment.

Several demanding elements were found to be relevant. Among these where general demands like workload, task ambiguity and role conflict. Due to their generic nature these demands are not very specific to the situation of pediatric residents and are hence often used to measure demands. Yet what sticks out most are the content demands, a category which illustratively defines some specific tasks and aspects of residential work as demanding. The content demands which where deduced from the interviews are: organization of care, cooperation with other healthcare professionals, contact with parents, ICT and alleged non-inherent tasks. Remarkably, with exception of contact with parents, these are all elements which are about tasks that were reported to be of secondary importance and time consuming at the expense of direct patient care. Apparently residents do not consider managing, organizing and cooperating to be key elements of their job. In this respect expectations may fall short of reality. Misconceptions about the content of residential work may be further amplified by supervisors. Residents reported feedback to be mainly directed at medical skills and knowledge. They are furthermore mainly judged on medical performance. This may lead supportive competences to be under exposed and above all regarded as non-inherent or at least less important.

Apart from frustrations and resistance, the 'misconception' about inherent tasks can lead to other impeding consequences. From the interviews it appeared that the differentiation between challenge and hindrance depends mainly on the perceived balance between effort and reward. More effort will be dedicated to rewarding tasks than unrewarding or energy consuming tasks. When asked after the challenges of residency, residents equivocally referred to direct contact with patients, diagnosing illnesses and installing therapy. Issues which gave them energy and motivation. Yet most frustrating and hindering aspects were about tasks which took more effort than they intuitively produced. For example negotiating with other specialists with little result is not only frustrating, it consumes valuable time, is not regarded to be a core task and hence not experienced as very rewarding. While challenge leads to increased motivation and effort, hindrance leads to frustration and decreased effort in order to restore the balance between effort and reward. A finding which closely fits the fundamentals of the effort-reward-imbalance-theory

(Siegfried, 1996). Evidently core issues produce more rewards than side issues, especially when time is scarce. However whether tasks are considered to be inherent to residential work is quite subjective by nature. Residents expected to spend more time with patients and thinking about illnesses and treatments. Yet in reality the work consists of much more. Though supportive tasks may be less challenging or satisfying, they are a fundamental aspect of residency.
Residents strongly pointed to a hierarchical development of competences. Novices first have to adapt to their surroundings. In order to perform their work they have to learn how to organize, administrate and cooperate. Therefore residents spend much of their initial time and energy at developing managerial and organizational competences. Once residents have become trusted with these competences they aim to improve cooperation through social and communicative skills. Only when work and organization have become familiar (apparently not before the second year), time and energy is left to develop professional and methodological competences and thus deliberately enhance medical knowledge and skills. Eventually residents are continuously learning. It is however not constantly directed at the medical domain. To answer how stress influences learning, one thus first has to specify 'learning' and its objectives. After all learning to cope with demanding work and stress involves learning as well.

5.2 Strengths and limitations

Seven extensive semi-structured interviews were conducted to examine the specific situation of pediatric residents. The chosen method of grounded theory enabled access to a richness of information which would have largely stayed untouched with the use of quantitative measures. Respondents were able to talk freely about their own thoughts and feelings and could hence point to new findings and directions. This has resulted in compelling stories about the experiences of residents. Careful sampling of respondents furthermore warranted a general reflection of the population. Moreover through interviewing both novice and senior residents a vivid understanding of longitudinal development of experiences and skills has been achieved.
There are however some limitations. As a result of practical considerations only seven residents were interviewed. Though saturation was reached after six interviews, some aspects may not have been mentioned since they are not part of the consciously constructed cognitive framework. For example emotional experiences were not spontaneously mentioned to be demanding because they are believed to be inherent to the job which residents consciously chose for. Interviews moreover depend on the quality of both interviewer and interviewee. Therefore some interviews flowed naturally while others were more or less a flagged conversation. Both carry their own characteristics and preoccupations about the subject of interest. Hence the way an interview evolves and the amount of retrieved information depends partly on their cooperation. Consequentially more interviews are needed to exclude before mentioned limitations.

5.3 Suggestions for further research an forthcoming practical implications

5.3.1 Stress

This research unveiled the many facets of residential work that cause and counterbalance stress and the way residents learn to cope with the challenges they face. However, the results of present research can not be interpreted quantitatively. No conclusions can be drawn about the relative importance of demands and resources. Therefore quantitative research is needed to know which demands and resources explain the largest proportion of stress variance among pediatric residents. Yet primarily more interviews are needed to guarantee coverage of all important topics, further explore the content demands and define specifically demanding tasks. In the same vein more information is needed about resources. Some skills were found to make work easier, but the list of these skills is probably not exhaustive. Eventually quantitative measures could lead to a well-designed stress monitor and enable early detection of exaggerated stress. Longitudinal or cross-sectional research could moreover unravel the possible changes of relative

importance of particular demands and resources with experience. After all some things may be more demanding in initial years and others in later years.
For matter of selection and prevention, more research is needed about the influence of personality. Perfectionism was reported to be a stressor on its own. Apparently some residents push themselves beyond their limits. Some personalities are found to be more prone to stress than others (Tyssen et al., 2007). Moreover personality can be an important predictor of overall performance (Thoresen, Bradley, Bliese & Thoresen, 2004; Ones, Dilchert, Viswesvaran & Judge, 2007). Hence more research is needed to know which personality traits make people most capable or prone to stress in the specific situation of pediatric residents. More information could lead to better guidance and aid prevention. Eventually personality assessments could become part of selection procedures in order to select the best suitable people and prevent turnover.

5.3.2 Learning

According to LePine et al. (2004), differentiation between challenge and hindrance stress refers to whether stress is appraised as promoting or impeding mastery, personal growth or future gains. A conceptualization which comes close to the finding that perceived inherent task were appraised as challenging and perceived non-inherent tasks as hindering. Yet from present results can not unambiguously be concluded that challenge stress actually leads to more motivation and consequentially better learning outcomes than from hindrance stress. Clever designed quantitative measures are needed to know whether this distinction is practically relevant. To prevent disappointments and frustrations, future residents and their supervisors likely need to be better informed about the contents and developments of pediatric residency in advance. Different expectations may lead to less resistance to supportive tasks. Once supportive tasks are regarded to be inherent to pediatric residency, they will likely be regarded as more rewarding, hence leading to a better balance between effort and reward, increased effort, motivation and consequential learning.

Time appeared to be scarce and valuable. Residents reported to have very little time to study about interesting medical phenomena or even reflect on past events. The same yields to their supervisors. Due to their busy schedule they are often difficult to contact or even have to compromise the quality of supervision. Hiring more staff seems an obvious but expensive way to solve the problem, yet other solutions may be directed at changing educational design.
At the present residents are more or less thrown overboard in the deep waters of experiential clinical learning. They are supposed to work along with the system, coincidentally learning from their experiences. Apparently the needs and distinctive characteristics of novice residents are hardly taken into account. Backgrounds, skills and experience were found to be important resources. Since residents at entry differ with respect to these characteristics, tailor made educational programs seems beneficial. Though there is room for residents to partly arrange their own educational needs, it is questionable whether they are fully capable of estimating their needs given the cognitive pressures of work. After all residents reported learning and shaping competences initially to receive minor or no attention.
The suggestion of hierarchical development of competences is one of the most striking results of present research. Though residents enter with different characteristics, backgrounds and educational needs, results from the interviews pointed to a predictable gradual development of overarching competences. Fuller (1969) was the first to conceptualize concern theory in education. According to his Concern Based Adoption Model, which was later revised by Hall and Hord (1987), development is characterized by three stages of concern; concern for self, concern for task and concern for impact. Concerns were found to progress from concerns that initially focused on self-concern, to task and impact concerns. Development of new skills will follow these stages with initial concern primarily directed at surviving, trying to subtract a comprehendible image of large amounts of new information and impressions. Moreover Skovholt and Ronnestad (1998) used 100 semi-structured interviews to identify themes of counselor development from novice to expert. Yet more research is

needed to establish a general pattern of development, recognize forthcoming residential concerns and design educational improvements. Likely residents first need to develop supportive competences in a less demanding environment before they are fully exposed to the duties and responsibilities of their work. A properly equipped toolkit of supportive competences may relieve cognitive loads at the benefit of clinical development.

References

1. Adviescommissie Onderwijs-Arbeidsmarkt. (1999). Een wending naar kerncompetenties. De betekenis van kerncompetenties voor de versterking van de kwalificatiestructuur secundair beroepsonderwijs. 's-Hertogenbosch: ACOA.

2. Bakker, A.B., Demerouti, E., & Verbeke, W. (2004). Using the Job Demands-Resources Model to predict burnout and performance. Human Resource Management, 43, 83-104.

3. Bakker, A.B., Hakanen, J.J., Demerouti, E., & Xanthopoulou, D. (2007). Resources Boost Work Engagement, Particulary When Job Demands Are High. Journal of Educational Psychology, 99, 274-284.

4. Bakker, A.B., Van der Zee, K.I., Lewig, K.A., & Dollard, M.F. (2006). The Relationship Between the Big Five Personality Factors and Burnout: A Study Among Volunteer Counselors. The Journal of Social Psychology, 14,(1), 31-50.

5. Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

6. Blackmore, E.R., Stansfeld, S.A., Weller, I., Munce, S., Zagorski, B.M., & Stewart, D.E. (2007). Major depressive episodes and work stress: Results from a national population survey. American Journal of Public Health, 97(11), pp. 2088-2093.

7. Blatter, B., Houtman, I., van den Bosche, S., Kaan, k., & van den Heuvel, S. (2005). Gezondheidsschade en kosten als gevolg van RSI en psychosociale arbeidsbelasting in Nederland. TNO kwaliteit van leven.

8. Boshuizen, H.P.A. (1996) The Shock of Practice: Effects on clinical reasoning. Paper presented at the Annual American Educational Research Association. New York, NY, April 8-14.

9. Colquitt, J.A., LePine, J.A., & Noe, R.A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. Journal of Applied Psychology, 85, 678-707.

10. Demerouti, E., Bakker, A.B., Nachreiner, & F., Schaufeli, W.B. (2001). The job demands-resources model of burnout. Journal of Applied Psychology, 86, 499-512.

11. Eckleberry-Hunt, J., Lick, D., Boura, J., Hunt, R., Balasubramaniam, M., Mulhem, E., & Fisher, C. (2009). An exploratory study of resident Burnout and Wellness. Academic Medicine, 84, 269-277

12. Edwards, D., Burnard, P., Coyle, D., Fothergill, A., & Hannigan, B. (2000a). Stress and burnout in community mental health nursing: a review of the literature. Journal of Psychiatric and Mental Health Nursing, 7, 7-14.

13. Edwards, D., Burnard, P., Coyle, D., Fothergill, A., & Hannigan, B. (2000b). Stressors, moderators and stress outcomes: findings from the All-wales Community Mental Health Nurse Study. Journal of Psychiatric and Mental Health Nursing, 7, 529-537.

14. Entwistle, N., & Ramsden, P. (1981). Understanding student learning. London: Croom Helm.

15. Eysenck, M.W. & Calvo, & M.G. (1992). Anxiety and performance: The processing efficiency theory. Cognition and Emotion, 6, 409-434.

16. Fothergill, A., Edwards, D., & Burnard, P. (2004). Stress, burnout,coping, and stress management in psychiatr-

ists: Findings from a systematic review. International Journal of Social Psychiatry, 50, 54–65.

17. Freedman, P.E. (1966). Human maze learning as a function of stress and partial reinforcement. Psychological Reports, 18, 975-981.

18. Frese, M., & Stewart, J. (1984) Sill learning as a concept in life-span developmental psychology; An action theoretic analysis. Human Development, 27, 147-162.

19. Fuller, F.F. (1969) Concerns of Teachres: A Developmental Conceptualization. American Educational Research Journal, 6, 20-26.

20. Girard, D.E., Sack, R.L., Reuler, J.B. Chang, M.K., & Nardone, D.A. (1980). Survival of the medical internship. Forum On Medicine,3, 460-463.

21. Hall, G., & Hord, S. (1987). Change in schools: Facilitating the process. Albany, NY: State University of New York Press.

22. Halbesleben, J.R.B., & Buckley, M.R. (2004). Burnout in organizational life. Journal of Management, 30, 859–879

23. Hobfoll, S.E. (1989). Conservation of resources: A new attempt at conceptualizing stress. American Psychologist, 44, 513-524.

24. Hobfoll, S.E. & Freedy, J. (1993). Conservation of resources: A general stress theory applied to burnout. In W.B. Schaufeli, C. Maslach & T. Marek (Eds.), Professional burnout: Recent developments in theory and research (115-131). Washington, DC: Taylor & Francis.

25. Holman, D.J., & Wall, T.D. (2002). Work Characteristics, Learning-Related Outcomes, and Strain: A test of Competing Direct Effects, Mediated, and Moderated Models. Journal of Occupational Health Psychology, 7, 283-301.

26. Houkes, I., Janssen, P.P.M., Janssen, De Jonge, J., & Nijhuis, F.J.N. (2001). Specific relationships between work characteristics and intrinsic motivation, burnout and turnover intention: A multi-sample analysis. European Journal of Work and Organizational Psychology, 10, 1-23.

27. Jackson, S.E., & Maslach, C. (1982). After-effects of job related stress: families as vistims. Journal of Occupational Behavior. 3(1) 63-77.

28. Judge, T.A., Bono, J.E., & Locke, E.A. (2000). Personality and job satisfaction: The mediating role of job characteristics. Journal of Applied Psychology, 85, 237-249.

29. Kahn, R.L., Wolfe,D.M., Quinn, R.P., Snoek, J.D. & Rosenthal, R.A. (1964). Organizational stress: studies in role conflict and ambiguity. New York: Wiley.

30. Karasek, R.A. (1979). Job demands, job decision latitude and mental strain: Implications for job design. Administrative Science Quarterly, 24, 285-308.

31. Karasek, R.A., & Theorell, T. (1990). Healthy work: Stress, productivity and the reconstruction of working life. New York: Wiley

32. Kompier, M.A.J. & Marcelissen, F.H.G. (1990). Handbook work stress : A systematic approach for organizational practice, Amsterdam, NIA.

33. Kwakman, K. (2001). Work stress and work-based learning in secondary education: testing the Karasek model. Human Resource Development International, 4, 487-501.

34. Lazarus, R.S., & Folkman, S.E. (1984). Stress, appraisal, and coping. New York: Springer.

35. Leiter, M.P., & Maslach, C. (2000). Burnout and Health. Handbook of health psychology. 415-426.

36. LePine, J.A., LePine, M.A., & Jackson, C.L. (2004). Challenge and Hindrance Stress: Relationships With Exhaustion, Motivation to Learn, and Learning Performance. Journal of Applied Psychology, 89, 883-891.

37. Luthans, F., Avey, J.B., Avolio, B.J., Norman, S.M., & Combs, G.M. (2006). Psychological capital development: Toward a micro-intervention. Journal of Organizational Behavior, 27, 387-393.

38. Martocchio, J.J. (1994). Effects of conception of ability on anxiety, self-efficacy and learning in training. Journal of Applied Psychology, 79, 819-825.

39. Maslach, C., Jackson, S. E., & Leiter,M. P. (1996). Maslach Burnout Inventory manual, 3rd ed., Palo Alto, CA: Consulting Psychologists Pres.

40. Maslach, C., & Jackson, S.E. (1981). The measurement of experienced burnout. Journal of Occupational Behavior, 2, 99-113.

41. Maslach, C., & Leiter, M.P. (2008). Early Predictors of Job Burnout and Engagement. Journal of Applied Psychology, 93(3), 498-512.

42. Maslach, C., Schaufeli, W.B., & Leiter. M.P. (2001). Job Burnout. Annual Review of Psychology, 52,397-422.

43. McManus, I. C., Winder, B. C., & Gordon, D. (2002). The causal links between stress and burnout in a longitudinal study of UK doctors. Lancet, 359, 2089–2090.

44. Meijman, T.F., & Mulder, G. (1998). "Psychological aspects of workload", in Drenth, P.J.D. & Thierry, H. (Eds), Handbook of Work and Organizational Psychology, 2, Psychology Press, Hove, 5-33.

45. Muhr, T. (1991) ATLAS/ti- A prototype for the support of text interpretation. Qualitative Sociology, 14, 49-71.

46. Ogínska-Bulik, N. (2006). Occupational stress and its consequences in healthcare professionals: the role of type D personality. International Journal of Occupational Medicine and Environmental Health, 19(2), pp. 113-122.

47. Ones, D.S., Dilchert, S., Viswesvaran, C, & Judge, T.A. (2007) In support of personality assessment in organizational settings. Personnel Psychology, 60, 995-1027.

48. Onstenk, J.H.A.M. (1997) Lerend leren werken: brede vakbekwaamheid en de integratie van leren, werken en innoveren. (Dissertation) Delft: Eburon.

49. Ostroff, C., & Kozlowski, W.J. (1992) Organizational socialization as learning process: the role of information acquisition. Personnel Psychology, 45, 849-874.

50. Parker, S.K., & Sprigg, C.A. (1999). Minimizing strain and Maximizing Learning: The role of Job Demands, Job Control, and Proactive Personality. Journal of Applied Psychology, 84, 925-939.

51. Patel, N. (2008) Burnout: the darker side of stress. NZ Business, 22(3), 30-48.

52. Pöhlmann, K., Jonas, I., Ruf,S., & Harzer, W. (2005). Stress, burnout and health in the clinical period of dental education. European Journal of Dental Education,9, 78-84

53. Poulton, E.C. (1971). Skilled performance and stress. In P. Warr (Ed), Psychology at work (55-75). Harmondsworth: Pinguin.

54. Prins, J.T., Gazendam-Donofrio, S.M., Tubben, B.J., van der Heijden, F.M.M.A., van de Wiel, H.B.M., & Hoekstra-Weebers, J.E.H.M. (2007a). Burnout in medical residents: a review. Medical Education, 41, 788-800.

55. Prins, J.T. , Hoekstra-Weebers, J.E.H.M., van de Wiel, H.B.M., Gazendam-Donofrio, S.M., Sprangers, F., Jaspers, Fr.C.A., & van der Heijden, F.M.M.A. (2007b). Burnout Among Dutch Medical Residents. International Journal of Behavioral Medicine,14, 119–125.

56. Rowe, M.M. (1997). Hardiness, stress, temperament, coping, and burnout in health professionals. American Journal of Health Behavior, 21(3), 163-171.

57. Shanafelt, T.D., Bradley, K.A., Wipf, J.E., & Black, A.L. (2002). Burnout and Self-Reported Patient Care in an Internal Medicine Residency Program. Annuals of Internal Medicine, 136, 358-367.

58. Siegrist, J. (1996). Adverse health effects of high effort-low reward conditions. Journal of Occupational health Psychology, 15, 27-41.

59. Skovolt, T.M., & Ronnestad, M.H. (1992) Themes in therapist and counselor development. Journal of Counseling & Development, 70, 505-515.

60. Strauss, A.L., & Corbin, J.M. (1998). Basics of qualitative research. Techniques and procedures for developing grounded theory. Thousand Oaks: Sage

61. Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12, 257-285.

62. Taris, T. W., & Bakker, A.B., Schaufeli, W. B.(2005). Job control and burnout across occupations. Psychological Reports, 97, 955-961.

63. Taris, T.W., & Kompier, M.A. (2004). Job characteristics and learning behavior. In P.L. Perrewe & D.C. Ganster (Eds.), research in occupational stress and well-being: Exploring interpersonal dynamic (Vol. 4, 127-166). Amsterdam: JAI Press.

64. Taris, T.W., Kompier, M.A., de Lange, A.H., Schaufeli, W.B., & Schreurs, P.J.G. (2003). Learning new behavior patterns: a longitudinal test of Karasek's active learning hypothesis among Dutch teachers. Work & Stress, 17, 1-20.

65. Taris, T.W., Kompier, M.A., & Wienlenga-Meijer, E.G.A. (2006). Leren op het werk: Een handelingstheoretisch perspectief. Gedrag & Organisatie, 19, 69-89.

66. Teigen, K.H. (1994). Yerkes-Dodson: A law for all seasons. Theory & Psychology,4, 525-547.

67. Thoresen, C.J., Bradley, J.C., Bliese, P.D., & Thoresen, J.D. (2004). The big five personality traits and individual job performance growth trajectories in maintenance and transitional job stages. The Journal Of Applied Psychology, 89, 835-53.

68. Tyssen, R., Vaglum, P., Gronvold, N.T., & Ekeberg, O. (2000). The impact of job stress and working conditions on mental health problems among junior house officers. A nationwide Norwegian prospective cohort study. Medical Education, 34, 374-84.

69. Tyssen, R., Dolatowski, F.C., Rovik, J.O., Thorkildsen, R.F., Ekeberg, O., Gude, E.H.T., Gronvold, N.T., & Vaglum, P. (2007) Personality traits and types predict medical school stress: a six-year longitudinal and nationwide study. Medical Education, 41, 781, 787.

70. Vahey, D.C., Aiken, L.H., Sloane, D.M., Clarke, S.P., & Vargas, D. (2004). Nurse burnout and patient satisfaction. Medical Care, 42, 57-66.

71. Van Maanen, J., & Schein, E.H. (1979). Toward a theory of organizational socialization. Research in Organizational Behavior, 1, 209-264.

72. Van Yperen, N.W., & Sneijders, T.A.B. (2000). A multilevel analysis of the demands-control model: Is stress at work determined by factors at the group level or the individual level? Journal of Occupational Health Psychology, 5, 182-190.

73. Willcock, S.M., Daly, M.G., Tennant, C.C., & Allard, B.J. (2004). Burnout and psychiatric morbidity in new medical graduates. The Medical Journal Of Australia, 181, 357-360.

74. Warr, P.B., & Downing, J. (2000). Learning strategies, learning anxiety and knowledge acquisition. British Journal of Psychology, 91, 311-333.

75. Weststar. J. (2009). Worker Control and Workplace Learning: Expansion of the Job Demand-Control Model. Industrial Relations, 48, 533-548.

76. Xanthopoulou, D., Bakker, A.B, Demerouti, & E., Schaufeli, W.B. (2007). The Role of Personal Resources in the Job Demands-Resources Model. International Journal of Stress Management ¸ 14, 121-141.

77. Yerkes, R.M., & Dodson, J.D. (1908). The relation of strength of stimulus to rapidity of habit-formation. Journal of Comparative Neurology and Psychology, 18, 459-482.