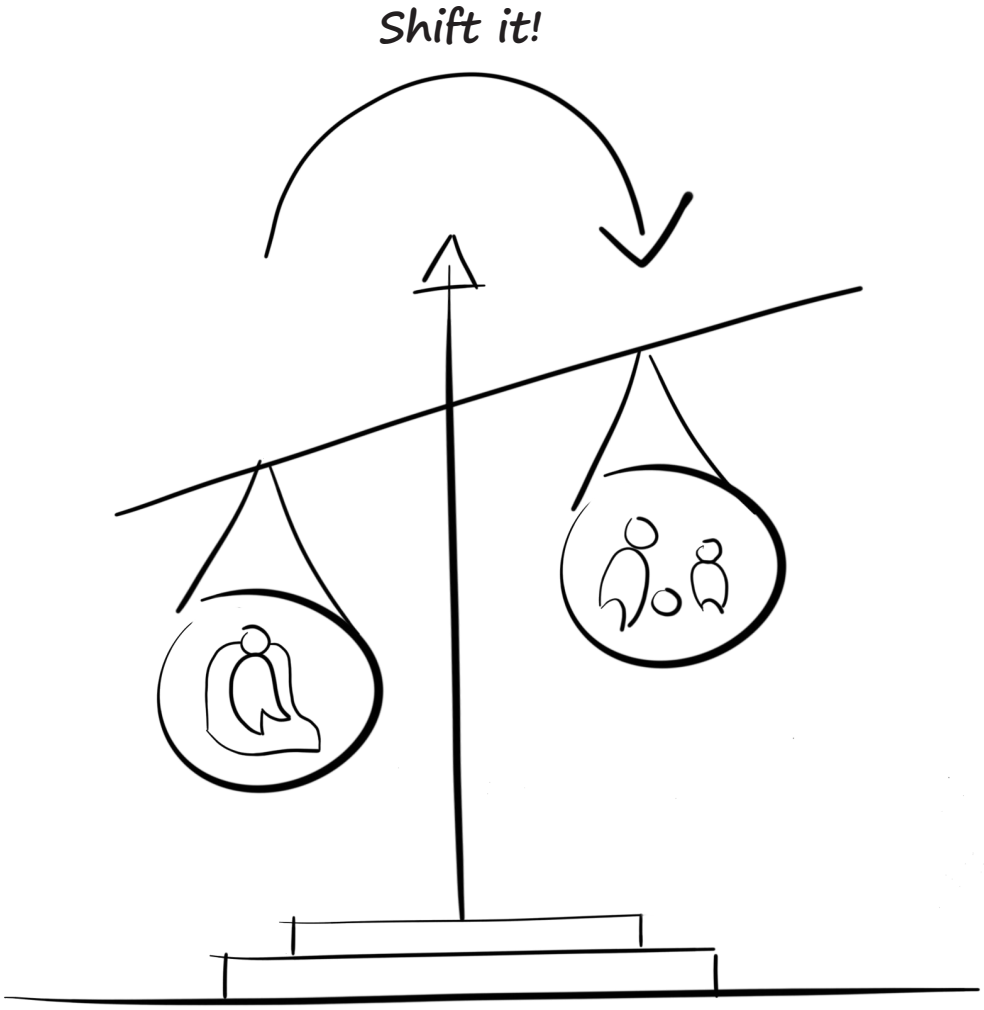

DESIGNING A LIFESTYLE INTERVENTION FOR PEOPLE WITH A PHYSICALLY DEMANDING JOB

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Master Thesis

Master Thesis - Design for Interaction
Faculty of Industrial Design Engineering
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January 2022

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In collaboration with
Amsterdam UMC, Arbo Unie & Heras

PREFACE

This report presents the process of my graduation project. It explores how we can help people with a physically demanding job to shift their physical activity behavior into a healthier direction.
My chair Jos Kraal introduced me to the topic, and I was directly interested since I recognized the issue from home. I grew up on a farm and have many relatives with physically demanding jobs. Most of them are too tired to be active in their free time and do not feel the need for it due to their active job. Among the older ones, I can observe the consequences this has on their cardiovascular health. Therefore, I was glad that I could use my graduation project to research how we could improve the health of people with physically demanding jobs. Generally, it is a meaningful topic to me because it fits my ambition to design for wellbeing. In particular, I was enthusiastic that the project could contribute to decrease health inequalities since I am eager to improve the quality of life of vulnerable groups.
Additionally, I like designing for behavior change. I enjoy figuring out why people behave in a certain way and how this could be changed. Related to that, I was happy about the research focus because I love to dive into the context of a target group, exploring its concerns, needs, and desires.

I am glad that I got the opportunity to write my thesis in cooperation with Amsterdam UMC and the Arbo Unie. In specific, I want to thank Pieter Coenen and Erwin Speklé. They provided me with significant contacts, valuable insights regarding occupational PA and existing interventions, and helped me with the ethical application. I am especially thankful that they gave me professional access to the target group. They helped me recruit Heras, a company that designs, manufactures, installs, and maintains protection solutions.
The employees of the coating department perform strenuous work 50 hours a week. They enabled me to understand the physical activity behavior of people with a physically demanding job, factors that are influencing it and supported me to design an intervention that fits their needs. I am very grateful for their commitment, openness, and honesty. Additionally, I would like to thank the Health and Security Manager Bob van Berkel and the team leader Ger van Deijk.
Further, it can be said that I was positively surprised by the cooperativeness of other stakeholders. Besides their regular work schedule, occupational health practitioners and researchers took the time to share useful information with me. I want to say thank you for the effort they made and hope they are content with the result.
Above that, I want to thank my supervisory team, Jos Kraal, and Natalia Romero Herrera. They provided me with valuable feedback and tips throughout the project and always motivated me to continue.
Last but not least, I want to thank my friends and family for their emotional support and their commitment to this project. I would not have been able to manage it without them.

Enjoy reading!

Julia Beckmannn

January 2022

EXECUTIVE SUMMARY

Cardiovascular diseases are a prevalent cause of death worldwide. People with physically demanding jobs tend to have poorer cardiovascular health than people with sedentary jobs. In contrast to leisure-time physical activity (PA), occupational PA (lifting, pushing, and pulling heavy loads over a long period without sufficient recovery) seems to have detrimental health effects. This phenomenon is called the 'PA Paradox' and requires interventions that counteract these harmful health effects.
In the current occupational health research, interventions for this population are typically narrow, focusing on limited factors in a specific environment. These kinds of interventions are not effective for people with physically demanding jobs. Instead, an intervention for this population must respond to workers' complex context, fit their daily activities and preferences, and be integrated into their work and home environment. Therefore, this project aimed to explore these aspects to design a promising concept for a lifestyle intervention that shifts workers' PA behavior in a healthier direction.

At the beginning of the project, expert interviews with occupational health researchers and practitioners were executed. Moreover, literature was reviewed to comprehend the PA Paradox and current approaches to counteract it. It was found that an intervention should stimulate moderate-vigorous PA, variation, and sufficient recovery and that workers must have the capability, motivation, and opportunity to perform a healthy PA behavior. Therefore, an extensive field study was carried out to investigate workers' PA behavior and the factors affecting it. That yielded an overview of factors influencing workers' capability, opportunity, and motivation for a healthy PA behavior. It showed that it would be most impactful to tackle workers' inadequate risk perception and over-exhaustion. Research through design was applied to explore how an intervention could address these factors in workers' home and working environments and what interactions fit workers' needs, preferences, and possibilities.

The generated insights were merged to 'Shift it!', a concept that makes workers feel confident about shifting their PA behavior in a healthier direction. 'Shift it!' consists of two parts: A health week and a digital buddy. The health week starts with a toolbox meeting to make the workers aware of the PA paradox and its consequences. Afterwards, workers can visit the company doctor to examine their current health state and future risks and monitor their heart rate for one week to get insights into the intensity of their PA and the effect of their breaks.
The digital buddy ensures that workers understand the issue and helps them to integrate recovery and PA into their daily lives. It offers them inspiration, helps them find a plan that fits their busy lives, and supports them to realize it by reminding, encouraging, and praising them.

Finally, the concept was evaluated with the workers and other stakeholders to explore its potential. Everyone was enthusiastic about the concept and showed interest in implementing its elements. The health screening and the digital buddy with all its functions were identified as the concept's core, but it is not yet clear which elements can be realized.

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1. INTRODUCTION

The first chapter describes the relevance of this project and defines its aim and scope. It sets research questions and specifies what approach is taken to answer these. Finally, it introduces relevant stakeholders and explains their expectations and contributions to this project.

1.1 RELEVANCE

Chronic diseases are the leading cause of death worldwide, and cardiovascular diseases (CAD) are the most prevalent. (World Health Organization, 2018). According to Dagenais et al. (2020), *"among adults aged 35–70 years, cardiovascular disease is the major cause of mortality globally"* (p.785). Furthermore, new evidence indicates that people who have a high physical workload (e.g. blue-collar workers), such as lifting, pulling, and pushing heavy loads, tend to have poorer cardiovascular health (even when adjusted for relevant health, lifestyle, and socioeconomic factors) compared to people with sedentary jobs (Li et al., 2013; Holtermann, Coenen and Krause, 2020; Interview #4). That seems to be contradicting since it is proven that physical activity (PA) is important to prevent multiple chronic diseases, such as COPD and cardiovascular diseases (WHO, 2010). According to global PA guidelines, a positive health effect can be achieved by performing at least 150 minutes of moderate-vigorous intensity PA per week (WHO, 2010). Workers who have high levels of occupational PA easily meet these guidelines, and it is therefore expected that they have a lower risk for lifestyle-related diseases (Rasmussen, 2019). However, that is not the case, as described above, and may be caused by differences in the nature of occupational and leisure-time PA (Hallman et al., 2015). It is suggested that people with physically demanding jobs are threatened by potential negative health consequences of occupational PA and might not benefit from the positive health effects of leisure-time PA (Holtermann, Coenen and Krause, 2020). This phenomenon is called the 'physical activity paradox' and requires additional efforts in interventions that shift workers' behavior in a healthy direction.

In the current occupational health research, interventions for this population are typically narrow, focusing on limited factors in a specific environment, such as at home or work. Coenen et al. (2020) and other studies have demonstrated that these kinds of interventions are not effective for people with physically demanding jobs, emphasizing the need for new directions. To improve the effectiveness of such lifestyle interventions, it is relevant to better understand factors driving unhealthy behavior (Interview #2). The health of workers with a high physical workload can only be enhanced by understanding their complex system of various influencing context factors, such as working conditions and facilities, but also social factors, an individual's attitudes, health literacy, and home environment (see figure 1). Therefore, the complex context of the workers as a holistic system should be taken into account, and both the work and home environment should be considered important. Since the effects of the Physical Activity Paradox seem to be the cause for poorer cardiovascular health, there is particularly the need for extensive knowledge about the PA performed during work and leisure to design promising lifestyle interventions (Jørgensen et al., 2019).

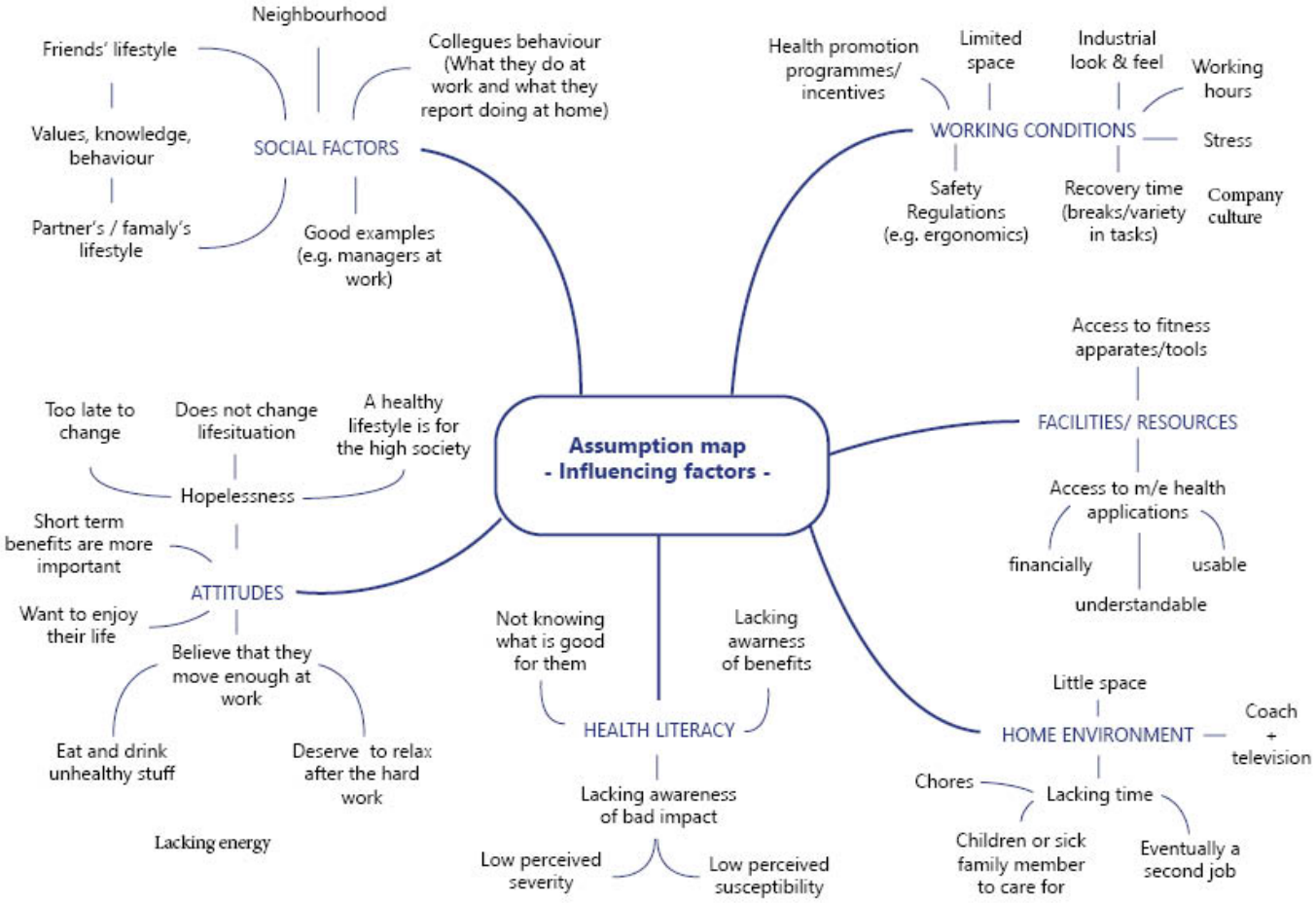


Figure 1: Assumption map of context factors that influence the target group's PA behavior (Based on my own experiences (family members working on farms and in fabrics), and occupational health literature,)

1.2 AIM AND SCOPE

I aimed to explore the PA behavior and underlying attitudes and values of people with a physically demanding job to design a first concept for a lifestyle intervention that shifts their PA behavior in a healthier direction. As described in the introduction, an intervention for this population must respond to the workers‘ complex context, fit their daily activities and preferences, and be integrated into the working and home environment to be successful. To achieve that, a holistic approach was required. Therefore, the main challenge of this project was to generate a clear understanding of workers‘ (PA) behavior, their context, why they make certain choices and what intervention elements work well for them.

The main research questions (RQ) guiding this project are:

RQ 1: What is the PA paradox and how can we counteract it?
- **RQ 1a:** What characterizes the PA behavior of people with a physically demanding job and what consequences does their current behavior cause?
- **RQ 1b:** What is healthy PA behavior for the target group?

RQ 2: What contextual factors do we need to address in a lifestyle intervention to shift the occupational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?
- **RQ 2a:** Which contextual factors influence the occupational and leisure time PA behavior of people with physically demanding jobs?
- **RQ 2b:** Which contextual factors have the strongest influence on workers’ occupational and leisure time PA behavior?

RQ 3: How can we design a lifestyle intervention that addresses relevant contextual factors to shift the occu pational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?
- **RQ 3a:** How can lifestyle interventions address the main factors influencing workers’ PA behavior?
- **RQ 3b:** What type of intervention fits workers’ abilities, needs and preferences?
- **RQ 3c:** How can lifestyle interventions integrate workers’ home and work environment?

RQ 4: What is the potential of the developed lifestyle intervention concept?
- **RQ 4a:** What does the target group think about the designed concept?
- **RQ 4b:** What do company stakeholders and occupational health researchers and practitioners think about the designed concept?

Hence, this project does not aim to develop a ready-to-implement intervention but to generate valuable knowledge on contextual factors that influence workers‘ PA behavior and provide a promising direction for future design studies.

1.3 PROJECT APPROACH

The design process of this project was oriented at the Double Diamond model (Design Council, 2015), which contains two main stages. The first diamond focuses on understanding what needs to be addressed and the second explores how it can be addressed. The form of the diamonds illustrates that both stages start off with exploring activities (diverging) and then take action to merge the insights into one direction (converging). In this project the two stages are divided in five phases which are illustrated in the following overview (figure 2).

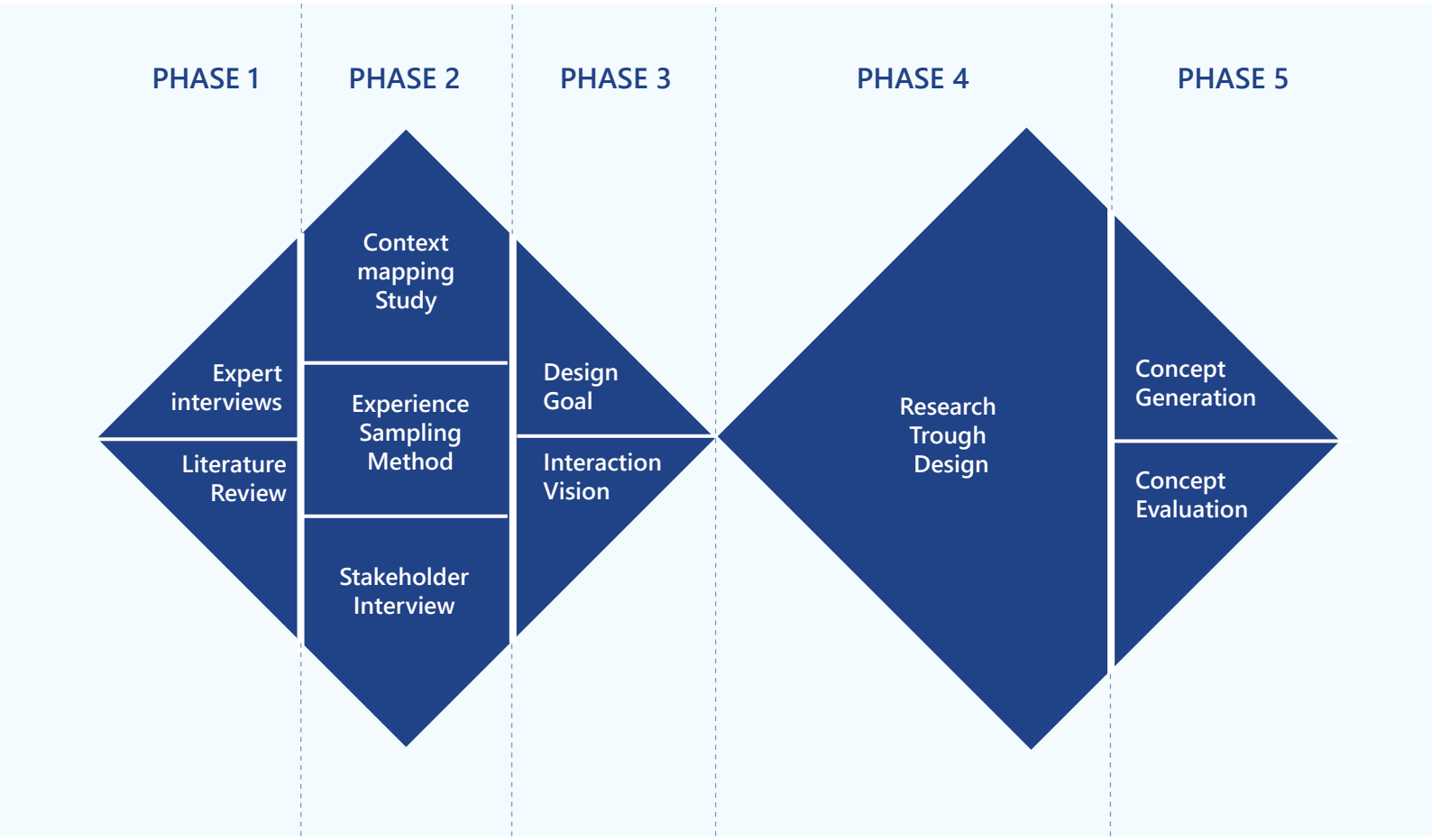


Figure 2: Overview of the project set up, following the Double Diamond framework (Design Council, 2015).

Phase 1 – Discover the problem

In the first phase, I reviewed occupational health-, and health psychology literature to understand the problem and to inform the following design process. I included papers about:

- PA Paradox
- Determinants of PA
- Intervention studies for people with physically demanding jobs or a low socioeconomic status
- Behavior (change) frameworks

Parallel, I executed expert interviews with occupational health researchers and practitioners to better comprehend the PA Paradox issue and current approaches to counteract it. I used the chance to also interview them about contextual factors that they found to influence workers' PA behavior and intervention studies they executed in the past.
Combining the insights of these activities resulted in solid background knowledge for the following phases and allowed me to answer the first two sub-research questions (RQ 1a-b) described above.

Phase 2 – Investigate contextual factors

During the second phase, I applied contextmapping to get a deep understanding of workers' PA behavior and factors that are influencing it. Contextmapping is a common framework to investigate the context of a target group. It offers tools and techniques to explore people's everyday routines and practices, their abilities and possibilities, and needs and preferences (Visser et al., 2005). I let workers fill in a sensitizing booklet with daily assignments around the central topic as preparation and executed in-depth interviews with them afterward. The booklet aimed to encourage participants to access, express, and reflect on their experiences, motivations, barriers, and preferences to increase the quantity and quality of the interview. In addition, I interviewed a family member to complement the gained insights because people who love us know us best. I combined the insights from the literature review, expert interviews, contextmapping study, and the family interview to give a complete overview of the contextual factors that influence the PA behavior of people with physically demanding jobs. That enabled me to answer RQ 2a. and provided first insights into RQ 2b.
To complete RQ 2b., I investigate which contextual factors are most prevalent in workers' daily lives by applying the Experience Sampling Method (Larson and Csikszentmihalyi, 2014). I installed three little boxes for four days at the participants' homes to ask them multiple choice questions in the home context.

Phase 3 – Define the design direction

In the third phase, I formulated a design goal and interaction vision based on the gathered knowledge. The design goal describes the intervention's desired effect, and the interaction vision defines what it should be like to interact with the future intervention (Pasman, Boess and Desmet). Together, these visions determined the direction of the process.

Phase 4 – Exploring intervention elements

In the fourth phase, I applied Research through Design (RTD). RTD is a research approach that allows designers to speculate what the future could be like by iteratively developing artifacts that can probe interactions and relations that currently do not exist (Stappers & Giaccardi, 2017; Zimmerman and Forlizzi, 2014). Hence, it enables designers to explore possible interactions by making future scenarios more tangible. For this reason, RTD was chosen for this project since the target group has difficulties imagining future scenarios. I executed several ideation and exploration activities and reflected on these to discover what interactions fit the needs, preferences, and possibilities of people with physically demanding jobs and what intervention elements seemed to have the desired effect. Each ideation and exploration contributed to the generation of knowledge and gave direction to the research. The different activities were informed by literature and expert interview insights regarding promising intervention elements and the results allowed me to answer research question RQ 3a-c.

Phase 5 – Deliver a concept

In the last phase, I merged the gathered knowledge to one concept. 'Shift it!' is a concept for a lifestyle intervention that makes workers feel confident about shifting their PA behavior in a healthier direction. It makes them aware of their risks and helps them to integrate recovery and PA into their daily lives.
Finally, I conducted interviews with the workers and a group session with other stakeholders to evaluate the potential of the developed concept. The evaluation aimed to answer research questions RQ 4a-b

1.4 STAKEHOLDER

It is relevant to identify significant project stakeholders because they can have certain expectations and deliver relevant information. Figure 3 shows an overview of the stakeholders that have been guiding this project. Since I wanted to understand the context of people with physically demanding jobs, the workers were the central stakeholders of this project and were involved in every step of it. The following part describes the different stakeholders and their functions in this project.

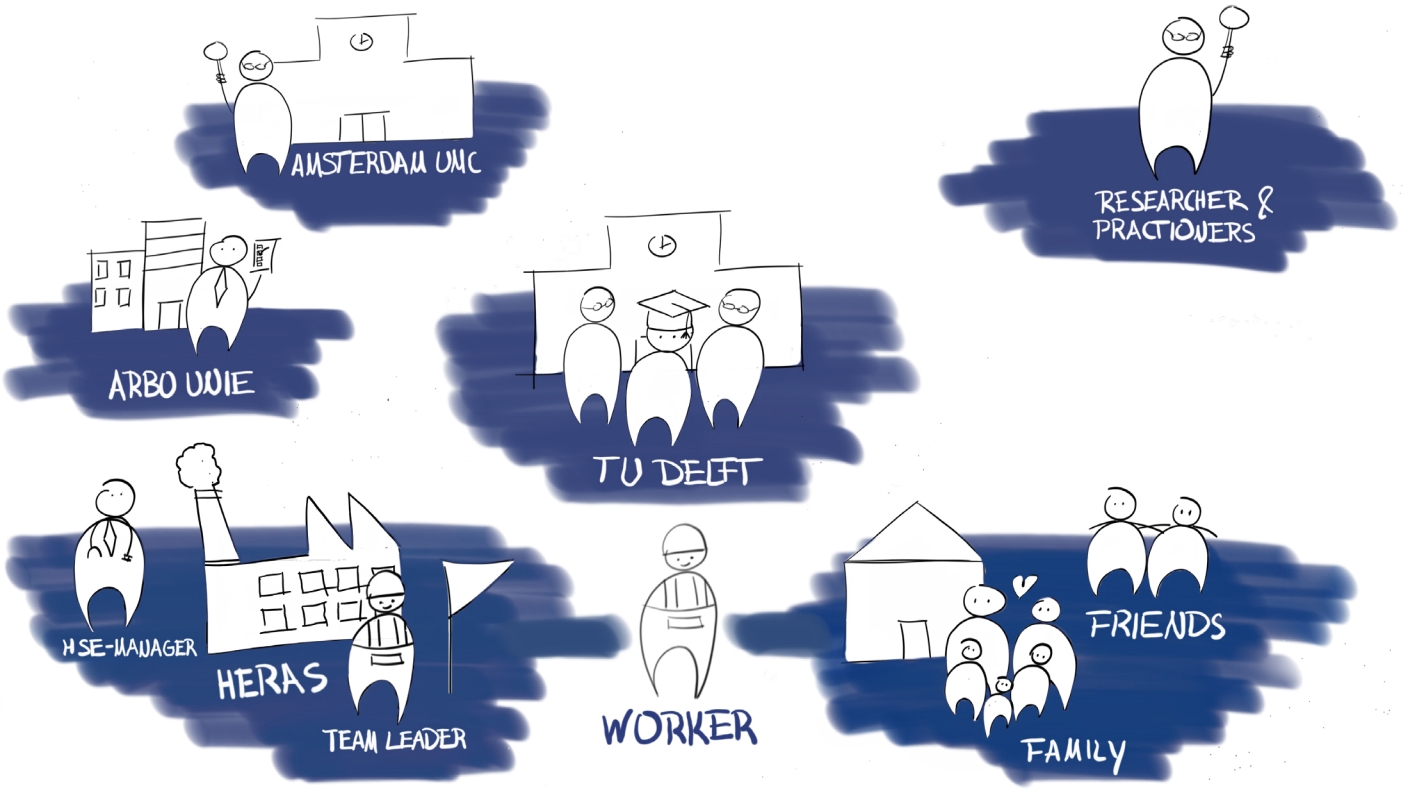


Figure 3: Stakeholder Map of this project

Participating company – Heras

Heras is an expert in perimeter protection. They design, manufacture, install and maintain suitable temporary and permanent solutions for every sector and situation. Their perimeter protection solutions are products and services consisting of fences, access and control, detection products, and integrated systems supported by project management, integration, installation, commissioning, and maintenance services (see figure 4, right). (Heras, n.d.)

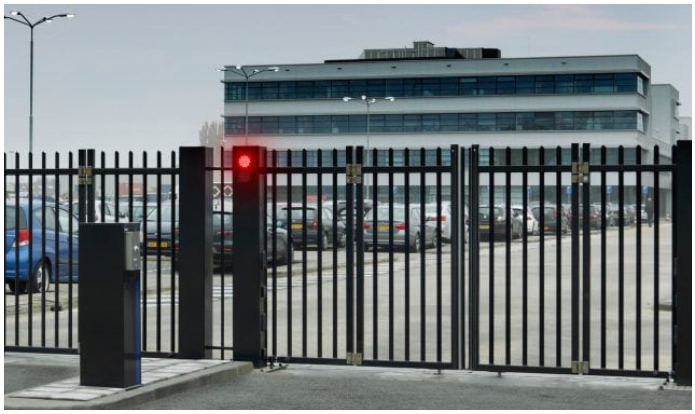
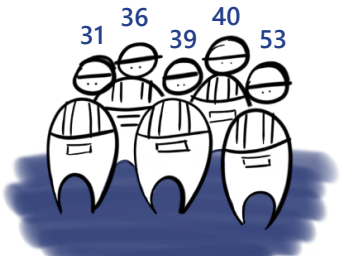


Figure 4: The left side illustrates Heras' headquarter in Oirschot. The right sight shows an example of their security products. (Left retrieved from https://www.nbd-online.nl/leverancier/116756-heras-bv/nieuws; Right retrieved from https://architectenweb.nl/producten/product.aspx?ID=16343)

The production and installation of these products require physically demanding work.
Especially the employees of the coating department experience their work as physically demanding and seem to be prone to health issues. Due to accumulating complaints, the company wants to find ways to improve the employee's wellbeing. (Interview #6). Therefore, this project focuses on the employees of Heras' coating department.

5 MALE WORKERS



Low

~ €2500

Polish, Slowak, Spanish Somali

Figure 5: Demographics of the workers

In pairs, the workers must hang up, take down and carry products such as bars, tubes, and beam sets (20-60kg), and some products must be coated by hand (see figure 6). They have to complete about 150 rounds in one day, so they must hang up and take down a product every three minutes. They work four days a week 10 hours, and on Saturday, they work seven hours overtime. (Interview #6)
Most employees come from foreign countries, such as Poland, Slovakia, and Spain. Their Dutch and English is limited, and their education level is low. Some cognitive skills needed for digital interaction can be underdeveloped (UNESCO, 2018).

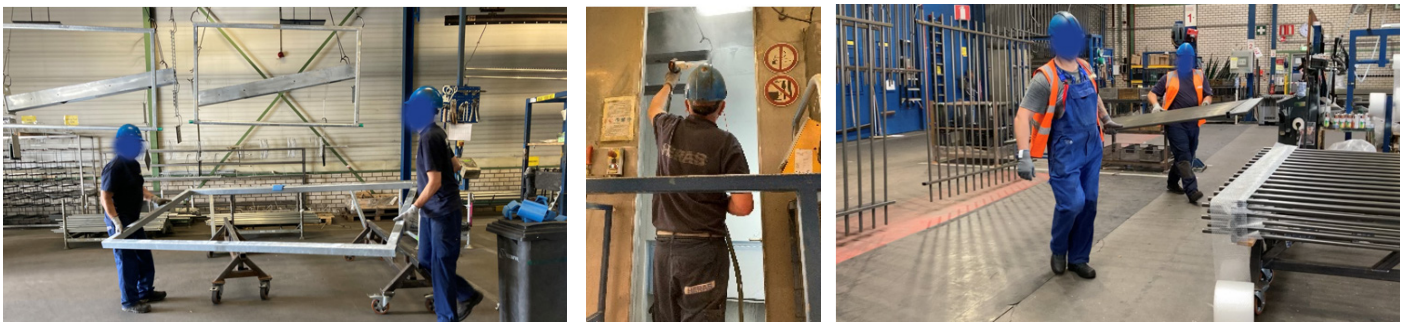


Figure 6: The left side illustrates Heras' headquarter in Oirschot. The right sight shows an example of their security products.

Next to the workers, Heras' Health and Security manager and team leader of the coating department have been relevant stakeholders. They informed me about the current situation and helped me evaluate what fits the workers' and company's needs. Also, I was exchanging my insights with Heras' HR intern, who parallel researched sustainable employability at Heras.

Partner

The project was executed in cooperation with the department of Public and Occupational Health of Amsterdam UMC and the Arbo Unie. The department of Public and Occupational Health focuses on the health effects of work and they are eager to find ways to enable vulnerable workers to live a healthy life (Interview # 1). The Arbo Unie strives to improve the vitality and health of workers to make them feel good and make companies more successful. Together with the client, they evaluate and if necessary, try to enhance a company's safety regulations, ergonomics and working conditions (Arbo Unie, n.d.). Both partners are interested in promising lifestyle interventions for workers and provided me with useful insights regarding occupational PA and existing interventions.

Occupational Health Practitioners/ Researchers

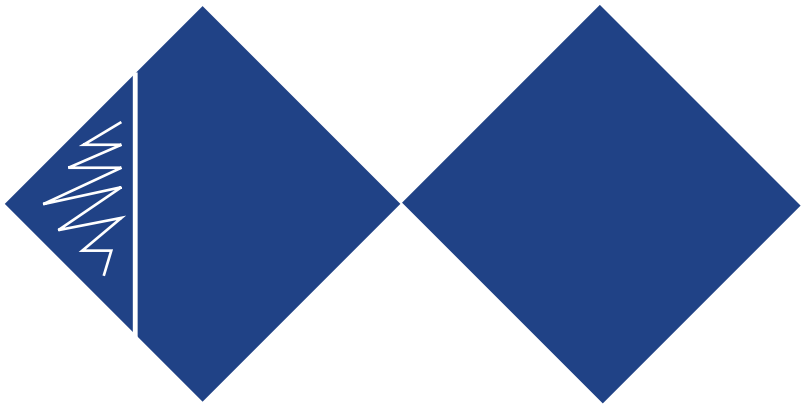
Occupational health practitioners and researchers are experts of the field and see the relevance of getting a deeper understanding of workers context to develop more effective interventions. They provided me with valuable information related to the Physical activity Paradox, existing interventions (earlier successes and failures) and the context of the target group.

Family and friends of participating employees

People who love us often know best what moves us. Workers might not be aware of certain behaviors or factors that influence their behavior. Therefore, family members and friends can complement information about workers habits, preferences and underlying motivations. Also, they might be involved in possible intervention directions.

Tu Delft Supervisors

The chair of the project was Jos Kraal, assistant professor of Behavioral Change at the Faculty of Industrial Design Engineering of TU Delft. His main research field covers design for behavior change, physical activity promotion and the development of lifestyle interventions to prevent chronic diseases. Additionally, Natalia Romero Herrera was mentoring the project. She is associate professor of Design for Self-Management at the Faculty of Industrial Design Engineering of TU Delft. Her main research interest focuses in the contextualisation of knowledge to design for self-management and (inter) personal data interaction design in the fields of healthcare and sustainability. Both keep an overview of the project and provide feedback and tips for improvement of the strategy and structure. Finally, they will evaluate the process and the results of the project.



2. BACKGROUND

This chapter explains why people with physically demanding jobs tend to have a poorer cardiovascular health and what we can do to counteract that phenomenon. More specifically, it answers the first research questions:

RQ 1: What is the PA paradox and how can we counteract it?

- **RQ 1a:** What characterizes the PA behavior of people with a physically demanding job and what consequences does their current behavior cause?
- **RQ 1b:** What is healthy PA behavior for the target group?

Additionally, it introduces the COM-B model to better understand what needs to be changed about workers current behavior. To do so, it combines insights from the literature review and expert interviews that have been conducted at the beginning of the project.

2.1 PA PARADOX

As mentioned in the introduction, we expect people with high physical workloads to have a reduced cardiovascular health due to the Physical activity paradox. According to this phenomenon, workers' higher health risk is caused by the different nature of occupational and physical activity. Leisure-time PA is usually executed in short moderated or high-intensity bouts of predominantly aerobic activities followed by long recovery periods. (Lund et al., 2019). Occupational PA, including tasks like manual handling, repetitive work, and prolonged static postures, is carried out over long periods without sufficient recovery (Coenen et al., 2018). Recent studies have indicated that occupational PA does not improve cardiovascular health. Actually, it seems to have detrimental health effects due to the following explanations (Holtermann et al., 2018, p. 149):

- *Occupational PA is of too low intensity or too long duration for maintaining or improving cardiorespiratory fitness and cardiovascular health*
- *Occupational PA elevates 24-hour heart rate*
- *Occupational PA including heavy lifting or static postures elevates 24-hour blood pressure*
- *Occupational PA is often performed without sufficient recovery time*
- *Occupational PA is often performed with low worker control*
- *Occupational PA increases levels of inflammation*

In contrast, leisure-time PA enhances a person's cardiovascular health by improving cardiorespiratory fitness, reducing 24-hour heart rate and blood pressure, and decreasing inflammation (Holtermann et al., 2018, Lund et al., 2019). However, people who work hard all day tend to be inactive during leisure time (Arias et al.,2015; Bláfoss et al., 2019). They spend most of their leisure time sitting or lying to recover from work (Gilson et al., 2019; Hallman et al., 2015). That means, besides the harmful health effects of occupational PA, workers miss the beneficial health effects of leisure-time PA and harm their health by sitting for long periods without any interruptions (Saunders et al. 2018).
Hence, the detrimental health effects seem to be caused by a combination of exhausting occupational PA at work and an inactive lifestyle after work.

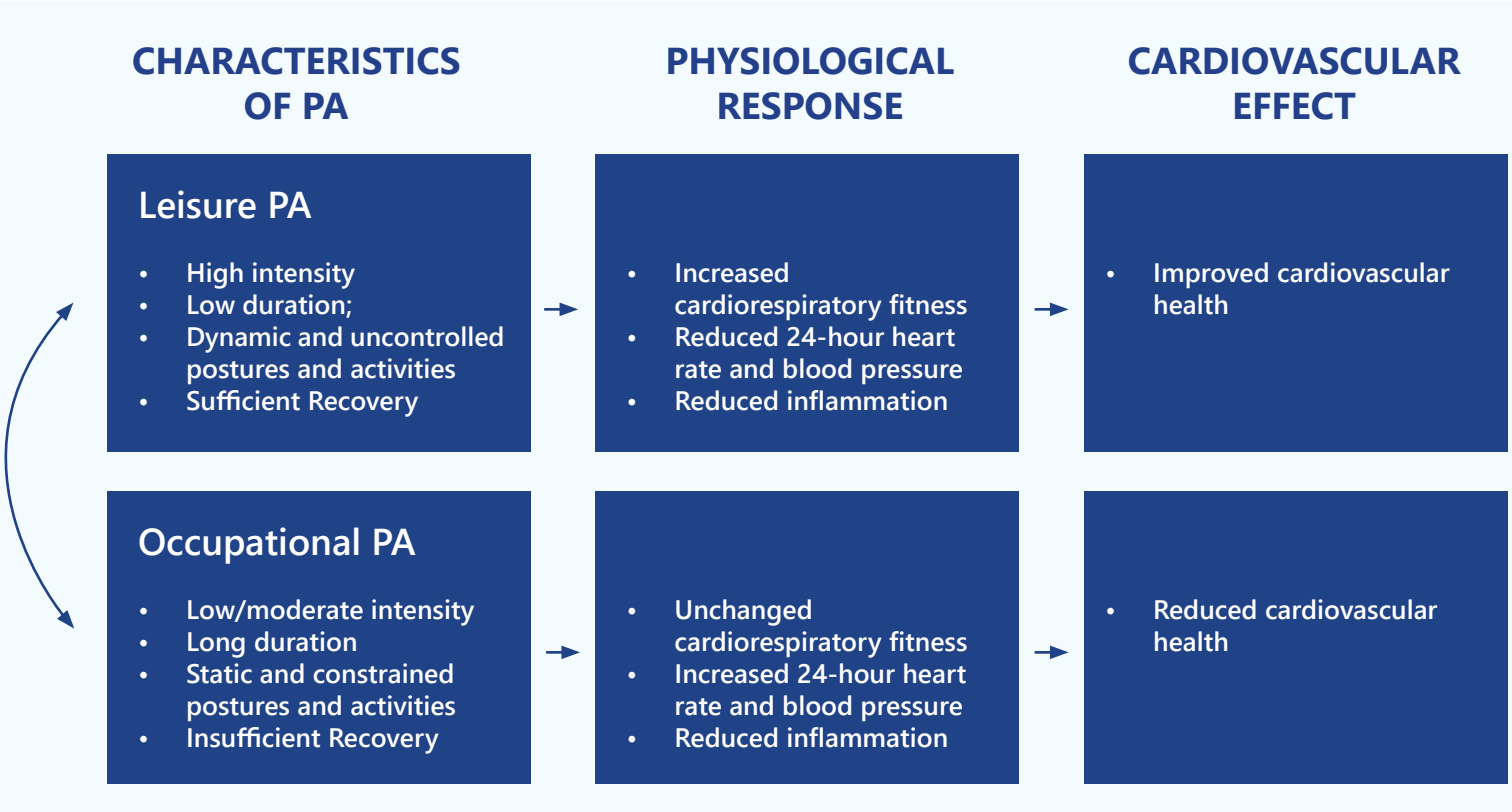


Figure 7: Conceptual Diagram of the proposed mechanisms behind the PA paradox (Holtermann et al., 2018).

2.2 COUNTERACTING THE PA PARADOX

The previous section explained that blue-collar workers tend to have poorer health due to their PA behavior at work and at home. Therefore, it is relevant to promote healthier PA behavior among these people. Occupational health literature and expert interviews indicated three important ingredients for a healthy PA: Moderate-Vigorous PA, Variation and Sufficient Recovery. These are described below.

Moderate - Vigorous PA

Holtermann et al. (2012) strongly recommend people with physically demanding jobs to perform leisure PA to improve their cardiorespiratory fitness. Enhancing workers' fitness can reduce the detrimental health effects by decreasing the relative aerobic workload and increasing the capacity to recover from occupational PA (Lund Rasmussen et al., 2019; Korshøj et al., 2021; Interview #6). To achieve that, workers must perform activities that reach at least a moderate to high intensity during work or leisure (Åstrand et al. 1986 cited by Holterman, Coenen and Kraus, 2020). This intensity can be achieved during sports like soccer, running, and swimming, but also during intense daily activities, such as stair climbing, brisk walking, and cycling (Holtermann et al., 2020). According to the physical activity guidelines, a positive health effect can be achieved by performing at least 150 minutes of moderate-vigorous intensity PA per week (WHO, 2010). Proper, professor in public and occupational health at Amsterdam UMC, argues that the activity at work does not count for the recommended weekly activity level since it seems that occupational PA does not contribute to the positive effects (Interview #4). Therefore, she recommends people with physically demanding jobs to comply with the global PA guidelines, neglecting the time they have been active at work. Thus, she proposes that workers should perform at least 150 minutes of moderate-intensity PA per week in their leisure time. Gupta et al. (2020) have shown that even short periods of moderate to vigorous PA positively affect workers' health if it replaces other behaviors (sedentary, stand, light-intensity PA, and time in bed). Hence, ideally, we get workers to move 150 minutes in their free time, but even small improvements can be considered as a success.

Variation

Experts recommend workers to perform another kind of movement than what they do at work. It must be more dynamic and at a different pace than the occupational activity (Interview #2,6). So, if workers need to carry heavy loads the whole day, then it might not be recommendable to go weightlifting in the gym after work but going for a brisk walk could be beneficial (Interview #5). Further, it is known that sitting uninterrupted for longer than 30 minutes is especially detrimental to health. Therefore, it is relevant to interrupt prolonged sitting (during leisure time) by short periods of standing or walking next to performing moderate to vigorous PA. (Hallman et al., 2015; Hamilton et al., 2008)

Sufficient Recovery

Scientists are not sure if we should advise people who work hard the whole day to exercise in their spare time. The human body also needs time to recover, and telling them to move even more during breaks or after work could lead to overtraining and result in even more negative health effects (Clays et al., 2014; Interview #5,6).

2.3 BEHAVIOR CHANGE

The project's overall aim is to design a concept for a lifestyle intervention that shifts production workers' PA behavior in a healthy direction. Hence, behavior change is required. The last parts already indicated the current and the target behavior. Next, it will be described what is needed to initiate change.

It was already mentioned in the introduction that various context factors influence workers' PA behavior in their home and working environment. This complex interplay between individual, social, and environmental factors requires a systemic approach to understanding the current behavior and identifying promising starting points for change. According to Willmott and Rundle-Thiele (2021), many traditional behavior theories *"focus on the intra-individual, and occasionally interpersonal factors, of behaviour while failing to account for the complex social and physical environments in which behaviour occurs"* (cited by Willmott and Rundle-Thiele, 2021, p.3). To overcome these limitations, they recommend applying the COM-B model (see figure 8). This is a model that allows identifying what needs to be changed by considering someone's capability and opportunity to engage in a particular behavior and someone's motivation to perform it (Michie et al., 2011; Willmott and Rundle-Thiele, 2021). Michie et al. (2011) describe these components as:

- **Capability:** An individual's psychological and physical capacity to engage in a specific behavior. Thus, an individual's ability to perform the necessary thought processes (comprehension and reasoning) and the essential knowledge and skills to engage in the target behavior.
- **Motivation:** Brain processes that energize and direct behavior. Both reflective processes (involving evaluations and plans) and automatic processes (involving habits, emotions, and impulses).
- **Opportunity:** External physical and social factors that make behavior possible or prompt it. Physical opportunity is afforded by the built environment and social opportunity by the cultural milieu that dictates how we think about things.

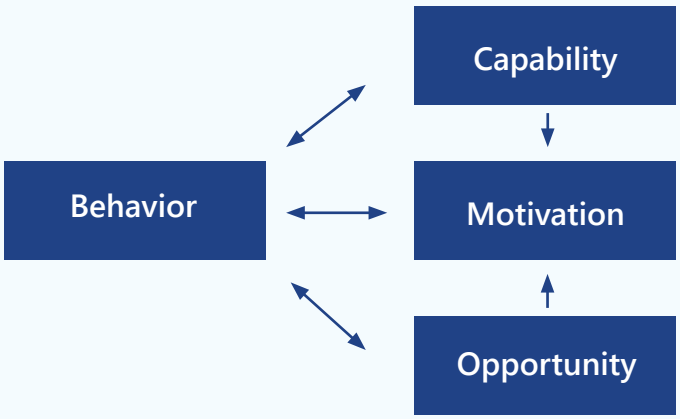


Figure 8: COM-B Model (Michie et al., 2011)

All these components directly impact whether a person engages in a behavior or not. Further, the arrows in figure 8 indicate that the different components influence each other. Someone's capability and opportunity to engage in behavior can influence someone's motivation to perform it. Hence, altering one component can directly affect one's behavior but can also facilitate a behavior by enhancing another component.
To change someone's behavior, designers can develop interventions that alter one or more components of this behavior system. To do so, it is essential first to figure out what component(s) must be changed to achieve a transformation. (Michie et al., 2011)
Hence, to transform production workers' PA behavior, it is necessary to explore factors that influence their capability, opportunity and motivation for a healthy PA behavior and determine their relative importance.

2.4 CONCLUSIONS

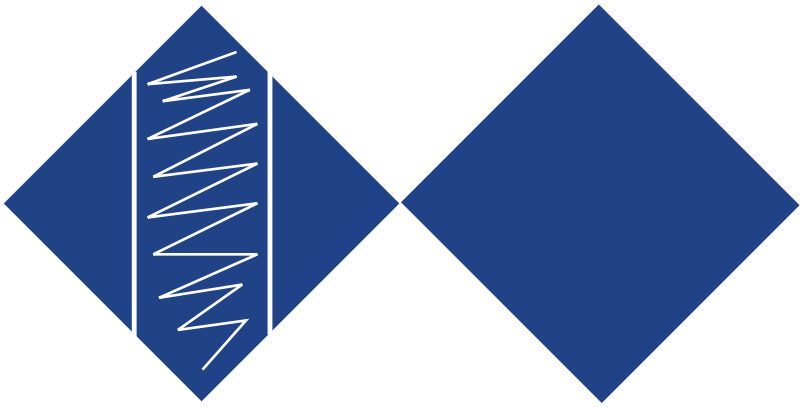
The first literature review and parts of the expert interviews helped in understanding the issue of the PA Paradox and how a healthier PA behavior could counteract its consequences. Further, the literature review yielded a promising model to identify what an intervention must address to change production workers PA behavior. More specifically, the two activities answered to the first two sub-research questions and gave direction to the third research question:

RQ 1a: What characterizes the PA behavior of people with a physically demanding job and what consequences does their current behavior cause?
Literature and experts claim that people with physically demanding jobs carry out strenuous tasks that include manual handling, repetitive work, and prolonged static postures over long periods without sufficient recovery at work. This occupational PA is expected to cause an increased 24-hour heart rate, blood pressure and inflammation. Additionally, it seems to be of a too low intensity and a too long duration to improve workers' cardiorespiratory fitness. Moreover, people with physically demanding jobs seem to spend most of their leisure time sitting or lying to recover from work. Consequently, they miss the beneficial health effects of leisure-time PA and harm their health by sitting for long periods without any interruptions.
A field study is needed to investigate if this behavior applies for Heras' production workers and to get more elaborated insights about it.

RQ 1b: What is a healthy PA behavior for people with physically demanding jobs?
People with physically demanding jobs should perform 150 minutes of moderate to vigorous PA (reaching 60% of heart rate reserve) per week next to their movement at work. It is relevant that the intensity of the PA of these recommended 150 minutes is higher than their work tasks and that they do more dynamic movements. Generally, each increase in moderate to vigorous activity is beneficial, variation is of importance, and prolonged sitting should be prevented.
Nevertheless, the human body needs time to recover as well, so the amount of leisure-time PA on working days should be limited. Therefore, it might be recommendable to schedule most of the advised PA on days off or during working hours, replacing it for other tasks. Not during their breaks since they need recovery at work as well.

RQ 2a: What contextual factors do we need to address in a lifestyle intervention to shift the occupational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?
This chapter has explained that a systemic approach is necessary to achieve a transformation in production workers PA behavior. It has recommended using the COM-B model since it does not only consider intraindividual factors but also complex social and physical environments. According to the COM-B Model, workers will only perform a healthy PA behavior if they have the capability, opportunity, and motivation to do so. My to be designed intervention could alter these behavior components to change workers' PA behavior. To find out which component(s) would be most promising to address, it is essential to explore factors that influence production workers' capability, opportunity and motivation for a healthy PA behavior and determine their relative importance.

To conclude, the first activities helped define the intervention's target behavior and delivered a framework to find out what must be changed to achieve the target behavior. Still, extensive field research is needed to get insights into the PA behavior of Heras' production workers and the factors that influence it.



3. FIELD STUDY

To investigate contextual factors that influence production workers' capability, opportunity, and motivation for a healthy PA behavior and identify their relative importance, I performed a field study. This contained two parts, a contextmapping study, and a home study. These are further informed by existing field literature and the insights won from interviews by experts. The approach and the following results are described in this chapter.

3.1 CONTEXTMAPPING

Study aim

The previous chapter emphasized the relevance of understanding workers' PA behavior and the factors that influence it. Therefore, the main aim of the contextmapping study was to explore workers' perspectives. I wanted to investigate workers' daily activities and learn about their underlying motivations and barriers. Hence, it was my ambition to gain first-hand insights into factors influencing production workers' PA behavior. Also, I desired to get a preliminary idea about the importance of the different factors. Hence, I was looking for answers for the following two research questions:

RQ 2: What contextual factors do we need to address in a lifestyle intervention to shift the occupational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?

- **RQ 2a:** Which contextual factors influence the occupational and leisure time PA behavior of people with physically demanding jobs?
- **RQ 2b:** Which contextual factors have the strongest influence on Heras' production workers' occupational and leisure time PA behavior?

Study design

I applied contextmapping to explore the experiences, needs, motivations and preferences of people with a physically demanding job. Visser et al. (2005) state that contextmapping gives *"access to a hidden world of user experience, and thereby build[s] a better understanding of it"* (p.122). They claim that we cannot identify peoples' underlying thoughts, feelings, and desires with standard methods such as interviews and observations since people find it difficult to express their values and desires in words (see figure 9).

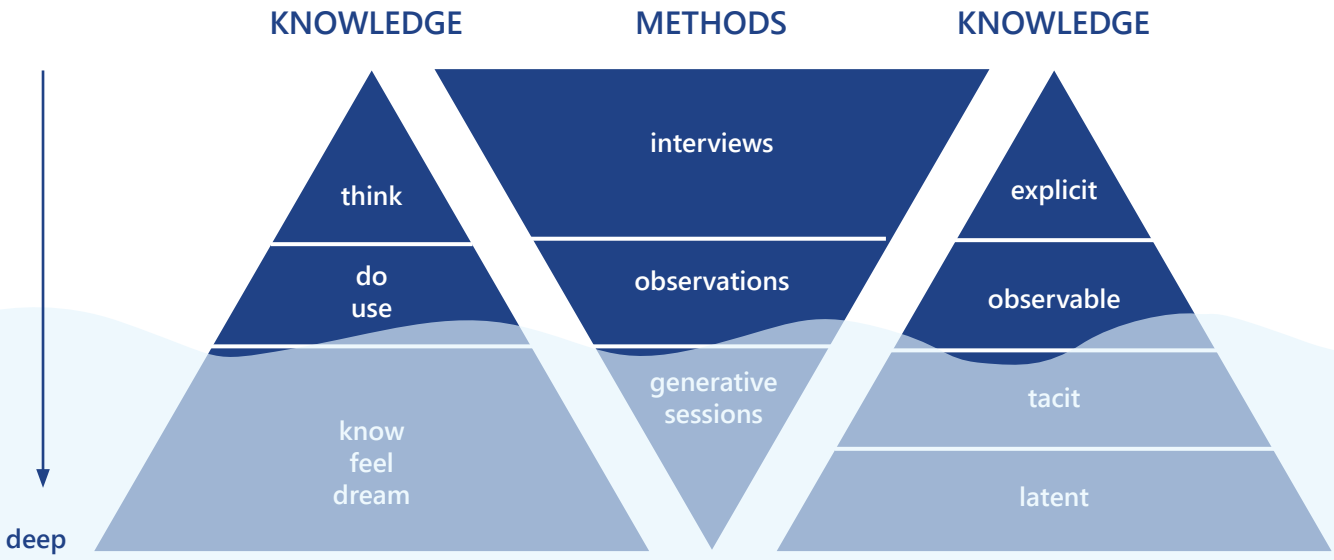


Figure 9: This illustration shows that generative methods are needed to access deeper knowledge (Sanders and Stappers, 2012)

Therefore, I applied contextmapping techniques to help the workers disclose their tacit knowledge and latent needs. Since contextmapping is based on the thought that past memories and future dreams influence peoples' current experiences, I designed the contextmapping study based on the "Path of Expression" (see figure 10). That means I asked participants to first describe their present experiences, recall memories, reflect on these, and finally identify future desires (Sanders and Stappers, 2012; Visser et al., 2005).

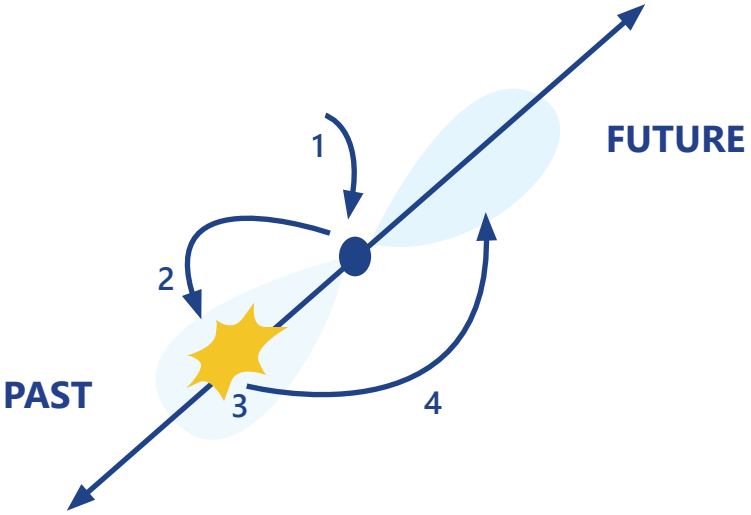


Figure 10: Path of expression ((Sanders and Stappers, 2012).

That is achieved by letting them *"make designerly artefacts and then tell a story about what they have made"* (Visser et al., 2005, p.123). As shown in figure 11, the contextmapping study involved preparation, sensitizing the participants, individual interviews, and communication of the insights (Visser et al., 2005).

Figure 11: Contextmapping process. Retrieved from: https://httbox.wordpress.com/over/contextmapping/

Participants/Recruitment

I was aiming to recruit at least five people with a physically demanding job. The cooperation with Heras gave me access to the target group. As described in the introduction, Heras is a company with physically demanding work, creating all kinds of fences and security solutions. We aimed for employees of the coating department since these have the highest physical workload according to the company, but assemblage or montage employees would also fit the target group. Therefore, employees of the coating department were informed about the study, the privacy regulations, that it is a voluntary study, and that they can stop at any moment. To participate, employees had to sign a consent form (see Appendix B). Participants had to be 18-67 years old. I excluded high-risk patients and workers with severe physical limitations.

Procedure

Sensitizing

Sensitizing participants increases the quantity and quality of participants' contributions during a later interview (Sanders and William, 2001; Visser et al., 2005). I gave each participant a workbook with short assignments around the central topic, moving at work and in leisure time, as preparation (see figure 12). The

assignments were split over four days and aimed to encourage participants to access, express, and reflect on their experiences, motivations, barriers and preferences. Little stickers with ambiguous pictures and emoticons were added to the package to trigger deeper thoughts and feelings and encourage participants to work on it (Visser et al., 2005). The sensitizing materials can be found in Appendix C. After four days, I picked up the filled-in booklets at the company.

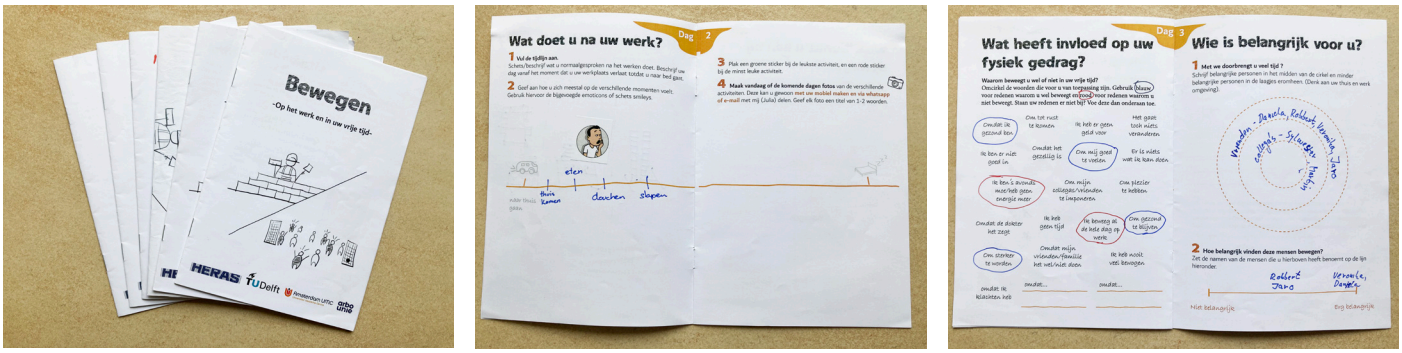


Figure 12: Filled in examples of the workbook.

Interviews

I executed semi-structured interviews to get an in-depth understanding of workers' experiences and motivations. The aim of the interviews was to explore the underlying thoughts and feelings regarding PA and contextual factors that influence their PA behaviour. This helped to investigate prevalent factors and if they are willing and able to tackle these. I used a semi-structured setup for the patient interviews since I needed to ask probing, open-ended questions with follow-up queries (Adams, 2015). I prepared a general script to ensure that the interviews cover relevant questions that compare participants' experiences, needs, motivations, and desires regarding PA (Appendix D). This script is based on the structure of the sensitizing booklets. Later I personalized the script for each interview, using the filled-in booklets to define meaningful follow-up questions. The participants were asked for permission to record the interview, and I made notes while interviewing. After finishing the interview, I complimented these notes and used them later for the analysis.

Analysis

The data of this study consists of field notes taken during and after the interviews and the audio recording of the interviews. I analyzed the data according to the six phases approach of Clarke and Braun (2014). This is a thematic analysis framework, helping to identify patterns and meaning in qualitative data (Clarke and Braun, 2014). Due to time limitations the interviews were not transcribed. Halcomb and Davidson (2006) state that *"[t]he use of analysis techniques such as thematic or content analysis seeks to identify common ideas from the data and, therefore, does not necessarily require verbatim transcripts"* (p.40). Therefore, I used the limited time to interpret the data, generating meaningful insights.

I organized and prepared the data from the interviews for the analysis. Field notes were typed up and written down on post-its in Miro. A different colour was used for each participant so that it could be easily traced back to who made a certain statement. Then, I reviewed the audio recordings and noted relevant quotes and thoughts to familiarize with the data. After that, I processed the coding of the data. Lean coding was applied to prevent an elaborate list of codes (Creswell, 2018). I sorted the data (the post-its) into 10 categories with the following shorthand labels: Personal factors, social factors, cultural factors, environmental factors, resources, work environment, home environment, current PA behaviour, future wishes, and others. Within these categories I clustered and labelled the post-its. That process led to a list of about 66 codes. These codes are listed and described in Appendix E. Next, I started to develop a set of potential themes by looking for overlapping codes and similarity. Also, I was reflecting on the relation between codes and initial themes. To do so, I generated a diagram that represents relationships among the identified initial themes, see figure 13 (Clarke and Braun, 2014; Creswell, 2018). The bigger post-its represent themes that resulted from post its of each color, meaning each participant reported something related to these themes.

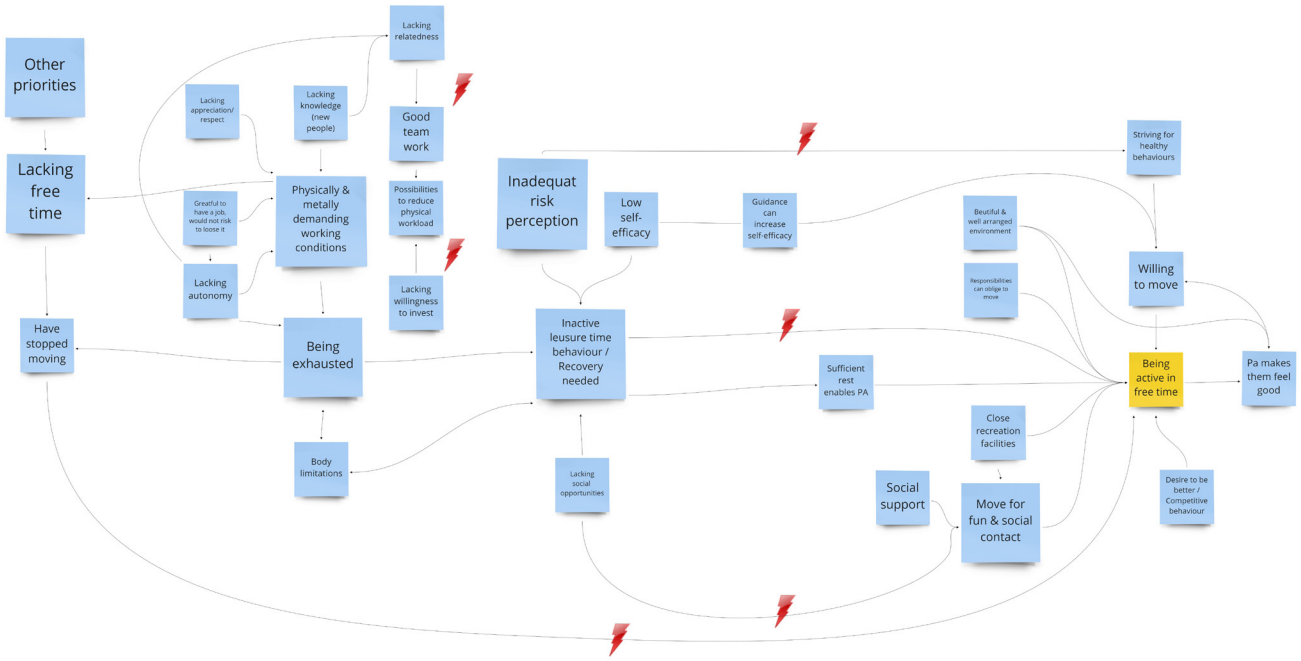


Figure 13: The diagram that represent relationships among the defined codes.

I reviewed the themes against the coded data and the full data set, gave each theme a name and described it. Finally, I filled in these themes into the COM-B model to identify which component(s) of the behavior system must be altered to achieve a change in production workers' PA behavior.

Results

Six male production workers of Heras' coating department participated in the contextmapping study. They represented an age group from 31 to 59 years old, and four of the six have a family. All participants filled in and gave back the sensitizing booklet and attended the interview. The individual interviews took, on average, 48 minutes. Figure 14 presents an overview of the identified themes, filled in the COM-B model. These themes represent the factors influencing production workers' capability, opportunity, and motivation for healthy PA behavior. As explained in the behavior change chapter, the different components (capability, motivation and opportunity) influence each other and so do the different factors. That is illustrated by the shape form of the blue building blocks. **The green tag means that a factor was experienced as a facilitator to healthy PA behavior. In contrast, the red-tagged factors impeded workers from healthy PA behavior and were therefore experienced as barriers.** Further, some factors could be perceived as both a barrier or facilitator to healthy PA behavior. That is the reason why some factors have a red and green tag. The following section details the different factors and how they affect workers' PA behavior. It combines the result of the contextmapping study with insights from the literature review, expert interviews and family interview. I translated quotes from Dutch, German, or Spanish to English.

Figure 14: Overview of identified factors that influence workers capability, motivation and opportunity for a healthy PA behavior (Green tag =Facilitator; Red tag = barrier).

Factors that were repeated by most participants

Incorrect risk perception

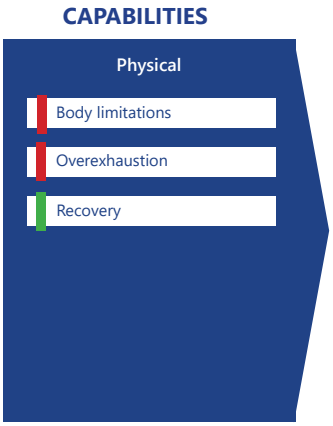
All participants knew that it is important to move to stay healthy. They could not explain why exactly it is essential to move, but they did connect it to better health.

> *Movement you just need, like air* #P4

None of the participants was aware of the Physical activity paradox. That confirms Oude Hengel's (Interview #2) expectation that workers do not know the different effects of occupational and leisure-time PA. Also, Proper (Interview #4) reported that workers are often not aware of the fact that they have an unhealthy lifestyle. Indeed both, literature and expert interviews indicate that workers do not have the necessary knowledge and skills to correctly estimate their own health risk (Tonnon et al., 2014; Interview #5; van den Berge et al., 2020).
Van den Berge et al. (2020) claim that workers will only consider improving their lifestyle when they notice a problem. This is called health adaptive behaviour and is in line with literature on the Protection Motivation Theory (Tonnon et al., 2014). Hence, an incorrect risk perception is a barrier to healthy PA behavior.

Short term thinking

Proper (Interview #4) mentioned that workers rather focus on short-term goals. She explained that it does not make sense to tell them that the chances are high that they get health complaints over 20 years. That is not relevant for them, because it is too far away for them. This is in line with Pampel, Krueger and Denney's (2010) study on Socioeconomic Disparities in Health Behaviors, which claims that people with a lower socioeconomic status choose short-term gain over long-term harm. For the participants, this short-term gain is to relax after work. Therefore, short-term thinking is a barrier to move during leisure.



Body limitation

Some participants reported that they stopped particular active behaviors due to health complaints such as pain.

> *I felt a little pain when I was running, it was not good for me, so I stopped* #P3

One participant noted that he could feel that he is getting older because he is more exhausted in the evening. In the past, he could have worked double shifts or exercised for hours after work, but now he is afraid that he will not get up anymore once he sits down when coming home.

> *It has to do with getting older, I think you notice that you can't do things as easily as a couple of years ago [...] „You notice that in the evening, then you're just tired* #P6

That aligns with Speklé's explanation that human physical capacity decreases immensely around 45 while the workload stays the same (Interview #5). However, another participant stated that he does move because he has the feeling that he should make use of the privilege of a healthy body. Consequently, body limitations are barriers to leisure-time PA, but the absence of these can stimulate it.

Over exhaustion

All participants emphasized that they are extremely exhausted after work. They explained that they would like to be more active during leisure, but that they spend their whole energy on work. They feel unable to move even more in their free time. That seems to be one of the most significant barriers to being active during leisure time.

#P3

> *„You know, we are from the coating department, and we are working their 10 hours, that is the problem why we don't do nothing after work, because we are tired.*

#wife of P5

> *He has more determination and energy to move, but after work he is just too exhausted*

Recovery

Participants reported that they do move if they are free for some days or that they first need to take a nap when coming home. That proposes that workers are able and willing to move during leisure time if they had the chance to recover before. Thus, recovery can be a facilitator to healthy PA behavior.

> *After sleeping one hour it is okay again.* #P4

Believe to move enough

The participants know that it is important to move but they believe that they move more than enough at work.

> *I have enough sport at work* #P4

They explained that it is not like assemblage where you are standing most of the day, but that they are really moving the whole day. They are lifting the different parts up or down, carry them and pack them. Therefore, many of them believe that there is no need to move at home, or even stronger, that they deserve to relax. This aligns with Coenen's (Interview #1) expectation that people that are occupied in physically demanding jobs do not move in their free time because they believe that they move enough at work. Other experts also reported that the high physical workload gives workers the feeling that they have an active lifestyle and that they feel fit (Interview #2,4). Hence, the belief to move enough seems to be a significant barrier to healthy PA behavior.

PA risks their job

Some participants mentioned that they do not move in their free time because they do not want to risk their job. They explained that being active during leisure would risk getting injured and thus that they cannot attend work the next day.

> *I am watching football, if I would play football, it would be a risk, if I would get injured I could not go to work tomorrow.* #P1

Instead, they use their free time to rest to be able to work the next day properly. Therefore, workers' fear to lose their job is a barrier to healthy PA behavior.

Strive for healthy behaviors

Participants reported proudly that they had changed their lifestyle recently. Some stopped smoking, others adopted a healthy diet, and one even started moving in his free time.

> *I am trying to eat good food, health food, I changed 1 year ago my lifestyle [...] I don't drink alcohol, no drugs, nothing, only cigarettes left, it's super, my life is good, seriously.* #P3

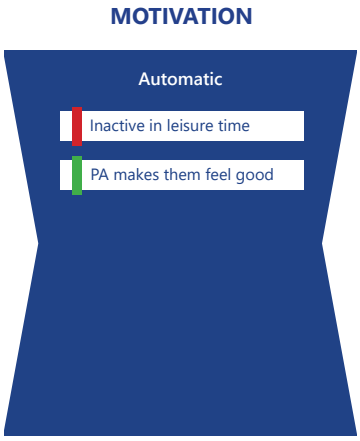
The satisfaction with these achievements suggests that they have positive attitudes regarding a healthy lifestyle. That is a promising development since other sources claimed that workers tend to have a rather negative attitude regarding a healthy lifestyle (Interview #4; van den Berge et al., 2020). The positive attitude is a facilitator for healthy PA behavior.

Desire to be better

Another motivational factor was the desire to be better than others and to stand out from the stereotype.

> *I don't want to be like the stereotype, you know, a lot of people come home after work and don't feel like doing anything.* #P2

However, this was only mentioned by one participant. Therefore, it might not be the most relevant factor.



Inactive in leisure time

Half of the participants are extremely inactive during leisure time. They come back home from work and the only things they are doing are having a shower, eating and then watching TV or going to bed.

> *You have to be in my skin to understand, I only sleep, I am looking for the sleep and the rest after this work.* #P3

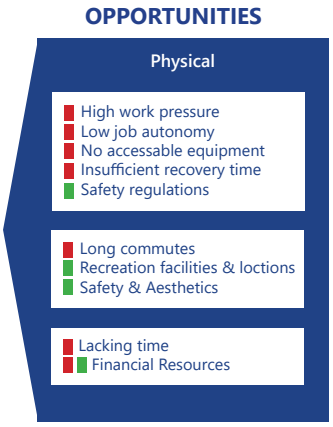
They reported that they feel the need to rest when coming home and only move if they really have to do so, for example to do groceries or to take care of other responsibilities. The inactivity is a barrier to healthy PA behavior.

PA makes them feel good

Most participants reported that leisure time PA energizes them and makes them feel good.

> *I have the feeling that you feel much fitter and have more energy the following day.* #P6

Hence, workers seem to be aware of the immediate positive effects of PA but many are not moving in their free time anyway. Nevertheless, it is a facilitator to healthy PA behavior.



High work pressure

Most participants highlighted the high work pressure in the coating department. They explained that the management increases the production goals each year and tries to reduce the number of employees. Consequently, the staying employees have to work even harder. Additionally, there are many errors in the coating department, so that they need to work overtime to reach the production goal.

> *Sometimes everything works out ideally, enough time to keep the schedule right, but often there is so much hurry up, hurry up, because everything has to get done, and I don't like that.* #P2

These findings align with the insights from expert interviews and literature study. Speklé (Interview #5) clarified that either machines determine the production pace or companies find other techniques to keep the productivity level high. Blue-collar workers are forced to execute tasks at high speed, causing health complaints and over exhaustion (Coenen et al., 2018b; Interview #5). Moreover, high work pressure makes it challenging to participate in other activities during work time. Therefore, it might be a barrier to participating in health programs at the worksite (van den Bergen et al., 2020).

Low job autonomy

The participants disclosed that the line determines the working speed and that they cannot decide when and with whom they want to take a break. Also, they cannot choose at what time they want to work, because once the line starts running, they must be present. The team leader does take it into account for his planning, but generally the job autonomy is low.

#P6

> *Here in the coating department, where we have to generate a certain output and the pace is determined by the line, we have to generate a Traverse every 3 minutes, so hang it up and take it down.*

#P2

> *No, we actually go on separate breaks because production always goes on, because there are, it's an automatic line, so there must always come someone to change.*

Literature also indicates that blue-collar workers are often occupied in jobs with low job autonomy (Hämmig and Bauer, 2013; Schreuder et al., 2008). They have little control over work tasks, intensity, working hours, time and duration of breaks, psychosocial stressors and the surrounding environment. Their working conditions are often suboptimal, but they cannot change it. That can lead to over exhaustion and is therefore a barrier for leisure-time PA. (Holtermann et al., 2018; van den Berge et al., 2020; Interview #5)

No accessible equipment

Equipment can reduce a worker's physical workload so that they might be less exhausted at the end of the day. Therefore, it could be a facilitator for leisure-time PA because workers might have the energy left to move after work. Moreover, working equipment can reduce musculoskeletal disorders and allow workers to be still able to move in the future. (Interview #5; Tonnon et al., 2018)
However, it was declared that there is no suitable equipment for the jobs in the coating department because it is not just lifting or carrying one product, but it is a combination of movements with varying elements. They have some tools that can help them with single steps, but they are not very convenient since they slow down the process. Therefore, these tools are not applied because workers will only use equipment if the benefit outweighs the cost (Tonnon et al., 2018). Hence, lacking accessible equipment is a barrier to healthy PA behavior since the workers have to carry the heavy loads without support, leading to exhaustion and eventual health complaints.

Insufficient recovery

Delivering strenuous physical work 40 hours a week and sometimes even more (due to overtime) is likely to offer insufficient recovery. Next to that, people with low income often have multiple jobs to provide for the family (Holterman, Coenen and Krause, 2020). This prolonged exposure to physical stressors combined with insufficient recovery could result in an allostatic load (Korshøj et al., 2021; McEven, 1998; Interview #5). As a consequence, workers might develop unhealthy behaviors, such as poor sleep and disrupted life rhythms, lack of exercise, smoking, alcohol consumption, and an unhealthy diet (Guidi et al., 2021).
Participants did not mention that they have a second job, but they all complained about their long working days. They are working four days a week 10 hours and often overwork on Saturday. That means they have a 50-hour week.

> *10 hours work are changing my life for the worse.* #P3

Additionally, they disclosed that it is often too busy to take all breaks because they continuously have to deal with new workers.
Consequently, they are too exhausted to be physically active in their free time and lack the time for it. Therefore, insufficient recovery is a barrier to being physically active in leisure time.

> *Yes, sometimes, but often not, if it does not fit then it does not fit, then I do not take a break.* #P6

Safety regulations

Blue-collar's occupational PA behavior is impacted by the presence/absence of safety regulations. For example, storing heavy material below knee height or above shoulder height results in a high physical load when workers need to rearrange it. That makes it more exhausting and can lead to health complaints. Also, a lack of information about how the human body works, what movements are good for them, and what should be avoided can lead to bad occupational PA behavior. (Interview#5)
Participants reported that they have regular meetings with the team leader to talk about this kind of information. Moreover, they mentioned that there is a safety round each week. That means that the team leader checks in with the different positions of the coating department to see how it is going, gives tips, and discusses if something needs to be changed. Hence, the safety regulations seem to be fine and thus not the cause for the workers unhealthy PA behavior

> *What I see, at Heras is that it's very well organized with movement, safety and things like that.* #P6

Long commutes

All participants go by car to work because it is either too far to cycle, or they would need to get up very early to do so. Some tried it out once, but it was too much after a long working day. Van den Berge et al. also found that blue-collar workers often have long commutes before and after work that prevent them from walking or cycling to their work. Additionally, they claimed that long commutes shorten worker's leisure-time and are tiring so that there is less time and energy left for being physically active. This was confirmed by the participants. Therefore, long commutes are barrier to healthy PA behavior.

Recreation facilities

Participants mentioned that if they move during leisure, they go to close parks, football places, or shops (with their children). That proposes that close recreation facilities can stimulate workers to get active.

> *Yes I live close to the woods, so we go into the woods for an hour, one and a half.* #P6

In contrast, one participant reported that he likes gardening but does not have the facilities here to do so. Therefore, he is only doing it when he is home in Poland, which is only three or four times per year.

> *I only garden in Poland, I have a nice house there, but I'm only there 3,4 times a year.* #P4

That shows how the absence of certain recreation facilities can be a barrier to moving. These findings align with Bauman et al.'s study results (2012), which suggest that leisure time activity is consistently related to the availability and the proximity of recreation facilities. Hence, close recreation facilities can be a facilitator for a healthy PA behavior.

Safety & Aesthetics

According to Bauman et al. (2012), a pleasant, green environment can stimulate people to go outside and move (Bauman et al., 2012). Indeed, many participants indicated that they prefer moving in nature. Furthermore, participants mentioned that they like cycling in the Netherlands because of the well-arranged cycle paths. They also place importance on visiting places that are safe for their children.

#P3

> *I really like it because the town is prepared for cycling, it's super, I guess all holland is prepared for cycling, you could even go to the seaside*

#P1

> *Yes, the swing and some places are good, is not dangerous for the children.*

That supports Coenen's (Interview #1) expectation that a well-designed environment can stimulate a particular behavior and thus be a facilitator for leisure time PA.

Financial resources

Experts explained that blue-collar workers often have limited financial resources and, therefore, might not have the money to subscribe to a gym or something similar (Interview #2,3). However, that was not mentioned as a barrier to move in leisure time by the workers themselves. Therefore, the financial resources do not seem to be a problem for them. That might be because there are enough activities that can be done for free, or that they do not even think about visiting a gym or something similar due to other barriers such as lacking time and energy.

Next to the workers' financial resources, it is worth mentioning that the company's resources seem to be

limited when it comes to investing in their employees. Participants do not believe that the company will change things to reduce their workload or improve their health if it requires money.

> *Then they would have to invest, and they are not going to do that, everything that costs money is under a magnifying glass.* #P6

The different departments need to ensure that they achieve the production goals and have limited possibilities to create better working conditions. Therefore, the lacking willingness to invest is a barrier to healthy PA behavior.

Lacking time

All participants indicated that they would like to move more in their free time but that they do not have the time to do so. As mentioned before, they have long working days and long commutes, so that their leisure-time is rather limited. On top of that, they have social responsibilities that take up much of the remaining time. Hence, workers have little time for PA after work.

> *Like now, I would like to do some sports, but I just don't have time for it.* #P6

Masculine culture / Macho culture

Literature and all experts report that there is a certain macho culture present in the physically demanding job sector (Courtenay, 2000; Du Plessis et al., 2013; Interview #1-6; Smith, BraunackMayer, & Wittert, 2006). They describe it as a 'can do culture' that is based on the principle of *"work hard, don't complain"* (Interview #2; Tonnon et al., 2018). This culture leans on masculine stereotypes that advocate stoicism, suppression of emotion, superiority, independence, and self-reliance (Smith, BraunackMayer, & Wittert, 2006).
Indeed, participants disclosed that employees of the coating department work hard and do not complain.

#P6

> *In de afdeling, ik denk dat de cultuur best goed is, die mensen die gaan ervoor en klagen niet en je hoeft ze ook niet te zeggen van jongens tempo kom op dit en dat, dat beseffen ze zich zelfs heel goed.*

#P4

> *I come to work to work, not to relax or to chat.*

They even go to work when being sick and only go home if the team leader realizes it and sends them home. This can act as a barrier but also as a facilitator to participate in PA (programs). It could be a facilitator because the workers are expected to be competitive and want to prove to each other that they can do it (Interview#2). However, it can also be that they try to act cool by not taking part in PA (programs) (Interview #3). Moreover, it could be a barrier because *"man who behaves according to the masculine stereotypes "would be relatively unconcerned about his health and wellbeing and would place little value on health knowledge"* (Courtenay, 2000, p.11). This also discourages talking about personal health issues and therefore creates an unsupportive social culture (Tonnon et al., 2014).

Social Dilemma (Other priorities)

All participants reported that they have other priorities after work. Workers with a family must care for their wives and children since their time together is minimal. Single workers need to run the household and maintain relationships with friends not to end up lonely.

> *Most of the time my wife cleans up, but I have to do something from time to time, otherwise my wife gets angry.*

#P4

Also, Teuscher et al. (2015) claim that PA behavior is the product of several factors, including social practices and social relations. They explain that the decision between being physically active and maintaining social relationships can result in a dilemma because both activities are essential for human wellbeing. In their study, people have reported that they used to be quite active, but they do not have time for it anymore due to work and family responsibilities. They want to care for the family, financially and socially. Thus, they have social roles and responsibilities that keep them from being physically active. Consequently, PA *"becomes subordinate and is perceived as an extra effort, which is time-consuming and requires extra energy"*. (Teuscher et al., 2015, p.620). Bukman et al. (2014) confirm that family members could keep workers from being physically active by reminding them of other responsibilities. Nevertheless, workers also mentioned that social responsibilities can oblige to get active. For example, having children or a dog that needs to go outside pushes workers to go for a walk. To conclude, social responsibilities can be a barrier and facilitator to leisure-time PA.

#wife of P5

> *Sometimes I can motivate him to move by telling him that we cannot sit home all day because the kids must go outside, that is the big excuse to make the magic happen.*

#P4

> *That I must do anyway whether I want or not, because my dog always wants, otherwise the dog is not happy and then I have no rest at home, so I have to.*

Family and general social support

Most participants disclosed that they only move in their free time if a family member or friend urges them to do so or suggests moving together.

> *When my son asks me on Sundays to go cycling or play football, then I do it.* #P5

That indicates that social support has a huge potential to help workers achieve healthy PA behavior. Consequently, it is important that the social environment is aware of the health benefits and has a positive attitude towards PA (Bukman et al., 2014).

Fun activities with others

All participants emphasized that they prefer moving with other people because it makes it a pleasant activity. They want to enjoy their limited free time and not have another task to accomplish.

> *It is often fun when we move with friends, then you do not move to move but for the sociability, to meet.* #P2

The participants in Teuscher et al.'s study (2015) also indicated that moving in a group makes it a pleasant activity and, therefore, is perceived as less demanding. Additionally, some participants indicated that they like to be active in groups because it gives them the opportunity to get to know new people. Participants further agreed that a team could act as a facilitator because people feel obligated to go when they have an appointment, even though they might not be motivated at that moment. These findings align with Bukman et al' study (2014). Nevertheless, it can also be a barrier to a healthy PA behavior. One worker mentioned that he does not have friends here who want to move with him. That limits his social opportunities to get active.

> *Actually, no here in holland I have a lonely live, I don't have somebody to call, hey let's play football, no.* #P3

Good teamwork

All participants highlighted the importance of working together. They explained that it is necessary to help each other because it is too heavy for one person.

> *What is good, we do it together, I used to work for other companies, there you had to lift 20, 0f 10 or 15 kg all day, that is difficult, but here no, I think here it is good actually* #P1

Hence, good teamwork reduces the physical workload of production workers. Therefore, it is a facilitator to a healthy PA behavior.

Reflection

We can see that many different factors influence production workers‘ PA behavior. Theoretically, all these factors could be addressed to shift a worker‘s PA behavior in a healthy direction by strengthening the facilitators and reducing the barriers. However, it is not feasible to tackle all the factors in one intervention. The data revealed that combating the factors that most participants repeated is most impacting. Therefore, I decided to focus on the factors marked by a star in the previous section since the data revealed that these are most impacting. Below I give an overview of these factors.

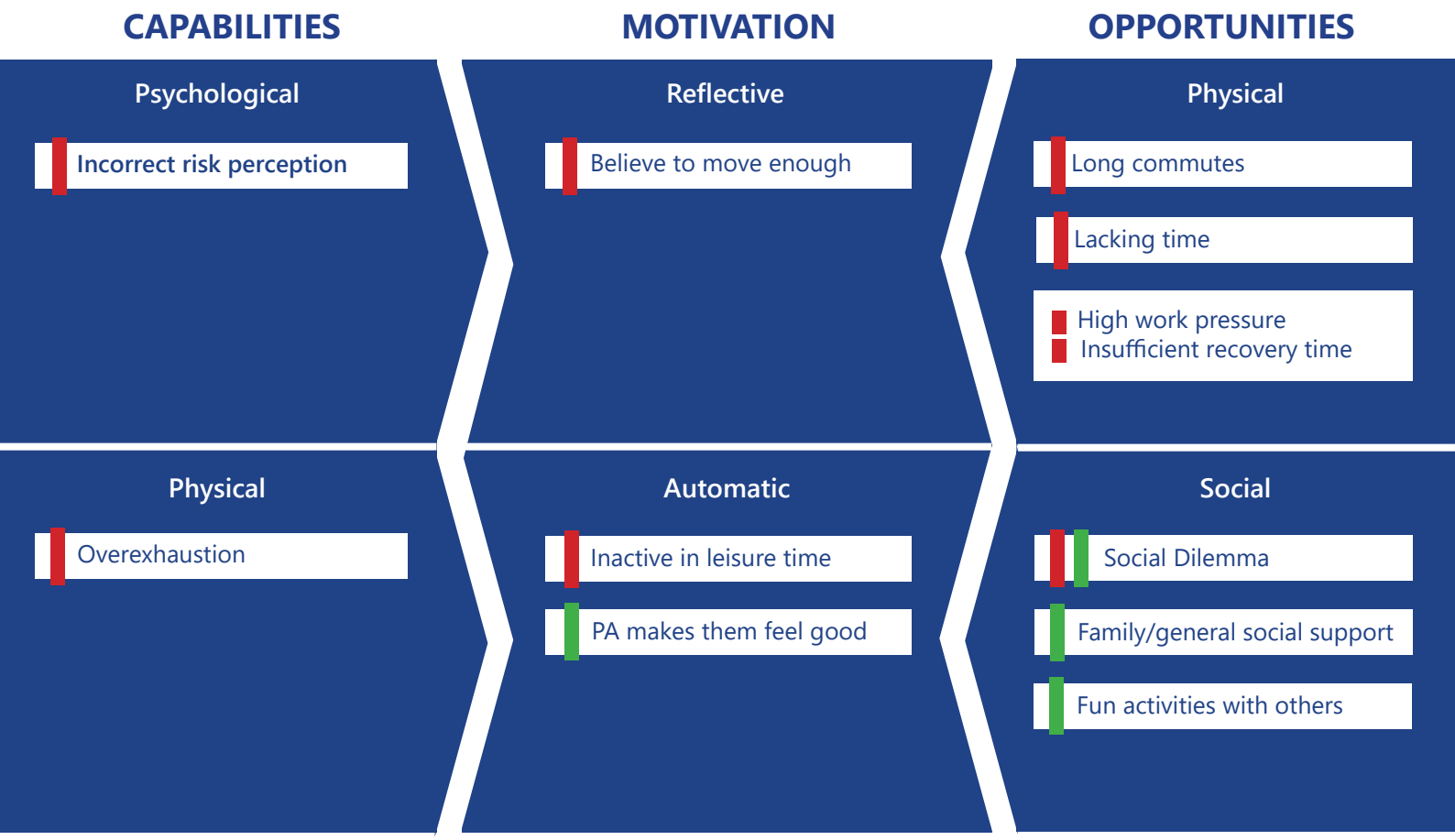


Figure 15: Overview of the most prevalent factors that influence workers capability, motivation and opportunity for a healthy PA behavior (Green tag =Facilitator; Red tag = barrier).

Nobody was aware of the different effects of occupational and leisure-time PA (incorrect risk perception). They all believed to move enough at work. Further, everyone emphasized the high work pressure and insufficient recovery time. **They are extremely exhausted after work** and most workers only want to rest in their leisure time (inactive leisure time behavior). Additionally, all participants highlighted that they lack time due to the long working days, long commutes, and other responsibilities after work (social dilemma).
In contrast, everyone mentioned social support, moving together with others, and PA making them feel good as facilitating factors.
This list of prevalent barriers and facilitators to a healthy PA behavior contains factors of each behavior component - capability, motivation, and opportunity (see figure 15). That indicates that it might be promising to alter all components to transform workers’ PA behavior. Nevertheless, the time of this project is limited, and generally, interventions seem to be more successful and easier to evaluate when having a clear focus. Therefore, part two of this research investigated which factors should be addressed to realize a shift in workers’ PA behavior.

3.2 HOME STUDY

Study aim

The home study aimed to collect data in the workers' home context to make conclusions about the prevalence of predetermined contextual factors. Therefore, it further contributed to answering the following research question:

- **RQ 2b:** Which factors have the strongest influence on workers' PA behavior at home?

Study design

The Experience Sampling Method was applied to facilitate systematic self-report. This is a common method for studying what people do, think, and feel during their daily lives (Larson and Csikszentmihalyi, 2014). I installed three little boxes for four days at the participants' homes to ask them multiple choice questions in the home context (see figure 16).

Figure 16: The three little boxes that were placed in participants' homes. The factors on the boxes are based on literature, expert-interviews and first insights from the contextmapping study.

Each of these boxes had seven buttons with little labels next to it. The labels described factors that might influence the physical activity behavior of the participants. Thus, the participants could press a button to indicate what influences their physical activity behavior in certain moments. The factors on the boxes were based on literature, expert-interviews and first insights from the contextmapping study. Each box had a different meaning:

- **Box 1: Moving.** This box offered the participants seven options to indicate why they were motivated to move at that moment. It was placed next to participants' entrance/at the door so that they could see it when they left the house. Participants who would rather move at home installed the box at a spot where they usually move/exercise to press a button whenever they were about to move.
- **Box 2: Not moving.** This box contained seven factors that might keep people from moving. Thus, the participants could press a button to indicate why they were not moving at that moment. It was placed next to the couch or where the participants spent most of their time inactive.
- **Box 3: Feelings.** This box contained seven different emoticons, allowing the participants to express how they felt at a specific moment. It was installed at a central spot between the two other boxes.

Figure 17: The three little boxes that were placed in participants' homes. The factors on the boxes are based on literature, expert-interviews and first insights from the contextmapping study.

I explained to the participants how to use the boxes and where to install them and provided them with a short instruction so they could look it up later again (see Appendix G). I triggered them to use the boxes by events. I basically asked them to press a button on 'Box 1: Moving' when they are about to move and to press a button on 'Box 2: Not moving' when they are sitting on the couch or generally when being inactive. Further, I asked them to indicate how they feel (Box 3) whenever they pressed a button on one of these two boxes and when they came back from physical activity. The three boxes were connected to a router to send the data to the researcher (see figure 18, left). The data is saved on a TU Delft cloud and represented in a dashboard using Grafana (see figure 18, right). This set up has been developed in Studiolab, IDE by Adriaan Bernstein and Martin Havranek under the supervision of Aadjan van der Helm and Natalia Romero Herrera. The prototype name is _sampler.

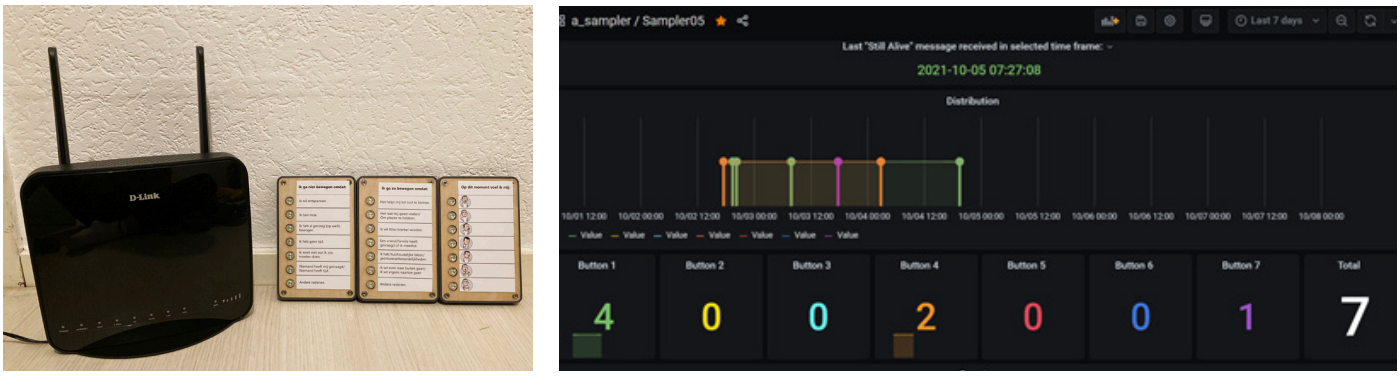


Figure 18: On the left you can see the router that is connected to the three boxes next to it.
The right picture shows the Grafana dashboard.

Participants/Recruiting

At the end of the interview's participants were asked to take part in the home study. The inclusion criteria were the same as for the contextmapping study. Again, a consent form was signed (see Appendix F).

Analysis

Since some participants used the boxes much more than others, I calculated the relative number each button was pressed. To do so, I created an Excel sheet that can be found in Appendix H. Further, I executed a descriptive analysis. I identified outliers (buttons that were clearly pressed more than others) of 'Box1: Moving' and 'Box2: Not moving' and checked what participants felt when they pressed one of these outliers.

Results

Four out of the six male participants signed the consent form and used the boxes for four days. The age of the participants differed from 31 to 59 and three of them have a family. Most participants pressed multiple buttons each day. Only one participant used the boxes less frequently, but he did press at least one button each day. Hence, nobody dropped out.

Figure 19: The diagram illustrates the relative number the buttons on 'Box2: Not moving' were pressed.

Graphic 19 shows that most times, participants did not move during leisure time because they felt that they moved enough at work. That belief let them feel confident/proud, indicating that they are satisfied with their PA behavior. Hence, the most significant barrier to PA seems to be that workers do not feel the need to be active in their leisure time.
The second most selected reason for not moving is that workers want to relax. That seems to be a contradiction when comparing the results of the two boxes because participants indicated on 'Box1: Moving' that PA helps them to relax. That can be explained by considering the insights of the interviews, suggesting that PA does help workers to relax their minds but that they feel too exhausted to get started. Indeed, participants indicated on 'Box3: Feelings' that they were tired when they pressed "I want to relax". That confirms that workers want to rest after work due to exhaustion. Hence, lacking energy and the need for body recovery seem to be substantial barriers.

Graphic 20 shows that most times, participants moved to do household chores.
The second most selected reason for moving was to go outside or to go somewhere. Participants did only sometimes indicate how they felt when pressing one of these two buttons. That was usually confident or happy.

The outcomes of 'Box 3: Feelings' were used to understand the outliers of the other two boxes. Nevertheless, it can be mentioned that the participants generally felt happy and confident with what they were doing. They only felt tired when they did not move because they wanted to relax or because they were too exhausted to move.

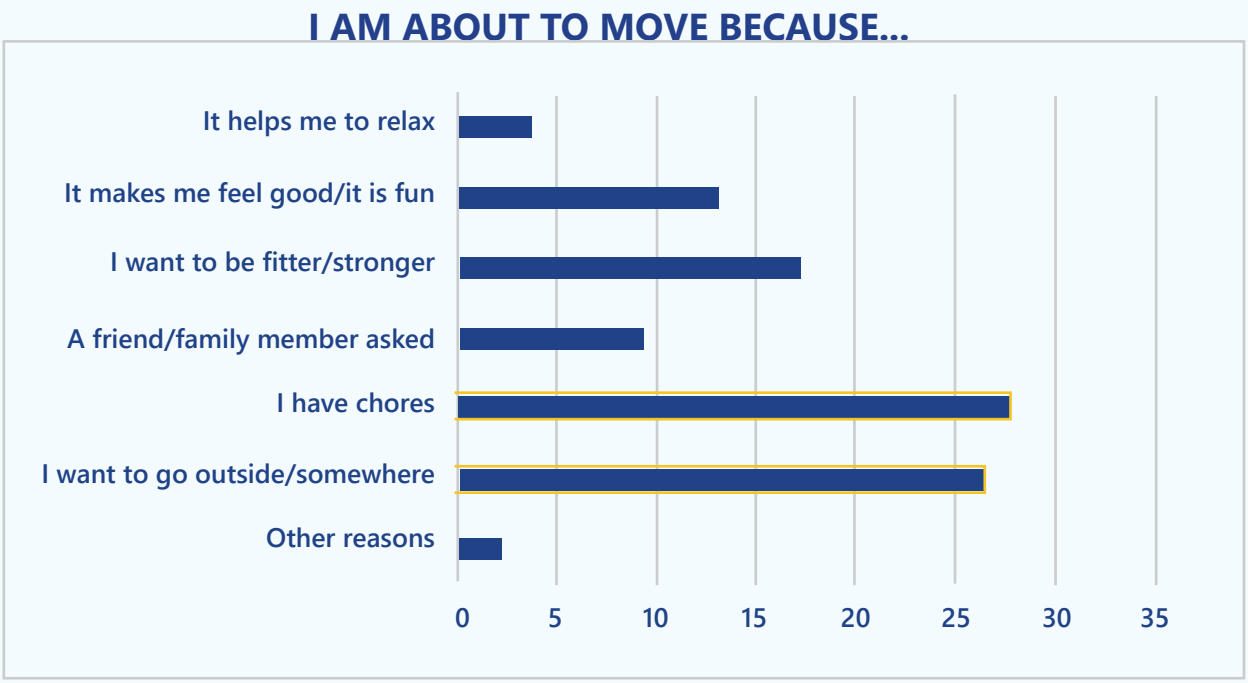


Figure 20: The diagram illustrates the relative number the buttons on 'Box2: Not moving' were pressed.

Reflection

The home study has shown that workers mainly do not move because they believe to move enough at work and feel the need to rest, suggesting that these are significant barriers to healthy PA behavior. Since these are the consequence of workers' inadequate risk perception and pure exhaustion, I have drawn the conclusion that it might be most impactful to focus on tackling these barriers.

Besides, the home study has shown that workers currently mainly move in their free time because they have to do chores. That is interesting since, during the interviews, it sounded as if workers did not have time to move due to responsibilities. It seems that workers do not consider household chores as PA. Therefore, I must be careful with pushing workers to move more in their free time since some might be pretty active already, and the human body also needs sufficient time to recover. However, it could also be that participants pressed the button for every little chore, such as emptying the trash bin, since I ask them to press a button each time they are about to move.

The second most selected reason to move was to go somewhere. That aligns with the insight from the interview that the participants often move to be in nature or to visit different kinds of places (shops, playgrounds, friends). That suggest that participants already do take their bike or walk shorter distances instead of taking the car. Again, it could be that the participants pressed the buttons even when going outside for a short while.

The outcomes of Box 3 did not add much value, but the fact that the participants only indicated to be tired when they were not moving could suggest that being active during leisure makes them feel happy and confident. Nevertheless, it could also emphasize that workers really need to sit down for a while after work due to pure bodily exhaustion.

To conclude, the home study results indicate that it is promising to address workers' risk perception and over exhaustion and pointed out that workers might be more active in their free time than anticipated.

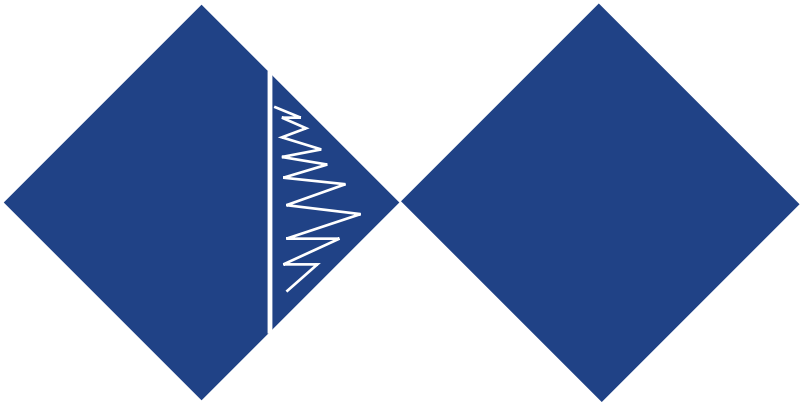
3.3 CONCLUSIONS

Combining the literature review, expert interviews, and contextmapping results yielded an overview of factors that influence workers' capability, opportunity, and motivation for a healthy PA behavior (see figure 14).The contextmapping results further allowed me to determine which factors are prevalent for Heras' production workers and the home study has shown the relative importance of these factors. Hence, the field study enabled me to answer the first two research questions of this project:

RQ 2.a: Which contextual factors influence the occupational and leisure time PA behavior of people with physically demanding jobs?
The PA behavior of people with a physically demanding job is influenced by various capability, opportunity, and motivational factors. The contextmapping study has shown that incorrect risk perception, the belief to move enough at work, over-exhaustion, high work pressure, insufficient recovery time, and long commutes are prevalent barriers to a healthy PA behavior among the production workers of Heras' coating department. In contrast, social support, moving together with others, and PA making them feel good were the dominating facilitators for a healthy PA behavior. Above that, social responsibilities seem to be a prevalent factor that can keep workers from a healthy PA behavior and facilitate it.

RQ 2.b: Which contextual factors have the strongest influence on workers' occupational and leisure time PA behavior?
Workers do not move during leisure mainly because they believe to move enough at work and feel the need to rest. These barriers are the consequence of workers' inadequate risk perception and pure exhaustion.

From this, I can conclude that it would be most impactful to tackle workers' inadequate risk perception and their over-exhaustion after work. Since these barriers are both capability factors, I decided to aim for positively altering the behavior system's capability component. Nevertheless, I considered opportunity and motivational factors during ideation since the different components and thus the different factors affect each other.



4. DESIGN BRIEF

This chapter depicts how the insights from the previous chapters are used to formulate a design goal and interaction vision. These were later used to guide the ideation and exploration activities and evaluate the emerged concept.

DESIGN GOAL

Studying the context of production workers has shown that two main barriers to a healthy balance are incorrect risk perception and over exhaustion (the need for recovery). As long as workers are not aware of the different health effects of occupational and leisure-time PA, they will not feel the need to change their physical behavior because they believe they move enough at work. Furthermore, they will not make an effort to shift their PA behavior in a healthy direction as long as they feel that they cannot do it. Hence, it is necessary to enhance workers' confidence, convincing them of the importance of a healthy balance and giving them the feeling that they can beneficially change their PA behavior. Therefore, the following design goal is defined:

"The design goal is to design an intervention for production workers' work and home environment that makes them feel confident about shifting their PA behavior in a healthy direction. "

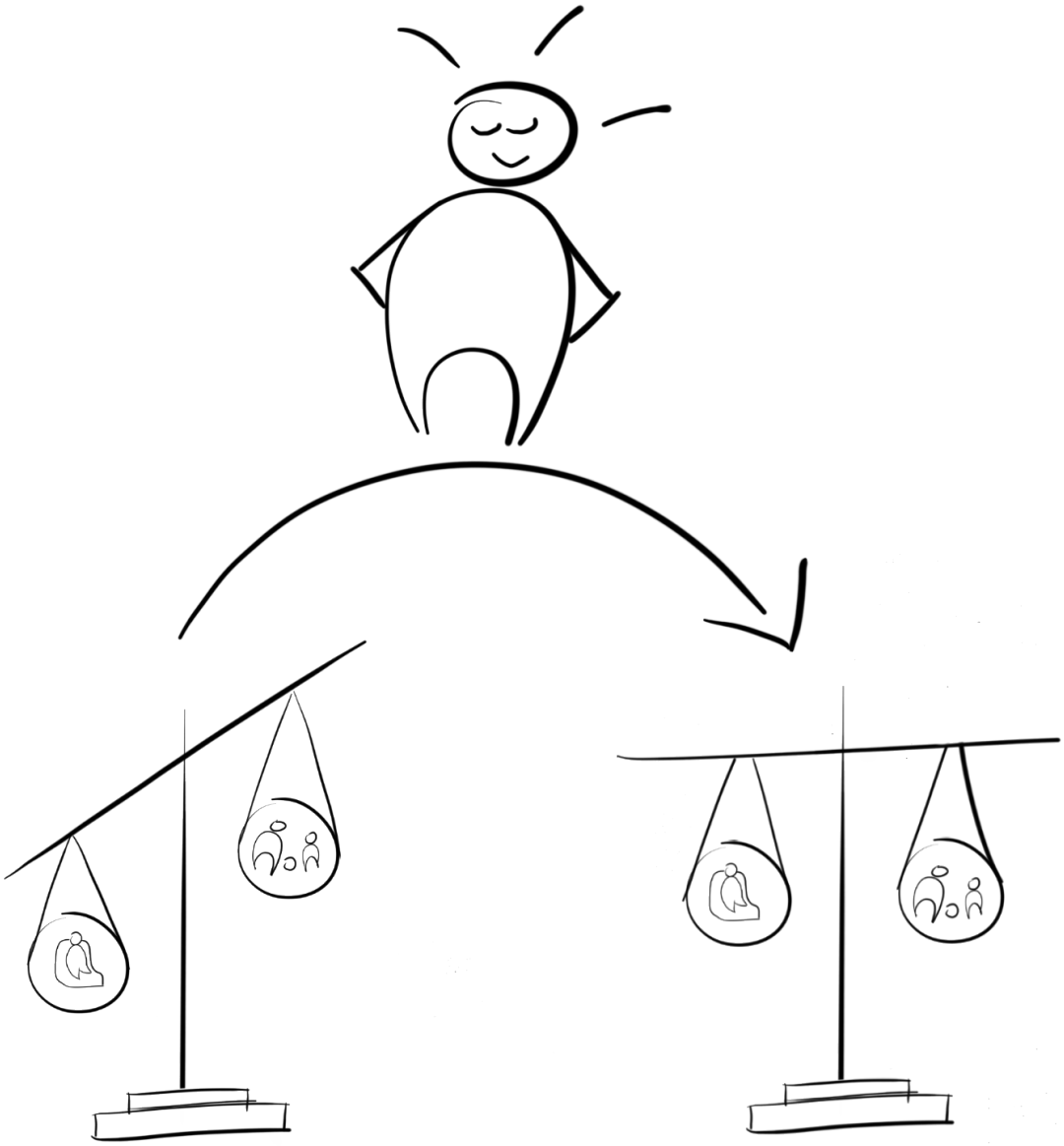


Figure 21: Represents the Design goal.

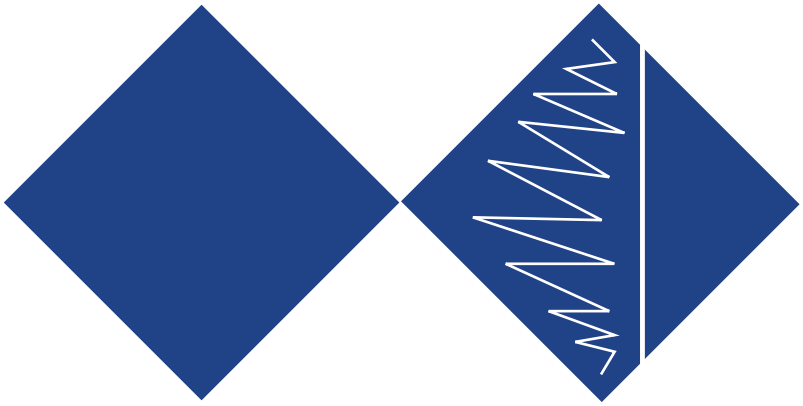
INTERACTION VISION

An interaction vision is defined to identify the character of the desired situation (see figure 22). More specifically, it represents *"the moods, feelings, or experiences that the interactions with the future [intervention] should bring for the user"* (Pasman, Boess and Desmet, 2011, p.2). Metaphors or analogies help to clarify and communicate the character of the desired interaction. I chose the metaphor of going bouldering because it is an experience that lets me feel confident. It is a very supportive environment. Friends and strangers at the sidelines give you tips and cheer for you. There are additional objects that help you get to the top. The mat on the bottom lets you feel safe and gives you the confidence to try it out because nothing will happen if you fail. You have control over the situation. You can stop at any moment and determine the path you want to take. Various levels allow you to explore your abilities by trying out what works and listening to your body. Finally, the satisfying feeling when reaching the top makes you feel confident and motivates you to try out a new one. Hence, the interaction with the future intervention should be supportive, safe, provide a feeling of control, exploration and satisfaction. These identified qualities served as inspiration for the generation of ideas and guided the concept evaluation.

"The interaction with the intervention should feel like going bouldering"

- SUPPORTIVE
- SAFE
- CONTROL
- EXPLORATIVE
- SATISFYING

Figure 22: The diagram illustrates the relative number the buttons on 'Box2: Not moving' were pressed. (Image retrieved from https://www.klook.com/en-GB/activity/49238-indoor-bouldering-gym-experience-singapore/)



5. DEVELOPMENT

This chapter describes ideation and exploration activities that investigate how an intervention can make workers feel confident about shifting their behavior in a healthy direction through answering the following research questions:

RQ 3: How can we design a lifestyle intervention that addresses relevant contextual factors to shift the occu pational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?

- **RQ 3a:** How can lifestyle interventions address production workers' incorrect risk perception and over exhaustion?
- **RQ 3b:** What type of intervention fits workers' abilities, needs and preferences?
- **RQ 3c:** How can lifestyle interventions integrate workers' home and work environment?

The first part of this chapter presents the ideation activities that I have carried out to identify possibilities to enhance someone's confidence and address the two main factors. The second part details the explorations I have executed to investigate what ideas indeed have the potential to increase an individual's confidence and fit workers' abilities, needs and preferences.

5.1 IDEATION

Activities

During the ideation, I generated ideas that could possibly increase workers‘ confidence and address the two main factors. To do so, I brainstormed with fellow design students, reviewed literature and expert interview insights, and sketched ideas. During these activities, I generated ideas for the home and working environment.

The first activity was the brainstorming session with peer students. We discussed what makes people feel confident (see outcomes Appendix I) and generated ideas for the different ways that could make production workers feel confident about shifting their PA behavior in a healthier direction (see figure 23).

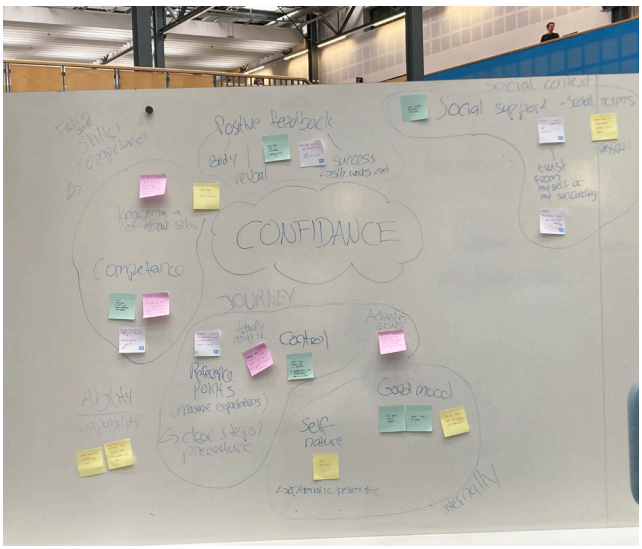


Figure 23: The diagram illustrates the relative number the buttons on ‘Box2: Not moving’ were pressed.

Results

Discussing the brainstorming session results with my supervisor made me realize that we were talking about self-efficacy beliefs and sources of these. Bandura (1986) defined self-efficacy as *“the belief in one’s capabilities to organize and execute the sources of action required to manage prospective situations”* (cited by Bennett and Morrison, 2016, p.133). More simply, it is about an individual’s confidence to perform a specific behavior successfully (Pekmezi et al., 2009). According to the self-efficacy theory, people with high self-efficacy embrace challenges, sustain a solid commitment to settled goals and recover quickly from setbacks (Bandura, 1994). Further, it suggests that individuals are more likely to engage in a particular behavior if they believe they can perform it successfully; otherwise, people might not even give it a try (Pekmezi et al., 2009; Pajares, 1997). Indeed, Pekmezi et al. (2009) reported that research has shown that self-efficacy beliefs influence the adoption of healthy behaviors and maintenance over time (Pekmezi et al., 2009).
Bandura identified four sources of self-efficacy believes: Mastery experiences, Vicarious experiences, Social persuasion, and Physiological state. These sources served as inspiration for the ideation process. The following segment describes each source and explains what intervention techniques could facilitate them. Below each source, sketches of related ideas are added. Some ideas are facilitating more than one source.

Mastery experiences (Past performance)

According to Bandura (1994) the most promising way to enhance self-efficacy is through mastery experiences. While successes increase someone's sense of efficacy, failures undermine it. We also found during our session that previous experiences make you feel confident, especially if you have succeeded in something several times. Additionally, we realized that it is essential to have reference points to feel confident, because they enable you to measure whether you are doing well or not.

Intervention techniques such as goal setting, action planning, training, and self-monitoring can initiate Mastery experiences (Pekmezi et al., 2009; William and French, 2011). According to van de Berge et al. (2020), it is important to let participants set personal goals to make them see their relevance and get motivated. However, it is not just important to set clear goals but also to specify how goals are to be achieved. Thus, defining when, where, and how a particular behavior will be executed (William and French, 2011). Williams and French (2011) claim that action plans are also more effective when self-generated but that it is beneficial to provide instructions to illustrate that there are possibilities to get active. Further, it is relevant to show people their progress, so they can see what they have already achieved. Proper (Interview #4) advises using personal goal cards to let workers describe and keep track of their personal goals. However, there are also other tools like self-monitoring technology or diaries (van den Berge et al., 2020). It is recommended to integrate a professional that can help the company or the employees to come up with goals and coach them throughout the first phase. (Interview #2).

Besides process facilitation, it can boost peoples' sense of efficacy to rehearse a particular behavior (Pekmezi et al., 2009). Therefore, training sessions can also contribute to mastery experiences.

Figure 24: Idea sketches related to Mastery experiences.

Vicarious experiences

Vicarious experiences are another effective way to enhance someone's self-efficacy. Observing how people similar to themselves successfully perform a particular behavior gives people the feeling that they too can do so. Additionally, people can obtain relevant skills and strategies for a specific behavior by observing others doing it (Bandura, 1994). My peers also mentioned that knowing that friends successfully finish their graduation projects makes them feel confident to do so as well. Hence, showing that peers achieve their goals could be a way to generate vicarious experiences.

Pekmezi et al. (2009) suggest showing videotapes of active peer role models or organizing group PA sessions with peer role models to facilitate vicarious experiences.

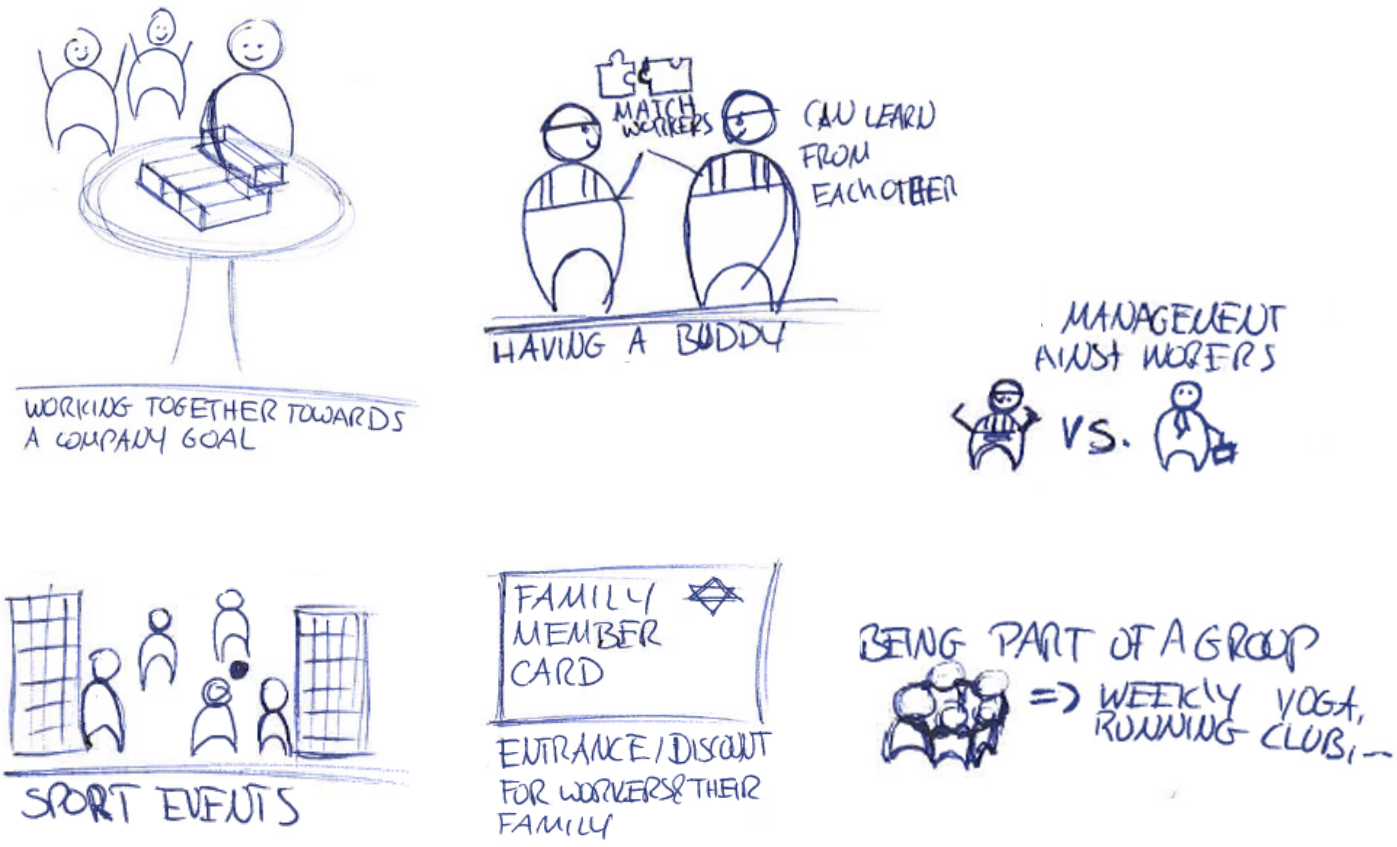


Figure 25: Idea sketches related to Vicarious experiences.

Social (Verbal) persuasion

Social persuasion influences people's self-efficacy beliefs less than past performance or vicarious experiences, but especially combined with actual successes it does have a positive impact on it (Pekmezi et al., 2009). My peer students also disclosed that it is important to have others supporting you in what you are doing and that people cheering for you can give you the confidence to go on with something, even though you are not yourself sure if you can do it. However, it is important to keep it realistic to prevent disappointing results (Bandura, 1994).

Intervention techniques like coaching and providing feedback are common ways to facilitate social persuasion (Pekmezi et al., 2009). Praising or rewarding individuals even for attempts at achieving a behavioral goal has been proven to significantly affect a person's self-efficacy belief (Williams and French, 2011). Further, it is essential to stimulate an individual's family and friends to support and reinforce their activity behavior (Pekmezi et al., 2009). Proper (personal interview, September 1, 2021) confirms that it is relevant to involve family members in lifestyle programs since they influence the leisure time behavior of the worker. Besides, people can be persuaded by emphasizing the physiological benefits of physical activity (Pekmezi et al., 2009).

Figure 26: Idea sketches related to Social persuasion.

Physiological state

Bandura (1994) claims that bodily and emotional states also influence peoples' self-efficacy beliefs. He states that people interpret stress reactions, pain, and fatigue as signs of vulnerability, poor performance and physical weakness. We also found that being in a good mood adds to feeling confident and suggest that optimistic persons are generally more confident. We also think that it is essential to be satisfied with your behavior to feel good and confident.

Intervention elements that reduce negative emotional reactions and evoke positive ones can strengthen an individual's sense of efficacy (Bandura, 1994). For example, an intervention could provide information about the benefits of being active or helping people interpret physical discomfort such as fatigue and muscle aches positively (Pekmezi et al., 2009; Williams and French, 2011).

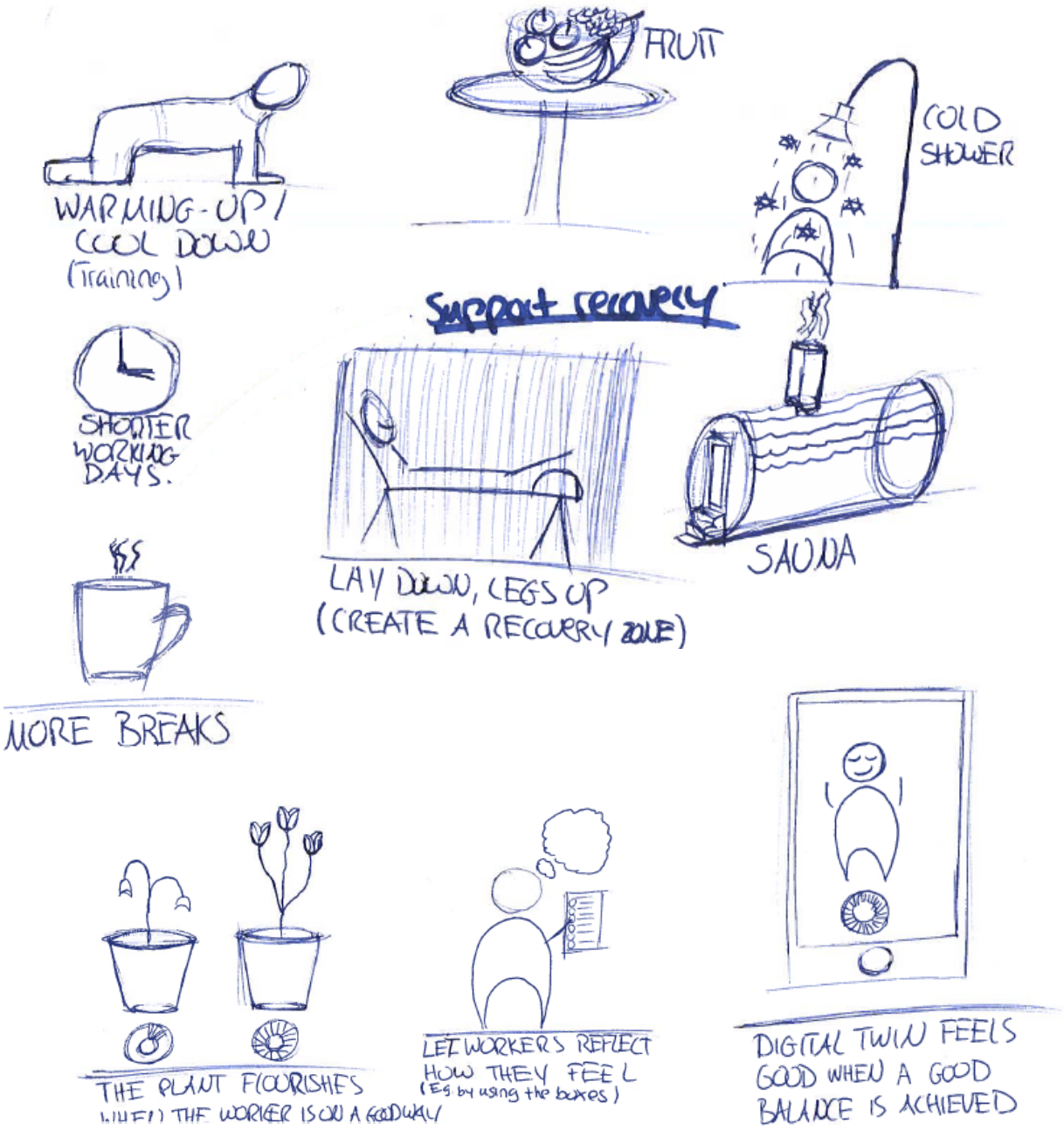


Figure 27: Idea sketches related to Physiological state.

Besides these four sources of self-efficacy beliefs, we found that personal convictions can make you feel confident during the brainstorming session. Due to workers' incorrect risk perception, they are currently convinced that they move enough at work. To make them feel confident about changing their PA behavior, this conviction must be changed. They must believe that it is relevant to move in their free time. Therefore, I also generated ideas that could increase workers' awareness.

Figure 28: Idea sketches related to creating awareness.

To conclude, interventions should use intervention techniques that increase workers' awareness and facilitate mastery experiences, vicarious experiences, social persuasion, or enhance workers' physiological state to increase their confidence.

5.2 EXPLORATIONS

With the following explorations I aimed to investigate what ideas can increase an individual's confidence and fit workers' abilities, needs, and preferences. They should help me to find out what elements should be incorporated in the concept for a lifestyle intervention addressing this target group. I have executed most explorations with Heras' production workers. Only Exploration 3 was carried out with people of my environment (friends and family).

Exploration 1 – Investigating interactions

I organized a group session with the participants of the contextmapping study to further explore workers' needs and preferences. Based on the ideas presented above, I prepared three different directions the workers could react on:

- **Keep the balance:** The first direction anticipated empowering workers to master a healthy PA behavior. The combination of a smartwatch with a smartphone application enables workers to achieve a healthy balance by giving them insight into their behavior and providing personalized advice.
- **Fit together:** The second direction focused on vicarious experiences and social persuasion. A company competition was meant to trigger the employees to get active during leisure. Employees could team up with colleagues, family member or friends, set a goal together and eventually win a price.
- **Personal Coaching:** The third direction aimed to initiate mastery experiences and a positive physiological state. A professional coach helps employees set adequate goals based on the outcomes of a health screening, and the company creates opportunities to recover from the high work pressure.

I included various interactions in these directions to investigate which ones they like.
Since the participants have difficulties with thinking about abstract future scenarios, I visualized each direction in a story board to make it more concrete (see Appendix K).
Also, I created a persona beforehand since some people do not like to express critique and find it difficult to forget about daily restrictions. Hence, I introduced the participants to 'Aron' (see figure 29) to make it easier for participants to give honest feedback and think about possible future scenarios.

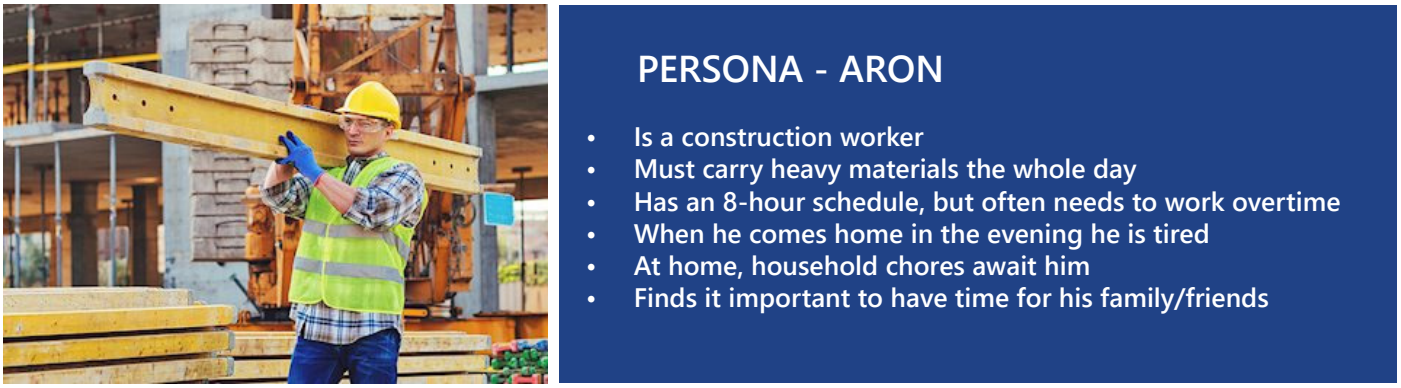
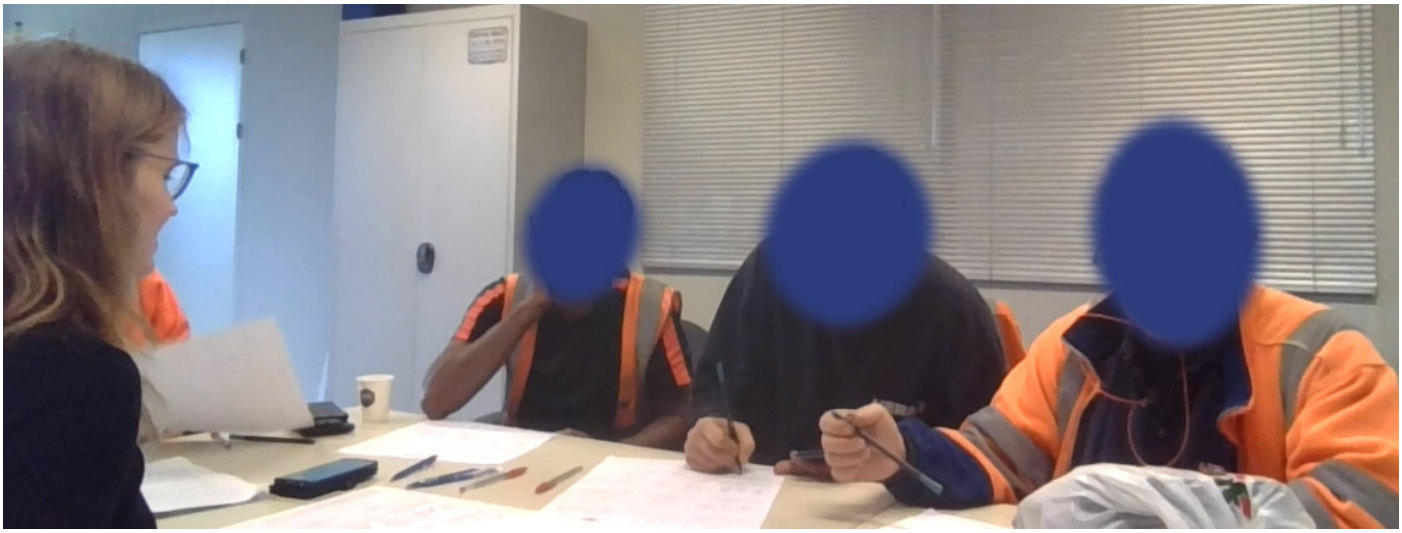
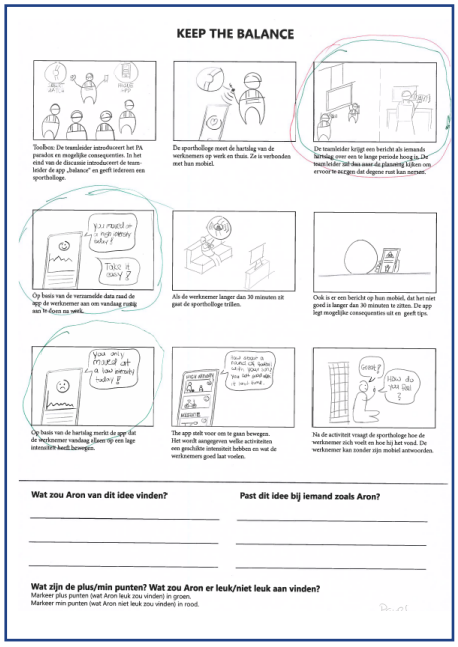
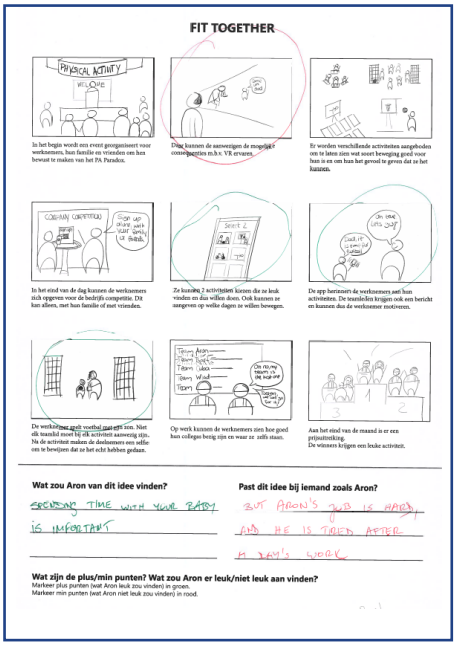


Figure 29: This Persona was used during the group session to evaluate ideas. (Image retrieved from https://www.ontariocolleges.ca/en/programs/professions-and-trades/construction-building-renovation)

I used the story boards to explain the different interactions and then the participants could highlight elements Aron would like in green and things Aron would not like in red (see Figure 30).







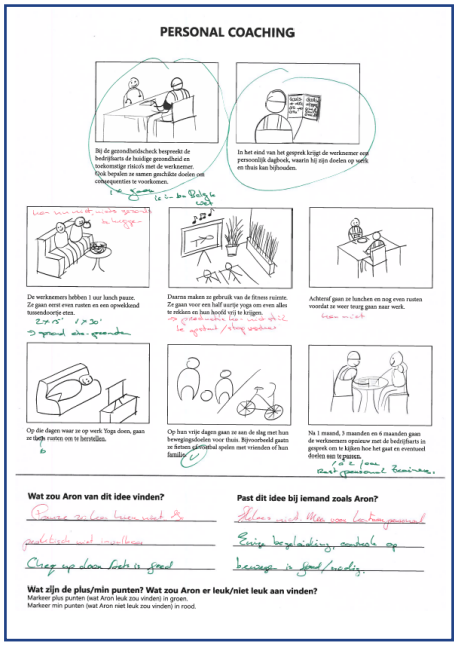


Figure 30: Setting of the group session and a filled in example of each direction.

Results

Two participants from the interviews were free at the moment I could facilitate the session. Therefore, only four out of the six male participants were present, three workers and the team leader. The age differed from 39 to 59. Two participants liked the Fit together direction the most, one the Personal coaching direction, and the last preferred a combination of the Keep the balance and Personal coaching. The following sections detail what participants liked and disliked about the different directions.

Insights - Keep the balance

It seems that workers are skeptical about 'new' technologies such as smart watches or VR. They see these as futuristic and do not use them. They especially did not like the idea that the team leader could see their personal health data even though it could save lives. They did like the idea of getting objective insights into their PA behavior and personalized suggestions for their leisure time based on these because it would show them if it is really necessary. Therefore, they would give it a try if the employer cannot see their personal data. However, it is not allowed to wear watches or use a phone in the production because material could get stuck and full attention is required.

Insights - Personal Coaching

All participants advocated the idea of a health screening once or twice a year and would like to get professional advice based on their current health and future risks. Besides, participants indicated that they would like to get healthy, snacks at work and were positive about moving on their free days to achieve PA goals.
In contrast, everyone emphasized that they are not willing to move even more at work even if they have an extra break before and after.

> *If we want to have 1 hour lunch break, then we have to spend 13 hours here. We can better use the hour with people at home.*

Anyway, it is not possible to prolong breaks, since they must achieve daily goals and the line determines the pace. Additionally, the workers would not want to have longer breaks if that would mean that they need to stay longer at work and thus have even less time for family and friends. They also do not want to spend their limited time with filling in a diary or something like that.

Insights - Fit together

All participants were fond of being active together with their family because they want to spend more time with them. Further, they liked the fact that they could choose an activity. In contrast, workers were averse to the idea of a competition. They highlighted that they do not want to be compared with colleagues (even though it is not related to their working competence) since the work pressure is high enough. Additionally, participants disliked the thought of mixing their work and private environment and indicated that several activities are too much next to work and other responsibilities. They did mention that it could be nice to have a company sport day once or twice a year.

Reflection on insights

The results of the group session clearly indicated that workers are not willing to participate in a program that makes them stay even longer at work or that wants them to move during their breaks. In contrast, workers seem to be open to working on PA goals in their free time, especially if it allows them to spend more time with their family or friends. Therefore, it seems to be more promising to stimulate moderate to vigorous PA during leisure.
Nevertheless, the working environment could contribute to a healthy PA behavior by ensuring proper recovery. It does not seem possible to increase the quantity of recovery time during work, but maybe the quality can be improved. Yoga does not seem to be a suitable approach for this target group but providing energizing snacks could be a first step in the right direction. Additionally, the working environment could advance workers‘ awareness. The group session has shown that workers would like to get recommendations based on objective data. That might be the case because they cannot believe that the PA at work is insufficient. They need a clear indication to be persuaded that occupational PA has different effects than leisure-time PA. Unfortunately, it is impossible to monitor their heart rate continuously since the workers cannot wear smartwatches during work, and experiences have shown that other measurement technologies are uncomfortable to wear over a longer period. However, it might be enough to do it for a week to convince workers that they do not reach the necessary intensity to improve their fitness level at work. If this would be realized, it is essential to clarify that the employer will not get insights into their personal health data. Also, it is relevant to explore what kind of information would be meaningful to the workers and how it can be best communicated. Additionally, the fact that workers would like to have a health screening even though they disclosed during the contextmapping study that they do not have health complaints indicates that workers care about future health risks. Therefore, informing them about these in a health screening might convince them that it is beneficial to change their PA behavior.
Besides, this exploration has shown that competitive elements should be avoided. That confirmed that the to be designed interaction should have a supportive character, which is in line with the interaction vision.

Exploration 2 – Discussing information and ideas

The second exploration aimed to investigate what kind of information could convince workers of the importance of a healthy PA behavior and what it would need to make them feel confident about getting active during leisure.
I created some PowerPoint slides with pictures and sketches and prepared questions for each slide (see Appendix L). The slides covered different media for information (Personal conversation, flyers, websites, smartphone applications, etc.) and different types of information (negative consequences, positive triggers, or facts). Additionally, they contained sketches of ideas to facilitate social persuasion and mastery experiences I had not gotten feedback on during the group session:

- An online community
- Having a buddy,
- Setting up and keeping track of goals
- A (family) member card,
- Getting a reward

I asked the workers who participated in the previous activities if they have time to give me some input. The workers could choose whether the conversation was held via a video platform such as teams or phone. In the last case, I sent the slides as a PDF beforehand.

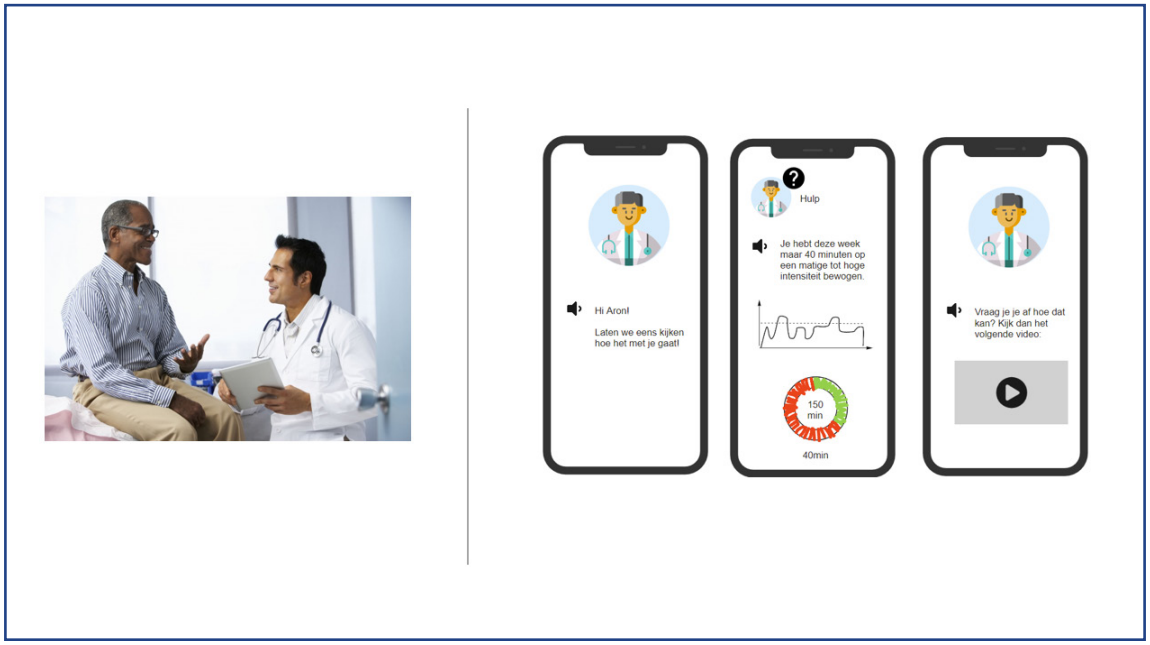


Figure 31: Setting of the group session and a filled in example of each direction. (Image retrieved from https://www.istockphoto.com/de/fotos/doctor-in-surgery-with-male-patient-reading-notes)

Results:

Two male workers of Heras coating department participated in this exploration. The two participants were 31 and 40 years old and one of them is already pretty active during leisure. The exploration yielded some insights regarding this area of information.

Insights - Information:

The participants made clear that, generally, they prefer personal conversations and find these more convincing. Nevertheless, one participant indicated that it might be good to have an application because he sometimes finds it challenging to follow Dutch conversations. An application would allow him to look up information later and translate things that he does not understand.

> *An application could help because I could look back at it or translate it if I do not understand something, that is more difficult in a personal conversation.*

Regarding the type of information, workers seem to be mainly interested into what effect it could have on their lives. Thus, for example, not just telling them that they get sick, but explaining to them that it could mean that they might be unable to work in the future and thus care for their families.

Insights - Facilitating mastery experience:

One participant liked the idea of getting help with setting up and keeping track of goals. The other participant did not feel the need for it since he already has his own routine. Nevertheless, he did agree that workers might need help with integrating PA in their free time.

> *People must be creative to integrate moving in their daily lives, you can put on music and dance while cleaning, or go somewhere by bicycle, or..., yeah you just need to know what you can do.*

Further, the active participant suggested that it could be promising to give people a little push because even though he has a routine, he still sometimes has the feeling that he cannot do it. He knows that the energy is coming once he gets started, but sometimes he feels too tired to do so.

> *"You just need to start, the first step is the most difficult, once you are sitting on the bicycle the energy is coming.*

Besides, both participants expressed that a member card to sport facilities would only trigger them to get active if they can go with friends or family.
The participants did not understand why they should get a reward for something they do in their free time. They did not feel the need for it.

Insights - Facilitating social persuasion:

Both participants think it could be helpful to have a buddy to discuss what to do and how it is going, but not to move together because that would make it more complicated.
They were critical about an online community where they could share their experiences and help each other. They made clear that they would not write something in such a community.

Reflection on insights:

The insights of this exploration were less strong since only two workers participated but still helped me progress. It made me realize that workers who are already active during leisure might have different needs than workers who are not. That made me curious how an intervention can make 'active' workers feel more confident about getting active during leisure and whether the same elements can benefit workers who have a sedentary leisure time behavior. Therefore, I found it particularly interesting that even 'active' workers sometimes need a little push.
Further, the results suggest that it could be promising to investigate intervention elements that help workers integrate PA into their daily lives. For example, it could be considered how to support workers to set and track goals. Besides, it appears to be significant to explain to workers what effect the detrimental health effects could have on their life to convince them of the importance of moving during leisure. According to the results of this exploration, the best would be a personal conversation to do so. Nevertheless, it is also indicated that a digital solution could be beneficial due to the different nationalities of the workers.

Exploration 3 – Investigating the power of music

The third exploration was triggered by the insight that even people who already have a routine, still sometimes have the feeling that they cannot do it. It made me think that people need to get in the right mood to get active. I realized that it is music that helps me to get ready for exercising and was wondering if it could have an effect on someone's confidence.

Therefore, I wanted to investigate music's potential to increase an individuals' confidence in getting active during leisure. To do so, I invited people in my environment to put on an energizing song before getting active. To make sure that participants were prepared to carry out the instructions, I asked them to choose a song and define what they want to do when the song is playing, where they want to do it, how long and when. The exploration was held for one week and I reminded the participants to put on the song at their defined time. After one week, I interviewed the participants about their experience. (Questions can be found in Appendix M)

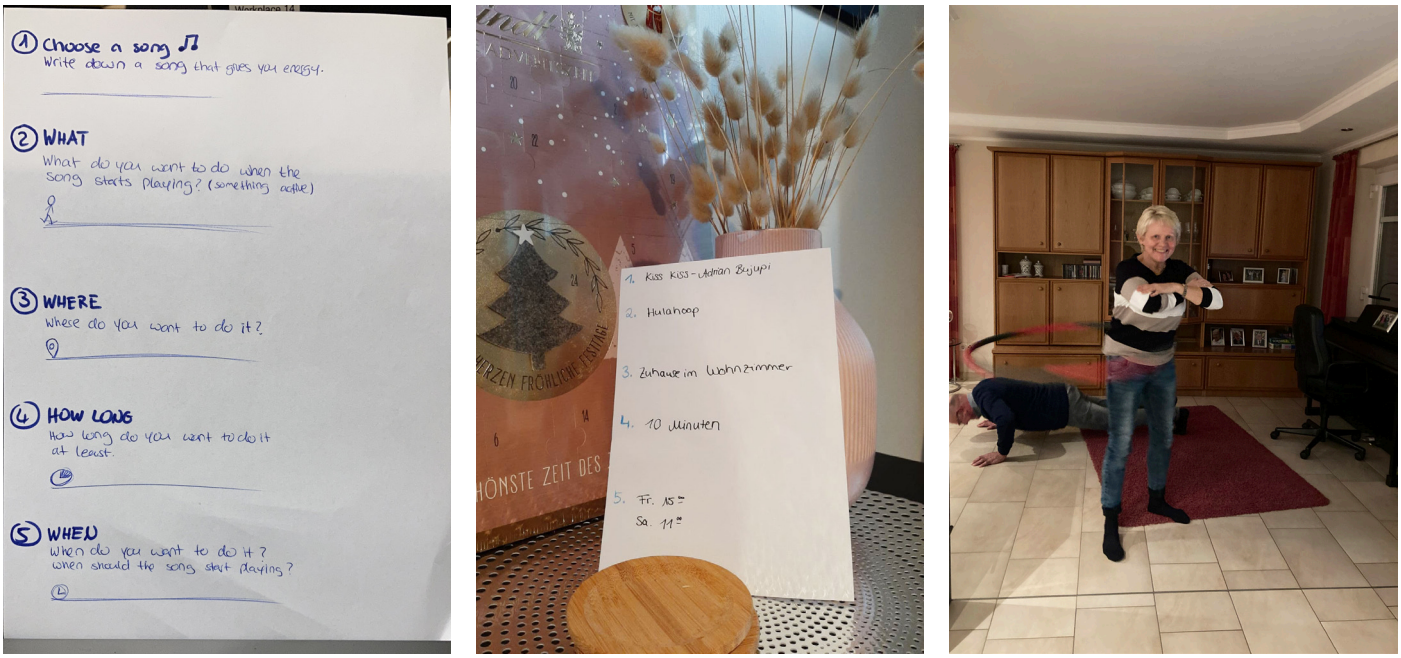


Figure 32: The left picture displays what I asked the participants at the beginning, the middle demonstrates a filled-in example, and the right picture shows two participants during their chosen activity.

Results:

Seven people participated in this exploration. Two farmers, one midwife, one cleaner, and three office workers. Thus, more than the half of the participants have physically demanding jobs and are therefore representative for the target group. The exploration delivered insights into music's potential to increase confidence and identified additional promising elements.

Insights - Music:

All participants reported that the song helped them to get in the right mood. It energized them and let them forget what they were thinking about before. It triggered them to start moving even if they did not want to do it before hearing it.

> Even if I didn't feel like it at first, it then motivated me because it put me in a good mood. It kind of pushes you.

Some reported that they started to connect the song with the positive emotions they feel when being active and assume that it could remind them to get active again even if they were unable to do it for a while. However, others indicated that they do not like it to listen the same song each time.

Other insights:
All participants mentioned that it was good to write down what you want to do because it forces you to deal with it. Some found it difficult to find something they could do, but once they did it was helpful because then they had a plan. Others found it difficult to determine a time because every day is different. For them, it was easier to let me know a day ahead at what time they wanted to move the next day. Further, the conversation itself motivated people to get active, having somebody who gives you a little push, and maybe even the thought that you help somebody by getting active.

> *No i actually don't think it was necessarily the song, I just needed a push to start something again and I think it was rather our conversation and writing something down.*

Generally, it was mentioned that it is important to have a personal reason to move. For an older participant this reason was that he had health complaints, for others it was to learn something, or to lose weight.
Also, moving together with others was mentioned as a powerful motivation again.
After the activity all participants felt better, more energized and satisfied with themselves because they did it.

Reflection on insights:

The results imply that music can indeed get people in the right mood to get active. Therefore, I assume that music could give workers the necessary push to overcome the feeling of pure exhaustion after their long working days. Additionally, it seems that music can act as a reminder if the same song is played each time before they get active because people start connecting it with their chosen form of leisure PA. However, the outcomes of the exploration also indicate that music alone is not enough. More specifically, it is not just the final decisive factor that makes people move. It seems that people need to be urged to set a plan to get active and have someone who is facilitating the whole process. Also, it appears to be promising to help people find a personal reason to get more active.

Exploration 4 – Investigating the potential of a digital Buddy

This exploration aimed to explore whether a digital buddy has potential to enhance workers' confidence to get active during leisure and was sparked by the insights of the previous explorations:

Exploration 2:

- Participants liked the idea of having a buddy to discuss what to do and how they were progressing

Exploration 3:

- Having a plan gave participants the feeling that they can get active (people must be urged to set a plan)
- The conversation itself motivated participants (having somebody who facilitates the process)

Besides, I found a study proving that people with a low income feel positive about interacting with a PA chatbot (Figueroa et al., 2021). The combination of these findings gave me the idea of a digital buddy. First, I was critical about a digital solution since Western et al. (2021) has indicated that digital PA interventions are not effective for people of low SES. However, they also explain that digital interventions maximize the reach and that it is relevant to develop digital interventions that fit the needs of low SES people to decrease inequalities. According to Følstad and Brandtzæg (2017), chatbots appear to be a promising direction to achieve that since even people with low digital skills are used to communicating with text messages or voice dialogue. Therefore, I decided to explore the potential of a digital buddy.

To do so, I was acting as the workers' digital physical health buddy. For one week, I sent them messages via Whats App. On the first day, I sent them information about the different effects of occupational and leisure-time PA. Afterward, I recommended that they move in their free time to feel better and keep the ability to take care of their family and do nice things with their friends, children, or grandchildren. Then, I supported them in setting an activity goal and plan for the week. The rest of the days, I mainly sent them reminding and encouraging messages at the prearranged moments and positive messages after they had been active to celebrate their success. Additionally, I provided them with tips such as putting on a song that gives you energy. Examples of these messages can be seen in figure 33.

After one week, I interviewed the participants about how they experienced having a digital buddy to evaluate its effect. The questions can be found in Appendix N.

Figure 33: Examples of the different types of messages I sent the participants as their digital buddy.

Results

Four of the six participants of Heras' coating department took part in this exploration. All were male and their age differed from 31 to 40. One of them dropped out after the first day; the rest participated till the end. I translated Dutch and Spanish quotes to English.

General insights

Overall, participants described the exploration as a positive experience and would recommend a digital physical health buddy to their colleagues. It seems that the digital buddy managed to get the participants more active, which made them feel good and energized. They felt satisfied because they did it, and it helped them sleep well.

> *Good, really good, because I did it. And then I felt tired, but the good tired, you know you can sleep well, and I also had energy, I think all plusses.*

The buddy also gave them the feeling that they can be active during leisure in the future. One participant even reported that he called his friend to ask if he wants to run together again.

> *Probably yes, you know, I will try to not stop with this, probably I will even do it every day, but it will take one week or something, it's good, thank you.*

Nevertheless, one participant admitted that he had not taken the digital buddy seriously because he felt that I did not understand what it means to work hard the whole day. When he got started, he realized that it was good for him and that I wanted to help him. He suggested that it might be better to aim for a slight increase in activity at the beginning and then try to get participants more active step by step.

> *Nothing different, I just got in my head I have heavy work, and sometimes I did not know if you understand that, that this work is heavy, that I am not gonna move every day.*

Insights - Creating awareness

The information provided at the beginning made participants think and convinced them that it is essential to move during leisure. They mentioned that they had never thought about it and that they do want to move more in their free time if there are concrete benefits.

> *Yes, that is good information, because I never looked at it like that before, that for example if I move at work, that it is possible, that it is not healthy.*

However, one participant found the informing messages too long and complex, so he directly dropped out. He proposed to convey the information in short and easy-to-understand messages and ask questions in between to check if he could follow.

Insights- Setting goals & plans

Some participants found it difficult to set up a plan or act according to it, but they realized what works for them throughout the week. Before that, they informed me if they had moved earlier or moved later because the scheduled moment did not fit. Anyway, they mentioned that it is good to set up a plan because it shows possibilities, and sharing the plan with the buddy feels like a promise. One participant explained that it is beneficial to have a plan when you are not active yet because you need to internalize it. Once you have a routine, a plan is not necessary any longer. Generally, they disclosed that the planning should be flexible since sometimes it simply does not fit.

Insights- Reminding and Encouraging

Participants reported that it is good to get reminding and encouraging messages because these give you the feeling that somebody is caring for you and that you are in this together. They explained that reminding and encouraging messages are particularly helpful on days when they feel too exhausted or lazy to get active by themselves.

> *It is like feeling somebody cares about you, and you know, somebody wants you to be healthy, those are good feelings, you have somebody who cares about you.*

Insights - Celebrating Success

Participants disclosed that reporting your activities and the positive messages afterward added to the feeling that they are not just doing it for themselves. It made them feel good because they kept their promise.

> *This is good because there is somebody there, and then you say to this person, yes I did something today and if you did not do something then you lie. Then you sit down and think, I am a liar.*

Reflection on insights

Having a digital buddy that provides information about the PA paradox and its possible consequences seems to persuade workers that it is crucial to be active during leisure. However, it only works if the information is understandable for them. Therefore, it is relevant to break down the content into smaller bits and make sure that they are easy to understand for the target population.

Further, it seems to make workers feel confident to have a plan that fits their daily lives. Therefore, it is good to remember that it is relevant to allow flexibility so that they can explore what schedule fits them. Eventually, it would be better only to ask them on which day they want to move and then ask on that day at what time they are planning to move. In that way, the digital buddy could remind workers to move without forcing them to have a strict plan.

Moreover, the combination of reminding, encouraging messages before the activity and praising messages afterward appears to be a good way to deliver social support (persuasion) and, therefore, contributes to increasing workers‘ confidence. An important consideration is that it was not a chatbot but a person acting as their buddy. Even though I told the participants that I am not Julia but their digital buddy, it might have increased the feeling of social support. Nevertheless, I assume that a chatbot would have similar effects since the participants of the study mentioned above experienced the interaction with the PA chatbot as motivating, *„similar to a friend that encourages you to exercise“* (Figueroa et al., 2021, p.7).

The aspects mentioned above and the fact that the buddy managed to get the participants active during leisure and that they indicated that they want to keep doing it in the future suggest that a digital buddy indeed has the potential to enhance workers‘ confidence. Hence, the digital buddy seems to be a promising direction.

Exploration 5 – Co-creating a digital buddy

Since the previous exploration has shown that a digital coach has the potential to make workers feel confident about getting active during leisure, I decided to explore this direction further. I organized a co-creation session with Heras' production workers to investigate what content and functions a digital buddy must cover to enhance workers' confidence. I let every participant create their personal digital buddy to understand what content and functions they consider to be helpful. Based on insights from earlier explorations and the recommendations of Figueroa et al.'s chatbot study, I prepared screens they could select from. The intention of these screens was not to get feedback on the User Interface, but to communicate particular content and functions. For example, providing inspiration (the gallery of pictures with activities that others like doing) could also be realized in other forms, such as text messages or voice dialogue. A picture is the easiest way to communicate the key message.

I conducted the co-creation session with each participant individually. I explained the meaning of the different screens and then asked them to add the ones they consider helpful to their personal digital coach (related questions can be found in Appendix O). Additionally, I offered them some empty screens so that they could add things I missed.

Afterwards, I counted how often the different screens were included (see Appendix O) and made the decision that the buddy should contain the content/functions that are chosen by more than the half of the participants (at least 3).

Results:

Five male workers of Heras' coating department participated in this exploration. They were all male and their age differed from 31 to 53. Three of the participants also took part in the first Digital Buddy Exploration, one dropped out and the last one had not experienced the digital buddy at all. Figure 34 shows the different buddies the workers created.

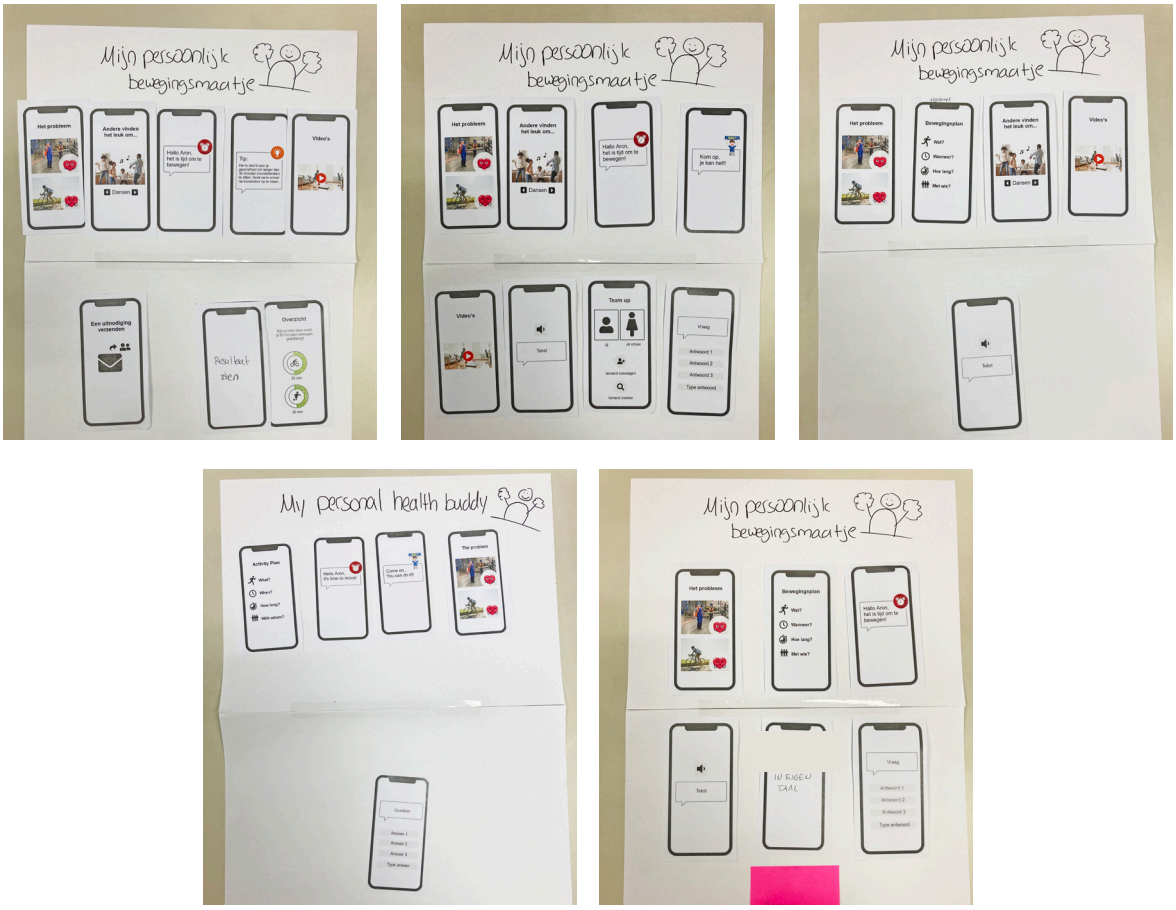


Figure 34: The different pictures show which content and functions the participants added to their personal physical healthy buddy.

Analyzing the outcomes of the co creation sessions has shown that the digital buddy should only contain a limited number of functions, some would even prefer it to be not a new app, but to be integrated in an application they already know, such as WhatsApp. Three of the five participants indicated that they do not make use of other applications. Participants who use their smartphone for all kinds of things were interested in more functions than the ones that only use it for texting and calling. Figure 35 shows the content and functions that were selected by most participants. Most participants were not fond of tracking how much they are moving. They emphasized that it is relevant to listen to your own body.

> *An overview of how much I have done is not good, I need to listen to my own body. We are humans not animals.*

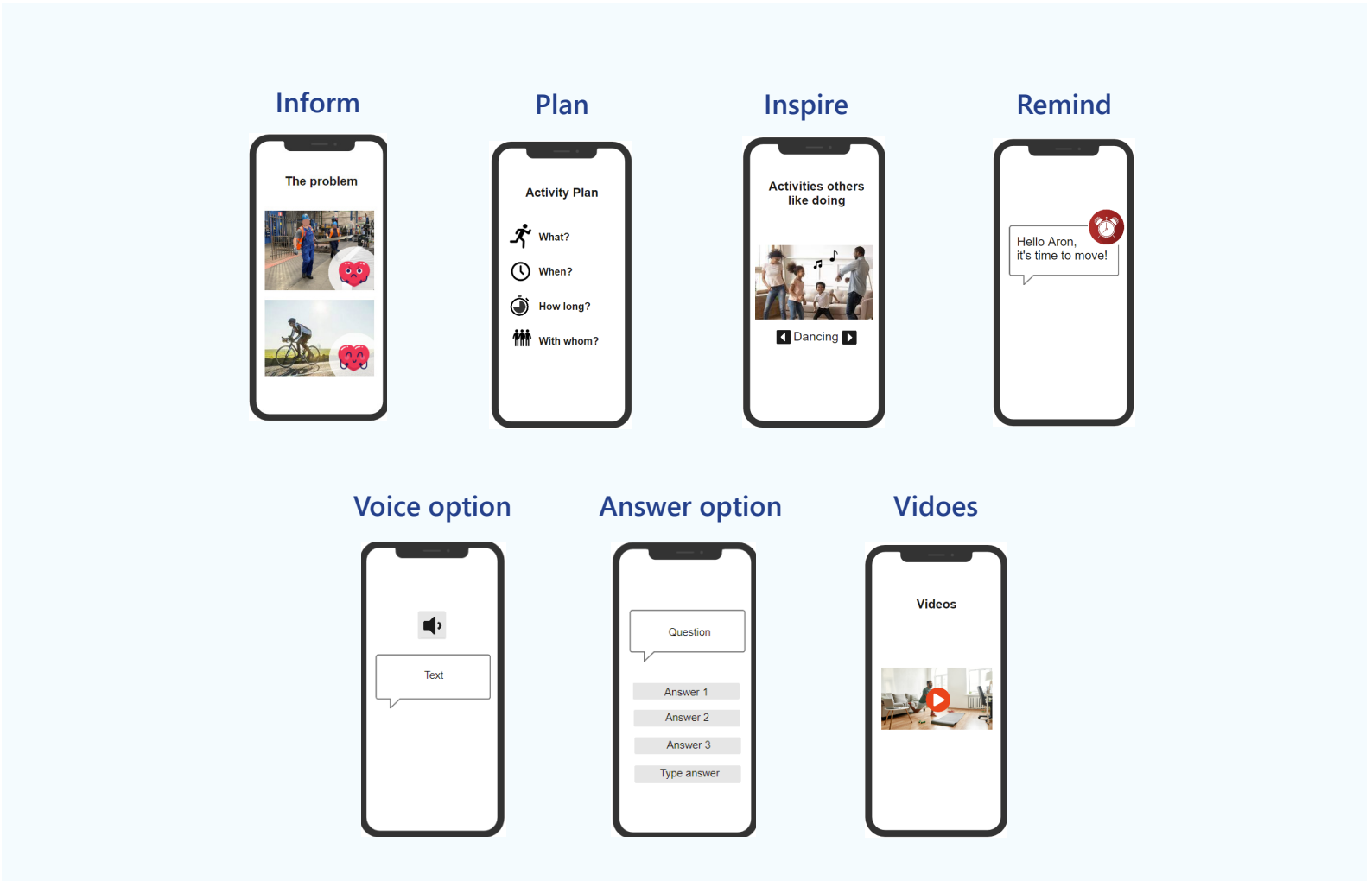


Figure 35: Screens that were selected by most participants.

Reflection on insights

The results have indicated that it is essential to keep the digital buddy simple since many workers are not familiar with smart phone applications. Therefore, it seems to be beneficial to keep the conversational flow and the sense of personal interaction and support. It does appear to be helpful to add a voice option and give them the possibility to choose from predefined answers. Also, they seem to like the idea that the buddy can send them videos to recommend suitable exercises. Hence, it could be valuable to add these functions in later versions.

Further, the results imply that workers are willing to understand the problem of their situation, since each participant indicated that the digital buddy should provide them with information about the issue. It appears that they are not only willing to understand it, but they also want to act. To do so, they seem to need inspiration, support with setting a plan and somebody who is reminding them to realize it.

Besides, it was surprising that only two participants selected the encouraging messages since the insights from the previous activity had shown that they contribute to feeling confident by delivering social support. Indeed, two of the three who followed Exploration 4 selected the encouraging messages. The other one explained that he does not need them since he already regularly exercises. Eventually, the digital buddy could ask workers in the beginning if they would like to get encouraging messages or not.

I forgot to include a screen regarding praising messages to celebrate achievements. Consequently, I cannot say if participants would have added them to their personal buddy. However, the insights from the previous exploration do suggest that these messages have a positive effect. Moreover, it is proven in earlier studies that praising individuals even for attempts to achieve behavior goals significantly affects a person's self-efficacy belief (Williams and French, 2011). Therefore, they were still considered as a valuable addition.

Furthermore, the fact that workers do not want to track their PA proves that many existing digital PA interventions are not fitting this population. They rather need an intervention that first makes them aware of the PA paradox and its consequences for their lives and then provides them with suggestions and inspiration to see possibilities to change their situation and help them explore what works for them.

Overview Explorations

Each exploration contributed to the generation of knowledge and gave direction to the research. Figure 36 gives an overview of the different explorations that I executed throughout the development phase.

	Exploration 1	Exploration 2	Exploration 3	Exploration 4	Exploration 5
AIM	Exploring workers preferences and needs for the future interaction.	Studying what kind of information can convince workers and what makes them feel confident to get active .	Investigating music's potential to increase an individuals' confidence to get active.	Exploring whether a digital buddy has potential to enhance workers' confidence to get active.	Investigating what content and functionalities a digital buddy must cover to enhance workers' confidence.
PARTICPANTS	Heras: 3 workers; Team leader (all male)	Heras: 2 workers (both male)	My environment: 2 farmers (man); 1 midwife (woman); 1 cleaner (woman); 3 office workers (women)	Heras: 4 workers; (all male, one dropped out)	Heras: 5 workers (all male)
MAIN INSIGHTS	Stimulate PA in the home environment, not at work; Work enviroment could create awareness and enhance recovery; Health screeening + objective data can help convincing workers ; Interaction should be supportive, not competitive.	Workers prefer a personal conversation, but a digital supplement would be good; Explain what consequences the detrimental health effects can have for their lives; Workers need a little push to overcome exhaustion; Workers need help with integrating PA in their lives.	Music can get people in the right mood for moving; Music can act as a reminder; Music alone is not enough -> People need to be urged to set a plan and have someone who is faciliating the whole process; People need a personal reason to get active.	A digital buddy can increase workers' confidence! Information about life consequences can convince workers, but must be easy to understand; Reminding, encouraging and praising messages can deliver social support; Planning must allow flexibility.	Keep it simple! Conversational flow fits the abilities of the workers; Should contain a voice option and answer options; Give information about PA and its consequences; Offer inspiration, and help finding a plan; Send reminding (encouraging and praising) messages.

Figure 36: Overview of the different explorations.

5.4 CONCLUSIONS

This chapter has investigated how to design a lifestyle intervention that addresses relevant contextual factors to make workers feel confident about shifting their PA behavior in a healthy direction.
The ideation outcomes suggest that workers‘ confidence can be increased by incorporating intervention techniques that increase workers‘ awareness and facilitate mastery experiences, vicarious experiences, social persuasion, or enhance workers‘ physiological state (related ideas can be found on page 49-53).
The explorations have shown what ideas indeed have the potential to address the two main factors, enhance workers‘ confidence and fit their abilities, needs, and preferences.
The results yielded answers to RQ 3a-c:

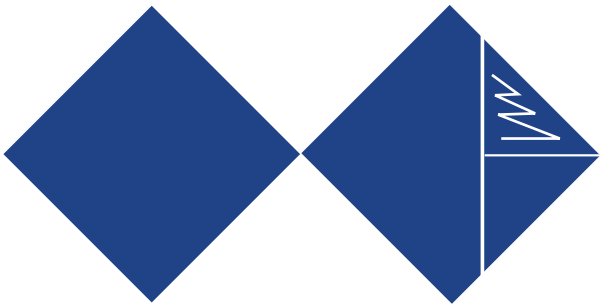
RQ 3a: How can lifestyle interventions address production workers’ incorrect risk perception and over exhaustion?
The ideation has shown that creating awareness to tackle workers‘ incorrect risk perception is significant. The results of the group session suggest that it is promising to combine a health screening with a self-monitoring period to do so. First, informing them about their current health state and future risks and then monitoring their heart rate for a week to prove to them that their PA‘s intensity at work is too low to improve their fitness level. Additionally, the insights from exploration 2 indicate that it is significant not just to tell workers about the health risks but also to explain to them what effect these can have on their daily lives. Thus, for example, that they might not be able to care for their family in the future if they do not take action.
One way to tackle workers‘ over-exhaustion after work is to reduce it. The ideation results suggested that this could be done by shortening their working days, reducing work pressure (e.g. employing more workers or decreasing daily goals), or ensuring proper recovery (increasing quantity or improving quality of breaks). Another way to deal with over-exhaustion is to help workers overcome it outside the workplace. Exploration 2 indicated that exhaustion does not unable workers to be active during leisure but rather gives them the feeling that they cannot do it. Once they get started, the energy is coming. Exploration 3 has proven that music has the potential to get workers in the right mood for moving. Putting on an energizing song gives workers the necessary push to overcome their exhaustion. Nevertheless, they need to rest first when coming back home from work.

RQ 3.b: What type of intervention fits workers’ abilities, needs and preferences?
The results of the explorations indicate that workers need an intervention that first makes them aware of the PA paradox and its consequences for their life and then provides them with suggestions and inspiration to see possibilities to change their situation and help them explore what works for them. As described above, combining a health screening with a self-monitoring period seems to be a promising way to increase the target group‘s awareness. Exploration 2 has revealed that workers would prefer personally discussing the outcomes of these activities with an expert. Nevertheless, they would also like to have the information digitally to look it up later if they do not understand something. The results of Exploration 4 and 5 suggest that a digital buddy is a suitable addition for Heras’ production workers. A digital buddy could repeat the information, provide inspiration and suggestions, and help them find out what works for them. The conclusions of Exploration 5 imply that a digital intervention should only include a few functions. It is key to keep them simple. As many workers are not familiar with smart phone applications apart from WhatsApp, the digital solutions should have a conversational flow. They should be based on text messages, but also contain a voice option so workers can listen to what it says in case they have difficulties with reading. Additionally, it seems beneficial to add answer options they can select from. It is relevant to keep messages short and easy-to-understand, using a language level that fits the target population. Also, it is recommendable to ask questions in between to check if the worker can

follow. Generally, it is essential that everything is offered at least in English and Dutch, since not all workers speak Dutch.

RQ 3.c: How can lifestyle interventions integrate workers' home and work environment?
The results of Exploration 1 have indicated that workers are unwilling to participate in a program that makes them stay even longer at work or want them to get active during their breaks. In contrast, workers seem to be open to working on PA goals in their free time, especially if it allows them to spend more time with their family or friends. Therefore, it seems more promising to stimulate moderate to vigorous PA during leisure. Nevertheless, as indicated above, the working environment could contribute to a healthy PA behavior by advancing workers' awareness or reducing their exhaustion. However, this project has shown that working environments with a production line are limited in possibilities. Also, the company only wanted to invest money if I could prove that it would positively affect the workers and the company. Since the explorations were intended to deliver that proof, I could not explore intervention elements in the working environment. Hence, to better integrate the work context into lifestyle interventions, more support and flexibility from companies is required.

To summarize, the ideation and exploration activities have shown that it is indeed promising to involve the home and working environment in a lifestyle intervention for people with physically demanding jobs. The working environment should make workers aware of the problem, and the home environment should facilitate moderate to vigorous PA during leisure. Both settings should ensure proper recovery. Further, the outcomes have indicated that an intervention for this target group should include in-person conversations with an expert and offer a supporting digital buddy that is easy to use.
The next step is to merge these insights into a concept for lifestyle intervention.



6. CONCEPT

This chapter merges the insights from the previous section into one concept. It presents this concept, describes an interaction scenario and explains the design choices that have been made. Additionally, it defines what still needs to be done to develop this concept.

6.1 CONCEPT DESCRIPTION

This section briefly describes the developed concept.
'Shift it!' is a concept for a lifestyle intervention that makes workers feel confident about shifting their PA behavior in a healthier direction. In this way, it contributes to improving workers' health, quality of life, and work ability. The result benefits both, workers and employers.
More specifically, 'Shift it!' makes workers aware of their risks and supports them in integrating recovery and PA into their daily lives. Hence, it increases workers' confidence by first creating awareness (changing workers' conviction that they move enough at work) and then facilitating mastery experiences, social persuasion, and enhancing workers' physiological state.

'Shift it!' consists of two parts: A health week (see figure 37) and a digital buddy (see figure 38).
The health week starts with a toolbox meeting to raise the workers' awareness of the PA paradox and its consequences on their lives. Then workers are given the opportunity to attend a health screening to examine their current health state and future risks. Finally, workers' heart rate will be monitored for a normal working week to create convincing evidence that the PA at work does not reach the necessary intensity to improve cardiovascular fitness. In addition, this will provide insights into workers' rest and recuperation. Moreover, the heart rate measurements will enable personalized advice.

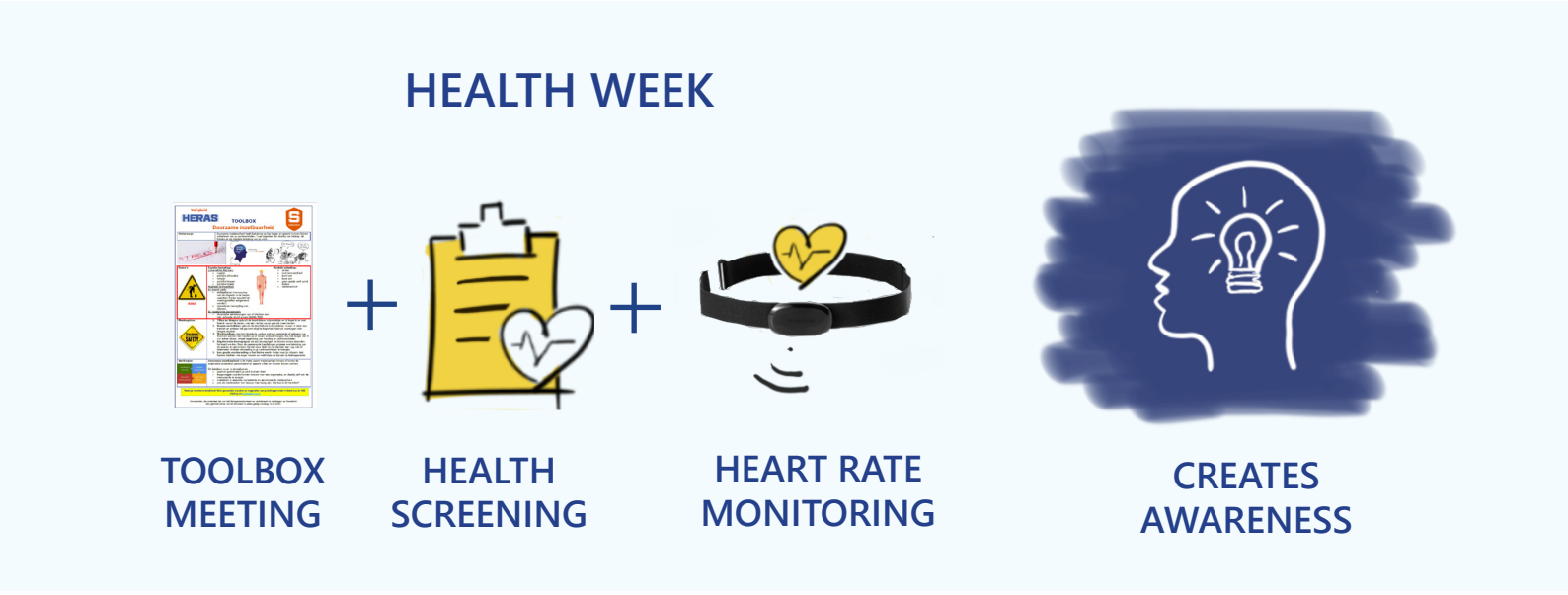


Figure 37: Concept part 1 - Health week.

The digital buddy supports the workers to counteract the potential detrimental health effects of the PA Paradox. It makes sure that the workers understand the issue and helps them to integrate recovery and PA into their daily lives. It offers them inspiration, helps them find a plan that fits their busy lives, and pushes them to realize it by reminding, encouraging, and praising them (see figure 38). To do so, it sends them messages they can read or listen to and offers them options to answer.
Thus, the digital buddy creates a **supportive and safe** environment that allows workers to **explore** what works for them. It will not punish them if they do not comply with the plan but rather shows empathy and triggers them to try something else to find out what fits them. It only raises provocative questions and makes suggestions. In the end, the workers can decide what they want to do. Also, it is easy to use, and all answers/ decisions can be changed in retrospect. Hence, the workers have **control** over the situation. Finally, the positive effects of leisure time PA and sharing with the buddy what they have done as well as being praised for it makes it a **satisfying** experience, triggering them to go on.

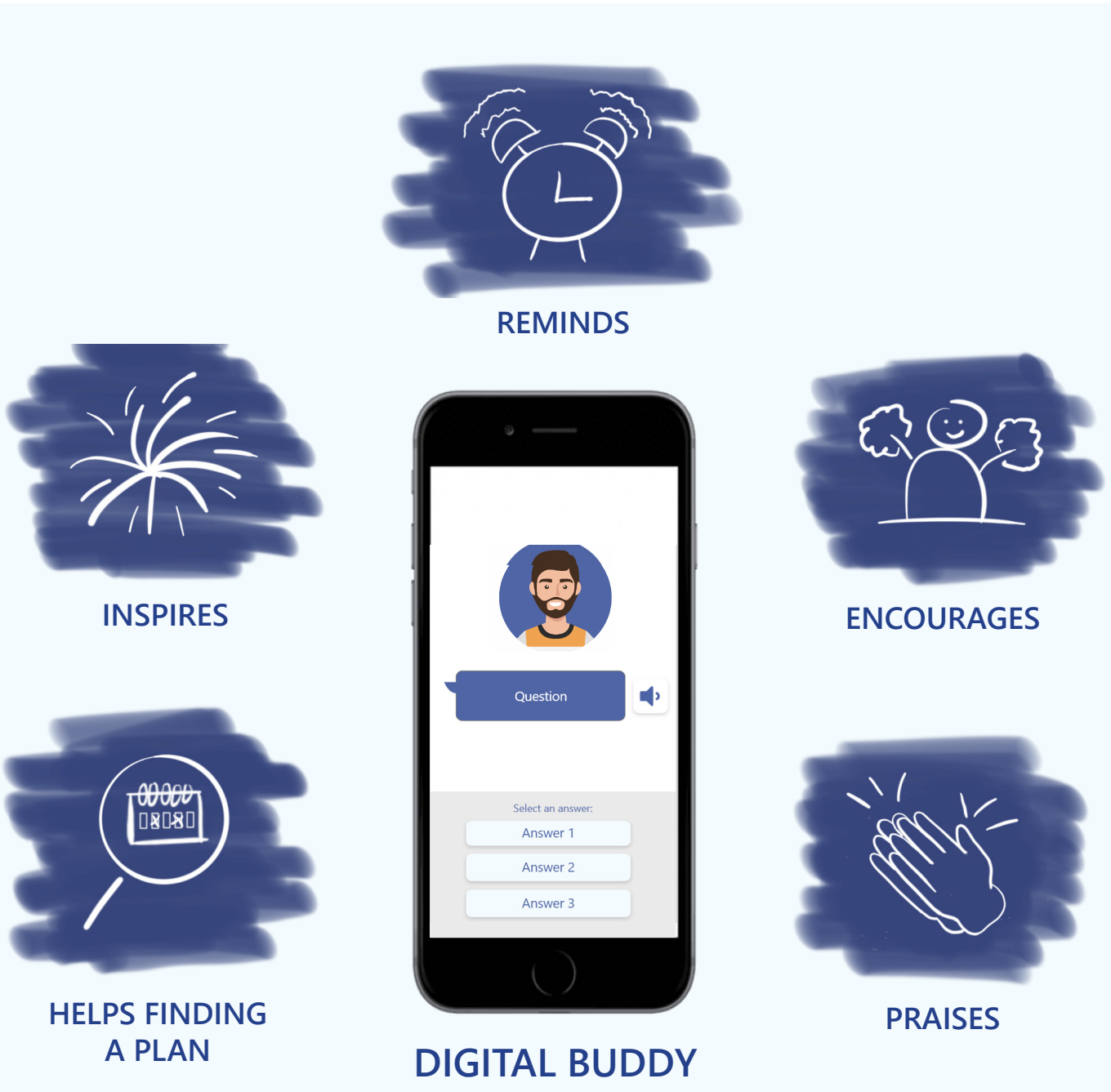


Figure 38: Concept part 2 - Digital buddy.

6.2 INTERACTION SCENARIO

Part 1 - Health Week

Heras regularly organizes toolbox meetings to inform the employees about safety and health issues. This time the meeting is about the PA paradox. The team leader discloses the different effects of leisure time and occupational PA and discusses with the workers what consequences it can have for their lives (figure 39). At the end of the toolbox meeting, each worker gets a ticket for a health screening, which they can redeem within the next week during their working hours at the company doctor (figure 40). Wlad is a worker at Heras' coating department. He cannot believe that his movement at work does not count or even has detrimental effects, but he decides to use the chance to check his risk.

Figure 39: Health week - Toolbox meeting.

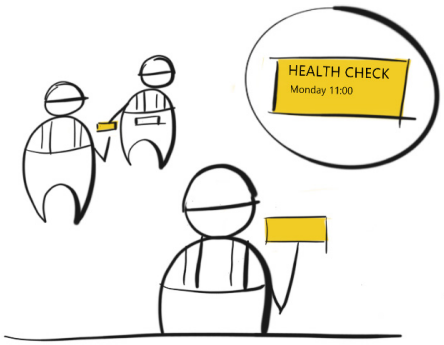


Figure 40: Health week - Health screening ticket.

The doctor examines Wlad's current health state and future risks during the health screening and determines his heart rate reserve (figure 41). The latter is required to estimate the intensity of the worker's PA. Also, it is necessary to measure his heart rate to assess the intensity of all PA activity. Therefore, the doctor provides Wlad with a Chest Strap Heart Rate monitor and asks him to wear it for one week during work and leisure (figure 42). The doctor explains that the measurements will allow him to check the intensity of Wlad's occupational and leisure-time PA and his rest moments at work, including the quality of these. Additionally, he clarifies that the data will allow him to provide fitting advice and will not be shared with the employer.

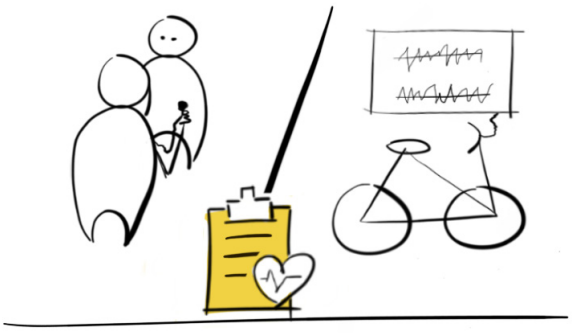


Figure 41: Health week - Health screening.

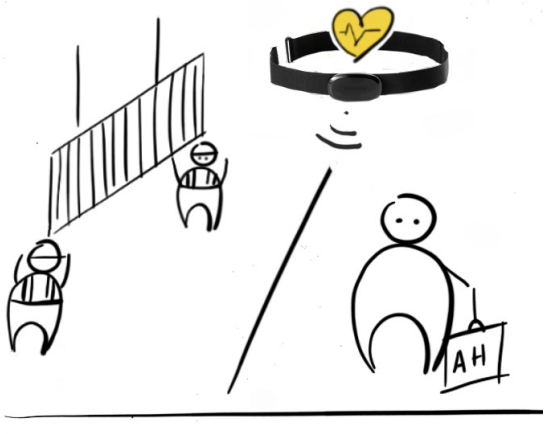


Figure 42: Health week - Heart rate monotoring.

After one week, Wlad brings back the heart rate monitor, and the doctor discusses the outcomes with him (figure 43). He shows him that he barely reaches the needed intensity to improve his fitness level at work and only for short periods during leisure. The doctor explains that this is not enough to prevent detrimental health effects. He recommends that Wlad performs about 100 minutes of dynamic moderate to vigorous PA next to his current PA. Also, he shows Wlad that his heart rate is elevated during the entire working time. It barely comes down to rest level during the breaks. The doctor reveals that he will strongly advise the manager to offer more breaks or enhance the breaks‘ quality since the data of the other workers indicated the same. Additionally, he recommends Wlad to ensure proper recovery at home. He clarifies shortly what that means and then introduces him to the digital buddy application, telling him that the buddy will support him in achieving healthy PA behavior (figure 44).

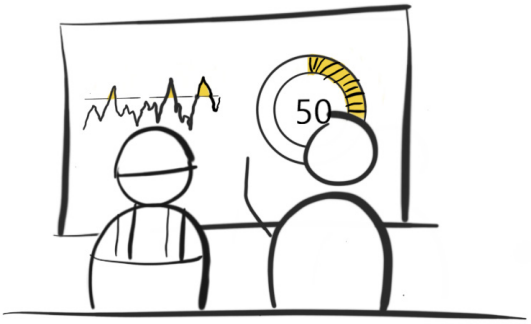


Figure 43: Health week - Discussing the reuslts.

Figure 44: Health week - Introduction of the Digital Buddy.

Part 2 - Digital Buddy

At home, Wlad opens the application. The digital buddy welcomes Wlad and explains that he wants to help him find a good balance between moving and recovery. The buddy clarifies that it knows that Wlad has an exhausting job and that he is the one who decides what is possible and what he wants to do.

After that, the buddy asks Wlad if the doctor has informed him about his risks, what he could do to stay healthy, and if everything is clear (figure 45). Then the buddy helps Wlad to define an initial plan. It asks him how much he is currently moving at a high intensity and recommends slowly increasing that. It requests Wlad to indicate how much he is willing to move next to what he is already doing. Afterwards, the buddy asks Wlad on what days he wants to be active, around what time, and what he wants to do. Since Wlad is unsure of what he could do, the buddy sends him a video showing what other workers like doing and suggests trying out one of these activities (figure 46). In Wlad‘s case, he chose dancing with his family. Before finishing the conversation, the buddy asks Wlad to indicate what song energizes him. To do so, it sends him some examples from which he can select.

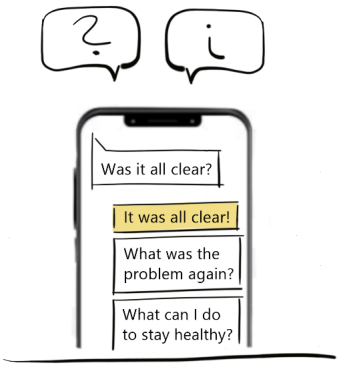


Figure 45: Digital Buddy - Checking understanding.

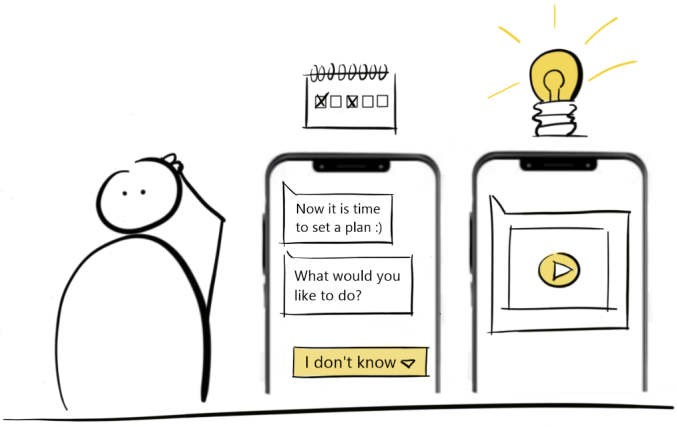


Figure 46: Digital Buddy - Setting a plan.

On the agreed day(s), the buddy sends Wlad a reminder, telling him that it is time to get active. Wlad declares that he is too tired to move (figure 47). The buddy responds that he can do it and motivates him to be active by putting on an energizing song (figure 48).

Figure 47: Digital Buddy - Reminding.

Figure 48: Digital Buddy - Encouraging.

The music gets Wlad in the right mood. He starts dancing with his family (figure 49). Later, the buddy asks him if he danced with his family and praises him if he did (figure 50).

Figure 49: Digital Buddy - Being active.

Figure 50: Digital Buddy - Praising.

Additionally, the buddy reminds Wlad that proper recovery is as important as being active and provides tips on what can help (figure 51).
At the end of the week, the buddy asks Wlad a couple of questions to let him evaluate whether the current plan works for him. It raises questions about the amount per week, the scheduled moments, and the activity itself (figure 52). Finally, the buddy summarizes Wlad's answers and asks him if he wants to stick to the plan or try something else next week.

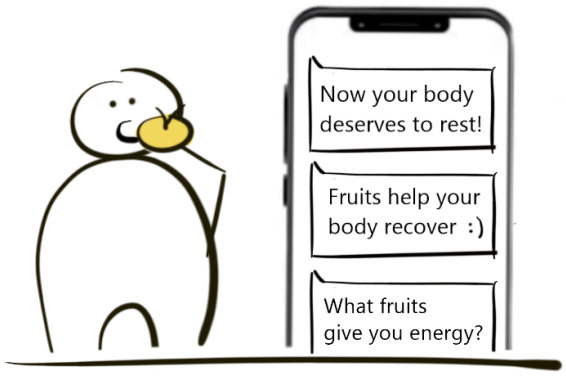


Figure 51: Digital Buddy - Providing recovery tips.

Figure 52: Digital Buddy - Reflecting on the plan.

6.3 CONCEPT REASONING

This part briefly describes the design choices that I have made to generate the concept presented above. The concept starts with a health week that aims to create awareness. This is essential to increase workers‘ risk perception, evoking their need to change their PA behavior.
Exploration 2 has shown that workers prefer getting information from a person. The toolbox meeting is an efficient way to do so since individual conversations would take up much time, and the company is already used to the format. However, the group session (Exploration 1) has indicated that information alone will not convince workers. They want to clearly see that they are at risk and that their movement at work is not sufficient. Therefore, I incorporated the health screening and monitoring week. I added the ticket for the health screening to pursue them to go without forcing them. It should feel like a unique opportunity they might not get again. That might not be necessary since workers showed interest in a health screening but this could speed up the process.
The second part of the concept – the digital buddy – is mainly based on Exploration 4 and 5. These have proven that a digital buddy has the potential to make workers feel confident about shifting their PA behavior in a healthier direction and that the integrated intervention elements and functions fit their needs, preferences, and abilities. To make the concept more feasible and ethical, I decided that the digital buddy should only offer predefined questions and answers that have been checked by a medical professional. Additionally, Exploration 3 has shown that music can help workers overcome their tiredness. Therefore, the buddy sends energizing songs to encourage workers to get active.
Figure 53 briefly summarizes why I included the different intervention elements.

Exploration 1, 4 & 5

- Workers want insights into their risks and behavior
- Evokes the need to take action

Exploration 3 & 4

- A plan feels like a promise and gives determination
- Workers find it difficult to find a fitting plan

Exploration 2, 3 & 4

- Workers find it hard to determine what they can do

Exploration 3 & 4

- Reminds workers of their promise
- Pushes them to get active

Exploration 3 & 4

- Helps workers overcome their exhaustion
- Gets them in the right mood

Exploration 4

- Gives workers the feeling that they are not doing it alone
- Makes them feel satisfied

Figure 53: Overview of the reasons for the different intervention elements..

6.4 FUTURE CONCEPT DEVELOPMENT

As defined at the beginning of the project, I did not develop a ready-to-implement intervention. However, I generated valuable knowledge on contextual factors influencing workers' PA behavior and provided a promising direction for future design studiesThat means occupational health researchers-, practitioners or other students can use 'Shift it!' as inspiration to design an intervention for this target group. However, further exploration is needed, and details must be worked out before it can be implemented. The following aspects are relevant for the future development of the concept:

Company Commitment

Company commitment is necessary to further develop and implement 'Shift it!'. Companies should be willing to organize a toolbox meeting over the PA Paradox and have the capacity to offer a health screening for each worker. They should create the content for the toolbox meeting, inform the team leader about it, and make the tickets for the health screening. Additionally, the company doctor must be able to perform a health screening and an exercise test. He must have the skills and the required materials. Also, the doctor should be equipped with Chest Strap Heart Rate Monitors to carry out the measurements.
Furthermore, companies should help investigate how they could improve the quality of workers' breaks.

Digital Buddy - User Interface design

For the digital buddy, it should be investigated what user interface appeals to the target group. Thus, questions such as what color use fits their preferences, should it have an avatar, and where the different components should be placed to make it easy to use must be answered.
Also, it is essential to determine the buddy's tone of voice. This project has indicated that it should be like a friend. The tone of the friend, kind or direct, could vary according to the needs of the participant. In each case, it must give workers the feeling that they have control. Incorporating both, predefined and open answers would give workers more control but make the concept technically more complex and challenging to comply with ethical guidelines. Eventually, the buddy can allow open answers/comments during the reflection at the end of the week so that the workers can better express their thoughts. Then, the buddy could show the workers their comments to make a better decision.

Digital Buddy - Dialogue creation

Next to the interface itself, the dialogue must be written. Due to workers' different nationalities and low education, the dialogue must fit their language level and be provided at least in English and Dutch. That is time-intensive and should not be underestimated. Additionally, a medical professional must check the dialogues to ensure that the digital buddy meets the ethical guidelines.

Technical development

Once it is clear what the user interface should look like and what the buddy should say, the technical details must be worked out. State diagrams must be created, and finally, the application must be programmed.

Explore long-term use

I recommend exploring the use of the buddy over a longer period. It could be appealing to investigate if the workers' needs change over time. Eventually, after finding a routine that fits their specific life situation, they may not need external support any longer or require support with other tasks.

Explore alternative ways of support

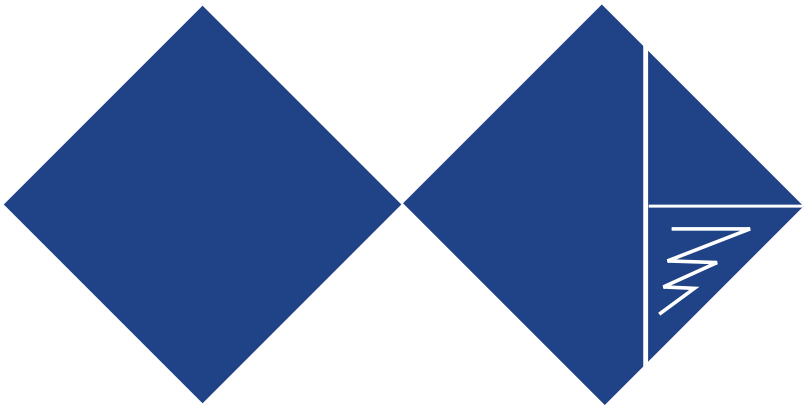
It must be tested if a digital buddy would indeed have the same effects as a real person acting as their digital coach. If that is not the case, it could be interesting to explore other ways to deliver the various supporting elements. For example, a relative or friend could offer support instead of a digital buddy. Why not care for the people we love before it is too late.

6.5 CONCEPT REFLECTION

The human-centered design approach yielded a concept for a lifestyle intervention that fits workers‘ abilities, possibilities, and preferences and has the potential to make them feel confident about shifting their PA behavior in a healthier direction. Looking back at it, it primarily makes workers feel confident about getting active in their free time. It barely supports workers to recover properly, which is another relevant ingredient for healthy PA behavior. As mentioned before, both working and home environments should contribute to workers‘ recovery. The company doctor does use workers‘ data (anonymously!) to advise the manager to improve the quality of their breaks. However, it is not defined how this can be done since I could not explore ideas in the working environment. The buddy provides tips for recovery in the home environment, but the focus is on facilitating leisure PA. I pondered including more elements to support recovery, but decided against it since it might have overwhelmed the workers.
Furthermore, variation was identified as a significant ingredient for healthy PA behavior. Workers should perform another kind of movement than what they do at work. Long periods of sitting should be interrupted. Both were neglected in the concept. It could be beneficial if the buddy suggest what kind of movement is suitable for them or maybe rather trigger workers to reflect what movements they are doing at work and tell them that it would be good to select another kind of movement during leisure. Also, it could be considered to provide participants with a smartwatch for leisure time so they could be informed when sitting for long periods. However, it should be gauged if it is feasible to address all three ingredients for healthy PA behavior in one intervention. It would make it complex to develop and might discourage workers from using it if it requires too many things at the same time.

Anyway, it is already a complex concept with many different elements. These elements are incorporated for reasons that are described in the previous section. Overall, they all contribute to making workers feel confident about shifting their PA behavior in a healthier direction. Thus, they all help to achieve the desired effect. Nevertheless, it should be considered if it is necessary to include them all to achieve that effect since the complexity will make it hard to implement it. Therefore, it should be investigated which elements are the core of the concept. Thus, which elements are minimally needed to achieve the desired effect.
For example, it could be tested if it is essential to incorporate a toolbox meeting, a health screening, and heart rate measurements to increase workers‘ risk perception.
I think that discussing personal data with a health professional has the most potential to convince workers that they do not move enough at work and can make sure that we only recommend people to be more active if they really need to. Hence, I consider the heart rate measurements and the discussion of the results as elementary elements of the concept. If this discussion makes workers aware of their risks and what they can do to stay healthy, letting the buddy repeat the information might be unnecessary. Therefore, I suggest that the digital buddy does not provide health-related information so that the dialogues must not be written/ checked by a medical professional. However, it must be tested if it is enough to provide the information one time and if the workers understand what the doctor is telling them.
Generally, I think that the focus of the digital buddy should be to help the workers find a plan that fits their busy lives and support them to realize it. To do so, it does not need to be intelligent, but just ask the right questions and send reminding and encouraging messages/songs at a chosen time.
Hence, I consider the elements displayed below (see figure 54) as the concept‘s core, but I was curious how the target group feels about it. Therefore, I decided to not only use the final evaluation to explore what the different stakeholders think about the overall concept but also to evaluate which elements are most relevant to enhance workers‘ confidence.

Figure 54: Core elements of the concept according to the researcher.



7. EVALUATION

This chapter describes the evaluation activities I did with the workers and other project stakeholders to evaluate the potential of the overall concept and its elements.
It answers the following research questions:

RQ 4: What is the potential of the developed lifestyle intervention concept?

- **RQ 4a:** What does the target group think about the designed concept?
- **RQ 4b:** What do company stakeholders, occupational health researchers-, and practitioners think about the designed concept?

7.1 EVALUATION - TARGET GROUP

Aim

The main aim of the evaluation with the target group is to study the desirability of 'Shift it!' and its different elements. I want to investigate whether the workers would use 'Shift it!' if the company would invest in it. Moreover, I aim at determining which elements are most promising to start with if it is impossible to implement everything. Additionally, I want to figure out whether the designed concept has the potential to fulfill the design goal and if it fits the Interaction Vision.

Procedure

I aimed to carry out individual evaluation sessions with five workers of Heras' coating department. These should last about 30 minutes and took place during their working hours. First, I showed the whole video of the concept, starting with the toolbox meeting (link can be found in Appendix P). Due to the workers' low education, I turned off the video's sound and instead explained it on the spot. That allowed me to switch between languages and adapt the speed to the comprehension level of the participants. After watching the video, I asked open questions such as what they think about 'Shift it!' and what they like or dislike to capture their impressions of the overall concept.
Secondly, I repeated the part of the health week. I stopped the video after the toolbox meeting, the health screening, and the heart rate monitoring to let the participants fill in the related sections of the questionnaire. They got the chance to explain their answers afterwards.. Finally, I went with them through the different example flows of the digital buddy (links can be found in Appendix P) and again let them fill in the corresponding section of the questionnaire and motivate their answers. I audio recorded the sessions and took notes of participants' answers and reactions. The questionnaire and interview questions are described in Appendix P.

Analysis

The evaluation data consists of the filled-in questionnaires, the field notes taken during and after the individual sessions, and the audio recordings.
After the evaluation sessions, I listened to the recordings, complemented the field notes, extracted meaningful quotes, and wrote relevant information on post-its. Then I briefly clustered these post-its and described the insights.
Besides, I entered the data from the questionnaires into an Excel sheet to create diagrams to evaluate the desirability and relevance of the different elements. Also, I used the data to check whether the concept can meet the Design goal and fit the Interaction Vision.

Results

Five male workers of Heras' coating department participated in the final evaluation. Their age differed from 31 to 53. The individual sessions took, on average, 35 minutes, and everyone filled in the whole questionnaire. The following section describes the resutls of the analysis, combining insights from the interview and the outcomes of the questionnaire.

Desirability

This section evaluates the desirability of 'Shift it!'. Generally, the participants were enthusiastic about the concept. They all liked the outcome and complimented me for my work. They were positive about the fact that it supports workers to improve their health and makes them feel better.

> *Nothing needs to be different, everything is good, it is really a good idea.*

> *I like that it pushes you to get active. It got me out of my home and I felt good about it.*

They especially liked the idea of checking their health during working hours and were positive about the digital buddy application. One participant even asked if the digital buddy is an existing application because he desires to use it. However, another participant was rather critical about an application because he had the feeling that applications are used to spy on us. Nevertheless, he disclosed that the digital buddy is a good initiative and would use it to get started. This indicates that he believes that the digital buddy could support him, but that he does not expect to need his help over a longer period.

> *Generally I am against applications, but this one is a good initiative. [...] I would use it to start up, and maybe open it up again if something goes wrong.*

To evaluate the desirability of the different elements, participants were asked to rank on a scale from one (Strongly disagree) to four (Strongly agree) if they would make use of the different elements. Hence, they were asked to indicate if they would attend the toolbox meeting, go to the health screening, do the heart rate monitoring, use the digital buddy's planning and reflection support, and its reminding, encouraging, and praising function. Figure 55 illustrates participants' answers. It shows how many participants strongly disagreed, disagreed, agreed, and strongly agreed with the questions related to the different elements. Additionally, it shows how high participants ranked the different questions on average next to the balks. For example, two participants agreed that they would attend the toolbox meeting, and three strongly agreed. Therefore, this question was ranked on average with a 3,6.

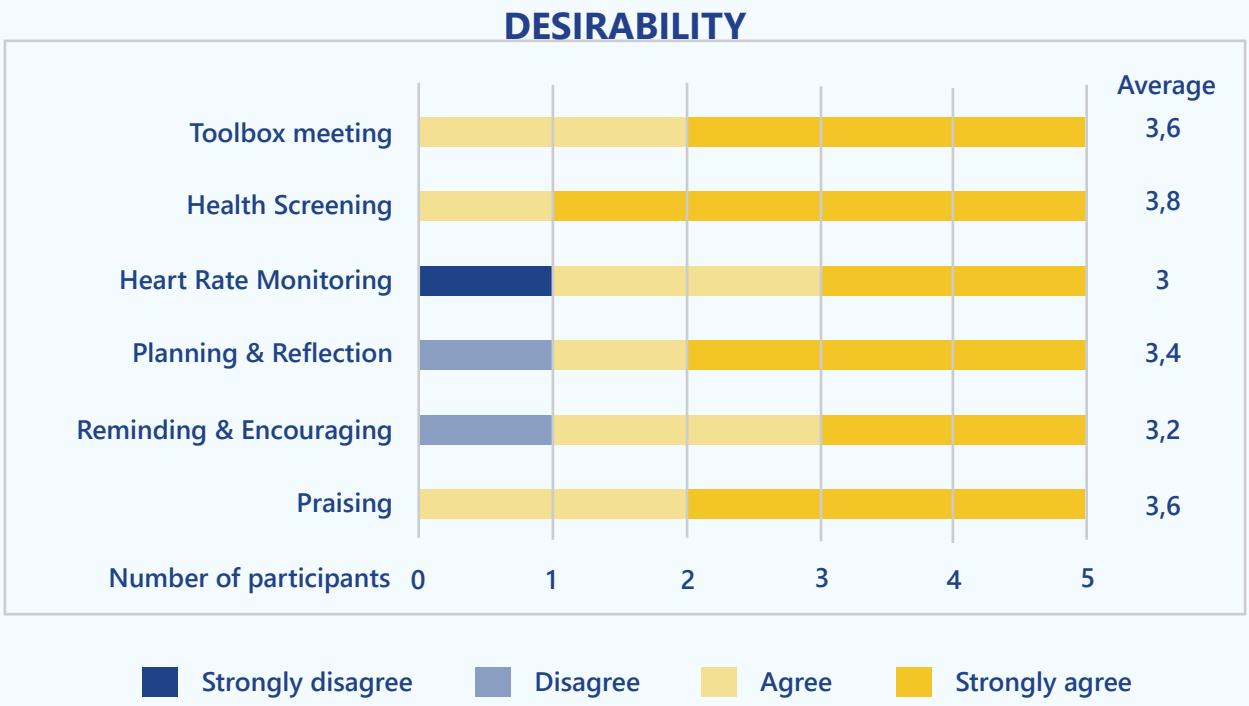


Figure 55: The diagram illustrates participants' answers to the questions that assess the desirability of the concept's different elements.

The clear predominance of yellow shows that the participants were enthusiastic about most elements. All elements were ranked on average above 3, meaning that most participants would use all elements.
Both, the answers to the open question and the outcomes of the questionnaire indicate that workers especially desire a health screening. They find it vital for workers to check their health and stated that it should be mandatory to allow workers attending a medical examination. That clearly shoes that workers want to be aware of their current health and future risks.

Related to this, most participants selected the health screening as the core of the health week because it would really show them if they are at risk.

> *It is the best option, then I know if something is wrong. During the toolbox meeting we are just talking.*

Nevertheless, the toolbox meeting was ranked relatively high as well. The participants were positively surprised about the idea of discussing what they can do at home to improve their health with the team leader.

> *I have never seen anywhere that the team leader is going to discuss with employees what they can do at home for their health, I don't think that it will happen, but good idea.*

In general, they seem to desire more contact with the team leader. One participant expressed the desire for regular discussions with the team leader (once or twice a month). Nontheless, it was reported that it is good that the team leader discusses the issue with the workers in general and that only the doctor get insights into the workers' personal health data. They find it important to maintain a line between work and health. Besides that, the heart rate monitoring was a controversial subject. Participants were unsure what to select. They want insights into the intensity of their PA, but they do not want to wear a chest strap over a longer period. Finally, most participants decided that they would do it for a short test period. Thus, their curiosity won.

> *Then maybe I will because I'm curious to see what number I get at work, but only once for the test because it's annoying to wear it.*

Nevertheless, it is questionable it they really would do it if they have the chance. One participant clearly indicated that he would not do it. Therefore, the heart rate monitoring seems to be the least desired. Regarding the digital buddy, only one participant would rather not use the digital buddy's planning and reflection support and its reminding and encouraging function. This participant already exercises on a regular basis, suggesting that these functions are less essential for people who are already active in their free time. Anyway, the answers to the open questions highlight the importance of the reminding and encouraging function. Participants emphasized that it helps to have somebody telling you that it is time to get active and that you can do it. It prevents them from making excuses for why they cannot do it and thus gets them active.

> *The concept is good, because often people do something else, then they forget about it. And then they get the message, don't forget, and then they think oh yeah I still have to do that, I still want to do that.*

> *It is expecially a good idea thet the buddy motivates me to get active when I am tired.*

When asking the participants in the beginning what they like about the concept, they also pointed out that it is good that it supports you to define a plan. That confirms that the workers desire to have a plan and that they need help to find one that fits their lives. In addition to that, they liked it that they could change the plan if something does not fit. They were also positive about the integrated tips regarding proper recovery.

> *The app is great idea, it's good that it helps me to find a plan and that it gives tips for recovery.*

The participants did not mention the praising part during the open questions, but all of them declared in the questionnaire that they would use it. Therefore, I assume that workers do not consider it as a core function, but still like it.

Design Goal

To evaluate whether 'Shift it!' has the potential to make workers feel confident about shifting their PA behavior in a healthier direction, I asked the participants if the presented concept would give them the feeling that they can improve their PA behavior. All participants were optimistic about it and made comments that confirm that they indeed believe it.

> *If I use this application it's good for me, I would start doing something.*

Additionally, I asked participants to rank on a scale from one (strongly disagree) to four (strongly agree) if the different elements of the health week could convince them that the movement at work is not enough to stay healthy and that their health is at risk. Further, I asked them to rank on the same scale if they believe that the digital buddy's different elements would help them shift their PA behavior in a healthy direction. An overview of the specific questions related to the design goal can be found in Appendix P. Figure 56 represents the participants' answers.

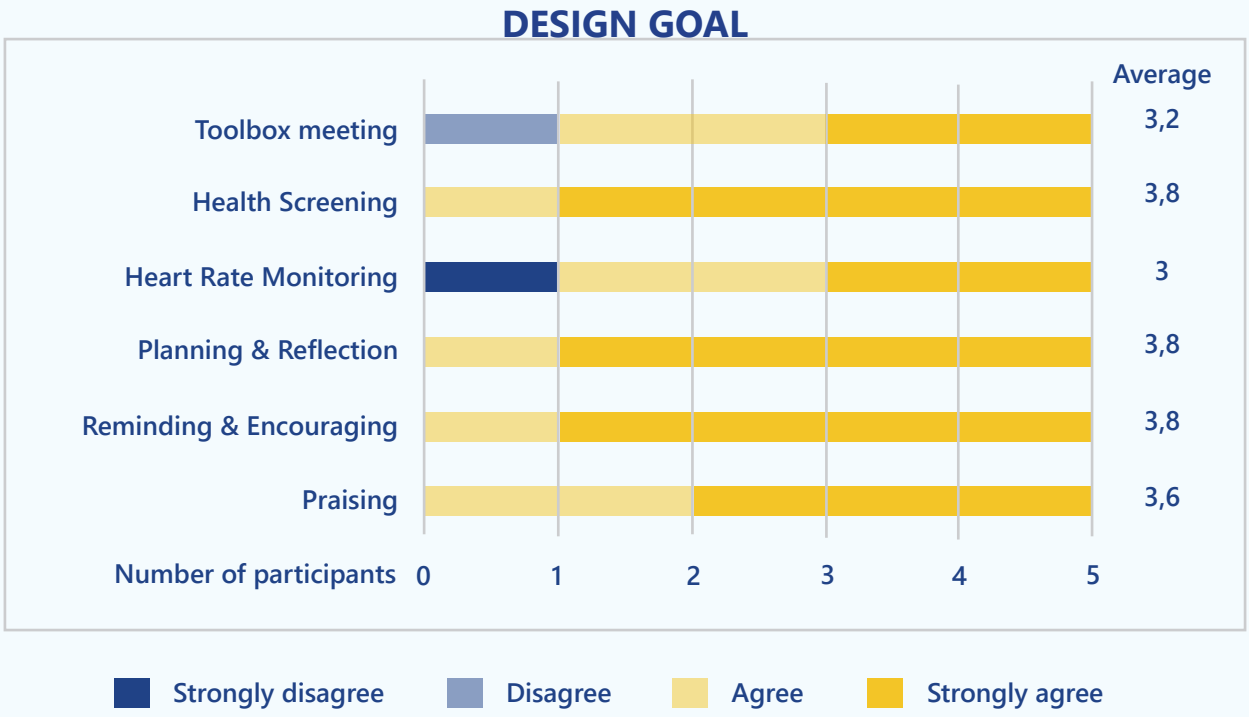


Figure 56: The diagram illustrates participants' answers to the questions that help assess if the concept can fulfill the design goal.

It can be seen that most participants believe that the different elements of the health week (top three balks) would convince them that their PA at work is not enough and that their health is at risk.
From this, I conclude that 'Shift it!' can potentially enhance workers' incorrect risk perception and thus change their convictions. As discovered during the ideation, this is an essential first step to make workers feel confident about shifting their behavior.
In addition, most participants strongly agreed that the different parts of the digital buddy would help them shift their PA behavior. Hence, they are confident that they can do it with the buddy's support.
From this, I conclude that the combination of the health week and the digital buddy can enhance workers' confidence, meaning that 'Shift it!' can meet the design goal.

Besides, it can be seen that the health screening was ranked the highest again (see figure 56). Hence, it seems to be the most desired and most convincing element of the health week, underlining its relevance. Regarding the digital buddy, its planning and reflection support and its reminding and encouraging function were ranked the highest, but the difference to the praising function was small (see figure 56). That suggests that the buddy's functions are equally important to make workers feel confident about shifting their PA behavior in a healthier direction.

Interaction Vision

The evaluation regarding the interaction vision was focused on the digital buddy. To assess wheather the interaction with digital buddy would meet the qualities of the interaction vision, participants were asked to rank the following statements on a scale from one (strongly disagree) to four (strongly agree):

- The digital buddy would give me the feeling that I am not doing it alone.
- The digital buddy would give me the feeling that nothing can go wrong.
- The digital buddy would give me the feeling that it is up to me what I want to do (That I am the one who makes the decision).
- The combination of the planning and reflection would trigger me to explore what works for me.
- This part (praising) would make me feel satisfied.

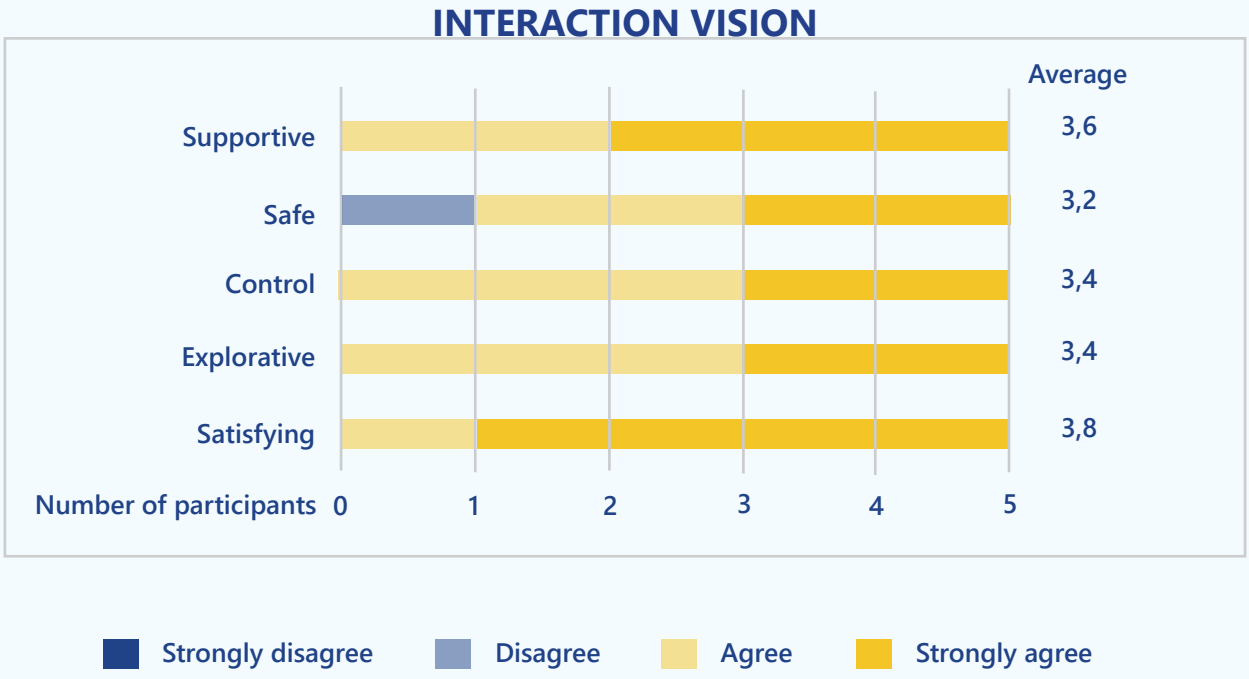


Figure 57: The diagram illustrates participants' answers to the questions that assess if the concept fits the qualities of the interaction vision

As can be seen in figure 57, all questions were ranked on average above three. That suggests that the digital buddy can meet all interaction qualities. Further, the diagram shows that participants especially expect it to be a supportive and satisfying experience. Indeed, participants explained that it would make them feel good to report that they have been active and being praised for it. Further, they declared that it feels like somebody is speaking to them and that it could be a particularly great support for people who are alone. Nevertheless, also participants with a family were enthusiastic about the support.

> *It feels like speaking to a human, that is nice!*

Furthermore, participants mentioned at the beginning that they like the concept because they can choose the hour, the exercise and because they can change the plan if it does not fit their life. That confirms that the buddy gives them the feeling that they have control over the situation. Additionally, participants declared that they could put it away if they would not feel like interacting with the digital buddy and everyone strongly agreed that they would be able to use it. From this, I conclude that they also have the feeling that they feel in control over the buddy.

> *I like that you can choose the hour, the exercise and adapt it to your own level!*

> *I like that I can put away the digital buddy if it gets me too much, or if I do not have time for it.*

Regarding the safe feeling, one participant explained that the digital buddy could not give him the feeling that nothing could go wrong because it would not control everything in his life. The buddy cannot prevent that we feel bad on some days. That makes sense and made clear that the question was too broad. However, the other participants neither questioned it nor made comments about it. That makes it difficult to evaluate it. The participants did also not say something that could be connected to an explorative feeling.
Therefore, it is questionable if the interaction with the digital buddy would create a safe environment that triggers workers to explore.

Reflection on results

This section briefly reflects on the results of the final evaluation.
Since 'Shift it!' is just a first concept, participants could not experience it but just saw a video of the concept and some example flows of the digital buddy. That means they had to imagine how it would be to have a health week and interact with a digital buddy. The actual experience might be different than what they expect it to be. Therefore, the results could be different if the same questions would be asked when testing or implementing it. Furthermore, the results are conspicuously positive. Eventually, the workers did not dare or want to criticize since I bonded with them throughout the project. Therefore, it might have been better to do the final evaluation with other workers. Also, it could be that they did not understand everything and did not want to show it because sometimes they looked up the question again when I asked them to motivate their answer or gave an answer that did not make sense in that context. Hence, the credibility of the results is questionable. Therefore, I would recommend executing further evaluation activities before implementing the concept. Different participants should be recruited for these activities, and someone from the target group should check beforehand if the questions are understandable. Also, it might be better if another person carries out the evaluation so that participants can express critique without having the feeling that they offend me. Nevertheless, I believe that the participating workers were honestly positive about the outcomes.

7.2 EVALUATION - OTHER STAKEHOLDERS

Aim

This evaluation aims to investigate what other stakeholders think about the designed concept to estimate its desirability and feasibility from companies point of view. Because in the end, these people must be willing to further develop and invest in it. Also, they have more experience and can therefore better indicate the feasibility.

Procedure

First, I gave a short presentation to inform the participants about this study's process and main insights. Then, I introduced 'Shift it!' by showing the video of the concept and answered raised questions. When everything was clear, I asked them open questions to evaluate the concept. These questions can be found in Appendix Q. I audio recorded the last part and took notes of their answers and reactions. Finally, we discussed some company-related recommendations.

Analysis

The data of this evaluation consist of the field notes taken during and after the discussion of the concept and the audio recording. After the meeting, I reviewed the recording to complement the notes and extract quotes.

Results

The evaluation with other stakeholders took place at Heras and lasted about two hours. The team leader of the coating department, Heras' Health and Security manager, and two occupational health practitioners (Arbo Unie employees) participated in this evaluation session. The following part describes the feedback provided by these stakeholders. I translated the quotes from Dutch to English.

The stakeholders were happy with the project's outcome. They explained that they are currently investigating how they can ensure sustainable employment at Heras and definitely will consider the elements of my concept.

They liked the idea of the digital buddy. They even asked if this is an existing intervention and declared that it is a great starting point when I told them that I developed it. They agree that they need to support workers in achieving healthy PA behavior, and they think that the digital buddy has the potential to provide this support. In addition, they indicated that it could be particularly beneficial for single workers.

> *It is indeed not enough to just tell workers what they need to do, we must guide them and give them support.*

> *The digital buddy could certainly be a support, especially for people who are alone.*

Further, they were glad to see that the toolbox meeting is part of the concept since Heras already givies this kind of meeting. Therefore, it is easy for them to implement it. Additionally, they agree that it would be beneficial to offer regular health screenings. It could show workers that they really care for their health. That they are not just talking about it (toolbox meetings) but also taking action. They cannot say yet if it will be realized/ if it is feasible for Heras, but they will definitely discuss the periodic medical examination with the management.

> *We cannot say yet which elements will be realized, but we will discuss it with the management. Among others, the periodic medical examination will definitily get attention.*

In general, they want to convince the management that Heras should put more attention to prevention programs and they will use my insights to strengthen their points and provide inspiration. They want to set policies for prevention.

In relation to that, it was discussed that people in the production get older and will not be able to go on with the same work till the end of their working life. It was declared that Heras should not start caring for them when they are old but already care for their health when they start working at Heras. They should consider how they can use workers in different areas. Thus, they should train employees more broadly, enabling them to advance to less strenuous positions when they get older. That would also allow them to switch positions and could thus facilitate variation in their occupational PA.

7.3 CONCLUSIONS

The final evaluation investigated the potential of ‘Shift it!’. To do so, it was studied what the workers and other stakeholders think about the developed concept. Hence, the last two sub-research questions were answered:

RQ 4a: What does the target group think about the designed concept?
The workers were enthusiastic about the designed concept and believed that it would help them shift their PA behavior into a healthier direction. In particular, they liked that it gives workers the chance to check their health and encourages them to get active because that improves their health and makes them feel better. Related to that, the evaluation outcomes suggest that, for the workers, the health screening is the most desired and convincing element of the health week. Further, the results indicated that the digital buddy‘s functions are equally important to make workers feel confident about shifting their PA behavior in a healthier direction, and most of them would use them all. Therefore, it seems to be most promising to include all functions of the digital buddy.
Besides, the evaluation has shown that workers believe that the digital buddy could provide support similar to a human, give them control over the situation, and provoke a feeling of satisfaction.

RQ 4b: What do company stakeholders, occupational health researchers-, and practitioners think about the designed concept?
Company stakeholders and occupational health practitioners were happy with the project‘s outcomes. They see the added value of a periodic medical examination and will use my insights to convince the management. Further, they agree that it is relevant to support workers in achieving healthy PA behavior and believe that the digital buddy is a good idea to facilitate this support. It could not yet be indicated if it is a feasible concept for Heras and if they are willing to invest in it since they first need to discuss it with the management. Nevertheless, the present employees expressed their interest.

Hence, the final evaluation has shown that the target group, company stakeholders, and occupational health practitioners are enthusiastic about ‘Shift it!‘. It can fulfill the design goal and has the potential to meet the qualities of the interaction vision. Further, it has revealed that workers consider the health screening and the digital buddy as the core of the concept. Moreover, it has manifested company stakeholders‘ interest in implementing its elements. From this, I conclude that ‘Shift it!’ has the potential to be developed to a lifestyle intervention that fits the complex context of people with a physically demanding job and helps them shift their PA behavior into a healthier direction.

8. CONCLUSION

This last chapter discusses the strengths and limitations of this project, gives final recommendations, and summarizes the answers to the four main research questions. Additionally, it presents my personal reflection.

8.1 STRENGTHS AND LIMITATIONS

One strength of this project was that it took a holistic approach. It investigated all kinds of factors influencing workers' PA behavior in their home and working environment. That resulted in an extensive overview of factors influencing workers' capability, motivation, and opportunity to a healthy PA behavior, including barriers and facilitators. Occupational health practitioners, researchers, students, and companies can use this overview to help workers shift their PA behavior in a healthier direction by reducing barriers and reinforcing facilitators. Additionally, what factors are most urgent to tackle is indicated, delivering a starting point.

Further, this project has shown what intervention elements can address these factors and fit workers' abilities, preferences, and possibilities. These insights and the developed concept (Shift it!) can inspire people who design lifestyle interventions for this target group. Also, it was explored how both the working environment and the home environment could be integrated into a lifestyle intervention. Ideas were generated for both settings. It was found that the working environment should make workers aware of the issue, the home environment should facilitate moderate to vigorous leisure PA, and both should ensure proper recovery. However, I did not have the chance to further explore the potential of the ideas for the working environment. Consequently, I focused the rest of the development on the home environment. Nevertheless, I did include some elements to create awareness, but it still must be investigated how the working environment can be integrated into lifestyle interventions to reduce workers' over-exhaustion.

Another limitation was the language barrier caused by the different nationalities of the workers. Sometimes participants did not understand what I was trying to tell them or what I asked them. Therefore, they sometimes made contradicting statements. However, most statements were clear. Moreover, involving different nationalities makes the data more valuable since foreigners are often excluded in smaller studies that cannot afford a translator.

Besides, most activities were executed with four to six participants. That is a pretty small sample size, which might have affected the reliability of the research outcomes. However, it allowed me to bond with the participants and helped me to get deeper insights into their complex context. Therefore, it was an appropriate sample size for the purpose of this qualitative research project.

Furthermore, the designed concept is only a first direction. It needs more iterations before it is ready to implement. That is fine since it was agreed upon a research focus but made it difficult to evaluate whether it can fulfill the design goal (achieve the desired effect) and if workers would really use it. Above that, it means that the company has no immediate benefit from the project's outcomes. Nevertheless, they can make use of the insights (especially the identified opportunities related to the working environment) to improve working conditions and thus employee satisfaction.

8.2 RECOMMENDATIONS

It was already mentioned that 'Shift it!' needs more iterations before it can be implemented. Section 6.4 provides a rough overview of things that still need to be done.
Nevertheless, I highly recommend further investigating the core of the concept before working out the details. Thus, finding out which elements are essential to make workers feel confident about shifting their behavior in a healthier direction. That can be done by testing the effect of the different elements separately. For example, one exploration could be to facilitate only a toolbox meeting about the PA paradox and then evaluate if that already increases workers' risk perception enough to convince them that their PA at work is not enough.
Based on the final evaluation outcomes, I recommend testing first whether a health screening is sufficient to increase workers' risk perception. Also, it should be explored for the digital buddy if really all functions are needed to make workers feel confident. That could be done in the same manner.
Also, I invite other researchers to ponder if all three ingredients for a healthy PA behavior (moderate to vigorous PA, variation, and sufficient recovery) should be facilitated in one lifestyle intervention or if it is wiser to split it up.

Furthermore, as mentioned earlier, I recommend investigating how the working environment can help reduce workers' over-exhaustion. It should be explored how companies can improve the quality of workers' breaks and how they can reduce their workload. Below are some sketches of ideas that can serve as inspiration (see figure 58). Besides these ideas, I recommend considering designing work according to the Goldilocks principle, making work 'just right' (Holtermann, Mathiasse and Straker, 2018).

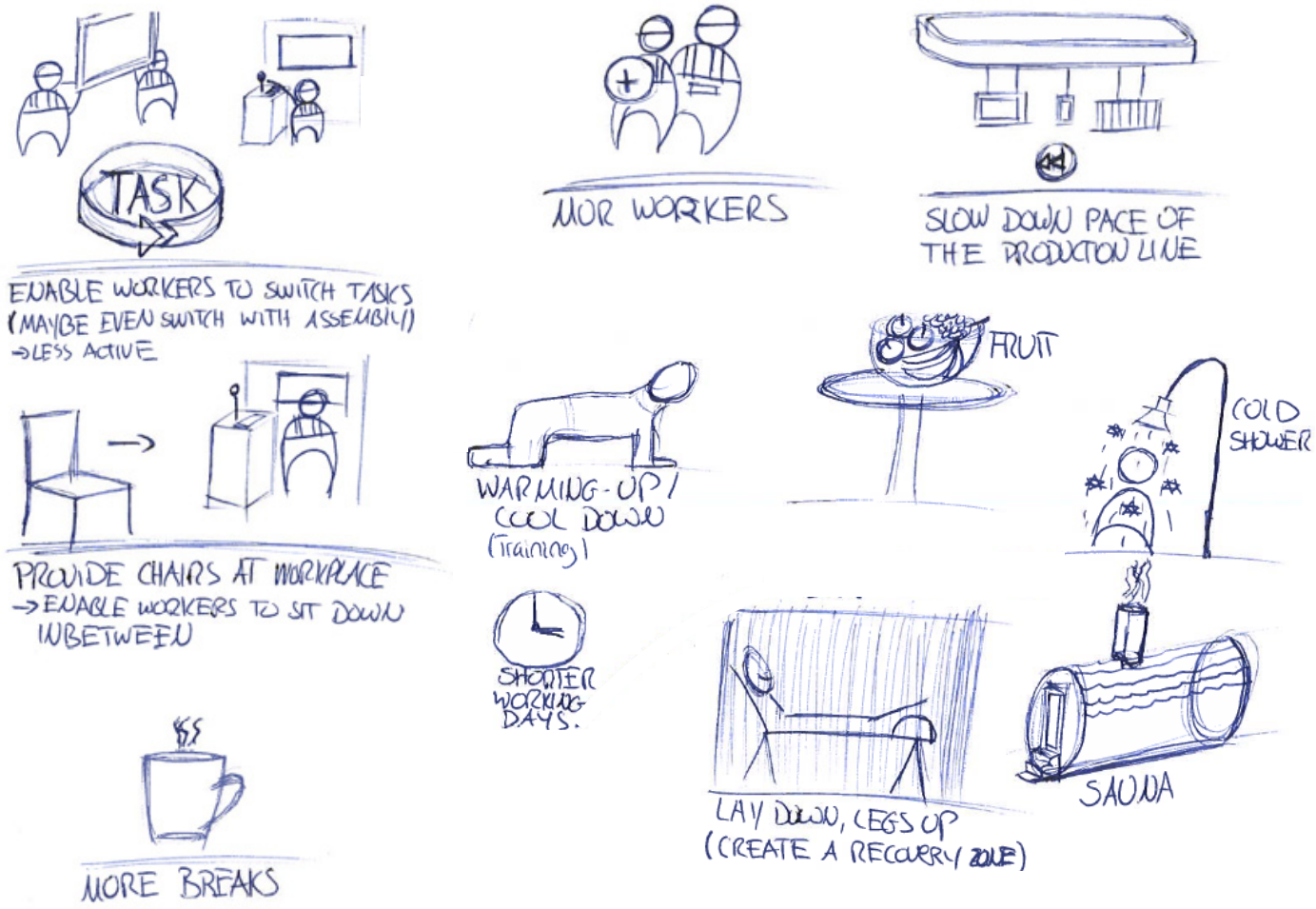


Figure 58: Idea sketches - Improving quality of breaks and reducing workload.

8.3 ANSWERS MAIN RESEARCH QUESTIONS

This project applied a holistic approach to investigate the PA behavior of people with a physically demanding job, contextual factors that are influencing it, and how we can design lifestyle interventions that shift their PA behavior in a healthier direction. It was guided by four main research questions answered through a literature review, expert interviews, a field study, and Research through design activities.

RQ 1: What is the PA paradox and how can we counteract it?
In contrast to leisure PA, occupational PA (tasks including manual handling, repetitive work, and prolonged static postures over long periods without sufficient recovery) seems to have detrimental health effects. To counteract the detrimental health effects, people with physically demanding jobs should perform moderate to vigorous PA and properly recover. The PA should be another kind of movement than they carry out at work.

RQ 2: What contextual factors do we need to address in a lifestyle intervention to shift the occupational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?
According to the COM-B model, workers must have the capability, motivation, and opportunity to perform a healthy PA behavior. This project has shown that various factors influence these three behavior components and provides an overview in chapter 3.
Mainly workers do not move during leisure because they believe they move enough at work and feel the need to rest. These barriers are the consequence of workers' inadequate risk perception and over-exhaustion. Since these are both capability factors, it was concluded that a lifestyle intervention should tackle workers' inadequate risk perception and over-exhaustion to enhance their capability to perform a healthy PA behavior.

RQ 3: How can we design a lifestyle intervention that addresses relevant contextual factors to shift the occupational and leisure-time PA behavior of people with a physically demanding job in a healthy direction?
We need to design interventions that first make workers aware of the PA paradox and its consequences for their life, then enable them to see possibilities to change their situation, and finally help them explore what works for them. For this purpose, it seems promising to combine in-person conversations with an expert with a supporting digital buddy. Generally, the working environment should make workers aware of the issue, the home environment should facilitate moderate to vigorous leisure PA, and both should ensure proper recovery.

The knowledge that was generated by answering the first three research questions was used to develop 'Shift it!', a concept that makes workers feel confident about shifting their PA behavior in a healthier direction. 'Shift it!' consists of two parts: A health week and a digital buddy. The health week raises workers' awareness. It informs them about the PA paradox, examines their risks and provides insights into their PA behavior. The digital buddy ensures that workers understand the issue and helps them to integrate recovery and PA into their daily lives.

'Shift it!' was evaluated with the workers and other company stakeholders, answering the last research question:

RQ 4: What is the potential of the developed lifestyle intervention concept?
Workers, company stakeholders, and occupational health practitioners were generally enthusiastic about the concept and showed interest in implementing its elements. More specifically, the final evaluation has shown that 'Shift it!' can make workers feel confident about shifting their PA behavior in a healthier direction and that workers consider the health screening and the digital buddy with all its functions the concept's core. It is not yet clear which elements can be realized by the company.

8.4 PERSONAL REFLECTION

At the beginning of the project, we were asked to set learning goals for our graduation project. This section reflects whether these goals were achieved.
Generally, I aimed to improve my planning and organizational skills throughout the project to prepare for working life. Despite having some problems at first (company recruitment and ethical application), I managed to graduate with only a slight delay. I only rescheduled the green-light meeting. However, this rather occurred through my mental state at the time than my planning. Apart from that, I have kept all agreements and executed my activities according to my set plan. Additionally, I felt confident during interviews, co-creation sessions, and presentations since I was always well prepared. Therefore, I believe that my planning and organizational skills are sufficient for the working life. Besides that, I had the following ambitions:

#1 I wanted to prove my contextmapping skills
The contextmapping approach enabled me to collect rich data despite the present language barrier within this study. Various stakeholders complemented my sensitizing materials. They found them appropriate for the target group and were convinced that the materials increased the quality of the interviews as well as the gathered data. They only had difficulties expressing their future wishes at first. However, letting them react to possible future scenarios during the group session (Exploration 1) helped explore those. Hence, I successfully proved my contextmapping skills.

#2 I wanted to improve my analytical skills
Before the project, I would rather go with my gut feeling when it came to analyzing data. However, my supervisors made me realize that I am actually following (in broad lines) a thematic analysis framework (Clarke and Braun, 2014). They provided me with literature that helped structure my analysis better. That made me feel more confident about my choices throughout the analysis. I can now say, that I improved my analyzing skills.

#3 I wanted to learn about quantitative research methods and data-driven design.
This project taught me how the Experience Sampling Method could be applied to collect quantitative data. However, due to the short duration of the home study and the small sample size, it is debatable whether the collected data can be seen as qualitative data. Further, I created a Likert scale to evaluate the designed concept and its elements. In principle, this can be seen as quantitative data, but again the sample size was small. Consequently, there was no opportunity to perform extensive statistical analysis.
Regarding data-driven design, I included heart rate monitoring to access insights into workers' PA and rest intensity, enabling personalized advice. Due to limited resources, I could not execute measurements (generate data) to inform my design. Also, I did not have the time to investigate data-driven design theories/strategies. Hence, my quantitative methods and data-driven design knowledge could not be further extended. Meaning, that I could not reach my third learning ambition to its full potential.

#4 I wanted to deepen my knowledge about health psychology and theory and apply it.
Before my graduation, I only applied models that focus on the intra-individual and interpersonal factors. During this project, I used the COM-B model to understand workers' (PA) behavior better. That taught me to analyze how the physical and social environment influences an individual's behavior. This allowed me to identify what needs to be tackled to shift workers' behavior in a healthier direction. Also, it enabled me to create a clear overview of influencing factors. Thus, I extended my knowledge about health psychology and theory and successfully applied it.

#5 I wanted to visualize my insights in a clear and convincing way.
I often face the struggle of communicating my insights visually. However, I think that I found a good way to communicate the various influencing factors within this study. I know that there is still room for improvement but I am happy with my visuals and the general layout. Nevertheless, in future, I will try to communicate more in visuals, reducing the amount of text.

To conclude, I achieved most of my learning ambitions but still have potential to improve.

Next to my preset goals, I learned to deal with unexpected challenges, such as getting back a booklet filled in in polish, having five interviews in a row in four different languages, and changing circumstances.
Also, it taught me to design with people who have a low educational level. Although, I must admit that it was harder than expected. I am not sure if that was partly due to the language barrier, but I found it difficult to estimate what they do understand and what not. Nevertheless, I managed to get valuable insights from them.

Generally, I think it has been the most challenging project I have done so far. From a complex ethical application process to designing an intervention that should fit two different contexts. Facing all these challenges let me grow as a designer and give me the feeling that I am ready to become a professional.

All in all, I am happy with the outcomes of the project, and hope that my findings will help occupational health researchers and practitioners to improve the health of people with a physically demanding job and thus contribute to reduce health inequalities.

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Interviews

Interview #1: Coenen, P., August 5, 2021
Interview #2: Oude Hengel, K., August 23, 2021
Interview #3: Cillekens, B., August 26, 2021
Interview #4: Proper, K., September 1, 2021
Interview #5: Speklé, E., September 2, 2021
Interview #6: van Berkel, B., September 6, 2021

APPENDIX

APPENDIX A

Project Brief

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Beckmann
initials: _____ given name: Julia
student number: _____
street & no.: _____
zipcode & city: _____
country: _____
phone: _____
email: _____

Your master programme (only select the options that apply to you):

IDE master(s): ( ) IPD (★) DfI ( ) SPD
2nd non-IDE master: _____
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: (★) Medisign
( ) Tech. in Sustainable Design
( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Jos Kraal — dept. / section: HCD / AED
** mentor: Natalia Romero Herrera — dept. / section: HCD / DCC
2nd mentor: Pieter Coenen
organisation: Amsterdam UMC
city: Amsterdam — country: Netherlands

comments (optional): 2nd external partner: Arbo Unie, represented by Erwin Speklé

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Jos Kraal date 22 - 07 - 2021 signature

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: 45 EC

Of which, taking the conditional requirements into account, can be part of the exam programme 45 EC

List of electives obtained before the third semester without approval of the BoE

★ YES all 1st year master courses passed

NO missing 1st year master courses are:

name J. J. de Bruin date 26 - 07 - 2021 signature

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: ★ APPROVED NOT APPROVED

Procedure: ★ APPROVED NOT APPROVED

- Remark: 2nd external partner: Arbo Unie, represented by Erwin Speklé". There is only one external mentor allowed, so please change into "advisor" (or simply don't mention him at all).

comments

name Monique von Morgen date 10 - 08 - 2021 signature

Tailoring lifestyle interventions to people with physically demanding jobs project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 21 - 07 - 2021 07 - 01 - 2022 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

New evidence indicates that people (e.g. blue-collar workers) who have a high physical workload, such as lifting, pulling, and pushing heavy loads, tend to have poorer health (even when adjusted for relevant health, lifestyle, and socioeconomic factors) compared to people with sedentary jobs (Niedhammer et al., 2018; Leijten et al., 2015; Li et al., 2013; Hiesinger and Tophoven, 2019). That seems to be contradicting since it is proven that physical activity (PA) is important to prevent multiple chronic diseases, such as COPD and cardiovascular diseases (WHO, 2010). This phenomenon is called the 'physical activity paradox'. According to global PA guidelines, a positive health effect can be achieved by performing at least 150 minutes of moderate-intensity PA per week (WHO, 2010). Workers who have high levels of occupational PA easily meet these guidelines, and it is therefore expected that they have a lower risk for lifestyle-related diseases (Rasmussen, 2019). However, that is not the case, as described above, and may be caused by differences in the nature of occupational and leisure-time PA (Hallman et al., 2015). Leisure-time PA is usually executed in short moderated or high-intensity bouts of predominantly aerobic activities followed by long recovery periods, improving cardiorespiratory fitness (Lund et al., 2019). Occupational PA, including tasks like manual handling, repetitive work, and prolonged static postures, is carried out over long periods without sufficient recovery (Coenen et al., 2018). Delivering this kind of strenuous physical work 40 hours a week or more is likely to cause fatigue and an inactive (sedentary) behavior in leisure time (Arias et al.,2015; Bláfoss et al., 2019). That suggests that people with physically demanding jobs are threatened by potential negative health consequences of occupational PA and might not benefit from the positive health effects of leisure-time PA (see figure 1).

In the current occupational health research, interventions for this population are typically narrow, focusing on limited factors in a specific environment, such as at home or work. Coenen et al. (2020) and other studies have demonstrated the ineffectiveness of these kinds of interventions for people with physically demanding jobs, emphasizing the need for new directions. To improve the effectiveness of such lifestyle interventions, it is relevant to better understand factors driving unhealthy behavior. We believe that the health of workers with a high physical workload can only be enhanced if we understand their complex system of various influencing context factors, such as working conditions and facilities, but also social factors, an individual's attitudes, health literacy, and home environment(see figure 2). Therefore, we must examine the complex context of the workers as a holistic system, in which both occupational and leisure-time PA are considered as important.

I will execute the project in cooperation with the public and occupational health department of Amsterdam UMC and the Arbo Unie. The public and occupational health department focuses on the health effects of work and they are eager to find ways to enable vulnerable workers to live a healthy live. The Arbo Unie strives to improve the vitality and health of workers to make companies more successfull. Thus, both stakeholders are interested in promising lifestyle interventions for workers and can provide me with usefull insights about existing interventions (earlier successes and failures). With this project, we aim to get a better understanding of the system in which workers perform physically demanding jobs. By gaining this understanding, we intend to shift the system into a more healthy direction by favourably balancing the workers' occupational and leisure-time PA in the complex context of other relevant factors. We want to develop a concept for a lifestyle intervention tailored to the target population.

To properly execute the project, we want to collaborate with a company that occupies people with physically demanding jobs (e.g. a construction company). Therefore, every effort is made to find a suitable company, but if this is not possible we need to improvise and adjust the project planning.

space available for images / figures on next page

introduction (continued): space for images

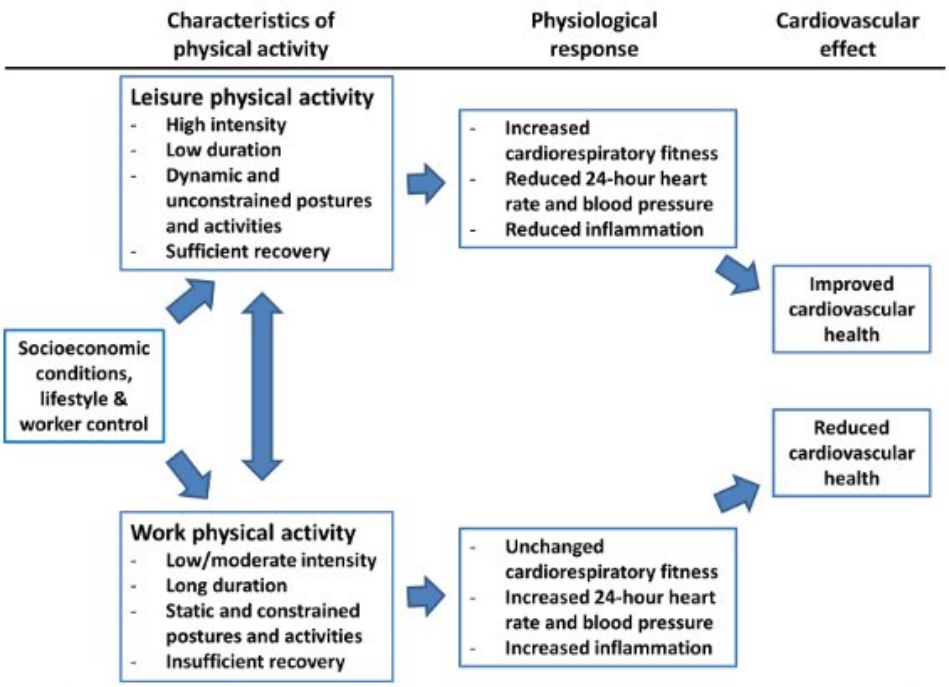


Figure 1 Conceptual diagram of the proposed mechanisms behind the physical activity health paradox.

image / figure 1: Mechanisms behind the PA paradox (Holtermann A, et al. Br J Sports Med February 2018 Vol 52 No 3)

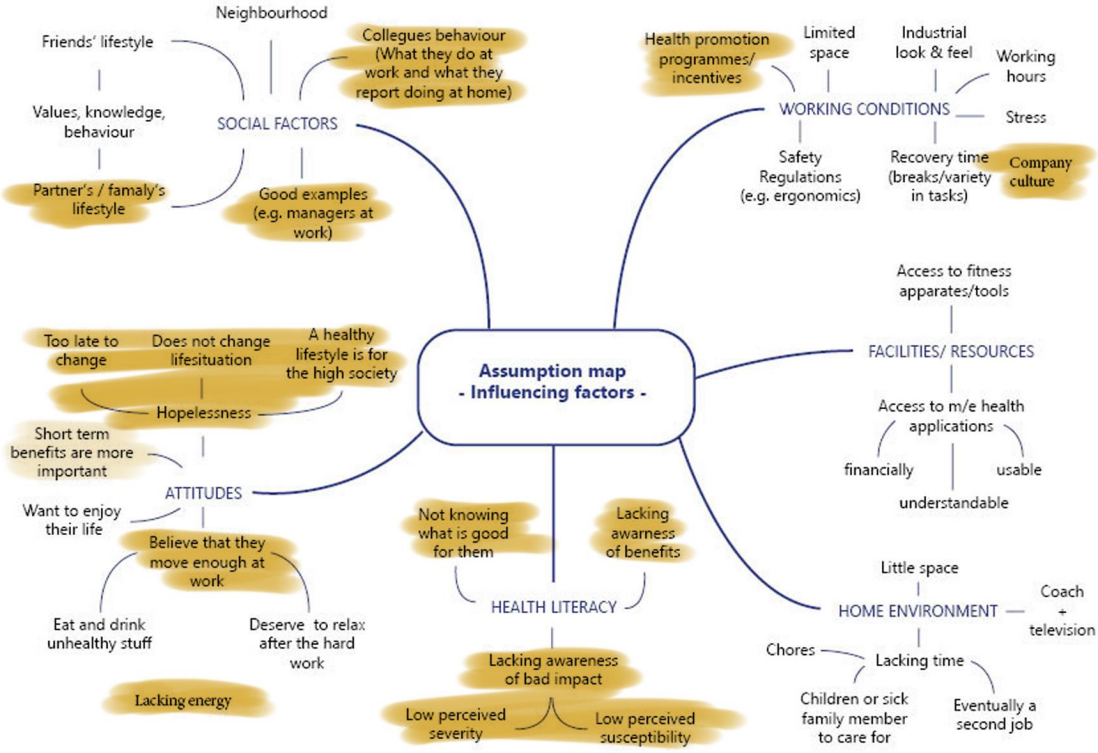


image / figure 2: Assumption map of context factors that influence the target group's PA behavior

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

I will explore the PA behaviour of people with physically demanding jobs to design a concept for a lifestyle intervention that favourable changes the PA behaviour of the target group. I will generate an understanding of the workers' context and why they make certain choices. Based on my own experiences (family members working on farms and in fabrics), and occupational health (OH) literature, I have already mapped context factors that influence the PA behaviour of the target group (see figure 2). I highlighted the factors that I find most interesting and promising to focus on, considering the intervention's ultimate goal to achieve a sustainable behaviour change: Several social factors, someone's individuals believes, attitudes, health literacy, and some working conditions. However, the other factors are relevant to take into account as well and can be used to play around with to achieve a change. Throughout my graduation project, I will verify/complement my assumptions, investigate how the different factors relate to each other and examine which ones are most relevant to address in lifestyle interventions for this population.
The generated knowledge will be used to design a concept for a lifestyle intervention that fits the needs of people with physically demanding jobs. For now, the goal of the intervention is to support workers to shift their occupational and leisure-time PA behaviour in a healthy direction. It must respond to the workers' context, fit their daily activities and preferences, and be integrated into the working and home environment. To achieve a sustainable change, I will look into health psychology theories like Self-determination theory and Social practice theories.

The main research question of the project are:

1. What contextual factors influence the PA behavior of people with physically demanding jobs?
2. What role do the contextual factors play for people with physically demanding jobs (in practice)? (What factors are most relevant?)
3. How can lifestyle interventions address relevant contextual factors to shift the workers' occupational and leisure-time PA behavior into a healthy direction?

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

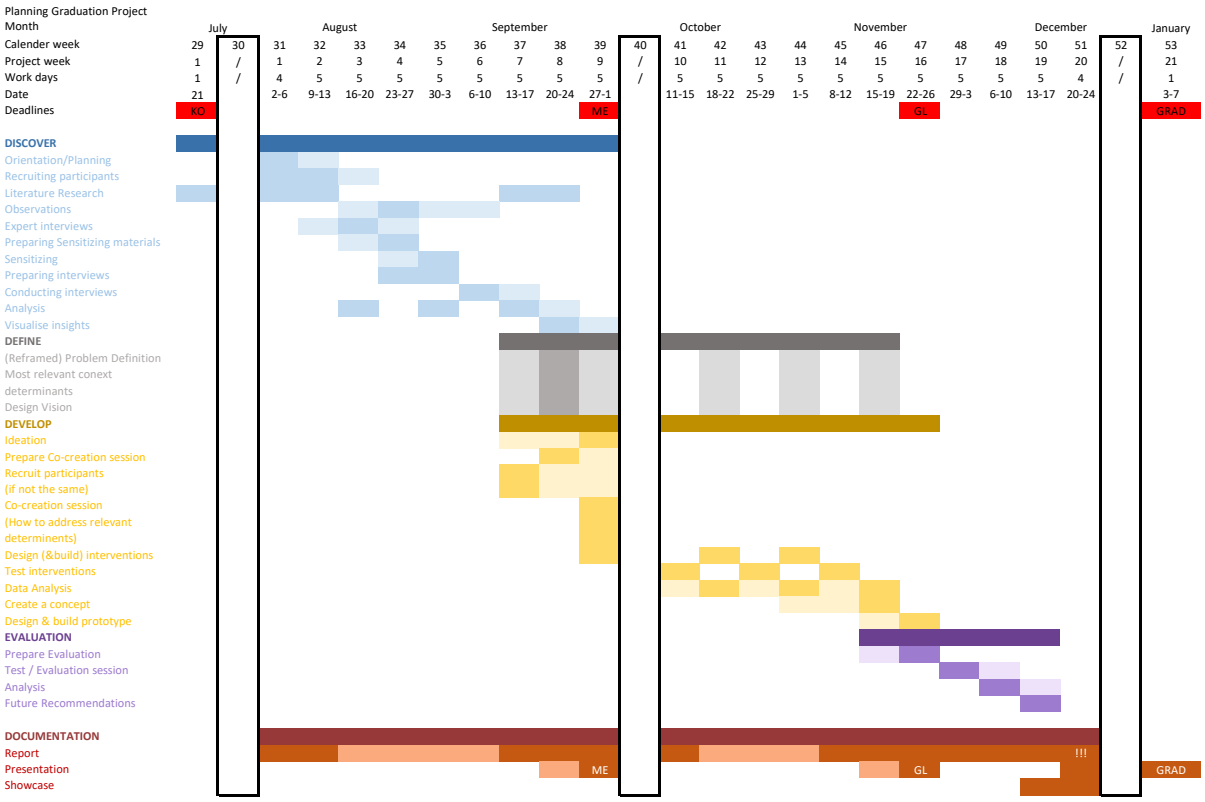
The project's focus is to study contextual factors that influence the PA behavior of people with physically demanding jobs (both at home and work) and how lifestyle interventions can address these factors. Further, I want to use the knowledge I will gather to develop a concept for a lifestyle intervention that aims to favourably change the PA behavior of the target group.

I aim to deliver a concept for a lifestyle intervention that suits the complex system of people with physically demanding jobs, with the ultimate goal to shift the workers' PA behaviour in a healthy direction. The insights gained during the research will determine what kind of solution fits best for such an intervention. Besides, I will deliver valuable insights into the workers' system and visually communicate these to the stakeholders of this project. I will base my research on existing literature on OH (contextual factors and existing interventions), health psychology-, and design theory. Also, I will interview experts like OH researchers, company doctors, ergonomists, managers, design ethnographers, and family members. However, the project's focus is to study the workers' perspective, enriching the academic knowledge with underlying factors. Therefore, I will apply a user-centered design process involving the workers in every phase. The active participation of the workers will ensure that the final solution fits the workers' context. I will combine a contextmapping study with a Research through design approach to first explore underlying thoughts and feelings related to workers' experience and then test how to address these within an intervention. So, first, I will do observations in the context, sensitize participants and execute in-depth interviews. Then, I will do a co-design session to create ideas and afterwards quickly test/evaluate and iterate. Finally, one concept will emerge, and I will evaluate whether it properly addresses the most relevant contextual factors. Thus, I will generate knowledge that can be used to develop lifestyle interventions that shift the complex system of people with physically demanding jobs into a more healthy direction. I collaborate with the Amsterdam UMC and the Arbo Unie, both striving to improve the health and vitality of workers. Therefore, I believe it is an appropriate project for the Medesign specialisation.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 21 - 7 - 2021 7 - 1 - 2022 end date



Due to the holiday period, the kick-off must take place one and a half weeks before the project start. That is why I start with holidays. Additionally, I will take two weeks of holidays, one after the midterm evaluation and one over Christmas. Apart from these weeks, I am planning to work full-time on the thesis throughout the whole project. My graduation ceremony will be after Christmas. The deadline for the thesis will be scheduled before Christmas anyway.

• DISCOVER: At the beginning of the project, I will create a user research plan, and I am planning to do literature research and expert interviews to investigate known context factors. Then, I will execute a contextmapping study to explore which contextual factors play a role in practice. To do so, I will first do observations in the context (if possible at the workers' home and work), sensitize the participants and collect data (eventually by means of Natalia's prototype), and then invite them for an in-depth individual interview to identify underlying thoughts and feelings.

• DEFINE: After discovering the context, I will review the problem definition and scope of the project. Further, I will determine the most relevant contextual determinants (that needs to be adressed in the lifestyle intervention) and define a vision for my final concept. I will iterate on these definitions throughout the develop phase.

• DEVELOP: Next, I will facilitate a Co-design session to (further) explore the desires of the workers and to collaboratively generate ideas on how relevant determinants could be addressed in an intervention. After that, I will quickly design and test low-fidelity prototypes in an iterative manner to validate or reject assumptions and answer research questions/generate insights. Then, I will use all the gained insights to create a concept.

• EVALUATION (Design goal): If possible I will test the desirability of the concept in the context, otherwise, I will evaluate it in a focus group of workers. Also, I will do a groups session with other experts, such as OH researchers, company doctors, ergonomists, managers, or family members.

• DOCUMENTATION: I will constantly document my gained insights, and I work actively on the report in between activities. I will prepare my presentations a week ahead, and I will work on the showcase duringthe last 2 weeks.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

It motivates me that the project allows me to research how to improve the health of people with physically demanding jobs. To me, that is a meaningful topic and fits my ambition to design for wellbeing. In particular, it makes me enthusiastic that I might contribute to decrease health inequalities since I am eager to improve the quality of life of vulnerable groups. Further, I am pleased that the project has a research focus because I love to dive into the context of a target group, exploring its concerns, needs, and desires (fitting the Design for Interaction track). Moreover, the project motivates me because I am very interested in topics related to behaviour change. I like to figure out why people behave in a certain way and how this could be changed. Also, I like the free solution space, that it is not yet defined what the outcome has to be. In my opinion, the problem has to be explored and framed before it can be determined which medium works best. Hence, this project fits my interests very well!

Regarding my personal learning ambitions, I generally aim to improve my planning and organization skills throughout the project, getting ready for working life. Besides that I have the following ambitions:

#1 I want to prove my contextmapping skills. I already used the framework for different kinds of projects throughout the Master's programme and my internship at Muzus. Therefore, I feel confident using it and want to prove my expertise.

#2 I want to improve my analysis skills. The analysis time is usually limited, I often have the feeling that I go with my gut feeling. I want to use my graduation project to find an adequate theory/structure for analysing data, and become more confident about the choices I make throughout the analysis. I will look for fitting literature and ask my supervisors for tips.

#3 I want to learn about quantitative research methods and data-driven design. The Master programme Design for Interaction focuses on qualitative research methods, but to validate my designs in the future I must be aware of quantitative methods. Also, data-driven design is a big topic nowadays and good to make use of, since the data gives insights over a long period and is often collected without any effort. I will use Natalia's prototype to collect quantitative data and eventually make use of fitness trackers. Natalia Romera Herrera is an expert in the field of data-driven design and can thus help me out to achieve this ambition.

#4 I want to both deepen my knowledge about health psychology and theory and apply it. I followed the class Health Psychology Tools and Methods, and I liked the theory very much. However, I still find it difficult to apply it. Therefore, I want to understand better how to make use of the knowledge. I believe that the theory will be useful to explain the workers' behaviour and as inspiration for design choices throughout the process. Jos Kraal is an expert in the field of behaviour change and can therefore provide me with relevant tips.

#5 I want to visualize my insights in a clear and convincing way. I am not the best graphic designer and often struggling with communicating my insights visually. However, I know that it is important to do it properly as a designer. Therefore, I keep forcing myself to practice it. I will do so throughout my graduation as well. I am planning to communicate my insights into the workers' context in a visual way.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

APPENDIX B

Consent Form - Contextmapping

Informatie voor deelname aan onderzoek

Verbeteren van de gezondheid van mensen met een fysiek zwaar beroep

Geachte heer/mevrouw,

Wij vragen u vriendelijk om mee te doen aan een wetenschappelijk onderzoek.
Meedoen is vrijwillig. Om mee te doen is wel uw schriftelijke toestemming nodig.
Dit onderzoek wordt uitgevoerd door Amsterdam UMC samen met Arbo Unie en TU Delft als onderdeel van een afstudeeropdracht bij de opleiding Industrieel Ontwerpen in Delft. De toetsingscommissie van de METc van VUmc heeft beoordeeld dat dit onderzoek niet onder de Wet medisch-wetenschappelijk onderzoek met mensen (WMO) valt.
Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker uitleg als u vragen heeft. U kunt er ook over praten met uw partner, vrienden of familie.

1. Doel van het onderzoek
Mensen met een fysiek zwaar beroep hebben over het algemeen een minder goede gezondheid vergeleken met mensen die een zittend beroep hebben. Dit kan het gevolg zijn van het zware beroep zelf, maar ook door de leefomstandigheden van deze mensen in de vrije tijd. Bestaande programma's om de gezondheid van deze werknemers te verbeteren zijn meestal gericht op één specifieke omgeving, zoals de thuis-, of werkomgeving en het effect van deze programma's is vaak beperkt. Om deze programma's te verbeteren willen we de gehele omgeving (werk, thuis, sociaal, cultureel) van mensen met een fysiek zwaar beroep leren kennen.

2. Wat meedoen inhoudt
In dit onderzoek willen we uitzoeken welke factoren invloed hebben op de gezondheid en het bewegen van mensen met zwaar fysiek werk, zowel thuis als in hun werkomgeving. Hiervoor willen we u graag interviewen om uw mening goed te leren kennen. Ter voorbereiding op het interview zullen we u vragen een werkboek met een aantal korte opdrachten in te vullen. Het invullen van de opdrachten gaat u 5 à 10 minuten per dag kosten en u zult het boekje 4 dagen bij u houden. Bij deze opdrachten vragen we u bijvoorbeeld naar uw activiteiten tijdens werk en na werk, omschrijft u welke personen voor uw belangrijk zijn en waarom u wel/niet beweegt in u vrije tijd. In deze fase verwachten we een tijdsinvestering van ongeveer 2 uur.

Tijdens het onderzoek vragen wij u om foto's van uw thuisomgeving te maken en met ons te delen. Ook zullen we van de interviews geluidsopnames maken. De geluidsopnames worden uitgeschreven waarna de geluidsopnames worden vernietigd. De informatie zal beveiligd worden opgeslagen bij de universiteit. Het is belangrijk te weten dat uw gegevens gecodeerd worden waardoor de gegevens niet herleidbaar zijn. Uw naam en adres worden niet opgeslagen en foto's/geluidsopnames worden onherkenbaar gemaakt door herleidbare gegevens te verwijderen of grijs te maken in de foto's. Uw gegevens zullen in het eindverslag daarom niet herkenbaar zijn.

3. Mogelijke voor- en nadelen

U heeft zelf geen (direct) voordeel van meedoen aan dit onderzoek. Uw deelname kan wel bijdragen aan meer kennis op het gebied van leefstijl programma's. De samenwerking tussen Amsterdam UMC, Arbo Unie en TU Delft is uniek en we verwachten veel interessante inzichten. Nadelen van deelnamen aan dit onderzoek kunnen zijn: extra tijd die het u kost voor het invullen van het werkboek en het interview.

4. Als u niet wilt meedoen of wilt stoppen met het onderzoek

U beslist zelf of u meedoet aan het onderzoek. Het is een volledig vrijwillige deelname. U mag op elk moment stoppen met dit onderzoek, en je hoeft hier geen reden voor te geven. Wel moet u dit direct melden aan de onderzoeker. De gegevens die tot dat moment zijn verzameld, worden gebruikt voor het onderzoek.

5. Gebruik en bewaren van uw gegevens

Voor dit onderzoek is het nodig dat uw persoonsgegevens worden verzameld en gebruikt. Het gaat om gegevens zoals uw ervaringen, voorkeuren, interesses en motivaties. Elk deelnemer krijgt een code die op de gegevens komt te staan. Dit heet gecodeerd. Uw naam wordt dan niet meer gebruikt.

Al uw gegevens blijven vertrouwelijk. Alleen de onderzoeker weet welke code u heeft. Voor het onderzoek worden uw onderzoeksgegevens gecodeerd gedeeld met onderzoekers van de Amsterdam UMC, TU Delft, en Arbo Unie. U wordt na het einde van het onderzoek op de hoogte gesteld van de belangrijkste uitkomsten van het onderzoek. Als u de toestemmingsverklaring ondertekent, geeft u toestemming voor het verzamelen, bewaren en inzien van uw persoonsgegevens. De onderzoeker bewaart uw gegevens 15 jaar. Daarna worden de persoonsgegevens vernietigd.

Meer informatie over uw rechten bij verwerking van gegevens
U kunt de onderzoeker vragen om een kopie van gegevens die u heeft aangeleverd.
Voor meer informatie over uw rechten bij de verwerking van uw persoonsgegevens kunt u contact opnemen met de onderzoekers van dit onderzoek van Pieter Coenen via p.coenen@amsterdamumc.nl. Pieter Coenen is verantwoordelijk voor het volgen van de regels voor de verwerking van uw persoonsgegevens. Indien u ontevreden bent over hoe wordt omgegaan met uw privacy dan kunt u een klacht indienen bij de Functionaris Gegevensbescherming via e-mailadres, voor VUmc: privacy@vumc.nl. Ook kunt u zelf terecht bij de Autoriteit Persoonsgegevens via https://autoriteitpersoonsgegevens.nl/.

6. Geen Vergoeding voor meedoen

Voor het meedoen aan dit onderzoek krijgt u geen onkostenvergoeding.

7. Heeft u vragen?

Bij vragen voelt u zich niet bezwaard om contact met mij op te nemen.

Hoofdonderzoeker
Pieter Coenen
p.coenen@amsterdamumc.nl
020 4448381

Onderzoeker
Julia Beckmann
j.beckmann@student.tudelft.nl
+491712992491

Dank voor uw aandacht en alvast heel erg bedankt voor uw deelname!

Bijlage: Toestemmingsformulier deelname

Verbeteren van de gezondheid van mensen met een fysiek zwaar beroep

Meedoen aan het onderzoek	Ja	Nee
- Ik heb de informatiebrief gelezen. Ook kon ik vragen stellen. Mijn vragen zijn voldoende beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.	○	○
- Ik weet dat meedoen vrijwillig is. Ook weet ik dat ik op ieder moment kan beslissen om toch niet mee te doen of te stoppen met het onderzoek. Daarvoor hoef ik geen reden te geven.	○	○
- Ik geef toestemming voor het verzamelen en gebruiken van mijn gegevens op de manier en voor de doelen die in de informatiebrief staan.	○	○
- Ik geef toestemming om mijn gegevens nog 15 jaar na dit onderzoek te bewaren binnen VUmc.	○	○
- Ik wil meedoen aan dit onderzoek.	○	○

Gebruik van de informatie van dit onderzoek	Ja	Nee
- Ik geef toestemming voor het verzamelen en gebruiken van foto's, en geluidsopnames. Deze opnames zullen in het eindverslag niet herkenbaar worden gebruikt.	○	○
- Ik geef toestemming dat mijn gegevens gedeeld worden met de TU Delft onderzoekers die worden genoemd in de informatiebrief	○	○
- Ik begrijp dat de informatie die ik geef gebruikt wordt voor het afstudeerproject en het eindverslag van de onderzoeker.	○	○

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar dat ik de deelnemer volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de proefpersoon zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker:

Handtekening: Datum: __ / __ / __

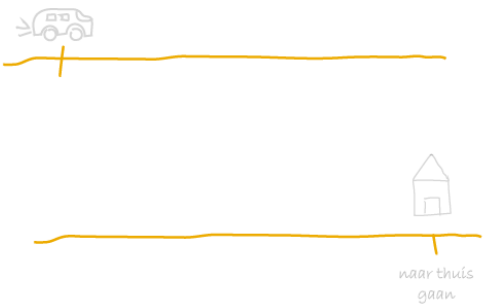
APPENDIX C

Sensitizing Materials

Dag 1

Een gewone werkdag...

1 **Vul de tijdlijn aan.**
Schets/beschrijf wat u op een gewone werkdag allemaal doet. Wat heeft u bijvoorbeeld vandaag gedaan? Geef aan op welke momenten u veel beweegt en wat soort beweging het is (b.v. lopen, tillen, duwen,..). Vergeet ook niet aan te geven op welke momenten u pauze houd.



2 Geef aan hoe u zich op de verschillende momenten heeft gevoeld. Voelde u zich blij, moe, verdrietig, of iets anders?
Gebruik hiervoor de bijgevoegde emoticons of schets smileys.

3 **Hoe zien uw pauzes eruit?**
Hoe lang houdt u pauze en wat doet u in uw pauzes?

Hoe ziet u werkplek eruit?

1 **Hoe ziet uw werkplek eruit?**
Schets, of leg uit hoe uw werkplek eruit ziet en wat u waar doet. Geef ook de afstand tussen plaatsen aan en denk ook aan de voorwerpen die u gebruikt.

2 **Zijn er dingen die het werken zwaar/vermoiend maken?**
Omcirkel deze dingen in rood en vul aan als u nieuwe dingen bedenkt.

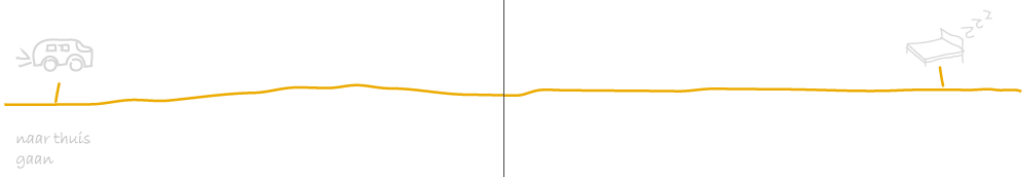
3 **Wat maakt deze taken zwaar?**

Dag 2

Wat doet u na uw werk?

1 **Vul de tijdlijn aan.**
Schets/beschrijf wat u normaalgesproken na het werken doet. Beschrijf uw dag vanaf het moment dat u uw werkplaats verlaat totdat u naar bed gaat.

2 Geef aan hoe u zich meestal op de verschillende momenten voelt.
Gebruik hiervoor de bijgevoegde emoticons of schets smileys.



3 Plak een groene sticker bij de leukste activiteit, en een rode sticker bij de minst leuke activiteit.

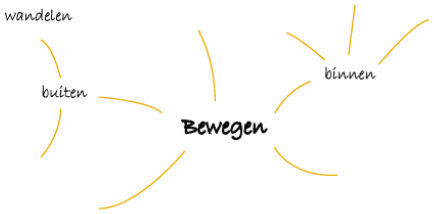
4 **Maak vandaag of de komende dagen fotos** van de verschillende activiteiten. Deze kan u gewoon **met uw mobiel maken en via whatsapp of e-mail** met mij (Julia) delen. Geef elk foto een titel van 1-2 woorden.

Dag 3

Waar denkt u aan bij "Bewegen"?

Schrijf op/schets waar u aan moet denken als het over bewegen gaat en maak hiermee een `mindmap´.
Ik heb hieronder alvast een aanzetje gemaakt. Vul deze aan met woorden en maak ook minimaal gebruik van 3 plaatjes van het stickervel. Succes!

Plak hier een plaatje



Plak hier een plaatje

Plak hier een plaatje

Hoe staat u tegenover "Bewegen"?

In welke mate bent u het eens met onderstande stellingen?
Geef elke stelling een cijfer van 1 tot 4. Geef een stelling een 1 als u er helemaal niet met eens bent en een 4 als u er helemaal met eens bent.

1 = Helemaal oneens
2 = Oneens
3 = Eens
4 = Helemaal eens

	1	2	3	4
Ik houd heel erg van bewegen	○	○	○	○
Ik vind bewegen erg belangrijk	○	○	○	○
Ik ben erg actief in mijn vrije tijd	○	○	○	○
Ik ben erg actief op werk	○	○	○	○
Ik ben erg fit	○	○	○	○
Ik voel mij erg gezond	○	○	○	○

Dag 3

Wat heeft invloed op uw fysiek gedrag?

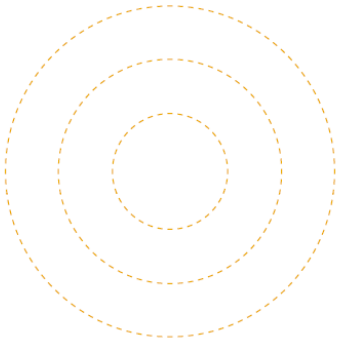
Waarom beweegt u wel of niet in uw vrije tijd?
Omcirkel de woorden die voor u van toepassing zijn. Gebruik blauw voor redenen waarom u wel beweegt en rood voor redenen waarom u niet beweegt. Staan uw redenen er niet bij? Voeg deze dan onderaan toe.

Omdat ik gezond ben
Om tot rust te komen
Ik heb er geen geld voor
Het gaat toch niets veranderen
Ik ben er niet goed in
Omdat het gezellig is
Om mij goed te voelen
Er is niets wat ik kan doen
Ik ben 's avonds moe/heb geen energie meer
Om mijn collegas/vrienden te imponeren
Om plezier te hebben
Omdat de dokter het zegt
Ik heb geen tijd
Ik beweeg al de hele dag op werk
Om gezond te blijven
Om sterker te worden
Omdat mijn vrienden/familie het wel/niet doen
Ik heb nooit veel bewogen

omdat ik klachten heb
omdat...
omdat...

Wie is belangrijk voor u?

1 **Met we doorbrengt u veel tijd ?**
Schrijf belangrijke personen in het midden van de cirkel en minder belangrijke personen in de laagjes eromheen. (Denk aan uw thuis en werk omgeving).



2 **Hoe belangrijk vinden deze mensen bewegen?**
Zet de namen van de mensen die u hierboven heeft benoemt op de lijn hieronder.

Niet belangrijk — Erg belangrijk

Dag 4

Wat kan anders op werk?

1 **Hoe staat u tegenover u bewegingsgedrag op werk?**
Hoe tevreden bent u met uw beweeggedrag op werk?
Zet een kruisje op de meter hieronder.

Helemaal niet tevreden — Erg tevreden

Ik ben wel/niet tevreden omdat...

Dit zou ik graag anders willen...

2 **Hoe zou uw werkomgeving eruit moeten zien?**
Schets of leg uit wat uw werkomgeving zou moeten doen om u te ondersteunen? Denk b.v. aan meer pauzes, kortere werkdagen, andere geredschap, meer steun onderling, faciliteiten om te sporten...

Wat kan anders thuis?

1 **Hoe staat u tegenover u bewegingsgedrag in de vrije tijd?**
Hoe tevreden bent u met uw beweeggedrag uw vrije tijd?
Zet een kruisje op de meter hieronder.

Helemaal niet tevreden — Erg tevreden

Ik ben wel/niet tevreden omdat...

Dit zou ik graag anders willen...

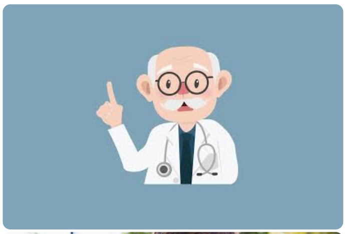
2 **Hoe zou uw thuisomgeving eruit moeten zien?**
Schets of leg uit wat uw thuisomgeving zou moeten doen om u te ondersteunen? Denk b.v. aan een sporthorloge, meer kennis over goed bewegen, meer steun van familie/vrienden, toegang tot een sportschool...

Aantekeningen

Heeft u nog vragen of opmerkingen?
U kunt ze hier kwijt!

Aantekeningen

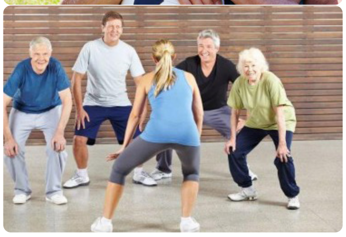
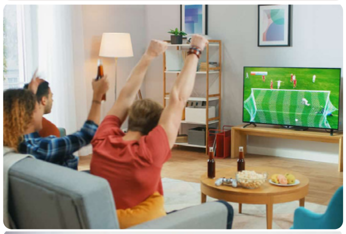
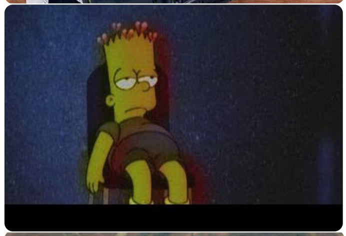
Heeft u nog vragen of opmerkingen?
U kunt ze hier kwijt!


BALANS
WERK
LEVEN
GEZONDHEID
BEWEGEN
FAMILIE

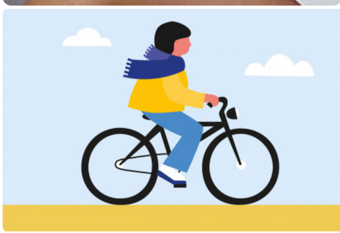


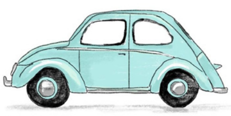


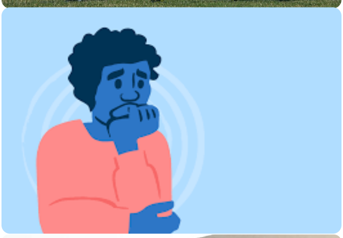






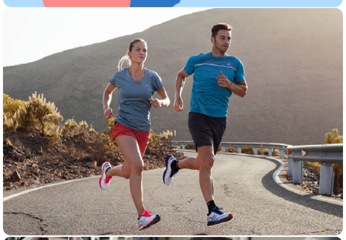
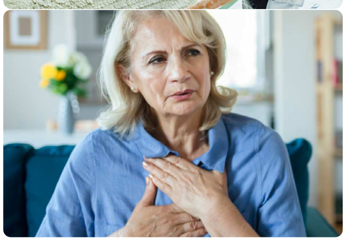
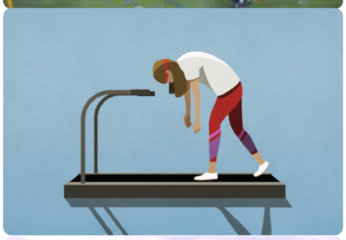


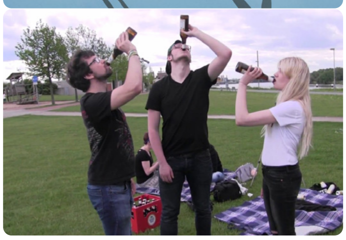



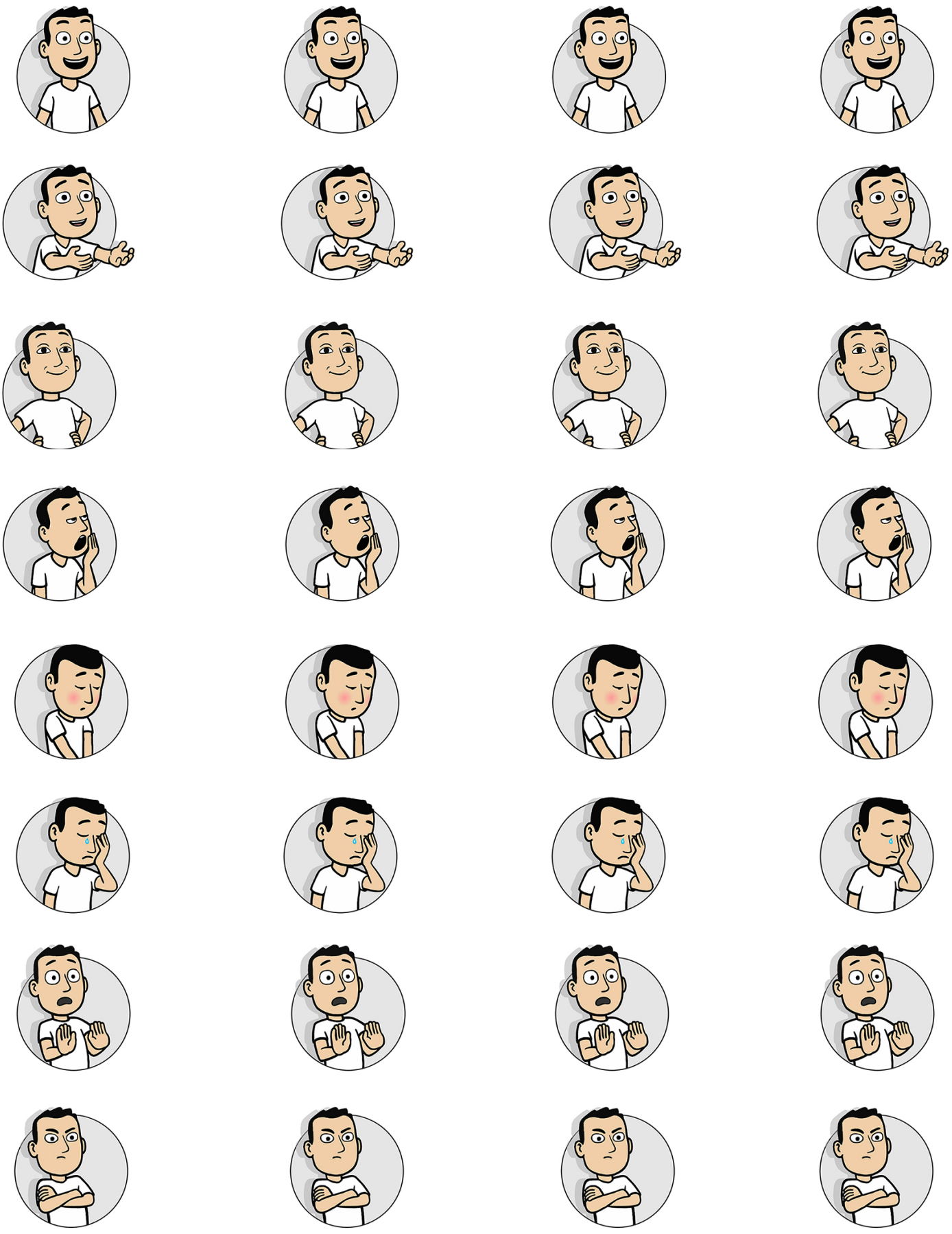







Emoticons



APPENDIX D

General Interview Script

Inleiding

Goedemorgen/goedemiddag mevrouw/meneer ...,

Wat leuk dat u tijd voor ons onderzoek, over bewegen thuis en op werk, hebt vrijgemaakt. In dit onderzoek willen we de gehele omgeving van mensen met een fysiek zwaar beroep leren kennen om gezondheidsprogramma's te verbeteren.
Zoals u misschien kan horen ben ik Duits, dus mijn Nederlands is ook niet perfect en als u het interview liever in het Duits wilt doen, dan kan dat ook. Of Engels is ook prima voor mij. Welke taal voelt het fijnste voor u/ in welke taal kunt u zich beter uitdrukken? (Anders kunnen we nog steeds tijdens het interview in een andere taal overgaan).
Zo, ik denk het is goed als we ons even voorstellen. Ik ben Julia, de onderzoeker van dit project. Ik studeer industrieel ontwerpen en vind het leuk de gezondheid van mensen te verbeteren. Vandaar wil ik dit onderzoek met jullie doen. @Bas, wil je je ook even voorstellen?
Zoals u weet, willen wij uw ervaringen, voorkeuren en behoeftes onderzoeken om de gezondheid van mensen met fysiek zwaar werk te verbeteren. Om dit te bereiken willen we kijken naar uw werk- en thuisomgeving. Hiervoor heeft u al een aantal opdrachten gedaan. Ik zag dat u het meeste heeft ingevuld, was het allemaal duidelijk? Of had u ergens problemen? Zo ja, waarom, wat was er niet duidelijk?
Ik vind u heeft het echt goed gedaan. Dit heeft mij al een beter beeld van uw dagelijkse leven gegeven, hartstikke bedankt!

Nu wil ik met u in gesprek om beter te begrijpen waarom u bepaalde dingen doet en waarom u voor bepaalde dingen heeft gekozen. Vergeet niet dat er geen goed of foute antwoorden zijn. U bijdrage is heel waardevol omdat u elke dag fysiek zwaar werkt. Daarom ben ik erg benieuwd in uw ervaringen!
Geef aan als u zich niet prettig voelt of niet meer verder wilt gaan. Wij zullen dan stoppen met het interview.
Voordat we beginnen nog even de vraag of ik dit gesprek mag opnemen, zodat ik het later terug kan luisteren en opschrijven. U hoeft zich geen zorgen te maken, de informatie blijft anoniem, dus het wordt niet met Heras gedeeld wie wat zegt.
(Opname starten).
Dus als u het goed vindt ga ik het interview opnemen en de verkregen informatie voor mijn verslag en presentatie voor mijn afstuderen gebruiken.

Ik heb een aantal vragen voorbereid, maar u mag ook gewoon dingen vertellen of vragen die u belangrijk vindt.

Vragen

In het begin wil ik u graag de kans geven uzelf even voor te stellen.

- Hou oud bent u? En heeft u een partner of familie hier?
- Wat is u baan? Op welke positie werkt u in de coatstraat? (Stel dat ze dat nog niet in het boekje hebben aangegeven)

Dag 1

- Nu gaan we het boekje erbij pakken. Ten eerste wil ik graag met u door de tijdlijn heen lopen, zodat u wat meer uitleg erbij kan geven.
    - Wat houdt dit taak in? En zou u even kunnen laten zien welke beweging dat is? (Als iets niet duidelijk is)
    - Wilt u iets meer toelichten wat u op de verschillende momenten heeft gevoeld? Waarom voelde u zich...? En wat heeft dat met u gedaan?

- Ik zie dat u ... pauze houdt. Vindt u dat genoeg?
    - Op welk moment heeft u de pauze echt nodig? Hoe lang zou de pauze op dat moment moeten zijn om bij te komen?
    - Wanneer is een korte pauze prima?
    - En zie ik het goed dat u .... doet in u pauze? Doet u dat in elke pauze of soms ook iets anders?
    - Zit of staat u in de pauze?
    - Wat eet u op werk? En wat eet u thuis? Kookt u vrouw of doet u dat zelfs?

- U heeft een aantal dingen rood omcirkeld.
    - Waarom heeft u deze dingen rood omcirkeld? Wat is er aan de hand? Wat is er mis mee?
    - Wat zou deze taken minder zwaar kunnen maken?

Dag2

Nu gaan we het hebben over wat u na uw werk doet.

- U heeft hier aangegeven dat u na werk gaat... . Wat doet u daar dan precies? Waarom doet u dat?
    - Verschilt het per weekdag wat u na uw werk doet? Dus doet u op maandag iets anders dan op een donderdag bijvoorbeeld?
- U heeft een foto opgestuurd waar u aan het... bent. Wat doet u daar nog meer? En doet u dat elke dag?
- U heeft dit foto opgestuurd, maar ik kan niet zo goed herkennen wat u er aan het doen bent. Zou u even kunnen vertellen wat u hier doet? En waarom doet u dat?

- Wilt u iets meer toelichten wat u op de verschillende momenten meestal voelt?
    - Waarom voelt u zich ...?

- Als ik het goed zie vindt u .... het minst leuk.
    - Mag ik vragen waarom u dat niet leuk vindt?
    - En waarom doet u het dan wel?
    - Zou u liever iets anders willen doen? Zo ja, wat dan?

- En wat precies vindt u het leukst om te doen na uw werk?
    - Waarom vindt u dat leuk?

- En hoe verschilt dat met een vrije dag? Wat heeft u bijvoorbeeld gisteren gedaan?
    - Doet u dat vaker op uw vrije dagen?
    - Waarom? Wat vindt u er leuk aan? / Waarom niet? Wat doet u dan normaalgesproken op uw vrije dagen?

Dag 3

- U heeft voor deze drie plaatjes gekozen. Zou u kunnen uitleggen waarom u voor deze 3 heeft gekozen? Begin met die hierboven.
    - Waarom verbindt u dat met beweging?
    - Doet u dat zelfs ook? Of zou u dat graag willen doen? Waarom wel/niet?

- Als een deelnemer opvallende dingen opschrijft (b.v. dingen die ik zelfs niet met bewegen verbindt) vraag dan waarom degene daaraan denkt als het over bewegen gaat.

- Wat betekent bewegen voor u?
- Waarom houdt u wel/niet van bewegen? Wat vindt u er wel/niet leuk aan?
- Waarom vindt u bewegen wel/niet belangrijk? Waarvoor is het belangrijk?
- U heeft aangegeven dat u in de vrije tijd wat minder/meer actief bent dan op werk. Heeft u het gevoel dat u genoeg beweegt?
    - Gaat u ook sporten?
    - Is de beweging thuis of op werk vermoeiender? Waarom?

- Wat geeft u het gevoel dat u wel/niet fit bent? Of dat u niet gezond bent?
    - En wat doet dat met u? Wilt u er iets aan veranderen?

- Bent u bekend met de beweeg-richtlijn? (De richtlijn is dat je ten minste 2 ½ uur op een matige intensiteit per week moet bewegen, dat is als je ademhaling versnelt maar u nog wel kunt praten. En 2 keer per week spier en bot versterkende activiteiten. Voor ouderen zijn ook balans oefeningen)
    - Denkt u dat u daaraan voldoet? Waarom/Waarom niet?

- U heeft aangegeven dat u niet beweegt in uw vrije tijd omdat…
    - Zou u kunnen toelichten waarom u dat tegenhoudt om te bewegen?
    - Zou u dat willen veranderen?
- U heeft aangegeven dat u wel beweegt in uw vrije tijd omdat…
    - Waarom motiveert u dat juist wel om te bewegen?

- En is dat anders in het weekend, of op u vrije dag?
- En zijn er nog andere redenen waarom u wel of niet beweegt?
    - Heeft de omgeving een invloed erop? Is er bijvoorbeeld iets van een park in uw omgeving? En vind u dat wel of niet belangrijk?
    - Is er een sportschool of iets degelijks in uw buurt waar u zou kunnen bewegen?
    - Of sport/beweegt u sowieso liever thuis? Waarom?
    - Vindt u het fijn om iemand te hebben die u verteld dat u moet bewegen en wat u zou kunnen doen? Dus vindt u het fijn om wat meer leiding te hebben?
    - Wat zou u kunnen motiveren om na werk meer te bewegen?

- Ik zie dat uw … het meest/minst belangrijk voor u zijn en dat ze bewegen (erg) belangrijk vinden.
    - Bewegen ze ook zelfs veel?
    - Heeft dat een invloed op u? Motiveren ze u om te bewegen?

- Ik zie dat uw … het meest/minst belangrijk voor u zijn en dat ze bewegen (helemaal) niet belangrijk vinden.
    - Betekent dat dat ze niet bewegen in hun vrije tijd?
    - En houdt u dat tegen om zelfs te bewegen? Maken ze rare opmerkingen als u wel beweegt? Of overtuigen ze u om liever iets anders te doen?

Dag 4

- Als ze niet hebben aangegeven (of als het niet duidelijk is) waarom ze wel/niet tevreden zijn met hun beweeggedrag, vraag het dan aan hen.
    - Vraag ook aan hen wat ze graag anders willen doen als ze dat niet hebben aangegeven, of of er iets is wat ze anders willen doen hoewel ze tevreden zijn

- U heeft aangegeven dat u werkomgeving …. Zou moeten doen om uw te ondersteunen. (Stel dat ze niets hebben ingevuld, vraag of ze onder middels wel een idee hebben wat hun zou kunnen helpen.)
    - Zou u dat meer kunnen toelichten?
    - Waarom zou u dat ondersteunen?
    - En hoe zouden ze dat kunnen doen?

- U heeft aangegeven dat u thuisomgeving …. Zou moeten doen om uw te ondersteunen. (stel dat ze niets hebben ingevuld, vraag of ze onder middels wel een idee hebben wat hun zou kunnen helpen.)
    - Zou u daar meer over kunnen vertellen?
    - Waarom zou u dat helpen?
    - En hoe zouden ze dat kunnen doen?

Aflsuiting

Dank u wel voor uw tijd en uw deelname aan het interview. Ik zal het interview uittypen en als u wilt kunt u hier een kopie van ontvangen. Verder zal ik de verkregen informatie gebruiken voor mijn verslag. Als u interesse heeft ga ik deze na afsluiting van het project met u delen.
Voordat u weer terug naar werk gaat wil ik u nog graag vragen of u interesse heeft om mee te doen aan vervolgactiviteiten van dit onderzoek. Er zijn twee dingen die wij nog graag willen doen:

1. Willen we werknemers gedrag in de thuisomgeving verder onderzoeken met behulp van deze kleinen kastjes (Laat Natalia's prototype zien). Daarvoor willen we graag 3 van deze kastjes voor een periode van 4 dagen in uw huis ophangen. Eentje naast uw voordeur (of een plek waar u thuis beweegt), eentje naast uw bank en eentje op een centraal plek in u huis. Elk van deze kastjes heeft 7 knoppen die u kunt indrukken en naast de knoppen staat beschreven wat het betekent als u een knop indrukt. Dus dit kastje zou u bijvoorbeeld naast uw bank plaatsen en er staan allemaal reden op waarom uw op dat moment niet beweegt. Elke keer dat u op de bank gaat liggen kunt u dan aangeven waarom u op dat moment niet beweegt. Dat kunt u aangeven door een knop in te drukken. Dus het is heel simpel. Als u bijvoorbeeld niet beweegt omdat u wilt ontspannen dan drukt u op deze knop, en als u niet beweegt omdat u al genoeg heeft bewogen dan drukt u op deze knop. En het werkt op dezelfde manier met de twee andere kastjes, alleen staan op het kastje naast de voordeur reden waarom u wel gaat bewegen en op het deerde kastje kunt u aangeven hoe u zich voelt. Dus het is heel makkelijk en zou u niet veel tijd kosten. En ik zou u helpen ze op de juiste plek te plaatsen. Alleen ik kan zien welke knoppen jullie indrukken, uw werkgever gaat niet ervaren wat u in uw vrije tijd doet. Zou u hier open voor staan? Lijkt u dat leuk? Dus wilt u meedoen?

    Leuk dan zal ik u deze informatiebrief meegeven en dan kunt u er nog even in rust over nadenken. Zou u mij uw mobiele nummer of mailadres willen geven? Dan kan ik u op de hoogte houden.

    Geen probleem, u kunt er nog even over nadenken, meedoen is vrijwillig.

2. Willen we een groepssessie met u en de andere deelnemers (uw collega's) organiseren om uw wensen (voor de toekomst) verder te bespreken en om na te denken hoe een gezondheidsprogramma eruit zou kunnen komen te zien. Deze sessie zou op een werkdag plaatsvinden en 1-2 uur duren. Zou u hier ook/wel voor open staan? Lijkt u dat leuk? Dus zou u mee willen doen?

    Leuk! De sessie zal waarschijnlijk op de 11de oktober plaatsvinden. Ger zul u op een later moment meer informaties hierover geven. Zou u mij uw mobiele nummer of mailadres willen geven? Dan kan ik u op de hoogte houden.

    Geen probleem, u kunt er nog even over nadenken, Ger zal u op een later moment nog een keer vragen. En anders bedankt in ieder geval voor u bijdrage tot nu toe.

Heeft u verder nog vragen of opmerkingen?
Dan wens ik u een fijne dag!

APPENDIX E

Overview Codes

Category	Code	Description
Personal Factors	Health complaints unable PA	Injuries can keep workers from leisure Pa. In contrast, the absence of injuries can motivate.
	Feel fit	The workers think that their fitness is on a good level. They are not quickly out of breath.
	PA is important for health	The workers are aware that it is important to move to stay fit, but they do not know why exactly it is relevant. You just need it to stay fit and not get fat.
	Getting older changes perspective	Getting older increases the risk perception, since their capacity decreases and either themselves or colleagues in their age suffer from health complaints.
	Listen to their bodies	Workers highlighted that it is important to listen to your body. They take rest when feeling pain or extreme exhaustion.
	Are not aware of PA guidelines	None of the participants was familiar with the PA guidelines
	Move more than enough at work	All participants had the feeling that they move more than enough at work. They see their work as their sport and thus feel no need for leisure PA.
	Low self-efficacy	Lacking previous experiences let can make people believe that they cannot do it, that it is nothing for them, even if they would like it.
	PA makes them feel good	PA makes workers happy. It gives them energy, helps them cope with stress and makes them feel proud.
	Moving due to a feeling of obligation	An obligation can get workers active. For example, having a dog that needs to go outside or paying for a gym.

	Guided exercising can enhance self-efficacy	One worker reported that it helped him to first exercise in a gym, because now he knows what he can do.
	Intrinsic motivation to stand out	One participant is pretty active in his free time because he wants to stand out from the stereotype and get stronger.
	Need for autonomy	The workers do not like it when someone tells them what they should do in their free time.
Social factors	Family/friends can stimulate PA	Most of the workers only move in their free time if a family member or friend ask them to do something together.
	Fun social activities	Moving together with family or friends is fun and distracts from the activity itself. Then, you do not move to move, but to socialize.
	Family has priority	Family is more important than anything else and they would like to spend more time with them.
	Fostering relations	They have social responsibilities they need to fulfill to foster their relation.
	Has no friends here	Some workers don't have friends here in the Netherlands. Thus, they do not have people to move with apart from their family (if they have one).
	Partner has an inactive behavior	Often partner is inactive as well, so that the workers must find the motivate himself and his partner.
	Lacking relatedness	Lacking relatedness due to different ethnic origins. Colleagues only work together, do not really have conversations with each other.
Cultural factors	Hierarchical structure	Workers have no chance to change their working conditions. They have the feeling that the only way to change their situation is

		to resign from their job. They cannot talk to the management, because then the team leader would feel cheated.
	Lacking respect/gratitude	Company treats them like animals. They demand more and more, but do not give something back. They do not even give them a future perspective, only shirt term contracts. Only the team leader sometimes buys them something as reward from his own money.
	Work hard, don't complain	The workers come to work to work and not to relax. They work hard and don't complain even if they are sick. They are very eager to do their best.
	Tensed/stressed atmosphere	The atmosphere is quite tensed due to constantly changing employees. The new ones don't have a clue what to do and also seem to be less motivated. That makes it stressful for remaining employees.
	Good teamwork	Colleagues help each other and keep care that nobody needs to carry heavy loads on their own. The team leader speaks to them if they don't do it
Environmental factors	Too far too cycle	All participants go to work by car due to the long commute. It is possible to go by bike, but quite far. Since they need to start very early and are extremely exhausted after work, cycling is not an option for them.
	Prefer moving outside	Workers like to go to parks or forests. They enjoy the view, and it calms them.
	Good cycle paths trigger to take the bike	The good cycle paths motivate the workers to go by bike to shops and friends close by.
	Close recreation facilities stimulate to move	A garden, close shops, or nice places for children trigger workers to leave their house

		and thus interrupt their inactive leisure time behavior.
Resources	Little free time is a barrier to move	The workers have long working days, long commutes, and social responsibilities afterwards. That leaves little time for leisure PA.
	Lacking willingness to invest	The workers do not believe that the company will invest in their health. Everything that costs money is put under a magnifying glass.
	No energy left after work	Workers are extremely exhausted after work. They have the feeling that they do not have the energy to perform PA afterwards, they just want to rest.
Work environment	High work pressure	The company is increasing the production goals every year and try to reduce the work force. That puts more workload on the remaining employees. Everything must happen quickly to achieve the daily goals.
	Line determines the speed	The line determines the pace. If the company sees an option to optimize the line, the pace will increase, and the workers must keep up.
	Working days are too long	The employees of the coating department work 10 hours a day and sometimes even longer. Workers find this too much. It is too draining.
	Insufficient recovery time	Sometimes they cannot take their breaks, then they can only quickly get a coffee and go back. Often, they cannot relax in their breaks, (e.g. because they need to help new colleagues). Also, it was mentioned that one free day in the weekend is not enough to counter act the workload.
	Hard work	The participants described the work as physically hard work (lifting and carrying

		heavy loads) under extreme conditions (40 degrees). T
	Focus needed	They have to be alert at work. They need to be awake, think fast and know what they must do. Otherwise, errors or even accidents can occur.
	Many errors occur	Due to this complexity, many errors occur. Sometimes the workers can use the repair time to take extra breaks.
	Cleaning should be standard	It is not a standard to clean up every day, they only do it when there is a error and you tell people to do so. Not cleaning up can be dangerous, if somebody for example litter plastic somebody else can slip. Generally, it is nice to work in a clean and organized space.
	Breaks are used to rest	During their breaks they just want to sit down and eat something or drink a coffee. Some also use their breaks to smoke.
	Enough breaks	The participant think that they have enough breaks, especially if there are many errors.
	Good health and security management	Workers complimented the health and security standards at Heras.
Home environment	Chores must be done after work	When coming home workers need to do groceries, cook dinner, and clean up, since they wither do not have a partner or the partner has a long working day as well.
	Family responsibilities	Next to that, they also need to care for their children (help them with homework, pick them up from football,…) and their partner.
	Partner takes over tasks	Only one worker reported that his wife is doing most of the household.
	Cannot stop thinking of work	Even in the evening they keep thinking about work, sometimes they are not even listening to their family members. The work is

		important to them, otherwise they cannot care for their family.
Current PA behavior	Relax after work (sitting/laying)	The workers spend most of their leisure time sleeping or resting (talking to family members, watching Tv or reading something)
	Weekend is used to recover	Especially in the weekend the workers desire recovery. They are exhausted from the week and want to get ready for the next week. Therefore, they sleep a lot. Some don't even want to socialize.
	More active when several days off	Workers are more active during their holidays or if they are free for the whole weekend and not just one day.
	Balance recovery and exercise	One of the participants found a good balance. He exercises every second day for about 30 minutes. In that way, he has a rest day in between. And if he feels too tired to exercise then he takes an extra day of rest.
Future wishes	Going back to 8h schedule	The workers want to go back to an 8h schedule so that they have more free time. They could even imagine to regularly perform PA if they only need to work 8h.
	Want to move more	The workers are willing to move more, but do not find the time for it currently. They think that it is good for them (e.g. need a strong back for their work).
	Spending more time with family	If they have more time, they would like to spend more time with his family, for example moving together.
	Improving incorporation of new people	Given the fact that the employees are constantly changing it would be beneficial to improve the incorporation of new people. That could reduce the work pressure of the remaining employees.

	Transferring to a less strenuous position	One worker disclosed that he would like to get education to get opportunities to transfer to a less strenuous position.
	Possibilities to sit down at work	One participant revealed that he would like to have a chair at his workplace when he gets older, so that he can sit down in between.
Others	Afraid to lose the job	The workers are very grateful to have a job and would not do something that would risk losing it. Moving in their free time could risk it because they could get injured. That would mean they could not work the next day.
	Switching tasks	Workers indicated that it would be good if they could switch positions, so they do not need to do the same strenuous work the whole day. However, that would mean that employees must be allrounders. That is not possible due to lack of knowledge.
	Satisfied workers are less tired	One participant explained that if you are satisfied with what you do, then you are not tired. If you are not satisfied, then you are tired
	Achieving lifestyle changes makes them happy	Some workers proudly reported that they changed their lifestyle recently and were happy about it. (Stopped smoking, changed diet, started moving)
	Healthy diet	Most participants seem to have a healthy diet. They cook fresh meals with vegetables, meat and potato.
	Unhealthy behaviors present	Some workers reported that they use their breaks to smoke, indicating that they smoke regularly. Besides, one participant mentioned that he goes with his kids to the McDonalds or eats chips in the weekend.

APPENDIX F

Consent Form - Home Study

Informatie voor deelname aan onderzoek

Verbeteren van de gezondheid van mensen met een fysiek zwaar beroep

Geachte heer/mevrouw,

Afgelopen periode heeft u deelgenomen aan de eerste fase van het onderzoek naar gezondheidsverbetering van mensen met een fysiek zwaar beroep (het opdrachtenboekje en interview). Met deze brief vragen wij u of u mee wilt doen met het tweede deel van het onderzoek. Dit is bijna dezelfde brief die u al voor de eerste fase heeft ontvangen, alleen hoofdstuk 2 en wat andere kleine dingen zijn veranderd. De nieuwe informatie is in het rood weergegeven.

Wij vragen u vriendelijk om mee te doen aan een wetenschappelijk onderzoek.
Meedoen is vrijwillig. Om mee te doen is wel uw schriftelijke toestemming nodig.
Dit onderzoek wordt uitgevoerd door Amsterdam UMC samen met Arbo Unie en TU Delft als onderdeel van een afstudeeropdracht bij de opleiding Industrieel Ontwerpen in Delft.
Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker uitleg als u vragen heeft. U kunt er ook over praten met uw partner, vrienden of familie.

1. Doel van het onderzoek

Mensen met een fysiek zwaar beroep hebben vaak een slechtere gezondheid vergeleken met mensen die een zittend beroep hebben. Dit kan het gevolg zijn van het zware beroep zelf, maar ook door minder lichamelijke activiteit of andere zaken in de vrije tijd. Bestaande programma's om de gezondheid van werknemers te verbeteren zijn meestal gericht op één specifieke omgeving, zoals de thuisomgeving of de werkomgeving en het effect van deze programma's is vaak beperkt. Om deze programma's te verbeteren willen we de gehele omgeving (werk, thuis, sociaal, cultureel) van mensen met een fysiek zwaar beroep leren kennen.

2. Wat meedoen inhoudt

In deze stap van het onderzoek willen we uitzoeken welke factoren in de thuissituatie de meeste invloed hebben op de gezondheid en het bewegen van mensen met zwaar fysiek werk. Hiervoor willen we graag 3 kleine kastjes (zie de foto bij de brief) voor een periode van 4 dagen in u huis ophangen. Elk kastje heeft 7 knoppen die u kunt indrukken en naast de knoppen staat beschreven wat het betekent als u een knop indrukt. De drie kastjes hebben verschillende thema's:

- Kastje 1: Bewegen. Op dit kastje staan redenen waarom uw op dat moment wel gaat bewegen. Elke keer dat u ergens naar toe gaat kunt u een knop indrukken om aan te geven waarom u gaat bewegen.
- Kastje 2: Niet bewegen. Op dit kastje staan redenen op waarom uw op dat moment niet beweegt. Elke keer dat u op de bank gaat liggen kunt u dan op een knop drukken om aan te geven waarom u op dat moment niet beweegt.
- Kastje 3: Algemeen. Op dit kastje zijn verschillende emoties geplakt, zichtbaar via smileys. Elk knop staat voor een bepaald gevoel. Gedurende de dag kunt u een aantal keer een knop drukken om aan te geven hoe u zich op dat moment voelt.

We verwachten dat het u niet veel tijd gaat kosten. De onderzoeker (Julia) helpt de kastjes op de juiste plek te

installeren. Na 4 dagen komt de onderzoeker de kastjes weer ophalen en ze zal u een paar vragen stellen over die knoppen die u het meest heeft ingedrukt. Dit zal u niet meer dan 20 minuten kosten.
Als u toestemming geeft zullen we eventueel tijdens het installeren van de kastjes foto's van de kastjes in uw thuisomgeving maken. Ook zullen we van het gesprek aan het eind geluidsopnames maken. De geluidsopnames worden uitgeschreven waarna de geluidsopnames worden vernietigd. De informatie zal beveiligd worden opgeslagen bij de universiteit. Het is belangrijk te weten dat uw gegevens gecodeerd worden waardoor de gegevens niet herleidbaar zijn. Uw naam en adres worden niet opgeslagen en foto's/ geluidsopnames worden onherkenbaar gemaakt door herleidbare gegevens te verwijderen of grijs te maken in de foto's. Uw gegevens zullen in het eindverslag daarom niet herkenbaar zijn. De data die worden verzameld wordt niet gedeeld met uw werkgever (Heras).

3. Mogelijke voor- en nadelen
U heeft zelf geen (direct) voordeel van meedoen aan dit onderzoek. Uw deelname kan wel bijdragen aan de kennis op het gebied van leefstijl programma's. De samenwerking tussen Amsterdam UMC, Arbo Unie en TU Delft is uniek en we verwachten veel interessante inzichten. Nadelen van deelnamen aan dit onderzoek kunnen zijn: extra tijd die het u kost de kastjes op te hangen en de knopjes in te drukken.

4. Als u niet wilt meedoen of wilt stoppen met het onderzoek
U beslist zelf of u meedoet aan het onderzoek. Het is een volledig vrijwillige deelname. U mag op elk moment stoppen met dit onderzoek, en je hoeft hier geen reden voor te geven. Wel moet u dit direct melden aan de onderzoeker. De gegevens die tot dat moment zijn verzameld, worden gebruikt voor het onderzoek.

5. Gebruik en bewaren van uw gegevens
Voor dit onderzoek is het nodig dat uw persoonsgegevens worden verzameld en gebruikt. Het gaat om gegevens zoals uw gevoelens en motivaties. Elk deelnemer krijgt een code die op de gegevens komt te staan. Dit heet gecodeerd. Uw naam wordt dan niet meer gebruikt.

Al uw gegevens blijven vertrouwelijk. Alleen de onderzoeker weet welke code u heeft. Voor het onderzoek worden uw onderzoeksgegevens gecodeerd gedeeld met onderzoekers van de Amsterdam UMC, TU Delft, en Arbo Unie. U wordt na het einde van het onderzoek op de hoogte gesteld van de belangrijkste uitkomsten van het onderzoek. Als u de toestemmingsverklaring ondertekent, geeft u toestemming voor het verzamelen, bewaren en inzien van uw persoonsgegevens. De onderzoeker bewaart uw gegevens 15 jaar. Daarna worden de persoonsgegevens vernietigd.

Meer informatie over uw rechten bij verwerking van gegevens
U kunt de onderzoeker vragen om een kopie van gegevens die u heeft aangeleverd. Voor meer informatie over uw rechten bij de verwerking van uw persoonsgegevens kunt u contact opnemen met de onderzoekers van dit onderzoek van Pieter Coenen via p.coenen@amsterdamumc.nl. Pieter Coenen is verantwoordelijk voor het volgen van de regels voor de verwerking van uw persoonsgegevens. Indien u ontevreden bent over hoe wordt omgegaan met uw privacy dan kunt u een klacht indienen bij de Functionaris Gegevensbescherming via e-mailadres, voor VUmc: privacy@vumc.nl. Ook kunt u zelf terecht bij de Autoriteit Persoonsgegevens via https://autoriteitpersoonsgegevens.nl/.

6. Geen vergoeding voor meedoen
Voor het meedoen aan dit onderzoek krijgt u geen onkostenvergoeding.

7. Heeft u vragen?
Bij vragen voelt u zich niet bezwaard om contact met mij op te nemen.

Hoofdonderzoeker
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020 4448381

Onderzoeker
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+491712992491

Bijlage: Toestemmingsformulier deelname

Verbeteren van de gezondheid van mensen met een fysiek zwaar beroep

Meedoen aan het onderzoek	Ja	Nee
- Ik heb de informatiebrief gelezen. Ook kon ik vragen stellen. Mijn vragen zijn voldoende beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.	○	○
- Ik weet dat meedoen vrijwillig is. Ook weet ik dat ik op ieder moment kan beslissen om toch niet mee te doen of te stoppen met het onderzoek. Daarvoor hoef ik geen reden te geven.	○	○
- Ik geef toestemming voor het verzamelen en gebruiken van mijn gegevens op de manier en voor de doelen die in de informatiebrief staan.	○	○
- Ik geef toestemming om mijn gegevens nog 15 jaar na dit onderzoek te bewaren binnen VUmc.	○	○
- Ik wil meedoen aan dit onderzoek.	○	○

Gebruik van de informatie van dit onderzoek	Ja	Nee
- Ik geef toestemming voor het verzamelen en gebruiken van foto's, en geluidsopnames. Deze opnames zullen in het eindverslag niet herkenbaar worden gebruikt.	○	○
- Ik geef toestemming dat mijn gegevens gedeeld worden met de TU Delft onderzoekers die worden genoemd in de informatiebrief	○	○
- Ik begrijp dat de informatie die ik geef gebruikt wordt voor het afstudeerproject en het eindverslag van de onderzoeker.	○	○

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar dat ik de deelnemer volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de proefpersoon zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker:

Handtekening: Datum: __ / __ / __

APPENDIX G

Home Study - Instructions

Instructies

Met behulp van deze drie kleinen kastjes willen we werknemers gedrag in de thuisomgeving onderzoeken.
We willen graag achterhalen waarom u wel of niet beweegt en hoe u zich erbij voelt.
Daarvoor vragen we uw om de aankomende 4 dagen deze kastjes te gebruiken. Onderaan staat beschreven hoe je de kastjes moet gebruiken.

Ik ga niet bewegen omdat:

Druk elke keer dat je gaat bewegen een knop op deze kast in.

Ik ga zo bewegen omdat:

Druk elke keer dat je op de bank gaat liggen of iets anders doet waarbij je niet beweegt een knop op deze kast in.

Op dit moment voel ik mij:

Druk altijd als je een knop op de andere twee kasten indrukt ook een knop op deze kast in om aan te geven hoe je je voelt. Ook zou het fijn zijn als je aangeeft hoe u zich voelt als je terugkomt van een activiteit.

Bewegen: Bewegen betekent niet alleen maar sporten, het kan echt van alles zijn. Denk bijvoorbeeld ook aan wandelen, lopen, fietsen, zwemmen, schoonmaken, tuinieren (werken in de tuin) of actieve dingen met de kinderen doen.

APPENDIX H

Home Study - Data

I am not moving because...

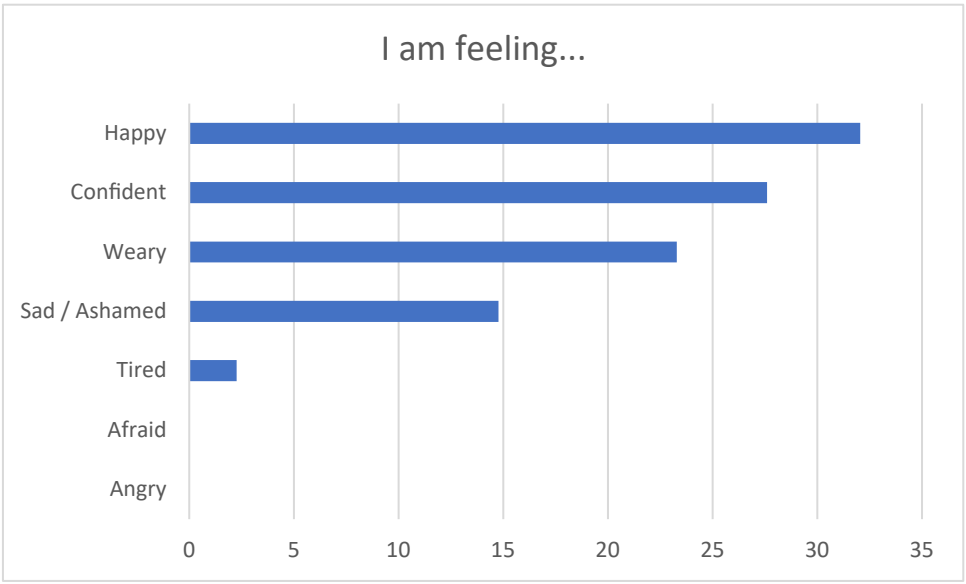
	Participant 2	Percentage P2	Participant 4	Percentage P4	Participant 5	Percentage P5	Particpant 6	Percentage P6	Total percentage
Other reasons	2	50	0	0	1	5	1	14,29	17,32
Nobody is free	0	0	0	0	1	5	0	0,00	1,25
I don't know what I should do	0	0	1	20	3	15	0	0,00	8,75
I don't have time	1	25	0	0	0	0	2	28,57	13,39
I am exhausted	0	0	0	0	5	25	0	0,00	6,25
I want to relax	0	0	3	60	5	25	0	0,00	21,25
I moved enough at work	1	25	1	20	5	25	4	57,14	31,79
	4		5		20		7		

I am about to move because ...

Other reasons	0	0	0	0	0	0,00	1	8,33	2,08
I want to go outside/somewhere	0	0	5	50	4	15,38	5	41,67	26,76
I have chores	1	50	2	20	2	7,69	4	33,33	27,76
A friend/family member asked	0	0	1	10	3	11,54	2	16,67	9,55
I want to be fitter/stronger	1	50	0	0	5	19,23	0	0,00	17,31
It makes me feel good/it is fun	0	0	2	20	8	30,77	0	0,00	12,69
It helps me to relax	0	0	0	0	4	15,38	0	0,00	3,85
	2		10		26		12		

I am feeling ...

Angry	0	0	0	0	0	0,00	0	0,00	0,00
Afraid	0	0	0	0	0	0,00	0	0,00	0,00
Tired	0	0	0	0	1	9,09	0	0,00	2,27
Sad / Ashamed	2	50	0	0	1	9,09	0	0,00	14,77
Weary	1	25	3	50	2	18,18	0	0,00	23,30
Confident	1	25	0	0	5	45,45	6	40,00	27,61
Happy	0	0	3	50	2	18,18	9	60,00	32,05
	4		6		11		15		



APPENDIX I

Outcomes Brainstorm Session with Peers

Feeling confident

Internal:

- Optimistic persons might be more confidant
- It seems to be important to be in a good mood to feel confidant
- Being satisfied with your own behaviour ,
- Personal convictions and passions can make you feel confidant (giving you the willpower to do something)

Social context:

- Others supporting you in what you are doing
- Having a safety net makes you feel confident because you have the feeling that nothing can happen (it is okay to fall/fail because you are in a safe environment)
- People cheering for your can give you the confidence to go on with something, even though yourself are not sure if you can do it
- Being able to express yourself as you desire (Social norms, company rules,..)
- Trust in myself or trust in others/ others trusting you

Being on a journey:

- You need reference points to be able to feel confidant, so that you can align expectations and measure where you are standing, (a reference point can be a certain standard, set by others or yourself)
- Measuring you own performance and progress
- Having control over the journey makes you feel confident (I understand what I need to do, or how to accomplish it, and I have all the tools I need)
- Heading towards a good goal can make you feel confident because it gives you the feeling that you are on the right way, even though you are not there yet and eventually motivates you to go on

Positive Feedback:

- Repeated positive feedback can make you feel confident (Positive reinforcement)
- There are different types of feedback: Bodily feedback (e.g. feeling good after a workout), verbal feedback (e.g. getting complements from your chef or your peers), if something works out well

Feeling competent (having the knowledge and the skills):

- Previous experiences make you feel confident, especially when you have done something several times
- Having much knowledge about something can make you feel confident
- Having the necessary competence gives you control over your journey and enables you to achieve your goals, having the ability
- Knowing that you are capable to do it, feeling capable can motivate you to start a new challenge
- Helping others makes you feel competent and gives you the feeling that you are good in something increases you confidence

- Feeling well prepared

APPENDIX J

Consent form - Explorations and Final Evaluation

Informatie voor deelname aan fase 2 van het onderzoek

Verbeteren van de gezondheid van mensen met een fysiek zwaar beroep

Geachte heer/mevrouw,

Afgelopen periode heeft u deelgenomen aan de eerste fase van het onderzoek naar gezondheidsverbetering van mensen met een fysiek zwaar beroep (het opdrachtenboekje en interview). Met deze brief vragen wij u of u mee wilt doen met het tweede deel van het onderzoek. Dit is bijna dezelfde brief die u al voor de eerste fase heeft ontvangen, alleen hoofdstuk 2 en wat andere kleine dingen zijn veranderd. De nieuwe informatie is in het rood weergegeven.

Wij vragen u vriendelijk om mee te doen aan een wetenschappelijk onderzoek.
Meedoen is vrijwillig. Om mee te doen is wel uw schriftelijke toestemming nodig.
Dit onderzoek wordt uitgevoerd door Amsterdam UMC samen met Arbo Unie en TU Delft als onderdeel van een afstudeeropdracht bij de opleiding Industrieel Ontwerpen in Delft. De toetsingscommissie van de METc van VUmc heeft beoordeeld dat dit onderzoek niet onder de Wet medisch-wetenschappelijk onderzoek met mensen (WMO) valt.
Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker uitleg als u vragen heeft. U kunt er ook over praten met uw partner, vrienden of familie.

1. Doel van het onderzoek

Mensen met een fysiek zwaar beroep hebben vaak een slechtere gezondheid vergeleken met mensen die een zittend beroep hebben. Dit kan het gevolg zijn van het zware beroep zelf, maar ook door minder lichamelijke activiteit of andere zaken in de vrije tijd. Bestaande programma's om de gezondheid van werknemers te verbeteren zijn meestal gericht op één specifieke omgeving, zoals de thuisomgeving of de werkomgeving en het effect van deze programma's is vaak beperkt. Om deze programma's te verbeteren willen we de gehele omgeving (werk, thuis, sociaal, cultureel) van mensen met een fysiek zwaar beroep leren kennen.

2. Wat meedoen inhoudt

In de tweede fase van het onderzoek willen we een afspraak maken met u en de andere deelnemers. Hierbij willen we uw wensen verder bespreken en na denken over hoe een gezondheidsprogramma eruit zou kunnen zien. Deze sessie zal op een werkdag plaatsvinden en 1 tot 2 uur duren. De ideeën die we daar uit halen willen we met u verder ontwikkelen en testen:

1. Aankomend twee maanden willen we graag twee keer een afspraak bij u thuis plannen. Tijdens deze afspraak bespreken we ideeën om uw beweeggedrag te verbeteren. Hiervoor verwachten we een tijdsinvestering van ongeveer 2 uur.
2. Een maand later willen we graag een groepssessie houden om de ervaringen van u en van de andere deelnemers te bespreken. We bespreken welke ideeën u leuk vond en welke minder leuk. Deze sessie zal op een werkdag plaatsvinden en 1 tot 2 uur duren.
3. Ter afsluiting willen we een laatste afspraak met de groep maken om het eindresultaat te bespreken. Ook willen we het met uw bespreken hoe u het onderzoek heeft ervaren. Deze sessie zal ook op een werkdag plaatsvinden en 1-2 uur duren.

Als u toestemming geeft zullen we tijdens de groepssessies foto's maken . Ook zullen we geluidsopnames van de groepssessies maken. De geluidsopnames worden gebruikt om het gesprek terug te luisteren en relevante informatie op te schrijven. Hierna wordt de geluidsopname vernietigd. De informatie zal beveiligd worden opgeslagen bij de universiteit. Het is belangrijk te weten dat uw gegevens gecodeerd worden waardoor de gegevens niet herleidbaar zijn. Uw naam en adres worden niet opgeslagen en foto's/geluidsopnames worden onherkenbaar gemaakt door herleidbare gegevens te verwijderen of grijs te maken in de foto's. Uw gegevens zullen in het eindverslag daarom niet herkenbaar zijn.

3. Mogelijke voor- en nadelen

U heeft zelf geen (direct) voordeel van meedoen aan dit onderzoek. Uw deelname kan wel bijdragen aan de kennis op het gebied van leefstijl programma's. De samenwerking tussen Amsterdam UMC, Arbo Unie en TU Delft is uniek en we verwachten veel interessante inzichten. Nadelen van deelnamen aan dit onderzoek kunnen zijn: extra tijd die het u kost voor het invullen van het werkboek en het interview.

4. Als u niet wilt meedoen of wilt stoppen met het onderzoek

U beslist zelf of u meedoet aan het onderzoek. Het is een volledig vrijwillige deelname. U mag op elk moment stoppen met dit onderzoek, en je hoeft hier geen reden voor te geven. Wel moet u dit direct melden aan de onderzoeker. De gegevens die tot dat moment zijn verzameld, worden gebruikt voor het onderzoek.

5. Gebruik en bewaren van uw gegevens

Voor dit onderzoek is het nodig dat uw persoonsgegevens worden verzameld en gebruikt. Het gaat om gegevens zoals uw ervaringen, voorkeuren en motivaties. Elk deelnemer krijgt een code die op de gegevens komt te staan. Dit heet gecodeerd. Uw naam wordt dan niet meer gebruikt.

Al uw gegevens blijven vertrouwelijk. Alleen de onderzoeker weet welke code u heeft. Voor het onderzoek worden uw onderzoeksgegevens gecodeerd gedeeld met onderzoekers van de Amsterdam UMC, TU Delft, en Arbo Unie. U wordt na het einde van het onderzoek op de hoogte gesteld van de belangrijkste uitkomsten van het onderzoek. Als u de toestemmingsverklaring ondertekent, geeft u toestemming voor het verzamelen, bewaren en inzien van uw persoonsgegevens. De onderzoeker bewaart uw gegevens 15 jaar. Daarna worden de persoonsgegevens vernietigd.

Meer informatie over uw rechten bij verwerking van gegevens
U kunt de onderzoeker vragen om een kopie van gegevens die u heeft aangeleverd. Voor meer informatie over uw rechten bij de verwerking van uw persoonsgegevens kunt u contact opnemen met de onderzoekers van dit onderzoek van Pieter Coenen via p.coenen@amsterdamumc.nl. Pieter Coenen is verantwoordelijk voor het volgen van de regels voor de verwerking van uw persoonsgegevens. Indien u ontevreden bent over hoe wordt omgegaan met uw privacy dan kunt u een klacht indienen bij de Functionaris Gegevensbescherming via e-mailadres, voor VUmc: privacy@vumc.nl. Ook kunt u zelf terecht bij de Autoriteit Persoonsgegevens via https://autoriteitpersoonsgegevens.nl/.

6. Geen vergoeding voor meedoen

Voor het meedoen aan dit onderzoek krijgt u geen onkostenvergoeding.

7. Heeft u vragen?

Bij vragen voelt u zich niet bezwaard om contact met mij op te nemen.

Hoofdonderzoeker
Amsterdam UMC
Pieter Coenen
p.coenen@amsterdamumc.nl
020 4448381

Onderzoeker
TU Delft
Julia Beckmann
j.beckmann@student.tudelft.nl
+491712992491

Bijlage: Toestemmingsformulier deelname_Belanghebbende

Verbeteren van de gezondheid van mensen met een fysiek zwaar beroep

Meedoen aan het onderzoek	Ja	Nee
- Ik heb de informatiebrief gelezen. Ook kon ik vragen stellen. Mijn vragen zijn voldoende beantwoord. Ik had genoeg tijd om te beslissen of ik meedoe.	○	○
- Ik weet dat meedoen vrijwillig is. Ook weet ik dat ik op ieder moment kan beslissen om toch niet mee te doen of te stoppen met het onderzoek. Daarvoor hoef ik geen reden te geven.	○	○
- Ik geef toestemming voor het verzamelen en gebruiken van mijn gegevens op de manier en voor de doelen die in de informatiebrief staan.	○	○
- Ik geef toestemming om mijn gegevens nog 15 jaar na dit onderzoek te bewaren binnen VUmc.	○	○
- Ik wil meedoen aan de eerste groepssessie in oktober.	○	○
- Ik wil meedoen aan de individuellen test en feedback momenten.	○	○
- Ik wil meedoen aan de tweede groepssessie in november.	○	○
- Ik wil meedoen aan de laatste groepssessie.	○	○

Gebruik van de informatie van dit onderzoek	Ja	Nee
- Ik geef toestemming voor het verzamelen en gebruiken van foto's, en geluidsopnames. Deze opnames zullen in het eindverslag niet herkenbaar worden gebruikt.	○	○
- Ik geef toestemming dat mijn gegevens gedeeld worden met de TU Delft onderzoekers die worden genoemd in de informatiebrief	○	○
- Ik begrijp dat de informatie die ik geef gebruikt wordt voor het afstudeerproject en het eindverslag van de onderzoeker.	○	○

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar dat ik de deelnemer volledig heb geïnformeerd over het genoemde onderzoek.

Als er tijdens het onderzoek informatie bekend wordt die de toestemming van de proefpersoon zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

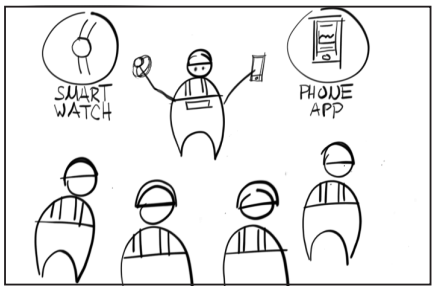
Naam onderzoeker:

Handtekening: Datum: __ / __ / __

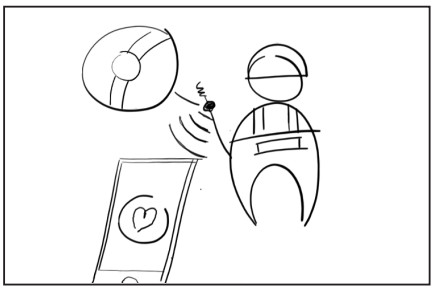
APPENDIX K

Exploration 1 - Three Directions

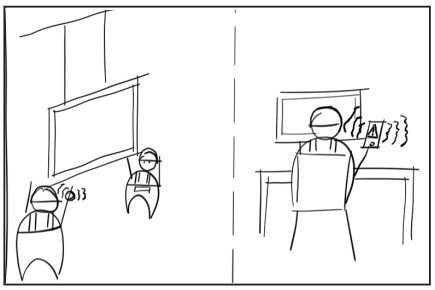
KEEP THE BALANCE



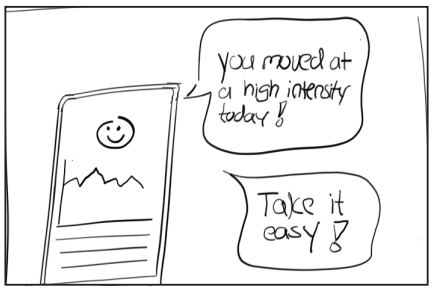
Toolbox: De teamleider introduceert het PA paradox en mogelijke consequenties. In het eind van de discussie introduceert de teamleider de app „balance“ en geeft iedereen een sportholloge.



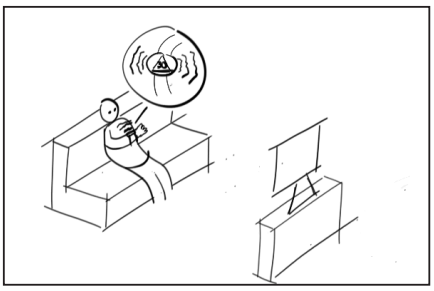
De sportholloge meet de hartslag van de werknemers op werk en thuis. Ze is verbonden met hun mobiel.



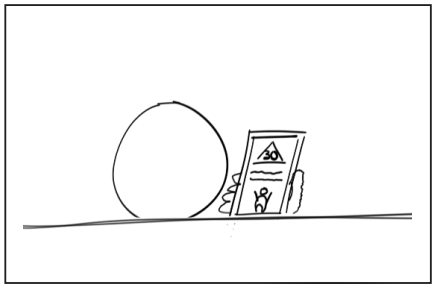
De teamleider krijgt een bericht als iemands hartslag over een te lange periode hoog is. De teamleider zal dan naar de planning kijken om ervoor te zorgen dat degene rust kan nemen.



Op basis van de verzamelde data raad de app de werknemer aan om vandaag rustig aan te doen na werk.

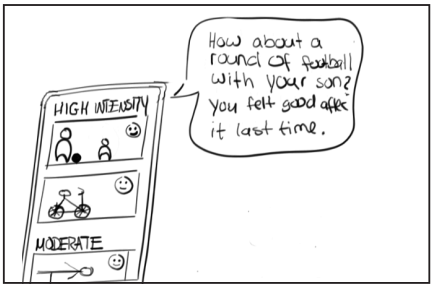


Als de werknemer langer dan 30 minuten zit gaat de sportholloge trillen.



Ook is er een bericht op hun mobiel, dat het niet goed is langer dan 30 minuten te zitten. De app legt mogelijke consequenties uit en geeft tips.

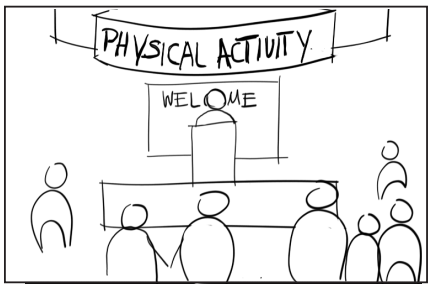
Op basis van de hartslag merkt de app dat de werknemer vandaag alleen op een lage intensiteit heeft bewogen.



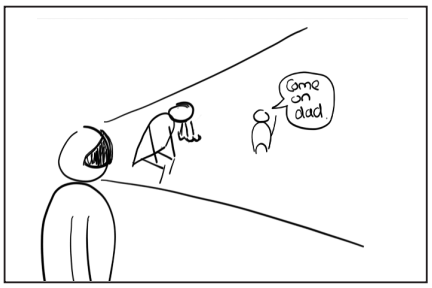
The app stelt voor om te gaan bewegen. Het wordt aangegeven welke activiteiten een geschikte intensiteit hebben en wat de werknemers goed laat voelen.

Na de activiteit vraagt de sporthologe hoe de werknemer zich voelt en hoe hij het vond. De werknemer kan zonder zijn mobiel antwoorden.

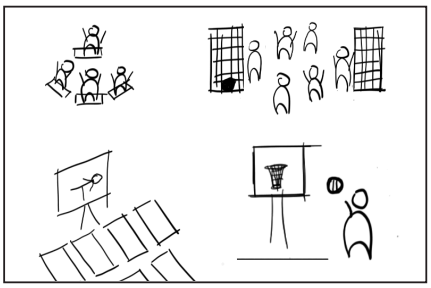
FIT TOGETHER



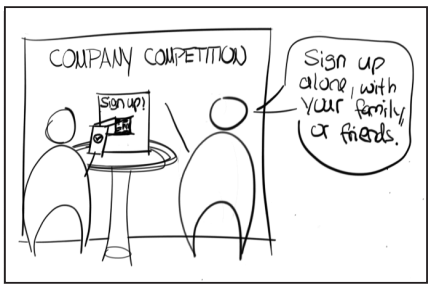
In het begin wordt een event georganiseert voor werknemers, hun familie en vrienden om hen bewust te maken van het PA Paradox.



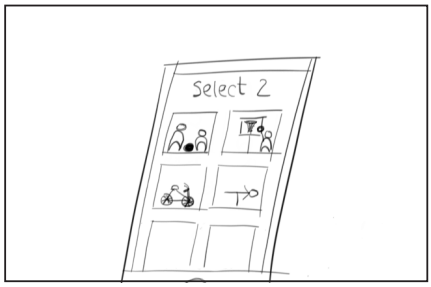
Daar kunnen de aanwezigen de mogelijke consequenties m.b.v. VR ervaren.



Er worden verschillende activiteiten aangeboden om te laten zien wat soort beweging goed voor hun is en om hun het gevoel te geven dat ze het kunnen.

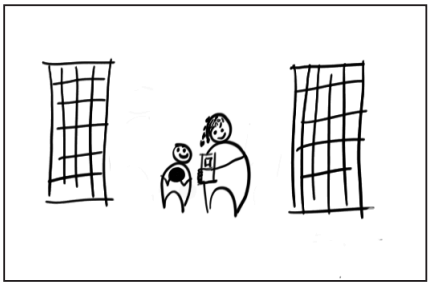


In het eind van de dag kunnen de werknemers zich opgeven voor de bedrijfs competitie. Dit kan alleen, met hun familie of met vrienden.



Ze kunnen 2 activiteiten kiezen die ze leuk vinden en dus willen doen. Ook kunnen ze aangeven op welke dagen ze willen bewegen.

De app herinnert de werknemers aan hun activiteiten. De teamleden krijgen ook een bericht en kunnen dus de werknemer motiveren.

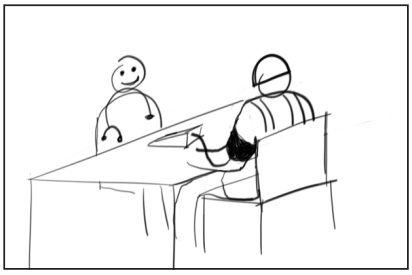


De werknemer spelt voetbal met zijn zon. Niet elk teamlid moet bij elk activiteit aanwezig zijn. Na de activiteit maken de deelnemers een selfie om te bewijzen dat ze het echt hebben gedaan.

Op werk kunnen de werknemers zien hoe goed hun collegas bezig zijn en waar ze zelfs staan.

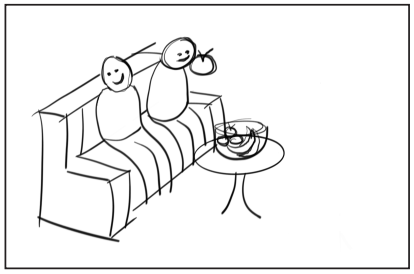
Aan het eind van de maand is er een prijsuitreiking.
De winners krijgen een leuke activiteit.

PERSONAL COACHING

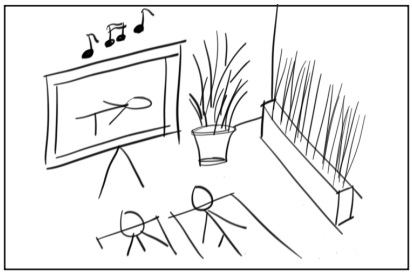


Bij de gezondheidscheck bespreekt de bedrijfsarts de huidige gezondheid en toekomstige risico's met de werknemer. Ook bepalen ze samen geschikte doelen om consequenties te voorkomen.

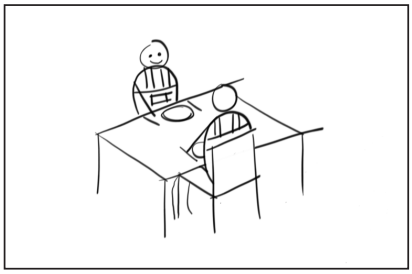
In het eind van het gesprek krijgt de werknemer een persoonlijk dagboek, waarin hij zijn doelen op werk en thuis kan bijhouden.



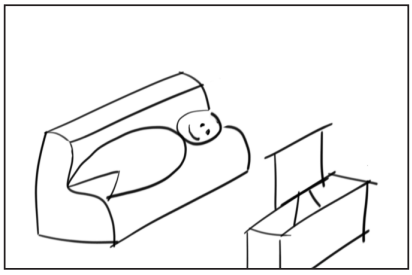
De werknemers hebben 1 uur lunch pauze. Ze gaan eerst even rusten en een opwekkend tussendoortje eten.



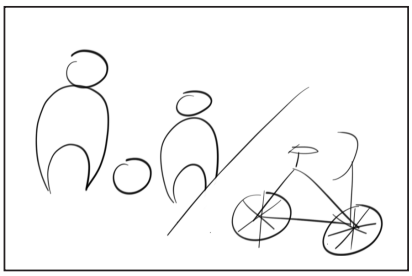
Daarna maken ze gebruik van de fitness ruimte. Ze gaan voor een half uurtje yoga om even alles te rekken en hun hoofd vrij te krijgen.



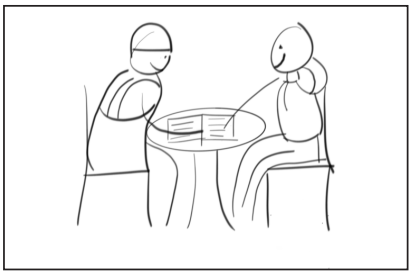
Achteraf gaan ze lunchen en nog even rusten voordat ze weer teurg gaan naar werk.



Op die dagen waar ze op werk Yoga doen, gaan ze thuis rusten om te herstellen.



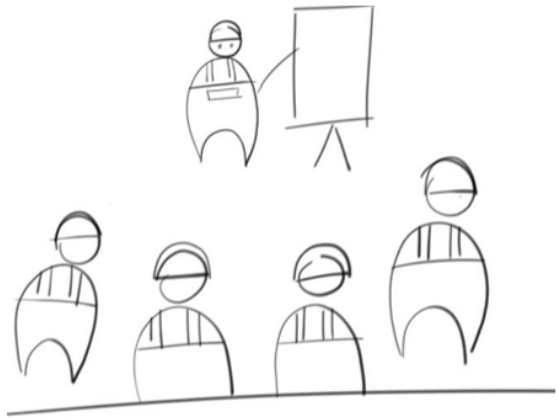
Op hun vrije dagen gaan ze aan de slag met hun bewegingsdoelen voor thuis. Bijvoorbeeld gaatn ze fietsen of voetbal spelen met vrienden of hun familie.



Na 1 maand, 3 maanden en 6 maanden gaan de werknemers opnieuw met de bedrijfsarts in gesprek om te kijken hoe het gaat en eventueel doelen aan te passen.

APPENDIX L

Exploration 2 - Slides and Questions



Veiligheid

HERAS

TOOLBOX

Duurzame inzetbaarheid

Safety First

Onderwerp:	Duurzame inzetbaarheid heeft betreking op het langer en gezond kunnen blijven uitoefenen van je werkzaamhden. Twee aspecten zijn daarbij van belang: de fysieke en de mentale belasting van je werk.

Risico's

RI&E

Fysieke belasting:

Lichamelijke klachten:

- rugpijn
- pijnlijke schouders
- nekpijn
- pijnlijke heupen
- pijnlijke knieën

Algehele vermoeidheid bij staand werk:

- etalagebenen (vernauwing van de slagader in de benen, waardoor minder zuurstof en voedingsstoffen aangevoerd worden)
- spataderen (verwijding van aderen)

Bij repeterende bewegingen:

- chronische aandoeningen van of klachten aan nek, schouder en/of armen (KANS, RSI)

Mentale belasting:

- stress
- oververmoeidheid
- burn-out
- bore-out
- geen goede werk-privé balans
- ziekteverzuim

Maatregelen:

THINK SAFETY

1. **Tillen en dragen:** gebruik de beschikbare hulpmiddelen en til beperkt en met beleid: vanuit de benen, met een rechte rug en gebruik twee handen
2. **Duwen en trekken:** gebruik de beschikbare hulpmiddelen, duwen is beter dan trekken en probeer het gewicht altijd te beperken. Gebruik voertuigen voor langere stukken
3. **Werkhouding:** voorkom langdurig werken met een gedraaide of gebogen rug. Voorkom werken met handen op of boven schouderhoogte. Sta niet langer dan 4 uur achter elkaar. Wissel regelmatig van houding en werkzaamheden.
4. **Repeterende bewegingen:** dit zijn bewegingen die binnen enkele seconden herhaald worden. Door de repeterende handelingen ontstaat overbelasting van de spieren en gewrichten. Op den duur leidt dit tot klachten aan rug, nek of ledematen. Probeer afwisseling in je werkzaamheden te brengen.
5. **Een goede voorbereiding is het halve werk:** luister naar je lichaam, laat fysieke klachten niet erger worden en meld deze op tijd aan je leidinggevende

Werkwijze:

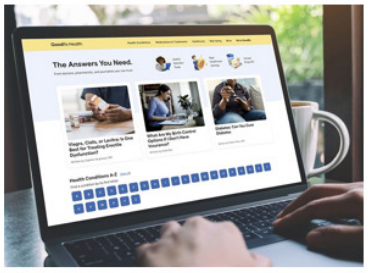
Duurzame inzetbaarheid is de mate waarin medewerkers binnen of buiten de organisatie productief, gemotiveerd en gezond willen en kunnen blijven werken.

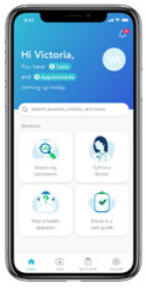
Dit betekent nu en in de toekomst:

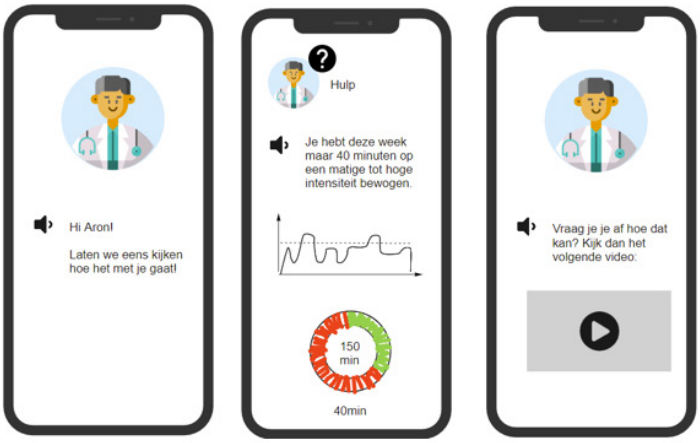
- goed en gemotiveerd je werk kunnen doen
- toegevoegde waarde kunnen leveren voor een organisatie, en daarbij zelf ook de meerwaarde te ervaren
- investeren in gezonde, competente en gemotiveerde medewerkers
- ook als medewerker hier bewust mee bezig zijn: hoe kan ik dit bereiken?

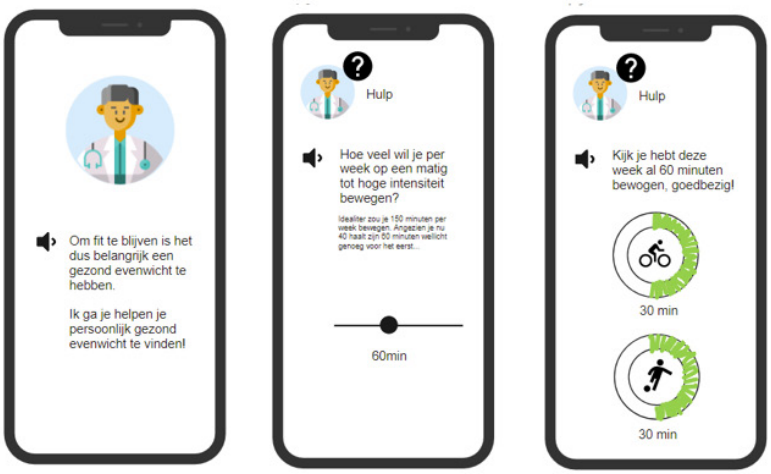
Neem je verantwoordelijkheid: Meld gevaarlijke situaties en ongevallen aan je leidinggevende of direct aan de HSE afdeling via Safetyatheras.nl

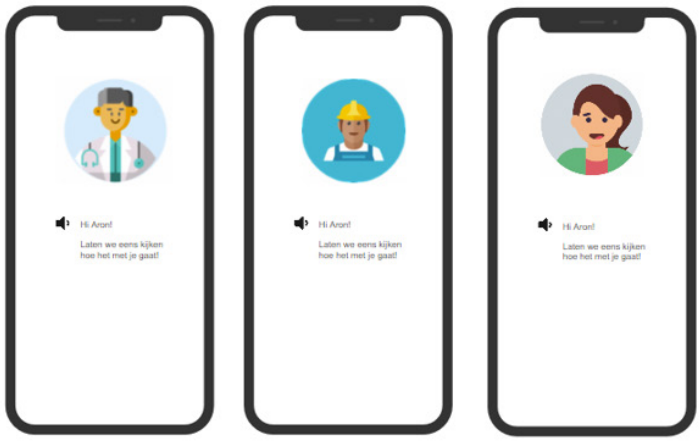
Documenten, die onderdeel zijn van het Managementsysteem en rechtstreeks te raadplegen op SharePoint.
Een geprinte versie van dit document is alleen geldig vandaag: 9-12-2020.

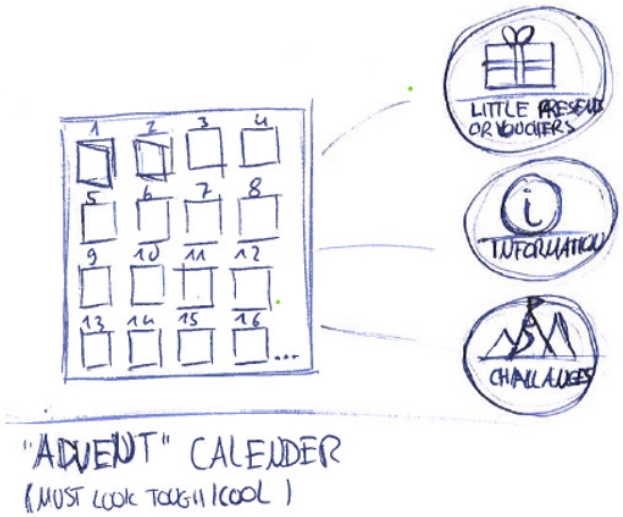


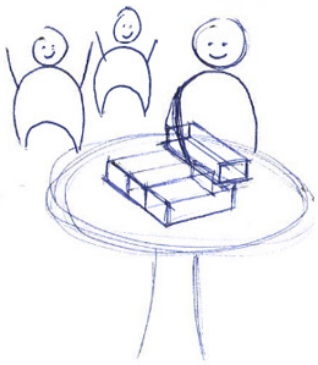



Hi Aron!
Laten we eens kijken hoe het met je gaat!
Hulp
Je hebt deze week maar 40 minuten op een matige tot hoge intensiteit bewogen.
150 min
40min
Vraag je je af hoe dat kan? Kijk dan het volgende video:


Om fit te blijven is het dus belangrijk een gezond evenwicht te hebben.
Ik ga je helpen je persoonlijk gezond evenwicht te vinden!
Hulp
Hoe veel wil je per week op een matig tot hoge intensiteit bewegen?
60min
Hulp
Kijk je hebt deze week al 60 minuten bewogen, goedbezig!
30 min
30 min


Hi Aron!
Laten we eens kijken hoe het met je gaat!
Hi Aron!
Laten we eens kijken hoe het met je gaat!
Hi Aron!
Laten we eens kijken hoe het met je gaat!


LITTLE PRESENT OR VOUCHERS
INFORMATION
CHALLANGES
"ADVENT" CALENDER
(MUST LOOK TOTALLY COOL)




Online
community


MATCH
WORKERS

Questions:

Slide 1

- Wat vind je van de toolbox inlichtingen?
    - Zijn ze duidelijk? Goed te begrijpen? Denk je dat iedereen begrijpt wat er wordt verteld?
    - Heb je het gevoel dat mensen achteraf gebruik maken van de informatie? Gaan ze hun gedrag veranderen?

Slide 2

- Wat soort informatie zet je het meest aan het denken? Wat informatie zou je overtuigen dat het belangrijk is om een gezond evenwicht te hebben?
    - Negatieve informatie, die duidelijk maakt wat alles miss kan gaan als je niet aan de slag gaat, dus bijvoorbeeld gezondheidsconsequenties zoals pijn, verminderd vermogen, hartinfarct, hartfalen..
    - Positieve informatie, verhalen van mensen die een gezond evenwicht hebben bereikt en zich goed voelen, nog op en late leeftijd fit zijn, met hun kleinkinderen kunnen spelen en langer in staat zijn te werken en dus hun familie te verzorgen
    - Harde cijfers, hoe veel mensen hebben hier last van, hoe erg is het en hoe waarschijnlijk is het dat ik het krijg?

Slide 3

- Welk medium heeft je voorkeur als het om informatie gaat?
    - Een groepsgesprek (toolbox meeting), een persoonlijk gesprek (met een expert), iets op papier (flyer, beker,..), een website, een smartphone applicatie?
    - Maak je gebruik van smartphone applicaties?
    - Liever tekst, illustraties of video's?

Slide 4

- Om inzichten in je eigen gedrag te verkrijgen zou je voor een week een hartslag sensor kunnen gebruiken. Zou je je data liever persoonlijk met een expert (bijvoorbeeld de bedrijfsarts) willen bespreken of vindt je het fijn uitleg in een applicatie op je telefoon te krijgen die je op elk moment kann bekijken?
    - Waarom?

Slide 5

- Zou je vervolgens liever op papier je doelen vastleggen en bijhouden of zou je hier een applicatie voor willen gebruiken?
    - Denk je dat het je collegas zou kunnen motiveren om meer te bewegen als ze duidelijke doelen vastleggen en deze bijhouden?
    - En vind je het fijn om doelen te kunnen aanpassen als ze niet passen?

Slide 6

- En vindt je het fijn om een persoonlijk doctor in de app te hebben, of liever een collega/vriend?
    - Waarom?

Slide 7

- Wat zou je van een adventskalender met een mix van informatie, uitdagingen en cadeaubonnen vinden?
    - Denk je werknemers zouden zoiets gebruiken?

Slide 8

- Zou je het fijn vinden met alle collega's samen naar een bedrijfsdoel toe te werken? (bijvoorbeeld dat je een steen op een toren mag leggen als je een doel hebt bereikt en als de toren af is krijgt iedereen een beloning)
- Of zou je het fijn vinden om gekoppeld te worden aan een collega (met gelijke interesses), met wie je kan bespreken hoe het gaat en elkaar tips kan geven?
- Of zou je liever een optie willen hebben om anoniem vragen te kunnen stellen en te zien hoe het gaat bij anderen, bijvoorbeeld in een online community?

Slide 9

- Zou het je motiveren je doelen te bereiken (meer te gaan bewegen) als je er iets van een beloning voor krijgt?
    - Wat soort beloning zou het dan moeten zijn?
    - Een cadeaubon voor een uitje, een uurtje eerder thuis gaan, geld,...?

Slide 10

- Zou een vrije toegang tot een sportschool, of een zwembad, of een klimzaal of iets degelijks je motiveren om te gaan bewegen?
    - Wat als de vrije toegang voor het gehele gezin zou zijn?

APPENDIX M

Exploration 3 - Interview questions

English questions

- How did it go?
- How was it to define what you want to do?
    - Was it easy or difficult to answer the different questions?
    - (What made it difficult?)
    - What effect had it to write it down?

- How did you feel when the song started playing? What did it make you feel?
    - What affect had it on you?
    - Did it made you feel positively about getting active?
    - Did it give you the energy to start up? Did it support you to push yourself?
    - Did the feeling change over time?
    - Was it the song that convinced you to get active or something else? What was it instead?
    - What else could give you the feeling that you can do it?

- How did you experience it to do it together with a related person?
    - Did you support each other? If yes, how did you do so?
    - Did it give you the feeling that if he/she is doing it, you can do it as well?

- How did you feel after finishing your activity?
    - Did you feel satisfied?
    - And what does that do to you? Does it give you the feeling that you could do it (tomorrow) again?

- Did you get active the last days?
    - Always when the song was playing?
    - If not, why did you not do it (on some days)?

German questions

- Wie lief der Versuch? Wie war es?
- Wie hat es sich angefühlt aufzuschreiben was du/ihr machen willst/wollt?
    - War es schwierig die verschiedenen Fragen zu beantworten?
    - (Was war schwierig daran? Und wie hat sich das angefühlt?)
    - Hat es etwas gebracht die Sachen aufzuschreiben? So ja, was hat es bewirkt?

- Wie hast du dich gefühlt, wenn du das Lied gehört hast? Was hast du gedacht?
    - Welchen Effekt hatte es auf dich?
    - Hat es dir ein gutes Gefühl gegeben?
    - Hat es dir die Energie gegeben zu starten? Hat es dir den nötigen Schubs gegeben, dich überwunden aktiv zu werden?
    - Hat sich das Gefühle über die Zeit verändert? (Am letzten Tag im Vergleich zum ersten Tag)

    - War es das Lied was dich überwunden hat oder etwas anderes? So ja, was war es ansonsten?
    - Was könnte dir sonst noch das Gefühl geben, dass du es kannst?

- Wie hast du es erfahren es gemeinsam mit deinem Partner zu machen?
    - Habt ihr euch gegenseitig unterstützt? Falls ja, wie habt ihr euch unterstützt?
    - Hattest du das Gefühl, dass wenn er/sie es kann, dann kann ich es auch?

- Wie hast du dich nach der Aktivität gefühlt?
    - Warst du zufrieden mit dir? Glücklich? Oder hast du dich eher schlecht gefühlt?
    - Und was hat das bewirkt? Hat es dir das Gefühl gegeben, dass du es (morgen) nochmal tun kannst?

- Hast du dich die letzten Tage bewegt?
    - Jedes Mal wenn das Lied lief?
    - Falls nicht, warum hast du dich (an manchen Tagen) nicht bewegt?

APPENDIX N

Exploration 4 - Interview questions

Evaluating experience

- How did you experience it to have your personal physical health buddy?
    - Did it give you the feeling that you can be more active in your free time?
    - Would you recommend it to your colleagues? Why, why not?
    - What did you like about it? Why did you like that?
    - What should be different? What could be improved?
    - Did you miss something? If yes, what?
    - Was it easy to follow/ understand?

- How did you find it to receive information and tips about a healthy physical activity behavior?
    - What effect had it on you?
    - Was it fine to get the information from your personal health buddy, or would you prefer a conversation with an expert? What would convince you more?

- What do think about defining an activity plan?
    - What effect had it to define what you want to do and when you want to do it?
    - Did it help you (to have a settled moment)? Or don't you like it to have a weekly schedule?
    - What would you like instead? Just planning one day ahead?
    - Or only determining the amount per week and having an overview how much is already achieved?

- Did you like to get reminders? (Messages that tell you it is time to get active)
    - Why /Why not? What kind of feeling do reminders trigger in you?

- And how was it to get encouraging messages?
    - How did messages such as - Come on... you can do it! – make you feel?
    - Did they give you a good feeling and convince you that you can do it? Or was it just annoying?

- Did you play a song before starting to move? How did the song affect you?
    - Did it made you feel positively about getting active?
    - Did it give you the energy to start up? Did it support you to push yourself?
    - Was it the song that convinced you to get active or something else? What was it instead?
    - What else could give you the feeling that you can do it?

- How did you feel after finishing your activity?
    - Did you feel satisfied? Did it energize you? Or did you feel even more exhausted?
    - And what does that do to you? Does it give you the feeling that you could do it (tomorrow) again?

Ervaringen beoordelen

- Hoe vond je het een persoonlijk bewegingsmaatje te hebben?
    - Heeft het je het gevoel gegeven dat je in staat bent in je vrije tijd te bewegen? Zou je je vrienden of collega's aanraden gebruik te maken van een persoonlijk bewegingsmaatje? Waarom? / Waarom niet?
    - Wat vond je goed? Waarom vond je dat goed?
    - Wat vond je minder goed? Wat zou beter kunnen?
    - Was het makkelijk te volgen / begrijpen?

- Hoe vond je het gezondheid gerelateerde informatie van de buddy te ontvangen?
    - Wat heeft dat met je gedaan?
    - Was het prima om de informatie als berichtjes te ontvangen of zou je liever met een expert hierover in gesprek gaan? Wat zou je meer overtuigen?

- Wat vond je ervan een bewegingsplan op te stellen?
    - Hoe was het om aan te geven wat je wilt doen en wanneer je dat wilt doen?
    - Heeft het je geholpen (een vast moment te pakken)? Of vind je het niet fijn een wekelijkse rooster te hebben?
    - Wat zou je fijner vinden? Zou je het beter vinden om alleen voor de volgende dag te bepalen wat je wilt doen?
    - Of wil je alleen vastleggen hoe veel je per week wilt bewegen en een overzicht hoe veel je daarvan al hebt bereikt?

- Vind je het leuk om herinneringen te krijgen? (B.v. berichtjes die je vertellen dat het tijd wordt om te gaan bewegen)
    - Waarom/ Waarom niet? Hoe laten herinneringen je voelen?

- En wat vond je van de aanmoedigende berichtjes?
    - Hoe laten je berichtjes zoals - Kom op... je kan het! – voelen?
    - Hebben ze je een goed gevoel gegeven en overtuigt dat je het kan doen? Of vond je ze vervelend?

- Heb je een liedje aangezet voordat je ging bewegen? Wat heeft dat met je gedaan, wat effect had dat?
    - Heeft het je in een goede stemming gebracht?
    - Heeft het je de nodige energie gegeven om op te starten? Heeft het je het nodige dutje gegeven?
    - Was het het liedje dat ervoor gezorgd heeft dat je beweegt of iets anders? Wat was het anders?
    - Wat zou je anders / nog meer het gevoel kunnen geven dat je in je vrije tijde kan bewegen?

- Hoe vond je het om samen met je familie te bewegen?
    - Hebben jullie elkaar ondersteunt? Hoe hebben jullie dat gedaan?

- Hoe voelde je je nadat je ging bewegen?
    - Was je tevreden? Heeft het je energie gegeven? Heeft het je goed laten voelen? Of voelde je je uitgeput en moe?
    - En wat deed dat met je? Heeft het je het gevoel gegevendat je het (morgen) nog een keer kan/ wilt doen?

APPENDIX O

Exploration 5 - Interview questions

Create your personal physical activity body

Now we will define together what your personal coach must do to make you feel confident about being active. By the way, should it rather be a friend or a coach?

- What should your personal coach address (talk about, help you with)?
    - Should it give you information (about the problem and what is good for you)?
    - Should it help you to set up an activity plan?
    - Should it inspire you? Give you tips what you can do (e.g. showing what others like doing)
    - Should the coach send you reminders?
    - Should it encourage you?
    - And would you like to get daily tips?

- What functionalities should your personal coach have?
    - Should the coach be able to show you videos?
    - Should it have a voice option, so that you can listen what the body tells you?
    - Would you like to have answering options? (So, that you only need to choose and answer and not come up with one yourself?

- Should it give you an overview on how you are doing/ what you did last week?
- Should it have social functions?
    - Would you like to team up with others?
    - Or should the coach be able to send invitations to others?
    - Or would you like to share your experiences with family, friends or colleagues? Or give them tips?

After discussing the different functionalities:

- Do you prefer a simple conversation, how I did it last week, or do you prefer an app with more functionalities?

- What do you use your smart phone for?
    - Social apps such as Whats app, Facebook, or Instagram?
    - Or games or other entertainment apps like Netflix?
    - Or business apps, such as online banking?
    - Or you only use your phone for messages and calls?

Creëer je persoonlijk bewegingsmaatje

Nu gaan we samen bepalen wat je persoonlijke bewegingsmaatje moet doen om je te overtuigen dat je actief kan zijn in je vrije tijd. Zou je het trouwens liever als een vriend zien of als een coach?

- Waar moet je persoonlijke coach zich mee bezighouden (over praten, je mee helpen)?
    - Moet hij je informatie geven (over het probleem en wat goed voor u is)?
    - Moet hij je helpen bij het opstellen van een activiteitenplan?
    - Moet hij je inspireren? Je tips geven wat u kunt doen (bv. laten zien wat anderen graag doen)
    - Moet hij je herinneringen sturen?
    - Moet hij je aanmoedigen?
    - En zou je dagelijkse tips willen krijgen?

- Welke functionaliteiten moet je persoonlijke coach hebben?
    - Moet hij je video's kunnen laten zien?
    - Moet hij een spraakoptie hebben, zodat je kunt luisteren naar wat hij je vertelt?
    - Wil je antwoordmogelijkheden hebben? (Zodat je alleen een antwoord hoeft te kiezen en niet zelf een antwoord hoeft te verzinnen?
    - Wil je een overzicht van hoe het gaat/ wat je vorige week hebt gedaan?

- Moet het sociale functies hebben?
    - Wil je een team kunnen vormen met anderen?
    - Of zou de coach in staat moeten zijn om uitnodigingen naar anderen te sturen?
    - Of zou je je ervaringen willen delen met familie, vrienden of collega's? Of hen tips geven?

Na het bespreken van de verschillende functionaliteiten:

- Heb je liever een eenvoudig gesprek, hoe ik het vorige week deed, of heb je liever een app met meer functionaliteiten?

- Waar gebruik je je smartphone voor?
    - Sociale apps zoals Whats app, Facebook, of Instagram?
    - Of spelletjes of andere entertainment apps zoals Netflix?
    - Of zakelijke apps, zoals internetbankieren?
    - Of gebruik je je telefoon alleen voor berichten en om te bellen?

Analysis

After the co-creation session, I counted how often the different screens were included (see image below) and made the decision that the buddy should contain the content/functions that are chosen by more than the half of the participants (at least 3).

APPENDIX P

Final Evaluation - Workers

Link of the used Video

https://youtu.be/wFcQ8_1BT7Y

Links of the English Prototypes (example flows)

Welcome and planning:
https://xd.adobe.com/view/452128ab-4a50-4876-b17a-10d9eec66b85-1072/?fullscreen

Reminding/encouraging:
https://xd.adobe.com/view/3feac310-7395-4b84-9dcc-ba3ce2722332-6ab9/?fullscreen

Praising:
https://xd.adobe.com/view/8f0a5445-f41f-4ded-b745-dbab2495e46a-da59/?fullscreen

Reflection:
https://xd.adobe.com/view/f8cf2581-2ab3-4295-9404-ffd64ce787c4-ad9c/?fullscreen

Links of the English Prototypes (example flows)

Welkom en planning:
https://xd.adobe.com/view/30813d0f-2c28-49d7-b6bb-a399dd490924-65d2/?fullscreen

Herinneren/aanmoedigen:
https://xd.adobe.com/view/02d1e23c-83b9-4503-b5df-3ba3f2b4d77a-5782/?fullscreen

Succes vieren:
https://xd.adobe.com/view/34b9e5a2-e1a5-4ea5-acd8-df2a27d70440-61ea/?fullscreen

Reflectie:
https://xd.adobe.com/view/676f2556-702f-4fca-92c5-5b9e25d9bc05-323c/?fullscreen

Questionnaire Final Evaluation - Health week

1 = Strongly disagree
2 = Disagree
3 = Agree
4 = Strongly Agree

Toolbox meeting:	1	2	3	4
1. I would attend the toolbox meeting with the team leader.	○	○	○	○
2. I would believe the team leader that my health is at risk.	○	○	○	○
3. The team leader could convince me that the movement at work is not enough to stay healthy.	○	○	○	○

Health check:	1	2	3	4
1. I would go to the health check.	○	○	○	○
2. I would go to the health check because of the ticket.	○	○	○	○
3. I would believe the doctor that my health is at risk.	○	○	○	○
4. The doctor could convince me that the movement at work is not enough to stay healthy.	○	○	○	○

Heart rate monitoring (objective data):	1	2	3	4
1. I would wear the chest strap for one week to get insights into my movement behavior (how intense I move at work and during my free time).	○	○	○	○
2. I would like to discuss the results with the doctor.	○	○	○	○
3. If the results would show that the intensity of the movement at work is too low, it would convince me that it is important to move during free time	○	○	○	○

General

If you could do one of the three, which one would you choose?

- ☐ The toolbox meeting.
- ☐ The health check.
- ☐ Measure my heart rate for one week at home and at work (+ discussion of results with the doctor).

Questionnaire Final Evaluation - Digital Buddy

1 = Strongly disagree
2 = Disagree
3 = Agree
4 = Strongly Agree

Planning and reflection:	1	2	3	4
1. The combination of the planning and reflection would trigger me to explore what works for me.	○	○	○	○
2. I would make use of this part.	○	○	○	○
3. This part would help me to shift my behavior in a healthy direction.	○	○	○	○

Reminding/Encouraging:	1	2	3	4
1. This would encourage me to get active (get me in the right mood to move).	○	○	○	○
2. I would make use of this part.	○	○	○	○
3. This part would help me to shift my behavior in a healthy direction (move and rest in my free time).	○	○	○	○

Praising	1	2	3	4
1. This part would make me feel satisfied.	○	○	○	○
2. I would make use of this part.	○	○	○	○
3. This part would help me to shift my behavior in a healthy direction.	○	○	○	○

General	1	2	3	4
1. The digital buddy would give me the feeling that it is up to me what I want to do (That I am the one who makes the decision).	○	○	○	○
2. The digital buddy would give me the feeling that I am not doing it alone.	○	○	○	○
3. The digital buddy would give me the feeling that nothing can go wrong.	○	○	○	○
4. I would be able to use the digital buddy.	○	○	○	○

1 = Helemaal mee oneens.
2 = Mee oneens.
3 = Mee eens.
4 = Helemaal mee eens.

Enquête Eindevaluatie - Gezondheidsweek

Groepsdiscussie met de teamleider	1	2	3	4
1. Ik zou aan de groepsdiscussie deelnemen.	○	○	○	○
2. Ik zou de teamleider geloven dat mijn gezondheid in gevaar is.	○	○	○	○
3. De teamleider zou me ervan kunnen overtuigen dat de beweging op werk niet genoeg is om gezond te blijven.	○	○	○	○

Gezondheidscheck:	1	2	3	4
1. Ik zou de gezondheidscheck doen.	○	○	○	○
2. Ik zou de gezondheodscheck doen vanwege het ticket.	○	○	○	○
3. Ik zou de dokter geloven dat mijn gezondheid in gevaar is.	○	○	○	○
4. De dokter zou me ervan kunnen overtuigen dat de beweging op werk niet genoeg is om gezond te blijven.	○	○	○	○

Hartslag meten (objectieve data):	1	2	3	4
1. Ik zou de hartslagmeter een week lang dragen om inzicht te krijgen in mijn bewegingsgedrag (hoe intensief ik op het werk en in mijn vrije tijd beweeg)	○	○	○	○
2. Ik zou de resultaten met de dokter willen bespreken.	○	○	○	○
3. Het zou mij overtuigen dat het belangrijk is in de vrije tijd te bewegen als uit de resultaten blijkt dat de intensiteit van de beweging op werk te laag is.	○	○	○	○

Algemeen:

Als je alleen een van de onderstaande dingen zou kunnen doen, wat zou je kiezen?

- ☐ De groepsdiscussie met de teamleider.
- ☐ De gezondheidscheck.
- ☐ 1 week thuis en op werk hartslag meten
  (+ bespreken van de resultaten met de dokter)

1 = Helemaal mee oneens.
2 = Mee oneens.
3 = Mee eens.
4 = Helemaal mee eens.

Enquête Eindevaluatie - Digitale kameraad

Planning en reflectie:	1	2	3	4
1. De combinatie van planning en reflectie zou mij motiveren te testen wat voor mij werkt.	○	○	○	○
2. Ik zou gebruik maken van dit gedeelte.	○	○	○	○
3. Dit gedeelte zou mij helpen mijn bewgingsgedrag te verbeteren.	○	○	○	○

Herinneren/Aanmoedigen:	1	2	3	4
1. Dit zou me aanmoedigen om actief te worden (me in de juiste stemming brengen om te bewegen).	○	○	○	○
2. Ik zou gebruik maken van dit gedeelte.	○	○	○	○
3. Dit gedeelte zou mij helpen mijn bewgingsgedrag te verbeteren.	○	○	○	○

Succes vieren:	1	2	3	4
1. Dit zou mij goed/tevreden laten voelen.	○	○	○	○
2. Ik zou gebruik maken van dit gedeelte.	○	○	○	○
3. Dit gedeelte zou mij helpen mijn bewgingsgedrag te verbeteren.	○	○	○	○

Algemeen:	1	2	3	4
4. De digitale kameraad zou mij het gevoel geven dat ik de leiding heb. (Dat ik degene ben die aangeeft wat mogelijk is)	○	○	○	○
5. De digitale kameraad zou mij het gevoel geven dat ik het niet alleen moet doen.	○	○	○	○
6. De digitale kameraad zou mij het gevoel geven dat niets mis kan gaan.	○	○	○	○
7. Ik zou in staat zijn de digitale kameraad te gebruiken.	○	○	○	○

Statements of the questionnaire assigned to what they evaluate

Statements related to desireability

- I would attend the toolbox meeting with the team leader
- I would go to the health check.
- I would wear the chest strap for one week to get insights into my movement behavior (how intense I move at work and during my free time)
- I would make use of this part (Planning and reflection).
- I would make use of this part (Reminding and encouraging).
- I would make use of this part (Praising).

Statements related to the Design Goal

- The team leader could convince me that the movement at work is not enough to stay healthy.
- The doctor could convince me that the movement at work is not enough to stay healthy.
- If the results would show that the intensity of the movement at work is too low, it would convince me that it is important to move during free time
- This part would help me to shift my behavior in a healthy direction.

Statements related to the interaction vision

- The digital buddy would give me the feeling that I am not doing it alone.
- The digital buddy would give me the feeling that nothing can go wrong.
- The digital buddy would give me the feeling that it is up to me what I want to do (That I am the one who makes the decision).
- The combination of the planning and reflection would trigger me to explore what works for me.
- This part (praising) would make me feel satisfied.

Interview Questions (open questions)

English questions

- What do you think about the concept?
- Would 'Shift it!' make you feel confident about shifting your behavior in a healthier direction?
    - Why/ Why not? (Would this concept give you the feeling that you can be active and rest in your free time?
- What do you like about 'Shift it!'?
    - Why?
- What don't you like about 'Shift it!'? What should be different?
    - Why?

Dutch questions

- Wat denk je over 'Shift it!'? Wat vind je van het concept?
- Zou 'Shift it!' je het gevoel geven dat je je bewegingsgedrag kan verbeteren?
    - Waarom/ Waarom niet?
- Wat vind je leuk aan 'Shift it!'?
    - Waarom?
- Wat vind je minder leuk? Wat zou je anders beter vinden?
    - Waarom?

Overview of answers to the questionnaire

Questions Related to Health week	1	2	3	4
Toolbox meeting				
Q1			2	3
Q2	1		2	2
Q3		1	2	2
Health Screening				
Q1			1	4
Q2		1	2	2
Q3				5
Q4			1	4
Heart rate monitoring				
Q1	1		2	2
Q2				5
Q3	1		2	2
Questions related to the Digital buddy				
Planning and reflection				
Q1			3	2
Q2		1	1	3
Q3			1	4
Reminding/Encouraging				
Q1			2	3
Q2		1	2	2
Q3			1	4
Praising				
Q1			1	4
Q2			2	3
Q3			2	3
General				
Q1			3	2
Q2			2	3
Q3		1	2	2
Q4			2	3

Overview of answers assigned to what is evaluated

Desirability					
Toolbox meeting			2	3	3,6
Health Screening			1	4	3,8
Heart rate monitoring	1		2	2	3
Planning and reflection		1	1	3	3,4
Reminding/encouraging		1	2	2	3,2
Praising			2	3	3,6
Design Goal					
Toolbox meeting		1	2	2	3,2
Health Screening			1	4	3,8
Heart rate monitoring	1		2	2	3
Planning and reflection			1	4	3,8
Reminding/encouraging			1	4	3,8
Praising			2	3	3,6
Interaction Vision					
Control			3	2	3,4
Supportive			2	3	3,6
Safe		1	2	2	3,2
Explorative			3	2	3,4
Satisfying			1	4	3,8

APPENDIX Q

Final Evaluation - Other Stakeholders

Toestemmingsformulier Geluidsopname Feedbackgesprek

Meedoen aan het feedbackgesprek	Ja	Nee
- Ik weet dat meedoen vrijwillig is. Ook weet ik dat ik op ieder moment kan beslissen om toch niet mee te doen of te stoppen. Daarvoor hoef ik geen reden te geven.	○	○
- Ik geef toestemming voor het verzamelen en gebruiken van geluidsopnames.	○	○
- Ik begrijp dat de informatie die ik geef gebruikt wordt voor het afstudeerproject en het eindverslag van de onderzoeker.	○	○

Naam deelnemer:

Handtekening: Datum : __ / __ / __

Ik verklaar dat ik de deelnemer volledig heb geïnformeerd over het doel van de afspraak en het gebruik van de geluidsonames.

Als er tijdens het gesprek informatie bekend wordt die de toestemming van de proefpersoon zou kunnen beïnvloeden, dan breng ik hem/haar daarvan tijdig op de hoogte.

Naam onderzoeker:

Handtekening: Datum: __ / __ / __

Link of the used Video

https://youtu.be/5wElDnJ7nD0

English Questions

- What do you think about the concept?
- Would you be interested in further developing it?
    - Why/Why not?
- What do you like about it?
    - Why?
- What should be improved? What should be different? What would you take out?
    - Why?
- Is the health week feasible for Heras?
    - Why/Why not?
    - Could the company doctor execute health screenings and exercise tests?
    - Would Heras invest in a health week?
- And would Heras invest in developing the digital buddy application?
    - Why/ Why not?
    - Do you think a sector organization could develop the digital buddy application and offer it to companies?

Dutch Questions

- Wat vind je van ‚Shift it!' (het concept)?
    - Zou je geïnteresseerd zijn in de verdere ontwikkeling ervan?
    - Waarom wel/niet?
- Wat vind je goed aan ‚Shift it!' (het concept)?
    - Waarom?
- Wat zou verbeterd kunnen worden? Wat zou je anders doen? Wat zou je eruit halen?
    - Waarom?
- Is de gezondheidsweek haalbaar voor Heras?
    - Waarom wel/niet?
    - Zou de bedrijfsarts gezondheidsonderzoeken en inspanningstesten kunnen uitvoeren?
    - Zou Heras investeren in een gezondheidsweek?
- En zou Heras investeren in de ontwikkeling van de digitale buddy applicatie?
    - Waarom wel/niet?
- Denken jullie dat een sectororganisatie de digitale buddytoepassing zou kunnen ontwikkelen en aanbieden aan bedrijven?