A Literature Review on the Risks and Potentials of Tracking and Monitoring eHealth Technologies in the Context of Occupational Health Management

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Abstract. Employee health is increasingly important, as is the use of eHealth technologies in the private and the organizational context. This paper examines which existing eHealth technologies that support monitoring and tracking of health are applied in occupational health management (OHM) and investigates the advantages and disadvantages of their application. To pursue this intention, we analyze the current state of research with a structured literature review and provide a comprehensive overview of relevant works. The results point out advantages and disadvantages that provide the groundwork to discuss success factors for tracking and monitoring eHealth technologies in OHM. The derived success factors aim at operational, technological, operational/technological aspects of eHealth tracking and monitoring usage. Thereby, favorable outcomes such as an increase in employee health can be achieved, and participation in OHM measures can be increased. However, it can also lead to adverse outcomes such as a reduced work-life balance.

Keywords: Technology Usage, Occupational Health Management, eHealth, Structured Literature Review, Health Monitoring and Tracking

1 Introduction

Many chronic diseases that humanity faces today are associated with an increasingly sedentary modern lifestyle and an unhealthy diet. In industrialized nations, only about one-third of the population is sufficiently physically active [1]. In addition to increasing physical inactivity and an aging workforce, dietary patterns in industrialized countries are characterized by high energy intake and excessive consumption of (saturated) fats, cholesterol, sugar, and salt that [2] classify as unhealthy. Besides, workplace health problems for example, due to prolonged sitting in front of computers increase. A recent study shows that sitting time is mainly spent at the office and increases with increasing age [3].

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However, employee health is essential for productivity and economic as well as social development, as workers make up half of the world’s population and spend a significant amount of time at work [4–7]. Intending to create a healthier work environment, promote lifestyle changes, and thus improve society's health, the World Health Organization (WHO) has acknowledged the workplace as one priority setting for health promotion in the 21st century [4, 8]. Therefore, occupational health management (OHM) emerged as a growing research stream for researchers and practitioners [9]. Although no universally accepted definition of OHM exists, it generally addresses all aspects of occupational health and safety and focuses heavily on various areas related to employee health, such as primary prevention of hazards, but also social and individual factors, and access to health services [10]. Thereby workplace health promotion that focuses on improving people's health by encouraging employees to change their behavior at work contributes significantly to OHM [11, 12]. Albeit the tremendous benefits of OHM, they have been plagued in the past by low employee participation rates and difficulties in tracking employees’ progress. Low participation rates result from skepticism or a lack of interest on the part of employees. The difficulty in measuring employee progress can be due to the high level of data protection that needs to be observed. With the rapid development of eHealth technologies, more and more companies see a promising benefit in integrating digital technologies in their OHM. They wish to revitalize their OHM activities and promote a healthy and active lifestyle for their employees [13, 14]. Next to wearable devices, other digital technologies such as applications on employees’ mobile phones and more complex technologies like smart mirrors for measuring health parameters or risk potentials are also applied [15]. Although the use of eHealth applications in the workplace context is steadily increasing, there is still a lack of clear understanding about which tracking and monitoring eHealth technologies are used for different purposes in OHM. Accordingly, there is a lack of clarity of the advantages and positive consequences of integrating eHealth technologies for tracking and monitoring the employees’ health in the context of OHM and the disadvantages and risks, and limitations of their use [14]. Against this backdrop, we therefore ask the following research questions:

RQ1: Which tracking and monitoring eHealth technologies are applied in OHM?

RQ2: Which advantages and potentials exist within the application of tracking and monitoring eHealth technologies in OHM?

RQ3: Which disadvantages and limitations exist within the application of tracking and monitoring eHealth technologies in OHM?

The paper is organized as follows: In the subsequent section, we provide a theoretical background, while in section 3, we introduce the systematic literature review (SLR) and its process. In section 4, we answer our research questions. In section 5, we discuss our findings by deriving success factors and stating practical and theoretical implications. Section 6 summarizes the study’s limitations and our findings.

2 Theoretical Basics

The introduction of *eHealth* or *electronic health* marked the promise of information and communication technologies (ICTs) to improve health and the health care system [16, 17]. We follow the definition of [18, p. 809] and define eHealth as "the use of internet technology by the public, health workers, and others to access health and lifestyle information, services and support; it encompasses telemedicine, telecare, etc."

In recent years, a trend that has increasingly emerged is the tracking and monitoring of health activities based on smart devices, scientifically often also referred to as self-tracking, quantified-self, or personal analytics [19]. This trend enables the individual to collect a great amount of data on daily activities, exercises, vital parameters, disease symptoms, sleep, and more [20] and offers many valuable possibilities for users. This displays a subset of what general eHealth encompasses. Within these theoretical distinctions and regarding tracking and monitoring of activities, mHealth represents the intersection between eHealth and the application of eHealth supported by smartphone technology that captures, analyzes, processes, and transmits health-related information through sensors other systems [21]. Typically, self-tracking or activity tracking is performed with wearables such as smartwatches and smart clothing that measure physical activity. As no clear distinction between monitoring and activity tracking exists in literature, we follow the characteristic that monitoring is usually performed by a device or external person mainly supervising medical data, while activity tracking records data and displays evaluations, whereby the user itself keeps track of its activities [19, 22].

Our focus on tracking and monitoring in the context of eHealth, along with its underlying technologies, applications, and smart devices, is not exclusively found in the private context but is also increasingly used in the occupational health context [23]. Employee health is influenced by several risk factors at the workplace, leading, among others, to cancer, accidents, musculoskeletal disorders, respiratory diseases, hearing loss, circulatory disorders, stress-related disorders, and communicable diseases [4]. Thereby a distinction between mandatory and voluntary OHM-related initiatives can be observed. While mandatory programs are forced through government legislation, voluntary OHM practices are driven, among others, by employee groups or the company's management [24, 25]. Although the management of occupational health and occupational safety is often grouped under the term OHM, there are marginal but essential differences. Measures to prevent occupational accidents and work-related health hazards and design workplaces ergonomically (occupational safety) are primarily prescribed by law through national occupational health and safety regulations – for example, in Germany through the Occupational Health and Safety Act. Occupational safety and health rules and regulations may be specific to certain industries, certain types of production facilities, the organization, and the design of workplaces. However, compliance with legal requirements is no longer sufficient to gain a competitive advantage in the battle for young talents. For this reason, many companies are offering their employees additional voluntary health benefits [26]. Promoting employee health is also becoming increasingly important considering an aging workforce and rising healthcare costs. Health monitoring is not entirely new; it may soon become the new trend in OHM with the emergence of new technologies to monitor employees.

Combining both concepts (OHM and eHealth) can lead to a reinforcing system. On the one hand, the use of new technologies, like self-tracking devices, turn analogues OHM measures into digital ones making them location-unbound, time-flexible, and more individual, while still offering a competitive experience for users. On the other hand, and against the backdrop of monitoring and tracking capabilities, users are directly informed about their health status and training statistics. Based on these examples, participant rates of OHM measures can be increased and lead to improved employee health awareness [12]. However, little is known about which tracking and monitoring technologies are widely used and what advantages and disadvantages they are associated within the context of OHM.

3 Literature Review of eHealth Technologies in OHM

To analyze the current state in which context eHealth tracking and monitoring technologies in OHM are used and which advantages and disadvantages exist, we conduct an SLR providing an overview of the relevant literature in the respective research field to provide initial insights and answers to the proposed RQs.

3.1 Overview of the Literature Review Process

We incorporate a structured review methodology to identify peer-reviewed articles from electronic databases that increase the quality of material on the issue being studied. Therefore, we applied the procedures of an SLR as proposed by [27–31]. To define the scope of the literature review, [27] and [28] suggest beginning with keyword research and enriching the results with more generic research since the keyword analysis cannot provide all available results from literature. Thus, after conducting an extensive keyword search, the keyword analysis is enriched by a backward search and completed with a forward search. The keyword search was carried out in six different databases known for high-quality literature: Business Source Premier, AIS eLibrary, IEEE Digital Library, Science Direct, Emerald Insight, and ACM Digital Library.

We created two search strings, consisting of significant terms related to the RQs; the synonyms and alternative spellings of these terms as the main concepts ‘occupational health’ and ‘eHealth’ are often named differently. We searched the databases for these two search strings. Boolean operators such as ‘*’ for displaying all possible endings of the respective keyword or ‘-‘ for displaying all possible connections between the two respective keywords also played an essential role in this research because of the various possible combinations of the keywords [32]. The final search strings were:
1) *(“work* health" OR "employee health" OR "occupational health" OR "operational health" OR "corporate health" OR "company health" OR "office health") AND (digital* OR ehealth OR e-health OR "electronic health" OR mhealth OR m-health OR "mobile health")*;

2) ("work* health" OR "employee health" OR "occupational health" OR "operational health" OR "corporate health" OR "company health" OR "office health") AND (tracking OR self-tracking OR self-monitoring OR wearable* OR quantified self).

Since this work focuses on current and future developments in this area, we limited our database search to publications from 2013 onwards. The searches were conducted exclusively in titles, abstracts, and keywords to ensure high-quality results. We identified 853 entries for the first search term and 624 entries for the second term, thus in total 1,477 entries. After excluding duplicates, a total of 1,306 entries remained.

3.2 Exclusion Criteria, Data Extraction, Quality Assessment, and Forward and Backward Search

We screened the 1,306 remaining entries under consideration of various exclusion criteria. First, only papers written in English were considered. Second, we only included journal articles and conference contributions in the result list because they are peer-reviewed in contrast to other publications. Third, all commentaries, guest editorials, presentations, periodicals, and research proposals were excluded for quality reasons [33]. Because the research field is still young, articles containing conceptual frameworks or conceptual developments remained included in the literature review. Also, both quantitative and qualitative studies were included. This process led to 1,255 remaining papers, appearing to be valuable contributions at first sight. To find publications that addressed our RQs, we first screened the articles' titles and subsequently their abstracts. The selection process was carried out by three authors independently. In an upfront alignment, we harmonized our view about the inclusion and exclusion criteria. We concluded to only include articles that answer at least one of our research questions based on title and abstract. After all three authors had screened the title and abstract, we aligned again and either included or excluded when the screening authors were of the same opinion. In the case of contradicting opinions, we discussed our different views to find a suitable solution for all three authors. This quality assessment step led to a total of 63 results.

Forward search implies finding citations to a paper, whereas backward search aims to find citations in a paper [32]. Moreover, [27] recommend enhancing the literature review by reviewing the citations for the articles that have been identified to determine prior articles that should be considered. We conducted a backward references search as described by [28] to extend the knowledge deeper. Also, the backward search process was performed to address the critique of SLRs being incomplete [34] and, therefore, to determine whether any referenced papers have not been included in the initial selection process [27]. According to [30], we included mainly particularly relevant articles in the backward search. Therefore, we selected the relevant literature of [14] and [35] for this purpose. Both publications provided the most appropriate starting point for the backward and forward search, as their focus adequately addresses our research questions and are about tracking and monitoring eHealth technologies in the context of OHM measures. The reference section of both publications contained 80 entries that went all through the whole screening process as described in the previous section. Out of the 80 sources within the publication screened in the backward screening process, we considered ten as valuable contributions. After implementing the backward search, we carried out the forward references search as proposed by [28] to expand the knowledge on the topic by locating follow-up studies or identifying newer findings and developments. Therefore, we selected the same two publications in the backward search and screened them forward with Google Scholar. This process led to another 20 findings that also went through the complete screening process. Out of these, we consider another four as valuable contributions. Consequently, the backward and forward search led to 10 additional contributions (cf. Table 1). In sum, we identified a total number of 77 relevant entries, which we analyzed in their entirety and extracted relevant data and information.

Table 1. SLR results

Retrieved papers from database screening	1,477
After duplicates removed (-171)	1,306
After quality assessment and exclusion criteria (-1,239)	67
After forward/ backward search (+10)	77

4 Results

To evaluate our findings, we first analyzed the 77 publications found according to our RQ1 and subsequently derived advantages (RQ2) and disadvantages (RQ3) accordingly. We first elaborated an intermediate concept-oriented matrix with three major research streams: (1) occupational health, (2) eHealth technologies, and (3) human well-being. Second, we used the derived concept-oriented oriented matrix to analyze the used eHealth technologies in detail (RQ1) and clustered the literature to advantages (RQ2) and disadvantages (RQ3) (Table 2). Therefore, we classified them and subsequently tagged each article with different keywords dealing with the applied context, technology, and the explicitly and implicitly stated advantages and disadvantages. We iteratively discussed our findings based on the review findings.

Table 2. Overview of Used Technologies and References Answering our RQs

eHealth Technologies (RQ1)	**Advantages (RQ2)**	**Disadvantages (RQ3)**
ICT	[36]	[37, 38]
Mobile Technologies	[39–43]	[39, 44]
Wearable Technologies	[14, 40, 45–59]	[14, 45, 47, 49, 51, 52, 55, 58, 60–62]
Other Technologies	[14, 39, 40, 63–65]	[14, 61, 64, 66]

4.1 RQ1: Which Existing eHealth Technologies Are Applied in OHM to Track and Monitor Employee Health?

The use of technologies in OHM is diverse and challenging to classify, as the technologies employed are often interlinked and connected. However, our results indicate that ICTs, including mobile technologies and wearable technologies, are predominantly explored. However, other technologies have already received attention in the literature, which we subsequently present.

ICTs. In general, the use of ICTs is crucial for applying eHealth technologies in OHM [38, 67] because eHealth is always associated with the use of ICTs, whether telecommunications, the Internet, or similar technologies [21]. Through ICTs, it is possible to monitor employees' health with various devices and techniques [67]. Also, [36] have examined an ICT-driven health prevention program and conclude that ICTs are an important factor in workplace health programs. They can be used to collect, store, and process lifestyle and health-related data through various applications. ICTs also enable early diagnosis and intervention advice based on predictive analytics. Further, they can be used to provide feedback to participants by visualizing the accomplishments of the health prevention program. Similarly, [37] developed an intelligent tool as an availability assistant for the desired work-life balance using ICTs. According to them, ICT services often include applications for smartphones, computers, smartwatches, and tablets for better availability management. These applications can, e.g., restrict the use of other applications or block calls and messages for a certain period.

Mobile technologies. Companies use mobile technologies linked with smartphone applications that allow employees to monitor various health-related aspects such as activity or weight [e.g., 35, 43, 68–70]. Smartphone applications are also applied to engage with users and communicate the company's wellness program [39, 40]. Even persuasive applications based on psychological theories on mobile devices for the health-conscious behavior of employees are applied [71]. These applications attempt to track employees' daily tasks to change their behaviors towards healthy nutrition, physical activity, and napping at the workplace, partly with an additional built-in reminder in the form of push notifications [44]. Many mobile technologies use embedded sensors connected to wearable devices to measure physical activity, which perform the actual measurement by built-in sensor technologies [72]. The smartphone applications are then used to capture and display physical activity or facilitate self-reporting in a structured manner [44, 73]. For example, [41] collected physiological data with a prototype wearable chest sensor to measure heart rate, pulse, and skin temperature of office workers and connected the wearable device with a smartphone app that visualized the recordings.

Wearable technologies. Especially the ubiquitous use of digital technologies, advancements in low-cost and unobtrusive wearable devices as well as the declining willingness of employees to participate in corporate health programs has led to an increase in the use of commercial wearable devices such as Fitbit or Jawbone in the operational context [14, 45, 47, 49, 51, 60, 61]. The devices can either be brought from home as personal equipment [74] or are provided by the employer [14, 52]. Other wearable devices used by companies are usually pilot devices [51]. These trackers are then used to track physical fitness, sleep patterns, or mood. Fatigue sensors are also applied to monitor work safety [50, 53]. Moreover, measuring other aspects like blood sugar, heart health, or even employees' brain activity can track mindfulness during work [40, 51]. Furthermore, wearables are used to monitor employees' posture and body motions and alert them when the behavior is unhealthy [75, 76]. Finally, additional information like body temperature and pulse might be transmitted to a computer for analysis [56, 62, 77–79]. Employers sometimes link wearable technologies to a specific reward system to motivate users and remind them to work actively on their daily goals [47]. Companies also distribute Fitbits to their employees and incentivize them to use the devices and share their information, e.g., by offering lower health insurance premiums [14, 48]. Wearable devices, such as wrist-worn watches, can also monitor the environment and environmental conditions like air quality in a factory through built-in sensors [46]. If the air quality becomes a risk factor, the watch alerts the employee. Some companies even implant inertial measurement units or RFID chips into the employees themselves, for example, to automatically identify risk factors during work [54, 55, 57, 80].

Other wearable technologies, such as smart shirts [81], are designed to ensure the safety of firefighters [e.g., 48, 54]. In this role, they can track heart activity, respiration rate, and body temperature through built-in sensors [67, 82].

Other (supportive) technologies. Alongside wearable or mobile devices, other eHealth technologies are used in OHM, which may have interfaces to the previously mentioned technologies. Some companies monitor their employees' health with existing workflow systems [66]. Others use the computer workstation itself to monitor employee health [67, 83]. Webcams installed on the computer can also be deployed to track health parameters like heart rate or posture in front of the computer [64, 84, 85]. Further, smart mirrors are used in rare cases, motivating employees to adopt physical habits at the workplace by giving exercise instructions [15]. Other applications include the development of an eHealth education program [86]. Also, gamification elements are often used to engage employees in good health, motivate employees to participate, simplify the usage, and make it more appealing with playful approaches [14, 39, 40, 61, 63].

4.2 RQ2: Which Advantages and Potentials Exist within the Application of eHealth Technologies in OHM to Track and Monitor Employee Health?

The potential of already existing eHealth technologies in OHM is vast and depends on how the technology is implemented. Since mobile technologies enable location-independent access to corporate health programs and their resources, these technologies represent a crucial factor for the success of OHM in general [87–89]. Studies even show that the mere recording and sharing of employees' data (e.g., via social media) leads to a better understanding of their health [90], well-being [14, 89], and thus increases employees' motivation to collect more data [36]. The use of eHealth technologies within OHM increases general health awareness [14] and changes unhealthy behavior or habits [45, 56, 91], such as incorrect posture [85, 92]. Further, wearable technologies can detect risks or injury hazards and alert the user accordingly [46, 54, 57]. The collection and evaluation of large amounts of data, such as daily activity levels, pulse or heart rate, weight, blood oxygen saturation, and body temperature, can help employees to detect diseases or risks at an early stage so that appropriate measures can be taken promptly [22, 40, 93, 94]. Moreover, eHealth technologies increase physical activity [52, 63, 91, 95] and improve health [47]. The use of wearable technologies can even encourage employees’ mental well-being, for example, by increasing physical activity or generally engaging employees in a healthy lifestyle [14, 40, 47, 48, 57]. Regarding several studies, wearable technologies can increase motivation for and enjoyment of health initiatives and help develop new habits that promote a long-term healthy lifestyle, especially for employees without a regular fitness schedule [14, 47, 91, 96]. In addition to physical health, some studies have also shown that eHealth reduces work stressors and improves employees’ mental health [41, 55, 95]. At the same time, eHealth technologies can improve employees' quality of life and life expectancy [45, 56, 88]. Several studies even confirmed that eHealth technologies minimize and prevent health risks in the workplace, e.g., back injuries or cardiovascular diseases, before they appear or before they influence the employees [53, 64, 97, 98]. Numerous sources also state that the use of eHealth technologies helps to increase employee productivity and efficiency through better health [14, 39, 45, 47, 50, 55, 99]. Integrating social components in eHealth tools can trigger feelings such as belonging to a group, affiliation, and emotional support and promote an environment of positive peer pressure. The reward and incentive systems usually included in these competitions might encourage activity [45, 47, 49, 96]. Furthermore, research demonstrated that implementing eHealth technologies in OHM reduces health-related absences and increases the employees' job satisfaction [39, 47, 50, 53]. As a consequence of direct benefits for employees’ health, studies also confirm that health care costs and health insurance premiums can be reduced [14, 39, 51, 59, 63, 100].

4.3 RQ3: Which Disadvantages and Limitations Exist within the Application of eHealth Technologies in OHM to Track and Monitor Employee Health?

The use of eHealth technologies can also harm various areas in the workforce. First, the constant monitoring of activity can feel like an obligation to some employees and reduce the enjoyment of self-monitoring. Second, demotivation can also arise when goals are set too high. Demotivation, in turn, may reduce physical activity, which is particularly detrimental in the long term [39, 52, 60]. In contrast, particularly challenges or activity tracking can encourage employees to engage in too much physical activity and take risks such as injury or overtraining. This is especially the case when the goals set are too high [47, 49, 91]. In addition, occupational safety can suffer from the use of technology if too much reliance is placed on it [44, 93]. The permanent availability by ICTs can lead to the employee being over-worked or stressed, which harms his or her ability to concentrate. Additionally, if an employee is intensively involved in a program and spends a lot of actual working time with it, productivity can suffer as well [37, 55].

Discrimination or social isolation are additional factors that result adversely from the implementation of eHealth in OHM. Social isolation occurs especially when employees are unable to participate in health programs due to physical impairments [14, 51] or if there is a fear that personal data will be collected by the employer [61]. To avoid discrimination by others, employees may participate in such programs due to peer pressure, even if they would not participate out of their ambition [45, 49, 91, 95].

A blurring of the boundary between work and private time can cause additional stress for the employee. This happens especially when the devices for health programs are also worn at home and thus affect the work-life balance of employees [45, 47, 74, 87, 88]. Many of the factors above can contribute to a stressful work environment [37, 45, 66, 87], leading to lower job satisfaction and increased absenteeism in the long term [66]. Moreover, the factors such as overwork, too much or too little physical activity, stress, or social factors like discrimination or group pressure may negatively impact employees' overall health and subjective well-being. Reduced subjective well-being can, in turn, harm physical, mental, and social health [37, 45, 55, 60, 66, 87].

The costs of implementing eHealth in OHM on employers and the negative consequences of implementation on employees should also be considered [48, 51, 89, 101]. Next to this, the implementation of eHealth technologies involves the recording of very personal data from employees. Therefore, employers must also focus on privacy issues. When employees perceive or suspect misuse of their data by the employer, they will be reluctant to or not even use such technologies. Although minimum standards are established through government regulations (e.g., European Union's General Data Protection Regulation), there is still a growing interest in privacy issues regarding the implementation of eHealth technologies in OHM [44, 49, 64].

5 Success Factors of eHealth Tracking and Monitoring Technologies in OHM

Our analysis was motivated by a deeper understanding of promoting healthy behavior utilizing OHM while focusing on eHealth tracking and monitoring technologies that allow for quantification and analysis of such healthy behavior. We see our analysis of identifying advantages and potentials as well as disadvantages and limitations as a groundwork to derive implications in the form of success factors that impact the usage of such technologies. The benefits of these measures can be fully exploited only if OHM managers take these success factors into account when implementing tracking and monitoring activities. We classify the derived success factors that emerge from our analysis from the user perspective into three dimensions: operational vs. technological vs. operational/technical. Operational success factors include *consciousness-related* and *management-related factors*. Technological success factors include *motivation-related factors*, *user experience*, and *technical requirements*. Further, operational/technical success factors include *data protection* and *profitability*.

Motivation-related success factors are multifaceted and imply that usage can be supported by integrating, e.g., social influence through challenges, leaderboards [42, 102], or performance graphs [103] into the device. However, social incentives must be designed so that they do not put pressure on employers and include achievable targets [45, 49, 91, 95]. In pedometer apps, for example, it makes sense to include gamification elements such as points and levels so that users can achieve intermediate goals and thus have a constant sense of achievement [104]. Gamification elements in applications can increase motivation and influence the second success factor, the *user experience*. Our literature review reveals that *user experience* is highly achieved through the integration of gamification and a straightforward design of the technology, which is easy to use [105]. The user interface should be uniform and clearly laid out, and the tracking or monitoring device should be small, slightly inconspicuous, and convenient [62]. The success factor of *user experience* is closely linked to the success factor of *technical requirements*. For tracking and monitoring eHealth technologies to be successful in OHM, we have deduced from the literature that they must meet the criteria of accuracy, reliability, or availability. Technical failures or errors quickly lead to negatively perceived user experiences, harming acceptance and user behavior [106]. If OHM managers and software developers address the above-mentioned technological success factors, the risks of tracking and monitoring technologies in OHM can be significantly reduced. It prevents the motivation of employees and thus the willingness to participate in digital OHM measures from being lost due to faulty goal setting, system complexity, or an inadequate system.

Focusing on success factors that must be controlled directly by top management, e.g., a corporate culture that promotes health policies (*management-related factors*) and discloses the importance of a health-conscious way of working (*consciousness-related success factors*), can also counteract several risk factors. Good communication of OHM measures and benefits can prevent employees from feeling too disturbed in their work-life balance [45, 47, 74, 87, 88]. In addition, top management must be involved in planning the interventions to fit into the company's policies and existing technological infrastructure [107]. Further, introducing digital OHM measures from the top down can ensure that a sufficient budget is allocated and that highly effective user-centered solutions are implemented to engage all employees in OHM activities [14, 51]. Success factors such as *data protection* and *profitability* form the interface between operational and technological success factors. Health data can be very sensitive, personal data that must be protected [44, 49, 64]. Clear policies guarantee the safe use of these tools in the corporate environment and ensure that employees' privacy is respected or that no employee is forced to share their health data [12]. The company must be aware of this responsibility on the operational side to communicate the technical requirements for data protection and data security to the developer of tracking and monitoring eHealth technologies at the same time. *Profitability* implies that the return on the digital OHM program is greater than the effort involved. In economic terms, this means that costs must be low and productivity high [108]. Profitability can be achieved when tracking and monitoring technologies are implemented on a cost-benefit basis, and their effects ultimately lead to higher working productivity for employees. Further, technological progress can have a cost-reducing effect on tracking and monitoring measures, as the cost of the sensors included in many technologies is steadily decreasing.

5.1 Theoretical Contribution

The findings of our SLR contribute to a deeper understanding of the risks and potentials of tracking and monitoring eHealth technologies in OHM. By identifying the risks and potentials of these technologies, we finally conclude that eHealth implementation is a cost-benefit trade-off between them. In addition, we derived success factors for implementing these technologies from the user's perspective, thus adding a holistic view to the existing literature. Thereby, the theoretical contribution to the existing body of knowledge is twofold. First, we demonstrate that the success of digital OHM depends on operational and technological factors. Past research on the effectiveness of tracking and monitoring interventions within the scope of OHM mainly focused on single factors such as gamification [42, 102, 109], data security [110, 111], incentive systems [112], missing the opportunity to explore interaction effects between them. Second, our findings are paving the way for further acceptance studies in tracking and monitoring in OHM. Including our success factors in acceptance studies could help draw an accurate picture of which factors lead to the long-term use of such interventions in the operational context.

5.2 Practical Implication

Regarding practical implications, we provide a broad overview of existing forms of tracking and monitoring eHealth technologies applied in OHM, which helps practitioners gain a holistic understanding of used technologies and their purpose. Based on the risks and opportunities of such technologies from the users' perspective, we have identified several key success characteristics that influence the adoption and use of such technologies and should be further considered by practitioners. Therefore, our success factors can serve as a starting point for managing risks and harnessing the potential of tracking and monitoring technologies in OHM.

6 Limitations, Further Research, and Conclusion

Since search strings dictated our keyword search, we continued to formulate the search string as broadly as possible to obtain a comprehensive literature review. As our study focuses on tracking and monitoring eHealth technologies in OHM, the context of our study is limited to them. The identified success factors are sometimes difficult to delineate and are partly interrelated. Nevertheless, they provide a good overview of how technology and the top management influence the success of tracking and monitoring in OHM. Later research should, however, verify and expand these success factors through empirical research, e.g., quantitative (acceptance studies) or qualitative (semi-structured interviews) work. Further, we encourage researchers to take a closer look at gamification because such elements can positively impact at least two success factors: *user experience* and *employee motivation*.

With our study, we identified implications for researchers and practitioners. Since research on tracking and monitoring eHealth technologies in the OHM context is spread across various facets, we have compiled key characteristics via a structured approach. Based on the existing literature, we characterize our research as the groundwork for deriving concrete OHM practices for tracking and monitoring employee health. Further, we condensed the used technology diversity, derived advantages and potentials, disadvantages, and limitations, and derived their success factors. By comparing different used technologies and their advantages and disadvantages, we pave the way for a new practical guide to help in the successful evaluation and implementation of tracking and monitoring eHealth technologies in the occupational health context.

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