

How Electronic Health Records influence the Quality of Work of healthcare employees: A narrative systematic review

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Abstract

The healthcare sector in the Western world has seen an increasing demand for healthcare employees as well as an increase in burnout, stress, and turnover rates. These developments coincide with the rapid adoption of Electronic Health Records (EHRs). One of the intended benefits of EHRs is to improve the working conditions of healthcare employees, yet studies suggest that they also increase job strain. An overview of studies on this topic does not exist, and that is why the purpose of this study is to provide a synthesis and overview of empirical research that report the influence of EHRs on the Quality of Working Life (QWL) of healthcare employees. To explain and predict job strain, the job Demand-Control-Support-Model (DCSM) is used, which in turn explains the Quality of Working Life. Overall, we show that the use of EHRs most likely leads to an increase in job demands, a decrease in job control, and an increase in social support. When applied to the DCSM, it appears that the most likely scenario is the “High Strain” Collective. Practical implications to remedy the decrease in QWL are consistent EHR training and creating awareness of the benefits of EHRs.

Keywords: Quality of Working Life (QWL); Electronic Health Records (EHRs); healthcare; healthcare employees; job demands; job control; social support

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Introduction

In recent years, the Western world has seen an increasing demand for healthcare employees (Afolabi et al., 2018; Alpern et al., 2013) as well as an increase in burnout, stress, and turnover rates in healthcare (Kim & Lee, 2009; Siefert et al., 1991). These developments coincide with the rapid increase in Electronic Health Records (EHRs) use (Shanafelt et al., 2016; Shanafelt et al., 2019). Generally, the purpose of EHRs is to digitize patient information exchange among departments and other healthcare organizations and to streamline provider workflow and efficiency (Han et al., 2020; Meskó et al., 2017). One of the intended benefits of EHRs is to improve the working conditions of healthcare employees (Menachemi & Collum, 2011). Research that focused on the technical aspects of EHRs showed that it indeed increased efficiency since these studies focused on the functionality of the systems themselves (Kuzel et al., 2012). From a strategic management point of view, it is essential to maintain low turnover rates and high attractiveness of healthcare jobs, but studies show that the adoption of EHRs has the opposite effect on healthcare employees, namely an increased job strain (Entzeridou et al., 2018; Menachemi & Collum, 2011). To investigate the favorableness of the job environment, Quality of Working Life (QWL) will be looked at, which can be explained by job strain. High job strain can result in higher turnover rates and a decrease in the attractiveness of jobs (Campo et al., 2009).

To understand QWL, the job Demands-Control-Support-Model can be used (Theorell et al., 1990). This model uses three psychological risk factors: job demands, job control, and social support (Elsass & Veiga, 1997; Karasek, 1979). Job demands refer to psychological stressors involved in fulfilling a workload (Karasek, 1979). Job control is defined as the authority that employees possess regarding work-related tasks and how they behave (Karasek, 1979). Social support focuses on the interaction employees have with co-workers and supervisors (Johnson & Hall, 1988; Landsbergis, 1988). The DCSM argues that a high level of job control and high social support reduces the risk of job strain in roles with high job demands (Johnson & Hall, 1988; Theorell et al., 1990). Contrarily, an imbalance between levels of job demands, control, and social support can increase job strain (Theorell et al., 1990). This, in turn, can increase higher turnover rates and unattractiveness of the jobs.

The existing literature has focused on the influence of EHRs on one or more aspects of QWL of healthcare employees (Babbott et al., 2014; Chao, 2016; Gajra et al., 2020; Gardner et al., 2019; Howard et al., 2013; Kroth et al., 2019; Lou et al., 2022; McPeck-Hinz et al., 2021;

Robertson et al., 2017; Zaresani & Scott, 2020). However, to our knowledge, there is no comprehensive literature review on the influence of EHRs on QWL of healthcare employees.

Drawing on the previously stated assumptions, this leads us to the research question: *How does the adoption of Electronic Health Records in healthcare organizations influence the Quality of Working Life of healthcare employees?*

Three sub-questions were made to develop an answer to the main research question. The sub-questions are as follows:

- *How does the adoption of EHRs in healthcare organizations influence job demands of healthcare employees?*
- *How does the adoption of EHRs in healthcare organizations influence job control of healthcare employees?*
- *How does the adoption of EHRs in healthcare organizations influence social support of healthcare employees?*

The contribution of this Narrative Systematic Review (NSR) is twofold: first, this review will contribute to the scientific field by providing an NSR on all available literature regarding the topic. Second, this review will contribute to management practice by setting out possible QWL scenarios as a result of adopting EHRs and possible strategies to improve QWL of healthcare employees.

Conducting an NSR allowed us to investigate the main topic in a variety of ways. First, the reason for systematically reviewing the existing literature, contrarily to non-systematically, was due to its high reproducibility (Xiao & Watson, 2019). Researchers can replicate this study in the future to identify any changes or developments in literature. Moreover, it allowed us to objectively search for studies and synthesize these studies (Xiao & Watson, 2019). Second, narrative reviews allow us to state a broad research question (Rother, 2007) which was needed due to conducting the first review regarding this topic. Moreover, a narrative review method was applied since it allowed us to investigate both qualitative and quantitative studies which were needed to answer our research question (Green et al., 2006; Randolph, 2007).

The article selection was performed using the electronic database Web of Science and PubMed. Web of Science is a general database that covers most academic fields which allows the focus on strategic management whereas PubMed is a more specified database focusing on the healthcare and medical field (Ridley, 2012). Furthermore, both databases can be searched

with well-structured and considered search queries which resulted in systematically narrowing down the number of studies available. After the first selection method, the studies that did not meet the quality standards and inclusion criteria were eliminated to end up with a selection of 10 highly relevant studies.

This study is structured as follows. First, the key concepts of this research will be explained in the theoretical framework. Secondly, the methods of research will be stated, including the article selection and an overview of selected articles. Thirdly, the results derived from the selected studies will be provided, analyzed, and interpreted. Fourthly, the discussion will be stated, the various kinds of contributions will be provided, and the conclusions will be given. Finally, limitations will be provided regarding this study, and recommendations for future research will be stated.

Theoretical Framework

This section will further discuss the concepts that are central to this study. First, background information and academic findings regarding Electronic Health Records (EHRs) will be explained. Second, the Quality of Working Life (QWL) will be discussed by emphasizing the job Demands-Control-Support-Model (DCSM) that was used throughout this research. Lastly, academic findings will be shown regarding the relationship between healthcare and QWL.

2.1 Electronic Health Records

Electronic Health Records (EHRs) refer to a comprehensive, longitudinal, cross-institutional collection of patients' health documents and healthcare data (Hoerbst & Ammenwerth, 2010). The core functionalities of EHRs, as described by Tang (2003), are results management, health information and data storage, order management, decision support, electronic communication and connectivity, administrative processes, reporting, patient support, and population health management. EHRs allow authorized providers to share digitally formatted patient records with other providers across more than one healthcare organization (Cowie et al., 2017). There is a variety of digital systems highly similar to EHRs, e.g. Health Information Technology (HIT), Electronic Medical Records (EMR), and Digital Health Technology (DHT), which all aim to digitally support healthcare and maintain, or improve, the quality (Waegemann et al., 2002). These digital systems share very similar characteristics (Alanazi et al., 2020). EHRs, however, are most prominently investigated in academic research (Alanazi et al., 2020) and will be used throughout the present study referring to these similar digital technology systems as well.

EHRs have been causing major digital transformations in the Western world regarding the healthcare sector (Han et al., 2020; Meskó et al., 2017). In the Netherlands, for example, national healthcare information exchange had become possible on April 5, 2022 (LSP, 2022), which made EHRs a necessity for healthcare organizations to have access to and contribute to the shared information system (Thakkar & Davis, 2006). The same rapid developments took place in the United States, where the American Recovery and Reinvestment Act passed by the United States government has shifted the health sector to a digital age by mandating all healthcare facilities to adopt a certified EHR system (ARRA, 2009). Healthcare facilities that did not meet the standard would be reduced by 1% of Medicare reimbursements yearly until the standard was met (Barrett, 2018). All in all, EHRs became essential or even mandatory digital systems for organizations in the healthcare landscape.

2.2 Quality of Working Life

Quality of Working Life (QWL) has assumed increasing interest and importance in many professions and fields for both employees and employers (Dutta & Singh, 2015). QWL is a multi-faceted concept and is used interchangeably with terms such as “Quality of Work” or “Quality of Work Life” (Md-Sidin et al., 2010). For consistency, the term “Quality of Working Life” (QWL) will be used throughout this study.

Initially, QWL focused on legislative actions taken to improve work working conditions such as the eight-hour work day and forty-hour work week (Walton, 1973). Later, according to Huang et al. (2007), QWL referred to the favorable environments and conditions of the workplace which address the welfare and well-being of employees. Lewis et al. (2001), however, argued that QWL not only focuses on the favorableness of the environment but also on the weaknesses. Furthermore, Kaushik and Tonk (2008) argue that QWL includes as well the quality of the balance between employees and the total working environment. Evidently, the purpose of QWL has changed. Nowadays, QWL covers the characteristics of the work and work environment which in turn, influences the employee’s work lives (Bagtasos, 2011). More specifically, QWL encompasses the desired favorable interaction between the worker, what the worker does, and the condition or environment an employee does the job (Bagtasos, 2011). QWL increased in popularity since it not only resulted in an increase in employee satisfaction, it also had major benefits for the organization, e.g. lower turnover rate, less burnout and stress, and higher performance (Walton, 1973). The total work environment received importance and interest since it motivates effective job performance (Gnanayudam & Dharmasiri, 2007) and work attitude (Trau & Härtel, 2007).

QWL can be measured by focusing on job strain (Carayon, 1993). Job strain is a characteristic of a work environment that is perceived as a threat to an individual (Caplan et al., 1979). Job strain can be predicted by looking at three psychosocial risk factors: job demands, job control, and social support (Carayon, 1993). The following sections will discuss the job Demands-Control-Support-Model (DCSM) which is used to measure job strain, and thus QWL.

2.2.1 Job Demands-Control-Support-Model

The Job Demands-Control model (Karasek, 1979) focuses on two dimensions: job demands and job control. These two dimensions were identified as essential job characteristics influencing job strain. Although the main purpose of the model is to investigate and predict job strain, it can also be used in a broader way to further develop or help job design and support

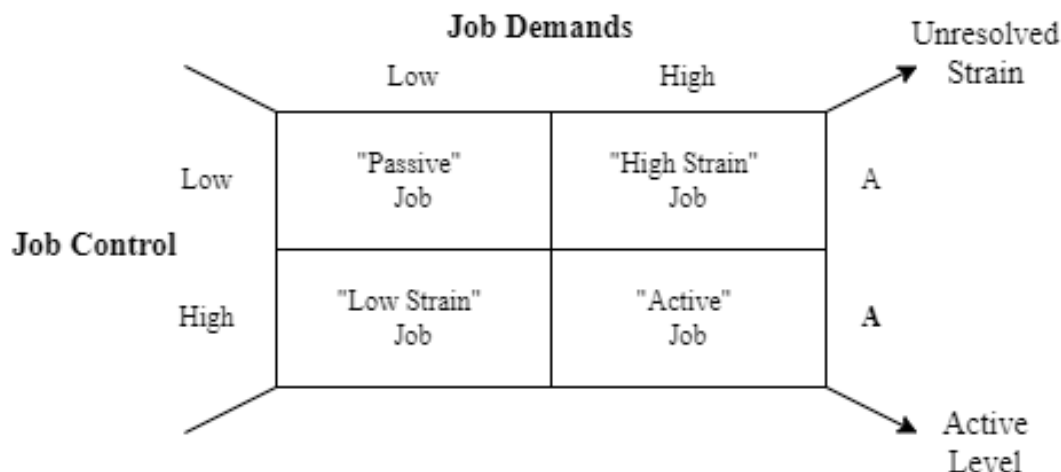
employee well-being (Landsbergis, 1988). As can be observed in figure 1, there are two sides to Karasek (1979)'s model, making four quadrants. The model distinguishes four situations employees can find themselves in which are based on high or low job demands and high or low job control. When both job demands and job control are high (Csikszentmihalyi, 1975), this results in the individual having an "active job". Karasek (1979) claims that this type of job will result in people developing new behavioral patterns in and outside of their jobs. The opposite of "active jobs" are jobs with both low job demands and low job control; "passive jobs". These kinds of jobs enhance a decrease in overall activity and work, and a decline in general problem-solving activities and decision-making freedom (Karasek, 1979). The most demanding and stressful jobs are when job demands are high and job control is low (Karasek, 1979). These jobs entail a high active involvement in work, but hardly any power to make decisions which results in a highly stressful job. In terms of this model, the last quadrant would explain the least stressful job; "low strain job". This is when job demands are low and job control is high (Karasek, 1979).

Furthermore, the model contains two predictions, "A" and "B", as can be seen in the model and describe "unresolved strain" and "active level" respectively (Karasek, 1979). Prediction "A" corresponds to the bottom-left to the top-right diagonal line and explains that when strain increases the job demands increase as well (Friedman et al., 1958) compared to job control (Beehr, 1976; Frankenhaeuser & Gardell, 1976; Frankenhaeuser & Rissler, 1970; Glass & Singer, 1972). The second prediction, the top-left to the bottom-right diagonal line "B", explains when individuals have sufficient skill or control level in coping with a given challenge, incremental additions to their competencies are predicted to arise (Karasek, 1979).

Taking this model into account while managing employees' job strain is essential to establishing a desirable QWL. Failing to do so may result in higher turnover rates, stress, and burnout (Walton, 1973). The key to this model is that even though job demands are high, this can still be eased by providing this individual with high job control (Karasek, 1979). However, this can only be achieved if the organization is aware of the job strain derived from the job content.

Figure 1

The Demand-Control Model (Karasek, 1979)



2.2.2 Job Demands

Job demands are set by the workplace or job and focus on the aspects of work dedicated to a person to fulfill the job (Karasek, 1979). Job demands are described by Perrewe and Ganster (1989) as the capacity of a worker to accomplish the work provided in a given period. According to Karasek (1979), the purpose of building the scale of job demands is to measure the psychological stressors in various fields. The fields he describes, and will be applied to this research, are accomplishing *workload*, stressors linked to *unexpected tasks*, and *job-related personal conflict*. Job demands are not necessarily negative, but when high demands are involved in meeting those job demands, they can transform into job stressors (Bakker et al., 2003). Generally, the job demands section of the model focuses on time pressure and work pace. The feeling of stress or burnout could derive from this demand due to job strain and may lead to extensive consequences for QWL (Carayon, 1993). In addition, an overload of job demands can lead to more task errors (Perrewe & Ganster, 1989).

2.2.3 Job Control

The job control section of the model focuses on the amount of control an employee has in their job regarding the job demands set by the workplace (Karasek, 1979). In other words, job control refers to the amount of control an individual has to act autonomously in their job and to the degree of freedom employees have in terms of applying their knowledge and experience. Combining the degree of control with an individual's skill level is often related and

results in job control (Quick, 1990). Job control can act as a mediator to the repercussions of job demands (Theorell et al., 1990). Jobs with high job demands and low job control lead to job strain. However, when job control is higher it acts as a mitigator and can reduce the severeness of job strain. Furthermore, if sufficient job control is provided by the job, individuals are more likely to be satisfied with their job and achieve their goals, which in turn decreases burnout, stress, and turnover rates.

Karasek (1979) explains that there are two measurable subdimensions regarding job control. These are *decision authority* and *intellectual discretion*. Decision authority is the amount of control or freedom an individual has over their job's decision-making (Karasek, 1979). Intellectual discretion explains how much leeway an individual has in applying personal knowledge or experience, and is not prohibited by that (Karasek, 1979).

2.2.4 Social Support

As mentioned before, a third dimension was added to Karasek (1979)'s Job Demands-Control model around the 1980s, namely; social support. This resulted in the job Demands-Control-Support-Model (DCSM). This adapted model, which can be seen in figure 2, explains that the social support from both co-workers and the supervisor is as important as the other two dimensions, and it further mitigates the influence of job demands and job control on the total job strain (Johnson & Hall, 1988). Social support is described by Quick (1990) as the level of helpful social interaction accessible on the job provided by co-workers or supervisors. That is why the two subdimensions of this part of the model are; *social support from co-workers* and *social support from a supervisor*. This results in table 1 describing all dimensions and subdimensions of QWL.

Table 1

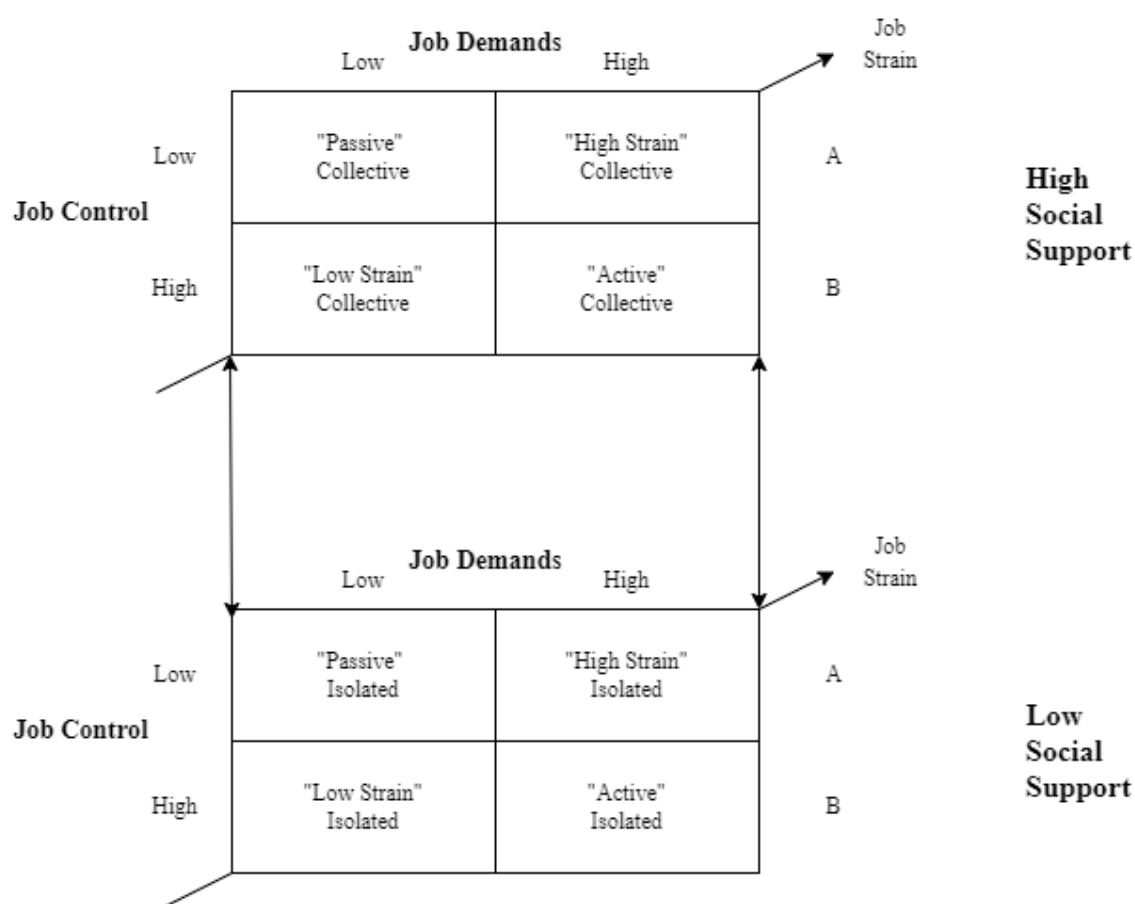
Summary of Quality of Working Life dimensions and subdimensions

Quality of Working Life	Job Demands	Workload
		Unexpected tasks
		Job-related personal conflict
	Job Control	Decision authority
		Intellectual discretion
	Social Support	Level of social support by co-workers
		Level of social support by supervisors

Research conducted by Van Yperen and Hagedoorn (2003) explains the relationships between social support, job demands, and job control and found that low control and high social support can attenuate the effects of high job demands and low control. Furthermore, social support from and to co-workers has been observed to have a moderate to high effect on the outcomes resulting from the relationship between job control and job demands (Johnson & Hall, 1988). The same effect has been seen in supervisory support. Moreover, to limit job strain from high job demands, it is necessary to have high job control. What has to be understood is that social support is more complex than job demands and job control, since it only functions as a mediator between the other two dimensions (Van Yperen & Hagedoorn, 2003).

Figure 2

The Demand-Control-Support Model (Johnson & Hall, 1988; Theorell et al., 1990)



2.3 Empirical Setting

The current study focuses on QWL of employees in the healthcare sector. Healthcare refers to all the services that medical professionals provide to preserve people's physical and mental well-being (Agarwal, Guodong, DesRoches, & Jha, 2010; Marques & Ferreira, 2020). Examples of healthcare facilities are hospitals and family physicians but also nursing homes and assisted living. What we understand as healthcare employees is anyone who delivers care and services to healthcare patients, either directly as a physician or a nurse, or indirectly in terms of helpers or laboratory technicians (Joseph & Joseph, 2016). Thus, all healthcare facilities with all healthcare employees will be considered in the present study, as long as the use of EHRs is present. Furthermore, healthcare facilities only in the Western world will be taken into account (European Union, Great Britain, The United States, Canada, Australia, or New Zealand) due to the very distinct social and cultural environment regarding healthcare and the application of EHRs (Anderson et al., 2003). Moreover, healthcare facilities need to either be in the implementation process of EHRs or are already post-implementation. According to Marques & Ferreira (2019) systematic literature review of 45 years of digital healthcare evolution, it is evident that especially over the past 15 years the body of literature on the topic of EHRs in healthcare has drastically increased.

2.4 Healthcare and Quality of Working Life

The QWL and all associated consequences such as burnout, stress, and high turnover rates in combination with healthcare, have become an increasingly popular research topic in academic research. Especially physicians, nurses, and other healthcare employees are affected (Laschinger et al., 2001). For example, West et al. (2018) claim that over fifty percent of physicians are affected by burnout which is connected to negative consequences for healthcare employees' health. Moreover, Laschinger et al. (2001) state that healthcare employees experience lower commitment, lower structural, and psychological empowerment, and are less satisfied with their job due to high job strain which is caused by an increase in job demands and a decrease in job control. On the contrary, in the case of low job strain, the opposite effect was visible (Laschinger et al., 2001).

Job control has been investigated in the healthcare sector as well. Research showed that job control may influence the positive relationship between empowerment and affective commitment (Portoghese et al., 2016). This, in turn, can result in the prevention of emotional exhaustion (Portoghese et al., 2016). Moreover, Laschinger et al. (2001) state that when

healthcare employees have a higher perception of job control, they feel more involved and see their work as more meaningful. Moreover, when healthcare employees feel more job control they perform better and experience higher autonomy in their jobs (Laschinger et al., 2001).

Research was also conducted making use of the entire DCSM in the context of healthcare. According to Sérole et al. (2021), a high job demand with low job control and a low level of support from co-workers would be a strong predictor of job strain and mental health. Furthermore, Landsbergis (1988) states that reported job strain and burnout are significantly higher in jobs that combine high workload demands with low job control. Another study, by Fox et al. (1993), showed that high levels of perceived workload had a significant relationship with low job control to predict job strain.

Methods of Research

To investigate the influence of the adoption of EHRs and QWL on healthcare employees, we conducted a narrative systematic review (NSR). NSRs present a holistic view of a topic and describe the development of a problem or its management (Slavin, 1995). An NSR is a type of literature review and is useful for educational studies as they focus on combining several parts of information into a readable paper (Green et al., 2006). This method was suitable to investigate the research question in a variety of ways. First of all, the reason this paper focused on a systematic research method, rather than a non-systematic review, was to systematically include all relevant available academic papers by applying an objective way of finding studies. Secondly, systematic reviews are useful in academic research due to their high reproducibility (Xiao & Watson, 2019). To our knowledge, this is the first NSR regarding the influence of the adoption of EHRs on QWL of healthcare employees. As digital technology, in this case the use of EHRs, is quickly expanding it seemed appropriate to maintain a systematic research method for future academics to reproduce this paper and further develop the present work. The reason this paper focused on a narrative review method was twofold. First of all, NSRs can be based on both quantitative and qualitative data (Green et al., 2006). The allowance of using both quantitative and qualitative data was necessary due this paper being the first NSR in academic literature regarding our research question and allowing us to focus as broadly as needed. This brings us to the second reason for using a narrative review method, rather than a meta-analysis, which was to be able to state a broad research question (Rother, 2007). Moreover, it is well-known that NSRs are a good fit in the healthcare sector (Jahan et al., 2016). These reasons resulted in the use of an NSR to investigate the research question: *How does the adoption of Electronic Health Records in healthcare organizations influence the Quality of Working Life of healthcare employees?*

3.1 Search Strategy

The search strategy of this review consisted of two consecutive techniques. The first technique was to apply a well-developed search query to two electronic databases; Web of Science (or Clarivate) and PubMed. Web of Science was selected to gain insight into a more general and interdisciplinary database. For example, studies in the field of strategic management or business-related fields can be found in this database (Norris & Oppenheim, 2007). PubMed on the other hand is a database more focused on medical science (Bar-Ilan et al., 2003), which is highly relevant to the topic of this paper. Since this paper intended to find

answers to a combination of both fields, i.e. strategic management and, medical science, these two databases were most relevant.

The queries used in the databases were securely developed to ensure the best and most accurate result, as stated in appendices A and B. The queries for both databases were identical except for the search techniques, e.g. Booleans and field tags. Title and abstract searching were applied to increase the number of hits compared to only title or only abstract searching. A time frame was applied according to a systematic search by Kraus et al. (2021) and Marques and Ferreira (2020) that state that the start of literature on EHRs in the healthcare sector was around 2006. These queries were applied to both electronic databases and all results were imported for the first screening process. Details of this are shown in figure 3 below.

The second technique applied to the search was to examine relevant or chosen studies' references, i.e. snowballing, to identify highly relevant studies that were not published in either database. This technique was applied after the previously stated screening process. Duplicates were excluded and later stages of selection could begin.

3.2 Inclusion and Exclusion criteria

To be incorporated in the review, all studies had to meet the following inclusion and exclusion criteria provided in table 2. The flow diagram of the search strategy is shown in figure 3. This diagram is a summary of the search process and describes briefly which steps were taken to derive the studies selected.

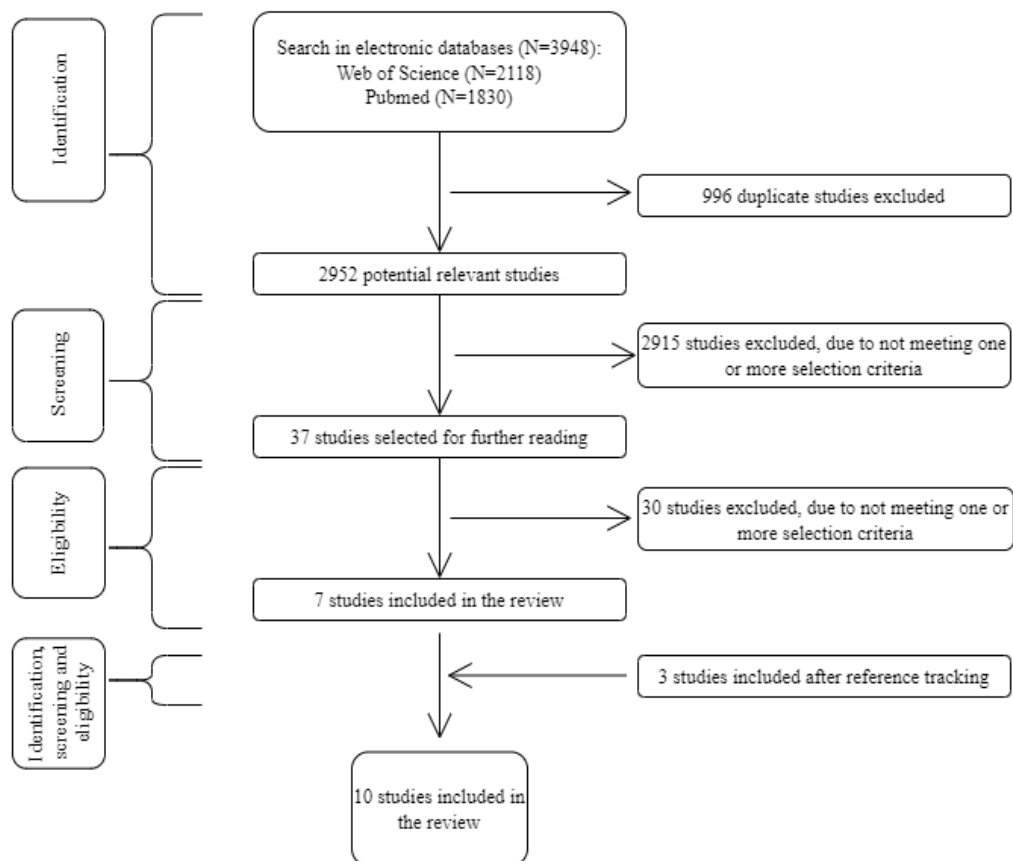
Table 2

Inclusion and exclusion criteria elaborated

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> - Studies have to be written in English. - Studies have to be written about the European Union, Great Britain, The United States, Canada, Australia, or New Zealand. - Studies have to be original empirical studies. - Studies have to be published in a peer-reviewed academic journal. - Studies have to be published from 2006 to 2022. - Studies need to report the influence of EHRs (or one of the other three similar digital systems) on at least one aspect of Quality of Working Life. 	<ul style="list-style-type: none"> - Studies not written in English. - Studies not written about the European Union, Great Britain, The United States, Canada, Australia, or New Zealand. - Non-empirical studies. - Studies not published in a peer-reviewed academic journal. - Studies published before 2006. - Studies that do not report the influence of EHRs (or one of the other three similar digital systems) on at least one aspect of Quality of Working life.

Figure 3

Flow diagram of the search strategy



3.3 Data Analysis

After the selection process described earlier, the findings were extracted in two stages using standardized data-extraction forms (Vermeerbergen et al., 2017). The first stage consisted of categorizing the selected studies into author, year, country of study, type of study, and the number of participants. The type of study refers to a quantitative, qualitative, or mixed-methods approach. The number of participants shown in the table below refers to the number of participants who contributed and participated, and non-responses were not considered. This

first stage is especially important since there are different types of studies selected, i.e. methodologies, and these are interpreted in different ways.

The second stage focused on the content of the papers and consisted of the outcome measures and the main findings. Outcome measures focus on the main elements of the study, regardless of being relevant or not. The main findings provide a small overview of what the study is about and which outcomes were seen as most important according to the author(s). Since the dimensions and subdimensions of QWL are heterogenous, a meta-synthesis of the qualitative papers and a meta-analysis of the quantitative papers was not possible (Vermeerbergen et al., 2017). This is why an NSR approach was applied to all dimensions of QWL.

3.4 Research Ethics

The present study was conducted with an objective position towards the literature that was used to avoid confirmatory biases (Jahan et al., 2016). Furthermore, the quality appraisal of the selected studies was done to an extent that any other biases are acknowledged and avoided. The present study only utilized published studies and were in no way connected to the author of the present study. This study was conducted in the most transparent and objective way possible, in terms of search strategy, results, interpretation of results as well as the reporting of them.

Table 3*Contents of Narrative Systematic Review*

Author Country	(year)	Type of Study	Number of Participants	Outcome Measures	Main Findings
Babbott et al. (2014) U.S. (New York and upper Midwest)	(2014)	Quantitative	n=379	Electronic medical records (EMR), primary care work conditions, physician stress, satisfaction, and burnout	Physicians in the moderate EMR cluster, compared to the low EMR cluster, report more stress and lower satisfaction. Physicians in the high EMR cluster indicate lower satisfaction than in the low EMR cluster. Time pressure was associated with significantly more burnout, dissatisfaction, and intent to leave only in the high EMR cluster.
Chao (2016) U.S. (Midwest)	(2016)	Mixed- Methods	n=29	Electronic Health Records (EHR), work routines, autonomy	EHR improved documentation and information exchange but increased variability in the documentation. In some cases, EHR increased cognitive load. The EHR implementation and changes observed resulted in three factors, under which the infringement of autonomy and flexibility was one.
Gajra et al. (2020) U.S.	(2020)	Quantitative	n=163	Electronic Health Records (EHR), burnout, work-related stress, and workload	64% of physicians felt a substantial amount of stress at work. Most felt emotionally (85%) and physically (87%) exhausted. 93% needed time beyond the time

				allocated to complete work responsibilities. EHR responsibilities caused moderate to excessive stress at work for 67% of physicians and 79% worked on EHR outside clinic hours.
Gardner et al. (2019) U.S. (Rhode Island)	Quantitative	n=1792	Electronic Health Records (EHR), physician stress, and burnout	26% of physicians reported burnout. 70% of EHR users reported HIT-related stress. Physicians reporting moderately high/excessive time on EHR at home had 1.9 times the odds of burnout compared with no EHR users. The proportion that agreed that EHR adds to their daily frustration had 2.4 times the odds of burnout, compared to those who disagreed.
Howard et al. (2013) U.S. (Northeast)	Qualitative		Electronic Health Records (EHR), work burden	The impact of EHR on work burden differed for clinicians compared to support staff. In some cases, the staff work decreased while using EHR, but in some cases, it increased, however, typically EHR use reduced work burdens for staff. For clinicians, the impact was more variable. EHR increased the amount and complexity of work involved in medical record-keeping, had a mixed impact on work related to ordering or reviewing lab results, and decreased work burdens related to prescribing.

Kroth et al. (2019) U.S.	Quantitative	n=282	Electronic Health Records (EHR), clinician stress, and burnout, workload control	The most prevalent concerns about EHR design and use were excessive data entry requirements (86.9%), long cut-and-pasted notes (75.2%), inaccessibility of information from multiple institutions (73.1%), notes geared toward billing (73.1%), interference with work-life balance (63.1%), and problems with posture (51.1%) and pain (47.5%) attributed to the use of EHRs. Coping strategies were associated with only 2.4% of the variability in stress and 1.7% of the variability in burnout
Lou et al. (2022) U.S. (Washington)	Quantitative	n=75	Electronic Health Records (EHR), physician wellness, workload, burnout, medical errors	The use of EHR resulted in an increase in EHR time (from 54.5 h per month to 123 h per month), increased patient load (from 4.9 to 7.1 patients per day), and increased chart review time (.39 to .59 h per patient per day). All of these were associated with an increased burnout score.

McPeck-Hinz et al. (2021) U.S.	Quantitative	n=1310	Electronic Health Records (EHR), clinician burnout, sex, work culture	Women reported more burnout (52% vs men 47.6%). Analysis of burnout revealed that work culture domains were significantly associated with self-reported results for commitment and work-life balance. Overall, clinician sex and local work culture may contribute more to burnout than the use of EHR.
Robertson et al. (2017) U.S. (Virginia, North Carolina, South Carolina, and Florida)	Quantitative	n=585	Electronic Health Records (EHR), work-life balance, burnout,	37% of respondents indicated one or more symptoms of burnout. 75% of this group of respondents attributed their burnout to the use of EHR. 53% reported dissatisfaction with work-life balance, and 85% of this group of respondents indicated that the use of the EHR affected their work-life balance. Respondents that spend more than 6 hours weekly after hours in EHR work were 2.9 times more likely to report burnout and 3.9 times more likely to attribute burnout to the use of EHR. They were .33 times as likely to report work-life balance satisfaction and 3.7 times more likely to attribute their work-life balance satisfaction to the use of EHR.

Zaresani and Scott (2020) Australia	Quantitative	n=7043	Digital health technology, physicians' job satisfaction, work-life balance,	Physicians who used digital health technology were 14.2 percentage points and 20.3 percentage points more likely to report respectively higher job satisfaction and good work-life balance, compared to physicians who did not use this technology.
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Results

To investigate the influence of the adoption of EHRs on QWL of healthcare employees, we conducted an NSR using ten selected studies. Below, we discuss our findings for each dimension of QWL: job demands, job control, and social support. At the end of each section, that describes results found in the selected studies related to the subdimensions, we will interpret the results.

4.1 Job Demands

The subdimensions of job demands are *workload*, *unexpected tasks*, and *job-related personal conflict*. This section will focus on identifying support to answer the sub-question: *How does the adoption of EHRs in healthcare organizations influence job demands of healthcare employees?*

4.1.1 Workload

Seven out of ten studies reported an increase in workload for healthcare employees due to the adoption of EHRs (Babbott et al., 2014; Chao, 2016; Gajra et al., 2020; Gardner et al., 2019; Kroth et al., 2019; Lou et al., 2022; McPeek-Hinz et al., 2021) and the reason for this increase is twofold: working on EHRs at home or after clinic hours and insufficient time for EHR documentation.

Gajra et al. (2020) state that from their sample 79% of healthcare employees work on EHRs outside of clinic hours. The study by Gardner et al. (2019) confirms this finding and states only 12.8% of people using EHRs bring minimal to none of the work home with them and 37.7% claim to spend moderately high to excessive time on the EHR at home. Furthermore, 60% of people using remote EHRs do it because they do not have enough time to perform their tasks within their provided timeframe (Gardner et al., 2019). Also, Kroth et al. (2019) support this claim and state that 60.2% spend moderately high or excessive time on EHR at home. Moreover, McPeek-Hinz et al. (2021) state that a median of 30.5% of the total time working on EHRs is spent after-hours and Lou et al. (2022) claim a median of 9.9 hours per month spend after-hours on the use of EHRs.

Insufficient time for EHR documentation is supported by Kroth et al. (2019) who state that 74.5% of their sample reported time pressure for documentation due to the implementation of EHRs. The study of Gardner et al. (2019) confirms this finding as they state that the majority of EHR users find poor or marginal time sufficiency for EHR documentation.

Chao (2016) provides illustrative quotes made by healthcare employees, such as the ones below, in support of these two types of increases in workload: *“I am using my brain more and spend time double charting.”* (Chao, 2016, p. 104) and:

We free text a lot of info. I find myself focusing on where to click on the screen rather than my pt. I find my usual 20 min process to discuss plan when my pt arrives to unit, now it takes 30–40 min to get through. I find I can’t remember who’s who as well.” (Chao, 2016, p. 104)

On the contrary, two studies reported a decrease in workload for healthcare employees due to the adoption of EHRs (Howard et al., 2013; Zaresani & Scott, 2020). This decrease is twofold: less searching time and communication.

Zaresani and Scott (2020) state that the majority of healthcare employees see less workload due to the adopted EHRs. Howard et al. (2013) provide illustrative quotes made by healthcare employees that support the previous claim, such as the following regarding the use of EHRs for data collection: *“Helps to keep us on track”* (Howard et al., 2013, p. 109) and the following quote regarding the decrease of time in searching for documents and information:

“I think it’s great... Everything’s accessible to you right there. You don’t have to go searching page by page through a folder to find what you want... Like I said, workflow got faster, a lot easier, because everything’s accessible to you.” (Howard et al., 2013, p. 109)

Furthermore, Howard et al. (2013) report a decrease in time spent on communication and an increase in its efficiency of it:

“It took more time [before we got an EHR]. You had to write everything out. You had to wait for [the clinician] in the hallway to ask him questions . . . once he would answer the message, they had to type up the telephone message and stick it onto the paper and put it in their paper chart.” (Howard et al., 2013, p. 109)

Despite these claims regarding a decrease in workload due to the adoption of EHRs, Howard et al. (2013) do mention that these results derive from the perceptions of healthcare employees and that according to their research, in some instances there is an increase of workload due to the adoption of EHRs.

All in all, we can say that an increase in workload due to the adoption of EHRs is more likely since seven out of ten studies support this, contrary to two studies that claim a decrease.

What can be seen is that especially in the case of an increased workload, the effect is not direct. Rather, the indirect effect of the adoption of EHRs on healthcare employees' workload is what causes the increase in workload. As mentioned, the two reasons for an increase in healthcare employees' workload due to the adoption of EHRs: working on EHRs at home or after clinic hours and insufficient time for EHR documentation. Possible explanations for these two reasons are usability and cognitive ability. Chao (2016) for example, mentions that healthcare employees often lacked expertise or experience regarding the use EHRs which leads to an increased workload. Healthcare employees seem to struggle to learn new skills in a rapid manner, which can result in workarounds or working on EHRs at home or after clinic hours. Cognitive ability was seen to be another explanation for the increase in workload for healthcare employees. Babbott et al. (2014) for example, mention that due to the (initial) complexity of the EHRs it is seen that healthcare employees spend more time thinking than before the adoption of EHRs. On the contrary, the two studies that claimed a decrease in workload were due to two reasons: less searching time and communication. Possible explanations for this can be found in Howard et al. (2013)'s study as they mention that healthcare employees do not manually have to search for documents and communication can be done more efficiently due to the use of EHRs.

4.1.2 Unexpected tasks

Three out of ten studies reported an increase in unexpected tasks for healthcare employees due to the adoption of EHRs (Chao, 2016; Howard et al., 2013; Kroth et al., 2019). The reason found for this increase seems to be user inconsistency.

Kroth et al. (2019) state that 76% of productivity was overemphasized due to the adoption of EHRs for healthcare employees. Chao (2016) provides illustrative quotes made by healthcare employees that support the previous claim such as: *"Information is not located in a manner that is conducive to a concise report"* (Chao, 2016, p. 104), *"The EHR is just not really user friendly. This system was made for L&D yet it doesn't have all info needed for delivery."* (Chao, 2016, p. 104) and *"Too many pages printing out with only little info"* (Chao, 2016, p. 104). Moreover, a quote derived from Howard et al. (2013) shows how inconsistently healthcare employees can work: *"Sometimes I forget [some of the prescription information] by the time I get back to the other program."* (Howard et al., 2013, p. 111)

On the contrary, one study states to have seen a decrease in unexpected tasks. The following quote derived from Howard et al. (2013) shows that when healthcare employees work consistently with each other it can result in a decrease in unexpected tasks:

“Literally one Wednesday a month, all personnel would systematically go through all the charts to find all the misplaced charts, as well as if there was any chart missing from sequence... [Since] we’re in computers, we no longer have to do that. Misplacing of charts [doesn’t] happen, which is a beautiful thing.” (Howard et al., 2013, p. 109)

As it can be observed, there is a slight majority of arguments for an increase in unexpected tasks rather than a decrease. A possible explanation for both the increase and decrease of unexpected tasks can be found in several studies (Babbott et al., 2014; Chao, 2016; Howard et al., 2013) and state that when there is collective training for healthcare employees regarding the use of EHRs, unexpected tasks would not arise as quickly, and vice versa.

4.1.3 Job-related personal conflict

Four out of ten studies reported an increase in job-related personal conflict for healthcare employees due to the adoption of EHRs (Babbott et al., 2014; Chao, 2016; Gardner et al., 2019; Kroth et al., 2019). The reason for this increase was based on frustration.

Gardner et al. (2019) claim that 64.2% of the sample agree or strongly agree that EHRs contribute to the frustration of their day. The study of Kroth et al. (2019) confirmed this finding by listing factors and the percentage of healthcare employees dedicating frustration to the following parts of EHRs. Excessive data entry requirements were supported by 86.9% of the sample. Unnecessarily long cut-and-pasted progress notes were claimed by 75.2% of the sample. Moreover, 73.1% of the sample agreed that the inaccessibility of information from other institutions contributes to their stress. Finally, these claims are also supported by Babbott et al. (2014) since they claim more frustration derives from healthcare employees using EHRs with a moderate number of functions compared to healthcare employees using EHRs with a low number of functions. Chao (2016) provides illustrative quotes that also support the claim, such as: *“Difficult to navigate between screens, especially during delivery or c/s. There is information missing and other information is not relevant to our unit.” (Chao, 2016, p. 104)*

One study out of ten describes a decrease in job-related personal conflict. Howard et al. (2013) claim that the effect of EHRs on frustration creates the opposite effect, namely a

decrease: “so you’re not really here at the end of the day trying to go through all these paper things ... that had to be charted.” (Howard et al., 2013, p. 109)

It is more likely that from EHR use job-related personal conflict increases, especially in terms of frustration, since four of ten selected studies support this in contrast to only one study that claims there is a decrease. Possible explanations of the frustration of using EHRs derives from the inability to use them and having little to no experience with the systems (Babbott et al., 2014; Chao, 2016; Howard et al., 2013).

To summarize, the majority of studies claimed an increase in all subdimensions of job demands: workload, unexpected tasks, and job-related personal conflict. The reasons for the increases in job demands were: working on EHRs at home or after clinic hours, insufficient time for EHR documentation, inconsistency, and frustration. On the contrary, decreases in the subdimensions were seen and derived from positive experiences for the same reasons, where healthcare employees felt like they saved time due to the adoption of EHRs. However, the majority of studies claim EHRs result in an increase in the subdimensions and that is why the adoption of EHRs is more likely to lead to an increase in job demands.

Experience and training were observed to be a common theme in both increases and decreases in the subdimensions of job demands. When healthcare employees work consistently with the EHRs, i.e. have the same experience and training, most of the job demands could decrease. Contrarily to this, when healthcare employees work differently or are not experienced and trained enough, this would lead to drastic increases in the subdimensions of job demands. This leads us to answer the sub-question: *How does the adoption of EHRs in healthcare organizations influence job demands of healthcare employees?* Based on the results of the studies, we can say that an increase in job demands as a result of the adoption of EHRs dominates over a decrease, however, both scenarios are possible.

4.2 Job control

The subdimensions of job control are *decision authority* and *intellectual discretion*. This section will focus on identifying support to answer the sub-question: *How does the adoption of EHRs in healthcare organizations influence job control of healthcare employees?*

4.2.1 Decision authority

Three out of ten studies reported a decrease in decision authority for healthcare employees due to the adoption of EHRs (Chao, 2016; Kroth et al., 2019; Robertson et al., 2017).

The reason for this decrease was due to the EHR design. None of the studies reported an increase in decision authority due to the adoption of EHRs.

What can be observed by Kroth et al. (2019) is that almost half of the healthcare employees claim to have poor or marginal control over their workload due to the use of EHRs. Moreover, only 1.4% have optimal control. Moreover, Robertson et al. (2017) found that the majority of respondents claim to have lost decision authority due to the implementation of EHRs. Chao (2016) supports these claims by stating that EHRs are designed in a way in which decision-making is set by the system and healthcare employees are unable to change these systems.

As stated before, decision authority is based on the actual or perceived decision authority employees have on their job. Especially the perceived decision authority is interesting here since due to the EHRs, not much actual decision authority is lost. Rather, it is the experience employees have with digital systems and the way they feel a decrease in decision authority.

4.2.2 Intellectual discretion

One of ten studies reported a decrease in intellectual discretion as a result of the adoption of EHRs for healthcare employees (Howard et al., 2013). The reason for this decrease was due to EHR design. None of the studies reported an increase in intellectual discretion due to the adoption of EHRs.

The following quote derived from Howard et al. (2013) shows the influence of EHRs on the intellectual discretion of healthcare employees. This citation shows us that because of the adoption of EHRs prevents healthcare employees from doing what they normally do and how much control they have over this matter:

The acquisition of a medical history used to be very conversational: 'What medical problems have you had?' 'I've had heart disease all my life and I had bypass surgery and then I had two stents placed...' [Now I have to] say, 'Hold on, I'm just taking your medical history now.' I [have to] close this window and open another window to get the surgical history... So the conversation flow is dictated by the chart... it creates obstacles towards documenting the information. (Howard et al., 2013, p. 110)

To summarize, as a result of the adoption of EHRs, job control has decreased based on all studies that reported a change in job control. Before the adoption of EHRs, healthcare employees could make their own decisions, and more importantly, decisions could differ from

one another due to intellectual discretion. Due to the adoption of EHRs, it is evident that this control is lost and healthcare employees identify it as such. Based on the studies, it is more likely for healthcare employees to experience a decrease in job controls as a result of adopting EHRs. This leads us to answer the sub-question: *How does the adoption of EHRs in healthcare organizations influence job control of healthcare employees?* Based on the results of the studies, we can say that a decrease in job control as a result of the adoption of EHRs dominates over a decrease since there was no evidence found for an increase.

4.3 Social support

The subdimensions of social support are the *level of social support by co-workers* and the *level of social support by supervisors*. This section will focus on identifying support to answer the sub-question: *How does the adoption of EHRs in healthcare organizations influence social support of healthcare employees?*

4.3.1 Level of social support by co-workers

Two of ten studies reported an increase in the level of social support by co-workers (Chao, 2016; Zaresani & Scott, 2020). One study reported a decrease in the level of social support by co-workers (Chao, 2016). The reason for both the increase and the decrease of social support by co-workers was identified as communication.

According to a citation from healthcare employees in the study of Chao (2016), they experienced a decrease in communication among co-workers after adopting EHRs. They claimed the following: *“it is easier for docs to just call to get patient status updates versus looking on the computer themselves.”* (Chao, 2016, p. 107)

Contrarily to this statement, Chao (2016) claims that the surveys focusing on pre- and post-implementation did reveal changes in communication among co-workers. Especially the frequency of intra- and inter-disciplinary communication increased (Chao, 2016). This statement is supported by Zaresani and Scott (2020), that measured an increase in support from colleagues after the adoption of EHRs.

The decrease in social support by co-workers was mainly seen in communication among colleagues. The pre-implementation method, calling, was seen as an easier and quicker way to communicate rather than looking at a screen. This could be because it is quicker to communicate through the phone, but could also be the cause of not knowing how to communicate effectively through EHRs. The increase in social support by co-workers was seen mainly in the data

collected by the researchers rather than the own experiences of healthcare employees. It was observed that especially among co-workers of different departments and specialties had seen an improvement in communication among colleagues.

4.3.2 Level of social support by supervisor

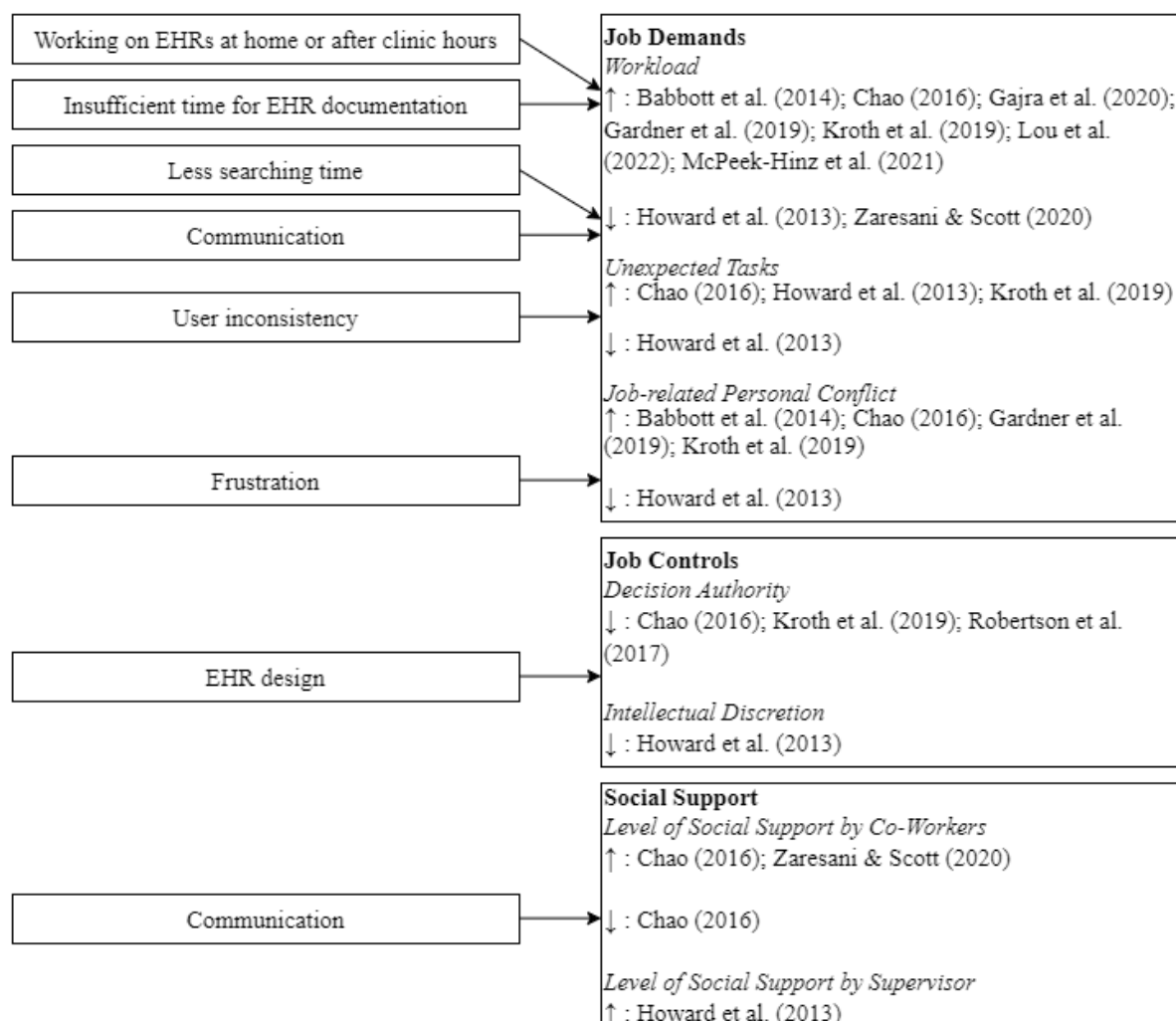
One of ten studies reported an increase in the level of social support by supervisor (Howard et al., 2013). The reason for this increase was identified as communication. None of the studies reported a decrease in the level of social support by supervisor.

According to the following quote derived from Howard et al. (2013), healthcare employees claim to feel an improvement in communication towards and from supervisors and contribute this improvement to the implementation of the technological implementation of EHRs.

“We communicate like this all day long . . . I like the way we just go back and forth with him [through] messages; you don’t have to constantly be searching for him. It’s quick. . . . He can do it between patients . . . so we never really wait real long for any kind of messages.” (Howard et al., 2013, p. 109)

The level of social support by supervisor was observed to have increased after the adoption of EHRs. Instead of directly calling or physically visiting supervisors, employees found that communication through the EHRs in terms of messages was experienced to have improved.

To summarize, both increases and decreases in social support were found. However, there seems to be a slight majority of studies reporting an increase in social support as a result of adopting EHRs. Based on the studies that reported on social support, it seems to be more likely for healthcare employees to gain social support as a result of the adoption of EHRs. This leads us to answer the sub-question: *How does the adoption of EHRs in healthcare organizations influence social support of healthcare employees?* Based on the results of the studies, we can say that an increase in social support as a result of the adoption of EHRs dominates over a decrease, however, both scenarios are possible.

Figure 4*Representation of findings*

Legend: “↑” means an increase of the subdimension as an effect of digital healthcare transformation; “↓” means a decrease of the subdimension as an effect of digital healthcare transformation.

As mentioned, answering three sub-questions allow us to answer the main research question. These will be stated again and summarized below to find an answer to the main research question. The first sub-question is: *How does the adoption of EHRs in healthcare organizations influence job demands of healthcare employees?* Based on the results described before, we can state that as a result of EHRs, the increase in job demands of healthcare employees dominated the decrease. It was found that these effects were caused by working on EHRs at home or after clinic hours, insufficient time for EHR documentation, inconsistency in EHR use, and EHR frustration. Thus, we can state that it is more likely for healthcare employees to feel an increase in workload due to the adoption of EHRs. The second sub-question is: *How does the adoption of EHRs in healthcare organizations influence job control of healthcare employees?* Based on the results, we can state that in all studies that reported job control, a decrease was found. This effect was caused by the perception of healthcare employees experiencing decreased job control. The third and final sub-question is: *How does the adoption of EHRs in healthcare organizations influence social support of healthcare employees?* Based on the results we found that an increase in social support dominated the decrease. This effect was caused by communication. We can state that even though a decrease was reported in one of the studies, it is more likely for healthcare employees to find an increase in social support due to the adoption of EHRs.

The answers to the sub-questions allow us to develop an answer to the main research question. The question that was proposed at the start of this research is as follows: *How does the adoption of Electronic Health Records in healthcare organizations influence the Quality of Working Life of healthcare employees?*

Based on figure 4 and the interpretation described above, several potential scenarios can be derived based on the adoption of EHRs and their resulting QWL dimensions which can be found in figure 5. Placing all outcomes described above in the DCSM, we recognize three possible outcomes, namely: the “High Strain” Collective, the “High Strain” Isolated, and the “Passive” Collective.

Table 4*Possible scenarios Quality of Working Life*

	Job Demands	Job Control	Social Support	DCSM
Scenario 1	+	-	+	"High Strain" Collective
Scenario 2	+	-	-	"High Strain" Isolated
Scenario 3	-	-	+	"Passive" Collective

The first scenario contains the “High Strain” Collective. High strain, as mentioned before, is the most stressful job based on the model. However, it may be mediated by an increase in social support. This scenario does describe a decrease or unfavorable environment related to QWL and is the most likely scenario to happen based on the results. The second scenario describes the “High Strain” Isolated, which is seen as the worst position to be in for employees. This situation is seen as the worst QWL possible, based on the model. The third scenario is the most favorable one, in which the “Passive” Collective is described. Job demands do not increase, however, job control decrease as well. This scenario, however, is mediated by an increase in social support. Although this is the most favorable scenario based on the results of adopting EHRs in healthcare, it is still far from the best one. Job control should have increased to reach the optimal situation.

Discussion and Conclusion

This chapter will consist of a discussion based on the results of the previous chapter. The discussion will consist of strategies that could be applied to increase QWL of healthcare employees during or after the adoption of EHRs. Furthermore, scientific, theoretical, methodological, and practical contributions and recommendations for future studies will be provided. Finally, we will provide the conclusion of this study.

5.1 Discussion

This study presents the first overview of studies that investigates the influence of EHRs on QWL of healthcare employees. Thus far, this study focused on the results of the studies reviewed, healthcare employees are most likely to end up in a “High-Strain” Collective job environment due to the adoption of EHRs. The high job demands and the balance between job demands and job control seem in need of improvement in healthcare facilities since healthcare employees in some studies experience high job demands and low job control. We suggest in this section future research directions on QWL of healthcare employees that use EHRs and provide strategies that could support the improvement of QWL.

5.1.2 Strategies for enhancing QWL based on EHR use

The results of the present review show that too high job demands and too low job control are the main issues in QWL of healthcare employees in healthcare facilities that adopt EHRs. Chao (2016), Babbott et al. (2014), and Howard et al. (2013) suggest a strategy to increase QWL of healthcare employees that work with EHRs: to increase healthcare employee EHR-related training and train employees consistently.

A difference was seen in the studies review regarding job demands, seven showed an increase and two showed a decrease. What was seen in the studies reporting a decrease (Howard et al., 2013; Zaresani & Scott, 2020) was that these healthcare employees were working consistently with the EHRs and were trained more. Contrarily, the seven studies reporting an increase (Babbott et al., 2014; Chao, 2016; Gajra et al., 2020; Gardner et al., 2019; Kroth et al., 2019; Lou et al., 2022; McPeck-Hinz et al., 2021) showed that healthcare employees did not have sufficient training or were trained differently. That is why we base our first strategy on consistent and more training for healthcare employees that come in contact with EHRs, to decrease the repercussions that derive from the use of EHRs. Further research directions could be to investigate the effect of consistent training of healthcare employees in terms of EHR use.

Job control was found to be decreased due to the adoption of EHRs. This was more perception-based rather than actual lost job control, due to the supporting nature of the EHRs. A strategy was suggested by Howard et al. (2013) in which this perception problem should be made clear to healthcare employees. This could be done by explaining and showing healthcare employees that EHRs are not developed to take over their work but to support them in, e.g., decision making.

5.2 Scientific contribution

To our knowledge, there is no NSR available regarding the influence of EHRs on QWL of healthcare employees, which is the scientific contribution the present study has. The impact this study hopes to have is to increase interest and popularity regarding this topic, especially regarding QWL. That is why future studies are needed to increase scientific knowledge. The fact that this study had a systematic approach, rather than a non-systematic, contributes to future research due to its high reproducibility (Xiao & Watson, 2019). The use of EHRs in healthcare is consistently increasing around the world which will lead to more scientific research regarding this topic. Future research can adopt the research method presented in this study to build on the propositions made in this report and to identify any developments regarding the influence of EHRs on QWL of healthcare employees.

5.3 Theoretical contribution

In this study, the main theoretical contribution consists of the three different scenarios that were derived from the results. The scenarios are proposing a starting point in literature but call for further research to be elaborated and confirmed. Moreover, this study outlines the usability of the DSCM since it showed three different scenarios. Furthermore, as seen in academic literature, we can confirm the complexity of the dimension of social support and the mediating effect it can have on the outcome of QWL.

5.4 Practical contribution

The practical contribution of this systematic review is very broad and can be subdivided into the different stakeholders; governments, managers, and employees. The nature of the practical contributions this study provides mainly derives from its usefulness for when these different stakeholders have to implement EHRs in the future or are coping with one at this moment. It is of high importance to manage this process carefully, as it can be observed in the different scenarios.

Governments, as the first relevant stakeholder, can use this systematic review in decision-making related to subsidies and other government-related help programs for the healthcare sector. Since some governments are compelling healthcare facilities to adopt EHRs (ARRA, 2009), they should also be aware of the changes in QWL. As mentioned in the results section, consistent training and education programs could be implemented to decrease the workload for employees. In scenarios where employees are educated differently regarding the EHRs, this could lead to a higher workload. When employees are all trained and educated the same regarding the digital systems, this could lead to better execution of the systems and could result in not only the same amount of workload but could even result in a decreased workload.

Secondly, managers could use this systematic review useful to ensure the adoption of EHRs runs smoothly. Job demands can be decreased by offering consistent training to healthcare employees to create a more consistent way of using EHRs. Job control could be increased by offering healthcare employees an understanding of the potential benefits of EHRs, to show them that decision-authority is not or hardly lost. Furthermore, social support can be provided anytime and will help QWL tremendously.

Lastly, employees may find this NSR useful to ensure being prepared for the adoption of EHRs and the related influences. Since this NSR identified three scenarios that would all lead to a slight or high decrease in QWL, employees could vouch for more training and could gain a better understanding of the benefits of EHRs.

5.5 Conclusion

Employment pressure in the healthcare sector will likely continue to increase. Therefore, low levels of QWL need to be prevented to help decrease negative repercussions such as burnout and high levels of stress and increase work performance. This can be done by decreasing job demands through training, increasing job control, and maintaining high social support. This review examined the influence of EHRs on healthcare employees' QWL. We found that EHRs are most likely to cause higher levels of job demands, lower levels of job control, and an increase in social support. However, when experience and training are present, it was seen to have a positive influence on job demands which increases QWL. Moreover, when healthcare employees are aware of the benefit of EHRs, in terms of decision-making and control, this could increase job control. Therefore, we consider that an increase in training combined with creating awareness of the benefit of EHRs would drastically increase QWL of healthcare employees.

Limitations and Future Research

This NSR comes with several limitations, which open up avenues for future research. The first limitation is that the study sample is limited, as it focuses solely on the EU, USA, Canada, Great Britain, Australia, and New Zealand and not on e.g. Asia, Latin America, or Africa. This was due to the very distinct social and cultural environment and language, also in academic research seen in the Eastern world (Anderson et al., 2003). However, focusing on the Western world created a good understanding of the possible scenarios as a result of the adoption of EHRs on QWL of healthcare employees. Furthermore, what was seen in the ten selected studies was that 9 out of ten focused on (parts of) the USA, and only one on Australia. This could mean that in the USA the topic of EHRs and QWL of healthcare employees is more popular in academic research. This calls for future research regarding Europe, Canada, Great Britain and New Zealand, as none of the studies found through systematically searching were about these countries' healthcare facilities.

The second limitation was regarding the subdimensions of QWL, where all studies reviewed concentrated on a limited number of subdimensions (workload, unexpected tasks, job-related personal conflict, decision authority, intellectual discretion, social support by co-workers, and social support by supervisor). This choice was based on the fact that this was the first NSR, to our knowledge, available and was meant as a starting point in academic literature. Therefore, we suggest that future research puts greater emphasis on the different subdimensions, psychological and physical, of QWL. Moreover, what can be seen in this study is that the core focus was on QWL. There was no focus on the quality of care or the performance of the EHRs which were central to this study. The reason for not focusing on any of these aspects was because of the size of the study it would have been. Focusing on all possible dimensions would not have been possible in the time provided.

The third limitation was regarding the broad focus of the present study. There were made no distinctions between small and large healthcare facilities, type of healthcare facility, or type of healthcare employee. This was because the present study is the first NSR in academic literature. What was seen in the studies discussed was that positive influences on QWL due to the adoption of EHRs were mainly found in smaller-sized healthcare facilities. Again, this calls for future research in which these factors can be investigated.

All in all, this NSR hopes to contribute to academic literature as a starting point to raise popularity and interest among academics. The present study proposed three possible scenarios as a result of EHR adoption but due to the quickly expanding nature of digital technologies, it is expected to consistently grow in terms of academic literature and the interest of all relevant stakeholders.

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Appendix A – Queries and Yield: Web of Science

Search	Query Queries and Yield: Web of Science (11-07-2022)	Yield
#1	(TI=("quality of work" OR QOW OR "quality of working life" OR "quality of work life" OR "job demands" OR "job demand" OR "job control" OR "job content" OR "decision power" OR "decision authority" OR autonomy OR "job demand*" OR "emotional demand*" OR "job variability" OR "time pressure*" OR "job control*" OR "job autonomy" OR "autonomy*" OR "social support" OR "peer support" OR "support social*" OR "support of supervisor" OR "supply of information" OR information OR "work outcome*" OR "health outcome*" OR "work and health outcome*" OR "mental strain" OR strain* OR "work motivation" OR motivation* OR burnout* OR "reduced personal accomplishment*" OR "personal accomplishment*" OR accomplishment* OR depersonalization* OR personalization* OR "emotional exhaustion" OR exhaustion*)) OR AB=("job demands" OR "job demand" OR "job control" OR "job content" OR "decision power" OR "decision authority" OR autonomy OR "job demand*" OR "emotional demand*" OR "job variability" OR "time pressure*" OR "job control*" OR "job autonomy" OR "autonomy*" OR "social support" OR "peer support" OR "support social*" OR "support of supervisor" OR "supply of information" OR information OR "work outcome*" OR "health outcome*" OR "work and health outcome*" OR "mental strain" OR strain* OR "work motivation" OR motivation* OR burnout* OR "reduced personal accomplishment*" OR "personal accomplishment*" OR accomplishment* OR depersonalization* OR personalization* OR "emotional exhaustion" OR exhaustion*))	5,096,611
#2	((TI=(healthcare OR "health care" OR medical OR hospital OR care OR "health facilit*" OR "health service*")) AND TI=(staff OR employee* OR worker* OR professional* OR personnel)) OR AB=(healthcare OR "health care" OR medical OR hospital OR care OR "health facilit*" OR "health service*")) AND AB=(staff OR employee* OR worker* OR professional* OR personnel)	383,368
#3	(TI=(HIS OR "health information systems" OR EHR OR "electronic health records" OR EMR OR "electronic medical records" OR DHT OR "digital health technology")) OR AB=(HIS OR "health information systems" OR EHR OR "electronic health records" OR EMR OR "electronic medical records" OR DHT OR "digital health technology"))	640,000
#4	#1 AND #2 AND #3	3,233
#5	#1 AND #2 AND #3 and English (Languages) and USA or ENGLAND or AUSTRALIA or CANADA or SPAIN or GERMANY or NETHERLANDS or ITALY or SWEDEN or NORWAY or FINLAND or PORTUGAL or SCOTLAND or FRANCE or DENMARK or GREECE or AUSTRIA or IRELAND or BELGIUM or NEW ZEALAND or WALES or SLOVENIA or NORTH IRELAND or CROATIA or CZECH REPUBLIC or BULGARIA or HUNGARY or LITHUANIA or CYPRUS or	2,118

	ESTONIA or LATVIA or LUXEMBOURG or MALTA or ROMANIA or SLOVAKIA (Countries/Regions) and 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 or 2011 or 2010 or 2009 or 2008 or 2007 or 2006 or 2022 (Publication Years)	
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<https://www.webofscience.com/wos/woscc/summary/2b7d7e2f-b642-4c8b-be26-5019aa246720-4887aa7d/relevance/1>

Appendix B – Queries and Yield: PubMed

Search	Query Queries and Yield: PubMed (11-07-2022)	Yield
#1	"job demands"[Title/Abstract] OR "job demand"[Title/Abstract] OR "job control"[Title/Abstract] OR "job content"[Title/Abstract] OR "decision power"[Title/Abstract] OR "decision authority"[Title/Abstract] OR "autonomy"[Title/Abstract] OR "job demand*"[Title/Abstract] OR "emotional demand*"[Title/Abstract] OR "time pressure*"[Title/Abstract] OR "job control*"[Title/Abstract] OR "job autonomy"[Title/Abstract] OR "autonomy*"[Title/Abstract] OR "social support"[Title/Abstract] OR "peer support"[Title/Abstract] OR "support social*"[Title/Abstract] OR "information"[Title/Abstract] OR "work outcome*"[Title/Abstract] OR "health outcome*"[Title/Abstract] OR "mental strain"[Title/Abstract] OR "strain*"[Title/Abstract] OR "work motivation"[Title/Abstract] OR "motivation*"[Title/Abstract] OR "burnout*"[Title/Abstract] OR "reduced personal accomplishment*"[Title/Abstract] OR "personal accomplishment*"[Title/Abstract] OR "accomplishment*"[Title/Abstract] OR "depersonalisation*"[Title/Abstract] OR "depersonalization"[Title/Abstract] OR "personalization*"[Title/Abstract] OR "personalisation*"[Title/Abstract] OR "emotional exhaustion"[Title/Abstract] OR "exhaustion*"[Title/Abstract]	2,471,718
#2	("healthcare"[Title/Abstract] OR "health care"[Title/Abstract] OR "medical"[Title/Abstract] OR "hospital"[Title/Abstract] OR "care"[Title/Abstract] OR "health facilit*"[Title/Abstract] OR "health service*"[Title/Abstract]) AND ("staff"[Title/Abstract] OR "employee*"[Title/Abstract] OR "worker*"[Title/Abstract] OR "professional*"[Title/Abstract] OR "personnel"[Title/Abstract])	443,689
#3	HIS[Title/Abstract] OR "health information systems"[Title/Abstract] OR EHR[Title/Abstract] OR "electronic health records"[Title/Abstract] OR EMR[Title/Abstract] OR "electronic medical records"[Title/Abstract] OR DHT[Title/Abstract] OR "digital health technology"[Title/Abstract]	252,633
#4	#1 AND #2 AND #3	3,233
#5	#1 AND #2 AND #3 and English (Languages) and 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 or 2011 or 2010 or 2009 or 2008 or 2007 or 2006 or 2022 (Publication Years)	1,830