Faculty of Health Sciences, Department of Psychology

An Assessment of Factors Influencing Use of Respiratory Protective Equipment in the Norwegian Smelter Industry and the Effect of a Knowledge-based Intervention

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A dissertation for the degree of Philosophiae Doctor – October 2018

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Abstract

Chronic obstructive pulmonary disease (COPD), asthma and other respiratory illness have been shown to be more prevalent in Norwegian smelter workers compared to the general population. All Norwegian smelters today have incorporated respiratory protection in the health and safety routines and regulations. There is evidence suggesting that the use of respiratory protective equipment (RPE) can be sub-optimal in occupations with respiratory exposure.

This thesis investigated psychological factors thought to influence intention to use RPE, and reported RPE use in a sample of Norwegian smelter workers. Results indicated that RPE use is at times sub-optimal, that disposable RPEs were still commonly used and that there were barriers related to proper use. A modified version of the Theory of Planned Behavior was compiled and structural equation modeling was used to investigate how attitudes, subjective norms, perceived control, safety climate and work experience predicted intention to use RPE. The relationship between intention and reported behavior was also investigated. Results indicated that *Attitudes* and *Subjective norms* and *safety climate* were the best predictors of *intention* to use respirators. An intervention study with two different intervention groups and one control group was designed, aiming to influence intention and use of RPE. Group 1 received RPE fit-testing. Group 2 received RPE fit-testing and a lecture in exposure, health effects and safety equipment, tailored to their workplace and work-tasks. Data was collected at four intervals using questionnaires: at baseline and three follow-ups, two weeks, three and nine months post intervention. The results revealed that participants in the two interventions groups showed small but significant improvements over the control group. The thesis concludes that attitudes, subjective norms and safety climate are important predictors of intention to use RPE, and that tailored and interactive interventions may improve knowledge, attitudes, subjective norms, intentions, perceptions of inconvenience and perceptions of organizational support regarding the use of RPE. In addition, the intervention effect was shown to persist throughout the project period.

Sammendrag

Det er observert hyppigere forekomst av kronisk obstruktiv lungesykdom (KOLS), astma, luftveissykdommer og fall i lungefunksjon blant norske smelteverksarbeidere enn hos den øvrige befolkningen. Alle norske smelteverk bruker i dag åndedrettsvern som en del av sitt helse og sikkerhetsarbeid. Det er tidligere rapportert at bruken av åndedrettsvern i ulike bransjer kan være sub-optimal.

Denne avhandlingen undersøkte forskjellige psykologiske faktorers innflytelse på intensjonen til å bruke, samt rapportert bruk av åndedrettsvern. Denne studien viste at bruken av åndedrettsvern er sub-optimal blant annet grunnet vanskelige arbeidssituasjoner og uforenlighet med annet sikkerhetsutstyr, som hjelm og briller. En modifisert versjon av *Theory of Planned Behavior* ble utviklet og testet med strukturell ligningsmodellering for å utforske hvordan sammenhengen mellom holdninger, subjektive normer, opplevd kontroll, sikkerhetsklima og arbeidsopplevelse korrelerte med intensjonen til å bruke åndedrettsvern. Forholdet mellom intensjonen og rapportert bruk ble videre undersøkt ved bruk av regresjon. Resultatene indikerte at holdninger, subjektive normer og sikkerhetsklima var de beste prediktorene for intensjonen til å bruke åndedrettsvern. Følgende ble to intervensjoner skreddersydd til industrien og arbeidsoppgavene deres for å øke intensjonen og bruken av åndedrettsvern. Gruppe 1 mottok tetthetstesting av åndedrettsvern. Gruppe 2 mottok tetthetstesting av åndedrettsvern samt et kurs i eksponering, helseeffekter og sikkerhetsutstyr. Spørreskjema ble brukt for å samle inn data, og ble utlevert før intervensjonen og 2 uker, 3 måneder og 9 måneder etter intervensjonen. Funnene indikerte små men signifikante forskjeller mellom intervensjonsgruppene og kontrollgruppen. Avhandlingen konkluderte med at holdninger, subjektive normer og sikkerhetsklima er viktige prediktorer for intensjonen til å bruke åndedrettsvern, og at intervensjoner kan brukes for å øke kunnskap, holdninger, subjektive normer, intensjon, opplevelsen av ulemper og opplevelsen av organisasjon i relasjon til bruken av åndedrettsvern. Effekten av intervensjonen vedvarte over tid.

List of papers

1. Hegseth, M. N., Robertsen, Ø., Aminoff, A., Vangberg, H. C. B., & Føreland, S. (2018). *Reasons for not using respiratory protective equipment and suggested measures to optimize use in the Norwegian silicon carbide, ferro- and silicon-alloy industry.* Paper presented at the Infacon XV: International Ferro-Alloys Congress, South-Africa and published in the proceedings, available (open access) at the following link: http://www.pyrometallurgy.co.za/InfaconXV/. ISBN 978-1-928410-02-7.
2. Robertsen, Ø., Siebler, F., Eisemann, M., Hegseth, M. N., Føreland, S., & Vangberg, H. C. B. (2018). *Predictors of respiratory protective equipment use in the Norwegian smelter industry. The role of the theory of planned behavior, safety climate and work experience in understanding protective behavior.* Frontiers in Psychology, 9(1366). doi:10.3389/fpsyg.2018.01366. Published.
3. Robertsen, Ø., Hegseth, M. N., Føreland, S., Siebler, F., Eisemann, M., & Vangberg, H. C. B. (2018). *The efficacy of a knowledge based and cognitive intervention to improve attitudes towards- and the use of respirators in the Norwegian smelter industry*. Under review in Annals of Work Exposures and Health
4. Robertsen, Ø., Hegseth, M.N., Føreland, S., Vangberg, H. C. B. (2018). *Longitudinal effects of an intervention to improve attitudes towards- and respirator use in the Norwegian smelter industry.* Unpublished manuscript.

Introduction

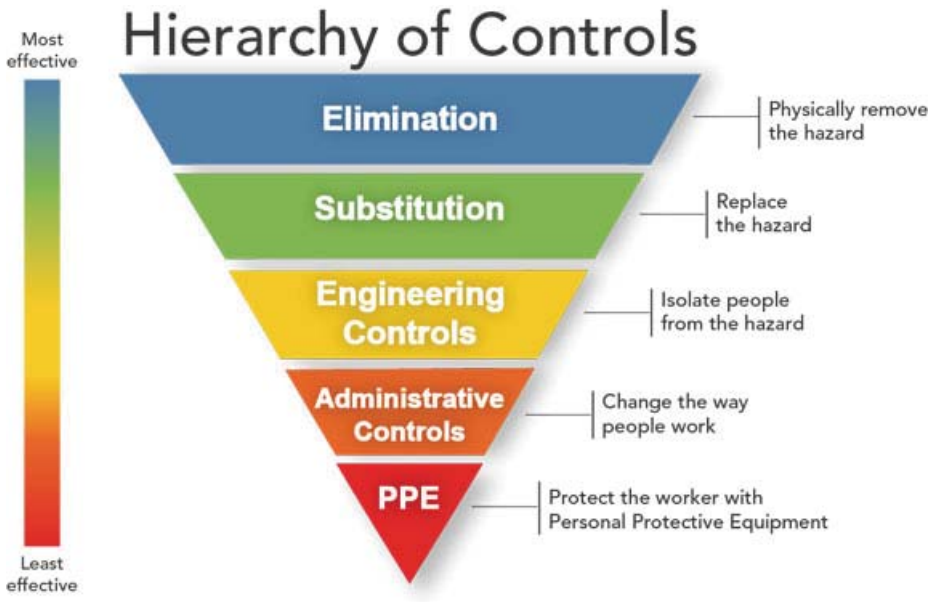
The smelting industry and respiratory health challenges

The Norwegian industries started growing in the late 19th century, with the first iron and metal smelting plants constructed in the first part of the 20th century (SNL, 2018). The smelting industry is an industry constituting important cornerstones in all parts of the country, and has been an important staple of Norwegian industrial development. These plants operate 24 hours per day, 365 days per year, and employ anywhere from 130-500 people. In total, the Norwegian smelting industry employs around 10000 people, who produce materials worth around 7.2 Bn EUR per year (Statistics Norway, 2017). While processes may differ between plants, depending on type of end product, occupational exposures for the employees are often comparable. The smelters investigated in this thesis can be divided into producers of ferrosilicon alloys (FeSi), Silicon metal (Si-metal), siliconmanganese (SiMn), ferromanganese (FeMn) and silicon carbide (SiC). The basic process involves treating raw materials with heat to produce molten products, which in turn are poured into molds for cooling and then crushed into specified sizes depending on what is desired by the end user. Dust, fumes and gases are produced and emitted during the production process into the work atmosphere during handling, from the transport of raw materials into the plant, furnace processes, crushing, packing and transport of finished product out of the plant (Jørgensen & Kero, 2017; I. Kero, Grådahl, & Tranell, 2017; I. T. Kero et al., 2018). Indeed, previous studies have shown that Norwegian smelter workers have been subject to harmful exposures such as dust in size ranging from nano-sized to coarse particles, fumes and gases at work (S Føreland, Bye, Bakke, & Eduard, 2008; Johnsen, Hetland, Šaltytė Benth, Kongerud, & Søyseth, 2008; I. Kero, Naess, & Tranell, 2015; I. T. Kero & Jørgensen, 2016). Previous studies have also shown higher prevalence of respiratory illness such as chronic obstructive pulmonary disorder (COPD), respiratory symptoms and reduced lung function among occupations with higher

respiratory exposure than in the general population (Bakke, Baste, Hanoa, & Gulsvik, 1991; Johnsen et al., 2013; Johnsen, Kongerud, Hetland, Benth, & Søyseth, 2008; Søyseth, Johnsen, Bugge, Hetland, & Kongerud, 2011a, 2011b; Søyseth, Johnsen, Henneberger, & Kongerud, 2015; Søyseth, Johnsen, & Kongerud, 2013). Treatment of COPD is expensive with costs estimated to be around €1.54 billion for the Norwegian health-care system from 2009-2019 (Nielsen et al., 2009). The disease is heavily debilitating for the individual. Hence, reducing the prevalence and thereby the cost of COPD should be attempted both for societal, economical and individual reasons.

Respiratory workplace exposure in Norwegian smelters (Solveig Føreland, Bugge, Bakke, Bye, & Eduard, 2012) and industrial accidents in general have been reduced (US and UK) in the twentieth century (CDC, 1999; HSE, 2015). The hierarchy of controls (NIOSH, 2016) provides an overview of how to deal with occupational hazards using an inverted pyramid to describe solutions ranging from most effective to least effective. See figure 1.

Figure 1: Hierarchy of controls (NIOSH, 2016)



However, in Norwegian smelters the use of personal protective equipment is still necessary in certain situations in order to ensure proper protection against workplace

exposure. At most smelters, the use of respiratory protective equipment (RPE) is enforced in varying degrees. Often, there are designated areas and work-tasks where RPE use is mandatory.

Even though employees are aware that they should use RPE to protect themselves, it can be expected, based on anecdotal evidence from the industry, that sub-optimal use is significant. These indications are not unique to the smelting industry. Previous literature has shown sub-optimal RPE use in farming, health care, construction, hazardous waste management, manufacturing and nuclear energy (Bryce, Forrester, Scharf, & Eshghpour, 2008; Carpenter, Lee, Gunderson, & Stueland, 2002; Guseva Canu et al., 2013; Han & Kang, 2009; MacFarlane et al., 2008; Mitchell & Schenker, 2008; Salazar, Connon, Takaro, Beaudet, & Barnhart, 2001; Tam & Fung, 2008). As a result, measures to improve RPE use have been requested. Graveling, Sánchez-Jiménez, Lewis, and Groat (2011) produced a list of suggestions in order to improve RPE use and compliance based on a review of articles regarding RPE use. The primary determinant of influencing RPE use were management factors, as they were found to be crucial to facilitate RPE use i.e. all management levels must be aware of hazards, possible health consequences and recognize the need for RPE use. The authors also mentioned user comfort, technical appropriateness and training as important factors in order to optimize RPE use. Hence, the issue of sub-optimal RPE use has traditionally been approached from an occupational hygienic angle, addressing technical and organizational issues. However, as RPE use is not influenced solely by technical aspects, there is also a substantial behavioural component.

Attitudes and behavior

Attitude and behavior are closely related and often encompass affective, behavioral and cognitive responses (Bohner & Wänke, 2002). Attitudes can refer to a set of emotions, beliefs, and behaviors toward a particular object, person or event. For example, a smelter-

worker may be positively inclined to use RPE because he/she knows that it has positive health effects (cognitive), but he/she does not like using RPE because it is uncomfortable (affective). If the smelter-worker understands that RPEs protect against exposure and then chooses to wear it, this represents the behavioral component. All three factors are not necessarily present in constituting an attitude which may comprise only one of the three. Making individuals think about the reason for holding a certain attitude can either increase or decrease the attitude-behavior correlation (Wilson & Dunn, 1986; Wilson, Dunn, Kraft, & Lisle, 1989).Thinking about the reasons for holding an attitude affects the cognitive aspects of the attitude and thus should elevate the attitude-behavior correlation if mainly cognitive aspects are accessible also at the time of performing the behavior (Bohner & Wänke, 2002). On the contrary, the association between attitude and behavior should be diminished by self-examination about reasons if the behavior is performed in a situation where affective attitude components are most salient (Millar & Tesser, 1986). This is relevant to the smelter worker if the attitudes towards use of RPEs are cognitive or affective based. An affective based attitude may be the disliking of RPEs due to aversive effect from use over time. It could also be falsely based on the cognitive component if the perception of RPE effect is diminished, i,e they could stop using RPE based on cognitive components if they believe that they are not protected by the RPE. If these attitudes are perceived and/or experienced repeatedly, the accessibility of the attitudes increases, making them stronger. Glasman and Albarracín (2006) showed that salience of attitudes better predicts future behavior, particularly if the participants had direct experience with the attitude-related object and they based their attitudes on behavior-relevant information.

There are many ways to influence attitudes and behavior, and one of these is the Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986; Petty, Wheeler, & Bizer, 1999). In the ELM, the two processing modes are called the central and the peripheral route.

The peripheral route features the influence of peripheral cues like non-content aspects (i.e. bikini girls on the hood of cars). They include a variety of less effortful mechanisms such as conditioning, social identification and the use of heuristics. On the contrary the central route aims at persuasion through arguments and effortful scrutiny of the message given and the source that delivers it (i.e. a medical doctor provides sound arguments and scientific evidence in explaining the hazards of getting a sunburn).

Theory of planned behavior

The Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) is a behavioral theory explaining the relationship between behavioral beliefs, attitudes, subjective norms, intention to behave and behavior. According to the theory, intention is the best predictor of behavior. The antecedents of intention are individual perceptions of likely outcomes of performing the behavior.

The TRA divides these perceptions in two distinct concepts, behavioral and normative. Beliefs about behavioral outcomes influence an individual attitude towards performing the behavior. Attitudes towards performing behavior can be e.g. *"Performing the behavior is beneficial / healthy / good"* and *"I like / dislike / performing the behavior"*. Normative beliefs influence individual perceptions of what subjective norms are in regard to performing the behavior, e.g. *"My family think that I should perform the behavior"*, *"My colleagues are mindful to perform the behavior"*. Intention to behave are thus influenced by attitudes and subjective norms, leading to an increase or decrease in the probability of an individual performing the behavior. Madden, Ellen, and Ajzen (1992) refer to three conditions affecting the strength of the relationship between intention and behavior, a) how well the measures of intention and behavior correspond in specificity b) how stable intentions are between the time of measurement and when the behavior is performed and c) the degree of control an individual exerts on the behavior under consideration. The TRA states that our personal

attitudes and perception of norms regarding a behavior influence the intention to perform behavior.

How we perceive our ability to control behavior has been theorized in several behavior theories. The level of perceived control in relation to performing a behavior was later added to the TRA, in an expansion named The theory of planned behavior (TPB) (Ajzen, 1985).

In the TPB, perceived control influences both intention and behavior. The level of control individuals perceive by intending or performing a behavior refers to their antecedent skills, resources and opportunities. More skills, resources and opportunities should lead to an improvement in perceived control with regards to the intention to perform a behavior. The same improvement in skills and resources should also increase the probability of performing the behavior. Accordingly, perceived control exerts both a direct and indirect influence on behavior. Madden et al. (1992) suggest that the indirect effect is assumed to have a motivational implication towards behavioral intention, whereas the direct effect reflect the actual control an individual has over the behavioral action.

The TPB has been widely applied in research. Godin and Kok (1996) and Armitage and Conner (2001) reviewed 241 studies in total (1985 - 1997) that used the TPB to investigate health-related behaviors. Their observations implied that the efficacy of the model was acceptable but that the results varied between health-related behavior categories. Furthermore, the TRA and TPB have been successfully applied in interventions on health-related behaviors in previous research (Brubaker & Fowler, 1990; Fishbein, Guenther-Grey, Johnson, & Wolitski, 1996; Jemmott III, Jemmott, & Fong, 1998; Murphy & Brubaker, 1990)

Factors influencing and explaining attitudes and protective behavior

Factors influencing RPE use and behavior may, as with other aspects of human behavior are subject to a number of different behavioral influences. Individual attitudes are arguably important, but there may be many other factors surrounding the individual that exert

influence, such as explicit ones, i.e. organizational pressure and implicit ones, i.e. perceptions of colleagues´ behavior influencing the individual.

Safety climate

Zohar (1980, p. 96) interpreted organizational climate as *"Perceptions held by employees about aspects of their organizational environment, summarized over individual employees"*. Furthermore, organizational climate was reworked to the more specific safety climate by reviewing safety literature. Items measuring safety climate were constructed and tested, resulting in eight dimensions comprising employees' perceptions towards management attitudes towards safety, effects of safe behavior and its result on social status and risk perceptions. The two most important dimensions in order to determine safety climate levels were found to be perceived relevance of safety to job behavior, detailing how safety training and work pace influence safety in the workplace, and employees' perception of management attitudes towards safety. The perception of management attitudes included how behavior of safety officers and committees results in the implementation of safety guidelines, and their authority to intervene and act in response to unsafe working conditions. Safety climate and safety culture are two concepts that often appear in safety related literature. Guldenmund (2000, p. 221) discussed how previous research dealt with the relationship and importance of the two constructs and concluded that *"… therefore, climate follows naturally from culture or, put another way, organizational culture expresses itself through organizational climate"*, indicating that organizational climate is the manifestation of culture within an organization, influencing most events and processes. Furthermore, the way in which these concepts are investigated will vary based on which concepts are under study. Safety culture refers to the expressed culture in an organization or workplace, e.g. management statements regarding safety, expressing how the organization expects employees to act and organizational values. Flin, Mearns, O'Connor, and Bryden (2000) reviewed studies investigating safety climate in

various industries and found that 1) employee perceptions of management attitudes towards safety, production and more, 2) safety system, including safety management, committees, policies, personal protective equipment and so on, 3) employee risk perception and attitudes towards risk and safety, 4) production pressure in relation to safety and 5) workers' skills, qualifications and knowledge regarding training and standards were the most common themes in questionnaires used. This reflects the many factors influencing safety climate and highlights the importance of multidimensional approaches. Furthermore, the link between safety climate and safety at work has been reflected in a growing body of research (Cooper & Phillips, 2004; Dejoy, Murphy, & Gershon, 1995; Griffin & Neal, 2000).

Work experience and well-being at work. The salutogenic approach

In a worksite where a salutogenic health perspective is adopted and successfully implemented, employees' attitudes towards protective behavior could be more salient. Previous research has shown that instruments measuring health at work are often based on a pathogenic perspective and point to the need for instruments based on a salutogenic perspective in order to promote well-being at work (Nilsson, 2010; Nilsson, Andersson, & Ejlertsson, 2013). Thus, a shift in focus from preventing disease to improving health is indicated. By focusing on employees experience of the workplace, one can apply specific measures in order to promote health. The Work Experience Measurement Scale (WEMS) was in part based on established theories regarding work and health (Antonovsky, 1987; Csikszentmihalyi, 1990; Docherty, Forslin, & Shani, 2002; Johnson & Hall, 1988; Karasek & Theorell, 1990; Kira, 2003) and comprised six factors: management, reorganization, internal work experience, pressure of time, autonomy and supportive work conditions. Results revealed that the WEMS showed adequate psychometric properties and appeared valuable in measuring work experience from a salutogenic perspective.

Changing attitudes and protective behavior

By increasing knowledge of RPE use an improved behavior should be expected. If the level of knowledge is insufficient prior to intervention, the disparity between perceived risk and actual risk could be significant. By providing appropriate knowledge and given that it is assimilated by participants, the distance between perceived risk and actual risk should be reduced. Campbell, McCloy, Oppler, and Sager (1993) stated that job performance is the product of interaction between motivation and knowledge. Griffin and Neal (2000) showed in two studies that safety knowledge was an important mediator between safety climate and safety performance for employees in mining and manufacturing organizations. Burke et al. (2006) provided further evidence for the link between safety training, safety knowledge and improved safe behaviors in a review of 95 studies. Specifically, they found that as training methods were more engaging, better knowledge acquisition and less accidents, illnesses and injuries were observed. Christian, Bradley, Wallace, and Burke (2009) reported similar results, concluding that safety knowledge and safety motivation were strongly related to safety performance behaviors.

Several studies illustrated that RPE fit-testing had positive effects on RPE efficiency (Harber, Boumis, Su, Barrett, & Alongi, 2013; Myers, Jaraiedi, & Hendricks, 1995; Or, Chung, & Wong, 2012). It is possible that RPE fit-testing has benefits other than finding determining fit. By conducting RPE-fit testing, an improved awareness and knowledge of RPE protection may be achieved, as participants gain an understanding of how RPE works and which parameters affect fit.

There are numerous categories of RPE available on the market today, ranging from disposable respirators, reusable half-face respirators, powered air respirators and supplied air respirators. Within all categories of RPE there is also a wide range of models to choose from. Individual RPE fit varies to such a degree that performing RPE fit testing is a necessity in

order to ensure optimal protection. A respirator that fits well on one individual may not fit another. Therefore, there may be employees working in exposed areas who have been diligent in their respirator use but who obtained nearly no protection from their respirator. Quantitative fit-testing measures and compares ambient particle concentration with the particle concentration inside a respirator. The result is a fit-factor, the relationship between concentration of particles outside the respirator vs. the concentration inside the respirator. The instrument displays the fit-factor in real-time so the participant can see how respirator fit is influenced by exercises and movements. During the test procedure, the test person receives information about the RPE he or she currently uses, they are involved in a discussion about their work situation and their need for respiratory protection and they get to choose RPE that feels comfortable. Additionally, the wearer is reassured that the RPE actually provides sufficient protection. In this respect, the fit-testing procedure is an engaging way of providing participants with information compared to a lecture, and as Burke et al. (2006) reported, a more engaging training scenario should lead to better knowledge transfer and more positive behavior changes. Therefore, one can assume that a fit-testing intervention could be successful in increasing knowledge and subsequently behavior.

Education and training-interventions in order to influence RPE use have been performed in sectors such as health-care and farming. Intervention designs including classroom training, visualization practices, occupational screenings, lectures, home-schooling, practical exercises and more have been proven efficient in increasing knowledge and improving protective behavior (Carrico, Coty, Goss, & LaJoie, 2007; Donham, Lange, Kline, Rautiainen, & Grafft, 2011; Dressel et al., 2007; Gjerde, Ferguson, Mutel, Donham, & Merchant, 1991; Shamsi, Pariani, Shams, & Soleymani-Nejad, 2015).

Luong Thanh, Laopaiboon, Koh, Sakunkoo and Moe (2016) reviewed some of the mentioned studies in a Cochrane review, concluding that with the current base of knowledge

of interventions to improve RPE use, it cannot be stated that interventions are *not* effective in increasing positive behavior. In addition, they requested more intervention studies using rigorous methodologies, such as randomized studies using proper controls. Lunt, Sheffield, Bell, Bennett, and Morris (2011) came to similar conclusions when reviewing literature aimed to improve behaviors in relation to dermal and respiratory hazards. Hence, interventions to improve protective behavior may be efficient if the methods are appropriate.

Given what we know about the respiratory risk in the smelting industry in Norway, there is still a need to improve protective behaviour and RPE use in particular. Investigating which factors influence this behaviour and finding effective approaches to alter the behaviour are important. Therefore, it would be necessary to assess psychological factors that could influence protective behavior and help explain why workers do or do not choose to wear RPE in situations where such equipment otherwise would be necessary or mandatory.

Aims of the thesis

The overall aim of the thesis was to explore psychological factors and their influence on RPE use among Norwegian smelter workers, and to evaluate the efficacy of a knowledge-based intervention in order to improve the use of RPE. Intervention effects on variables such as knowledge, attitudes, social norms, intention to use respirators and reported RPE use were investigated and effects over time were evaluated.

Methods

The DeMaskUs project

The present thesis was part of a comprehensive, interdisciplinary project called *The DeMaskUs project.* The project was aiming to study the generation and dispersion of nano-sized particles from diffuse emissions during metal alloy production, the effects such particles have on human cells, characterization of RPE and RPE use in the industry, identify psychological factors' relationships with the use of RPE and evaluate the efficacy of performing a knowledge-based intervention in order to improve the use of RPE. The studies included in this thesis deal with the last two topics.

Preparatory work

One smelting plant was recruited as a pilot plant to act as a test base for the development of the questionnaire, testing and training with RPE fit-testing equipment, conduct focus groups and intervention development. The primary researcher spent three work-shifts with employees at the plant to observe job-tasks, converse with employees about production, safety, organization and work-environment in order to gain insight into the current situation for the smelter workers. The researcher explained that the project was aiming at learning what smelter workers thought and felt about the use of personal protective equipment and to provide them with proper objective respirator fit-testing in order to facilitate and optimize protection.

Development of questionnaire

An assessment tool to investigate our research question did not exist specifically for the smelter industry. The development of a measure was therefore a necessity. A pilot questionnaire was developed in several steps, based on an open answer questionnaire and results from focus groups. The stepwise method for the development of the pilot questionnaire is described below.

Open answer questionnaire.

In order to create items for *the theory of planned behavior* section of the questionnaire, an open answer scale comprising 9 items was sent to 10 employees from three smelters according to the description by (Fishbein & Ajzen, 2009). The objective of the open answer questionnaire was to elicit behavioral outcomes (positive and negative outcomes of respirator use), normative referents (individuals or groups who may or may not acknowledge the use of respirators) and control factors (circumstances that influence respirator use). Results from the survey functioned as the foundation for the creation of items on attitudes, subjective norms, perceived behavioral control, intention and previous behavior used in the pilot-testing questionnaire.

Focus groups.

Focus groups were used to aid in item generation and providing general insights in the smelter's work life. Twenty-eight participants from the pilot plant volunteered to attend the focus group sessions together with two researchers. The focus groups were designed using previous literature (Kitzinger, 1994, 1995; Morgan, 1996; Stewart & Shamdasani, 2014). Participants were divided into 7 groups, comprising 2-5 persons. A meeting room in the plant's administrative building was used and researchers supplied snacks and refreshments. Participants and researchers signed informed consent-forms agreeing that the interviews would be anonymous, and any information gained would solely be used in the construction items for the questionnaire. Participants were also informed that they could withdraw from the focus groups at any time and without any reason. All participants agreed to audio-recording. Interviews were conducted as informal conversations, where the participants were free to discuss topics such as job-tasks, safety, personal protective equipment, organization and anything they might deemed related to safety in the workplace. The researchers used a list of topics and open questions to guide the conversation.

The focus groups yielded 384 minutes of audio recording. Following the focus groups, the researchers listened to the audio recordings. It appeared that the main difficulties concerning the use of respiratory protective equipment were poor compatibility with other personal protective equipment, i.e. glasses, sweat, communication difficulties and that sometimes, if exposures were particularly high, the filters would clog up. These issues would make performing job-tasks and protect oneself constantly problematic. The nature of some job-tasks prevents the worker from taking a break to replace the RPE if necessary. Statements from participants were converted into single-items, which subsequently were discussed and modified by the research group.

Preliminary questionnaire.

A preliminary questionnaire was created based on the open answer questionnaire and the focus groups and distributed to 31 employees at four smelting plants for testing. A response rate of 71% was achieved (n=22). Adjustments were made based on preliminary analysis and comments from employees.

Pilot questionnaire.

A pilot assessment battery was developed containing several different instruments and demographics variables regarded as relevant for RPE use. The content was the following: demographics, work history, safety training, perceived exposure, perceived risk of exposure, perceived respiratory symptoms (asthma & COPD), subjective health assessment, smoking, RPE use & knowledge, safety climate, work experience measurement scale, single items (RPE knowledge & use, social pressure, perception of control, training, management), TPB scales and personality facets. The TPB scales, safety climate and work experience measurement scales were included to explain psychological factors in relation to RPE use. In total, the pilot questionnaire comprised 221 items and was delivered to 85 employees at the pilot-plant. The goal was to perform exploratory and confirmatory factor analysis on the TPB

items, and after data collection to discuss the questionnaire with the plant's health & safety (H&S) committee. However, only 39 (46% response rate) questionnaires were returned, making factor analysis results inconclusive. Moreover, many items in the TPB model showed ceiling effects. The subjective analysis hinted towards some structure in the theoretical model, however. The plants H&S committee comprised employee representatives, shift-managers from all sections of the work-site and management. The committee was encouraged to provide constructive criticisms regarding item wording, readability, questionnaire structure or any other issues. The results from both analysis and input from the committee were discussed and used by the research group and university contacts to make adjustments accordingly. Items with ceiling effects were reworded. A sub-scale from the WEMS (Reorganization) was removed due to irrelevance to the target population and scale order was adjusted so that the most salient questions were moved to the beginning. The TPB scale was also moved to the top of the questionnaire, after demographics, to ensure that other items did not influence TPB-responses. This placement also increased the chance that participants who finally dropped out would at least respond to the TPB. The initial pool of 52 TPB items was reduced to 29 at the end of the pilot study.

A short scale for Safety Climate (SC)

Hahn and Murphy (2008) developed and validated a short scale of safety climate. The scale included six items measuring four dimensions, one item measured coworker behavior norms, one measured safety feedback, three measured management commitment and one measured worker involvement in safety.

In the current thesis, the instrument was translated to Norwegian using a back-translation method (Sperber, 2004). Five individuals who were not part of the project and were fluent in Norwegian language translated the English version into Norwegian. For the back translation into English, the Norwegian version was sent to five further individuals. The

researchers reviewed the translations and chose the items which best kept the meaning of the question through the back-translation. All items were scored on a Likert-scale from 1 to 4 where 1 corresponded to *"Completely disagree"* and 4 to *"Completely agree"*.

The Work Experience Measurement Scale (WEMS)

The WEMS was designed to gain insight in a wide spectrum of employee work experience. The scale is comprised of the following sub-scales; management, reorganization, internal work experience, pressure of time, autonomy and supportive working conditions (Nilsson, 2010; Nilsson et al., 2013). The original scale was Swedish and a back-translation method comparable to the one used for the safety climate scale above was used to translate the scale to Norwegian (Sperber, 2004). The sub-scale reorganization was deemed irrelevant for the target population and was removed. All items in the scale were measured on a Likert-scale ranging from 1 *"Completely disagree"* to 6 *"Completely agree"*.

Single items

Single items were generated based on topics addressed in the focus groups. Recordings were used as background for item generation. Topics discussed were safety, management, protective equipment, job tasks, safety climate, and more. All single items were scored on a seven-point Likert-scale ranging from 1-7, where 1 corresponded to *"Completely disagree"* and 7 to *"Completely agree"*.

Respiratory health

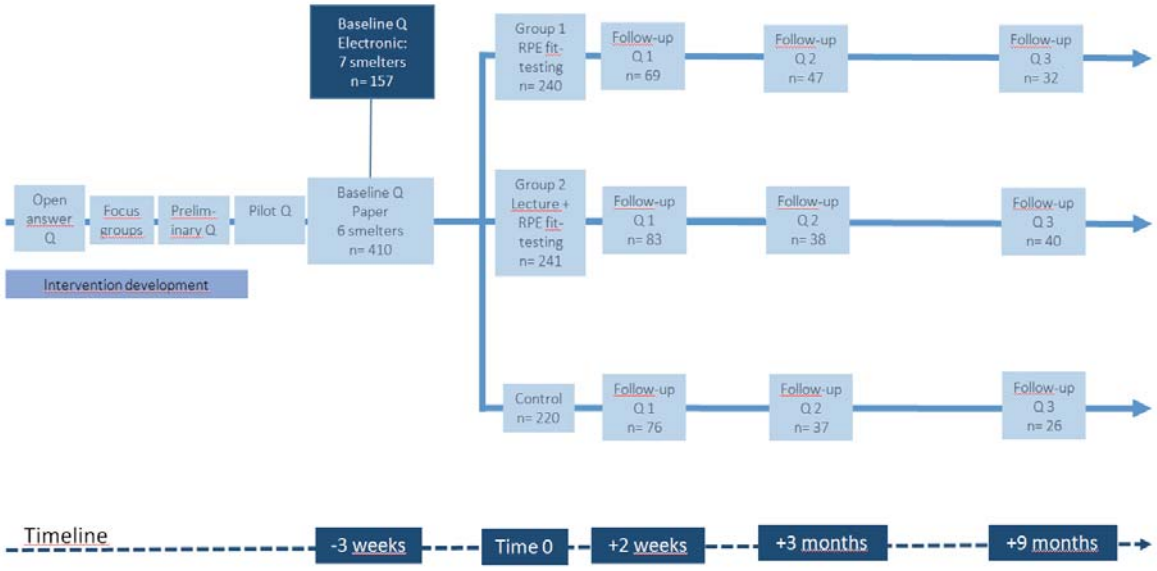
A short scale of five items was applied to measure the subjective experience of respiratory health. The scale has previously been used on seafood processing workers and seeks to gain insight in whether or not participants experience respiratory symptoms of asthma and COPD (Thomassen, Aasmoe, Bang, & Braaten, 2017). Q1.1: "*Have you in the past 12 months experienced wheezing chest*". Q1:2: "*If yes on the previous question, where you short of breath as well?* ". Q2.1: "*Do you normally cough or ahem in the mornings?*".

Q2.2: "*If yes on the previous question, do you normally cough up phlegm as well?* ". Q3: "*Do you experience coughing almost daily for periods of three months or longer during a year?".* The scale was thought to influence respirator use, as it was expected that participants who experienced more symptoms would perhaps be more positively inclined to the use respirators due to an increased symptom load.

Main study

The design was a randomized controlled before and after survey. Questionnaires were distributed at four intervals, at baseline (before intervention), and three follow-ups at two weeks, three months and nine months post intervention, respectively. See figure 2 for timeline of the project.

Figure 2. Project DeMaskUs timeline.



Recruitment

Participants were recruited from thirteen Norwegian smelting plants which had agreed to participation during 2015. Participants from thirteen plants answered the baseline questionnaire, and of these thirteen, six plants took part in the intervention study. Participating smelting plants were members of the Norwegian Ferroalloy Producers Research Association

and two silicon carbide producers with particular interest in the research topics addressed by this project. Members from the research group visited the plants and held meetings with management and employees in order to disseminate information about the project.

The plants included in the intervention study were chosen because they had not yet implemented RPE fit testing in their regular HSE program. The contact person at each plant sent a list of participating employees to the research group. The inclusion criteria for participation were that the participants had to be 18 years or older and work in any position at the plants where they had been currently or could be exposed to the work environment were included. There were no additional screening processes prior to the study.

Baseline questionnaire

Data collection in the baseline survey was performed either by sending questionnaires by e-mail (for the seven non-intervention smelters) or by sending envelopes containing the questionnaire in individually named envelopes to the plants, where contact personnel would distribute them to the participants (for the six intervention smelters). The envelopes contained a questionnaire, pre-paid envelope for return, information about informed consent, anonymity and participation, information about the project and information about lottery prizes that would be randomly selected. The envelopes were distributed at the smelters approximately three weeks prior to the intervention. Posters were designed and sent to participating intervention plants reminding employees that the project was soon commencing and asking for participation in the survey. The posters were displayed on site approximately one week before arrival. Reminder emails were also sent to contact personnel and participants in the email survey to increase the response rate. See Appendix I for baseline questionnaire.

Intervention

The intervention study was designed to deliver a lecture about dust exposure and health effects based on current and updated information tailored to each plant participating and conducting respirator fit-testing of employees. By tailoring the intervention towards specific plants and work-tasks, it was believed that the information would be more relevant for participants than general knowledge of exposures and health effects. Employees at the six intervention smelters were randomized into three groups before distribution of the baseline questionnaire, one control and two intervention groups. Information regarding which scheduled fit-testing and lecture they were assigned to was given together with the questionnaire. Intervention Group 1 received fit-testing and Group 2 both fit-testing and the adapted course in exposure and health. The control group did not participate in any intervention. Participants were randomized using a random number generator. However, all participants received the same baseline questionnaire.

Group 1.

The intervention was intended to function as a behavior modifier by increasing participants' knowledge about their exposure at the plant and possible health hazards. Participants were invited to receive respirator fit testing using a TSI Portacount Respirator Fit Tester 8038 (TSI inc, Shoreview, MN, USA). According to the HSE 282/28 standard the fit-factor (ambient particle concentration outside the RPE/particle concentration inside the RPE) should be at least 100 for a half-face RPE to pass the test (HSE, 2012).

The personnel operating the instrument gave instructions on how to properly don the RPE and what affects its fit, such as facial structure, facial hair, movement, perspiration and filter saturation. The intention of the intervention was two-fold. Firstly, the participants would experience a one-to-one interaction with trained personnel in order to learn about RPE fit and secondly, they were also able to see fit-factor changes in real-time and how important RPE fit

is. Participants were asked which RPE they normally used, and this RPE was tested first. If the RPE passed the test, they were welcomed to try another one. This choice was presented to participants in case they did not experience the RPE as comfortable. If the RPE failed, another RPE was recommended and the test was restarted. Participants were also instructed in proper RPE donning as part of the fit-testing.

Group 2.

The second intervention-group was subjected to the same RPE fit-testing as Group 1. In addition, they were invited to participate in a ~45 minutes lecture on exposure and health effects, tailored to each participating smelting plants´ production and exposure scenario. They were invited to ask questions at any time. The research group consisting of psychologists, physicians and toxicologists constructed the design and content of the course. The idea was to provide accurate information from credible sources to allow the workers to make adequate decisions concerning their health. The intention of the lecture was to provide participants with up-to-date information on exposure, health effects and protective measures. A specialist physician in occupational medicine and a toxicologist gave the three-parts lecture. The first part by a toxicologist, consisted of information regarding particulate respiratory exposures (dust, fumes and gases) in general and plant specific exposure data providing the participants with insight of the location of different types of exposure within the plant, including their relation to specific job-tasks. The aim of the in-depth tailored information was to make the lecture as relevant as possible for the individual employee. The second part was delivered by a physician and provided information of how the different types of exposure affect the respiratory system and which symptoms and diseases could develop. The participants were encouraged to participate in some interactive sections of the lecture, such as passing around dust filters that had been used at their smelter plant, to allow the participants to see how much dust the filter had collected in an hour-long period of time. The toxicologist then described

different types of RPE and how they function, protect against exposures and how important they may be in reducing exposure. After the lecture, participants were welcomed to ask questions and discuss the subject matter. The meaning of increased risk was also discussed. Overall, the lecture was intended to give detailed information that would support participants in making good decisions with respect to RPE use.

Follow-up Questionnaires

The follow-up questionnaires (see appendix II for follow-up three questionnaire) were condensed versions of the baseline questionnaire, containing items that were assumed to change due to the intervention. Number of items were reduced to 78, where some had multiple responses possible. Three questions were added to two of the follow-up questionnaires (three months and nine months) that were not of interest to the thesis. The questionnaires were sent to the intervention plants' contact persons for distribution. Participants received a personally addressed envelope containing the questionnaire, brief information of the follow-up study, lottery information and a pre-paid envelope for return. A soft deadline for questionnaire response was set at approximately two weeks after they received the envelope.

Ethical considerations

The Regional Committee for Medical and Health Research Ethics in Norway considered the activities described by the project as irrelevant for approval according to the Norwegian health research legislations. The Norwegian Center for Research Data approved methods for collecting and storing data. All participants in all activities were informed that participation was voluntary, that they could at any point withdraw from the study and that all data collected would be anonymous and solely used for analysis in the current project. The first page after the front-page of all questionnaires included information on informed consent.

Main findings: Papers I-IV

Sample

The study collected questionnaires at intervals and the total number of employees that received the baseline questionnaire was 1243. 710 for the paper version, and 533 for the e-form version. 567/1243 responded (45.61%). The average baseline respondent was a 45 years old male with a high-school level education, 19 years work experience in the smelter industry and living in a relationship.

The first and second study was based on baseline measures whereas the third study compared baseline versus follow-up data to investigate effects from the intervention. Participants were randomized into three groups based on id-codes. In total, 701 questionnaires were delivered for each follow-up study, follow-up one yielded 228 responses (33%), 76 controls, 69 in Group 1 and 83 in Group 2. The fourth study was based on the first follow-up one, two and three. Follow-up two received 209 responses (30%), 57 controls, 82 in Group 1 and 64 in Group2. Follow-up three received 164 responses (23%), 43 controls, 56 in Group 1 and 65 in Group 2. There was a discrepancy in respondents on follow-up studies, i.e. some participants who responded to follow-up 1 did not respond to follow-up 2. Therefore, there were fewer respondents to test between time points than total respondents at each time point. Study three and four both use both baseline data and follow-up data for comparing efficacy of intervention. Study three investigated immediate effect of intervention, while study four evaluated effects over three and nine months post intervention.

Paper I

567 Norwegian smelter employees responded to the baseline questionnaire. Total response rate was 45.2% (58% for the 410/710 paper versions and 28% for the 157/533 E-versions). The aim of the study was to perform descriptive analysis of items investigating reasons for not wearing respiratory protective equipment (Hegseth, Robertsen, Aminoff,

Vangberg, & Føreland, 2018). Two demographics, two work- and exposure related and three items regarding employees' use of respiratory protective equipment were presented in the results. In order to assess whether or not RPE use was relevant for the individual employee, one item asked for area of work. 425 (77%) reported to be working in production or maintenance, 91 (17%) worked in management and 28 (6%) answered *"other"*, i.e. administration, warehouse or cleaning staff.

98.2% of participants reported that they were exposed to at least one hazardous exposure during a work-week. The most common exposures were reported to be quartz dust, FeSi dust, Si dust, Mn dust and CO gas, which indicated that RPE use was indeed relevant for the majority of employees.

An open-ended follow-up question invited participants to provide further response as to why they did not always use RPE. Ninety-six employees responded to this question. Their responses were condensed by the researchers for clarification. Reasons given were as follows; *"Condensation, mismatch with protective goggles", "Excuses, forgetfulness and laziness", "It is not needed in the areas where I work", "Communication issues", "Heat, stress and sweat", "Health issues (dermal or respiratory), "Administrative or organizational issues"* and *"Practicalities"*.

The final item reported in this study was *"What percentage of time spent in mandatory of exposed (gases/dust/fumes) areas do you use RPE?"*. The item response ranged from 0-100% on a visual analogue scale. Responses were converted into five categories.

The key findings of this survey were that most employees perceived to be exposed to respiratory health-risk via their line of work, most of them still using disposable RPEs'. In addition, a significant percentage of employees reported that they do not always use RPE even though they knew they should, naming practical issues such as condensation, mismatch with other protective equipment, communication and heat as primary reasons. The results from this

study was important for gaining insight in the current situation regarding respirator use at Norwegian smelters.

Paper II

The aim of this study was to investigate psychological factors influencing intention to and reported use of respiratory protective equipment (Robertsen, Siebler, et al., 2018). A questionnaire was created comprising demographics, theory of planned behavior, safety climate, work experience and single items having emerged from focus group interviews and pilot questionnaires. Confirmatory factor analysis was used to validate and optimize the TPB scales. Adequate psychometric values were achieved for the final instrument. The relationship between TPB, safety climate and work experience, intention and reported respirator use was reported. The results indicated that the latent variables subjective norms, attitudes towards the behavior and safety climate were the best predictors of intention to use respirators. Among the demographic variables, single participants, i.e. those who had previously participated in respirator fit-testing and those who spent more hour on average per day in exposed areas showed to negatively influence intention to use respirators. Education level was shown to positively influence intent to use respirators.

A regression analysis predicting previous behavior using behavioral intention and perceived control as independent variables was made, indicating that intention to use respirators positively influenced previous behavior. Perceived behavioral control showed a negative relationship with previous behavior. However, perceived behavioral control did not achieve proper psychometric values, leaving interpretation problematic. In sum, the TPB model seemed to perform adequately in conjunction with safety climate. The WEMS did not influence intention or behavior in the current study, possibly indicating that the instrument measures a more overall picture of organizational climate.

Paper III

The aim of the third paper was to evaluate the effect of the intervention study two weeks post intervention (Robertsen, Hegseth, Føreland, Siebler, et al., 2018). Participants were randomized in three groups, one control and two interventions. Results indicated that the intervention groups achieved higher scores in knowledge and practicalities compared to the control group. Both intervention groups improved their score for knowledge and reduced their score for inconveniences. Group 1 improved in attitudes and organization, while Group 2 improved in subjective norms. Overall, the intervention groups improved scores in five out of eight variables, whereas the control group did not improve in any variable. A regression analysis indicated that participation in the intervention groups influenced intention to use respirators significantly for Group 1 and marginally significant for Group 2 when controlling for attitudes, subjective norms and perceived control.

Paper IV

The aim of the fourth paper was to evaluate intervention decay/maintenance of intervention effect at three and nine months post intervention by the follow-up questionnaires which were nearly identical to the one used two weeks post intervention (Robertsen, Hegseth, Føreland, Eisemann, & Vangberg, 2018). Variables used to determine effect of intervention were again analyzed to investigate how the changes maintained over time. The results indicated no fading in any measured variable. Additionally, two groups improved their scores between two weeks and nine months: Group 1 improved in subjective norms, while the control group improved in attitudes and organization perception. The results indicate that performing a knowledge-based behavior intervention among Norwegian smelters can lead to small but significant changes persisting over time. However, no measures were taken post nine months, thus no certain prediction of how often interventions should be performed can be derived.

The results indicated that the effect of the intervention did not fade over time. Possibly, spillover effects between groups lead to an improvement in the control group as well, explaining the finding that the control group improved their score for attitudes and organizational perception.

General discussion

The thesis set out to investigate RPE use in the Norwegian smelting industry from a psychological perspective. Factors influencing RPE use were investigated and an intervention with the aim of improving attitudes, knowledge and reported RPE use was applied. Effects of the intervention were assessed two weeks post intervention and followed through a nine month period. The development of a working model of describing attitudes was an important foundation of the project. The general findings are first discussed and subsequent implications follow.

The aim of the first paper was to gain insight in the use of RPE at Norwegian smelters. Specifically, we wanted to investigate practical aspects concerning RPE use such as perceived exposure, RPE use, types of RPE used and reasons for non-use. The study was important in order to unveil information of the current situation in Norwegian smelters. Reported prevalence of use was 75% or less in exposed areas for almost one third of the sample, indicating that focusing on optimizing RPE use was still important and relevant (Hegseth et al., 2018). One reason not to wear RPE could be the perception that such protection was not necessary in their specific work situation. Nevertheless, our results showed that 98% of the respondents reported that they were subject to one or more potentially respiratory hazardous exposure during a normal week at work. Hence, a perception of lack of hazardous exposures could not explain the reported sub-optimal RPE-use. As the participants reported that they experienced exposure, they should have had strong personal incentives to use RPE. It was therefore expected that there might be practical reasons for not using RPE. Indeed, while a third of the sample reported that they always used RPE, participants mentioned inconveniences, comfort issues, breathing difficulties, inaccessibility, colleagues not wearing RPE and not being confident in protection provided as reasons for not always using RPE. Condensation and/or incompatibility with protective glasses, forgetfulness, laziness,

communication issues and that RPE was not needed in certain areas were reported as reasons for non-use. Some specified heat stress and discomfort from sweat made the use of RPEs difficult, some reported health issues as reasons and some were dissatisfied with managements' lack of focus on exposure reducing measures. In sum, these findings indicated that there may have been conflicts between RPE design and work environments. Comparable barriers have been discussed in previous literature as well. In the hazardous waste industry, Salazar et al. (2001) found communication issues, personal comfort, reduced vision, cramped work-spaces and fatigue to be negative influences on RPE use to be. Laird, Pack, and Carr (1993) reported heat, difficulty breathing and reduced vision as reasons participants did not use RPE, or removed before finishing the work-task. These results indicate that these barriers are common across occupations, and were probably due to the design and function of the RPEs.

In regards to the use of RPE, perception of short-term nuisances of wearing RPE may outweigh the long-term risks of respiratory illness such as COPD. That is, difficulty breathing, fogging glasses, communication challenges and so on may take precedence over long-term protection, leading to sub-optimal use of RPE, as reported in (Hegseth et al., 2018). In an isolated situation, removing the RPE to avoid fogging glasses or talking to a colleague may not pose much of a threat. However, the accumulation of exposure over time increases probabilities of suffering from respiratory illness, comparable to how one will increase the risk of cancer by smoking. Still, if we were all fully rational with respect to our health, no one would be smoking. While smoking and the use of RPE are not identical activities, it is believed that the way in which we deal with the two are comparable. Using RPE can be uncomfortable, hot, sweaty and so on, but by using it constantly there will be a reduction in risk. Smoking however, feels good but is detrimental over time. Therefore, long-term protection provided by RPE use is interesting from a psychological perspective.

The Theory of Planned Behavior (and Theory of Reasoned Action) has been applied in health-behavior settings, effectively explaining the influence of the three sub-factors attitudes, subjective norms and perceived behavioral control to behavioral intention and behavior (Ajzen, 1991; Armitage & Conner, 2001; Godin & Kok, 1996). To our knowledge, this is the first time it has been used in a setting of Norwegian smelters.

In paper 2 the results from the baseline questionnaire were used to test whether the theoretical framework in the TPB was valid with respect to explaining behavior in this sample. The final model was tested with demographic variables and we concluded that subjective norms, attitudes towards behavior, safety climate and education level positively influenced intention to use respirators, in accordance with the proposed model (Robertsen, Siebler, et al., 2018). The strongest predictors for intention were affective- and cognitive components of attitudes and descriptive components of subjective norms. Whether or not employees liked RPE, perceived them comfortable (affective) or beneficial (cognitive) for their health, affected their intention to use RPE. Perception of colleagues´ behavior also influenced intention to use RPEs.

Furthermore, being single, having previously received fit-testing and average hours spent in exposed areas per day influenced intention negatively. The model also indicated that smokers might be less intent to use respirators. We found that participants spending more hours per day in exposed areas reported less intention to use RPE. This finding represented a paradox since more hours in exposure equals more risk, which should consequently lead employees to be more focused on risk reduction. However, increasing RPE use would most likely increase discomfort, communication issues and other inconveniences. The likely increased level of discomfort experienced may represent a barrier as concerns intention to use RPE. Ideally, the more time spent exposed should lead to an improvement in intention to use RPE, as it would increase protection. The fact that it does not, indicates that the barriers are

indeed strong. An alternative explanation may be that employees working in exposed areas over time have habituated to the exposure levels and therefore do not consider the exposure as a risk.

The finding that single persons reported less intent to use respirators might be due to a reduced amount of social pressure from home towards protective behavior. An increased social pressure from home may lead to a higher perceived responsibility for employees who live in a relationship. As found in the pilot study in paper II, participants named family and colleagues as social referents for subjective norms, indicating that they put some value on the opinions of family in relation to their use of RPE. In a study on adolescent drivers and safe driving behavior, Taubman - Ben-Ari and Katz - Ben-Ami (2012) showed that those who had parents who were better role models, encouraged safe driving, were more open to communication and generally more involved in their teens´ driving experience, resulted in teens reporting a higher level of conformity to authority. Furthermore, reckless driving was less popular amongst their friends. Even though these two scenarios are not identical, it is reasonable to assume that the effects of social pressure from family may be present in both situations. The importance of subjective norms is further supported by Trafimow and Finlay (1996), who investigated the relationship between attitudes and subjective norms across many behaviors. They found that while attitudes were the best predictors, subjective norms were indeed important. Cestac, Paran, and Delhomme (2011) also found subjective norms to be a significant predictor in speeding behavior for young drivers. Furthermore, a study on aircraft maintenance workers showed that subjective norms and management attitudes were important predictors of intentional but unsafe behaviors, where subjective norms was shown to have influence on intention comparable to our study (Fogarty & Shaw, 2010). As the results of the current project and previous literature indicate, subjective norms are important predictors of behavior.

The inclusion of the short scale for safety climate in the model, which in some respects can be related to subjective norms, also showed a significant relationship with intention to use RPE. A short scale is more time-economic and at the same time covering important determinants of safety climate. However, it should be noted that a general overview may not be able to give detailed insights in possible problem areas. The results indicated that employees' subjective norms and perceptions of safety climate had a significant impact on their intent to use RPE. It may be inferred that employees who perceived management as present and motivated in relation to safety work, and experienced open and safe channels to convey safety related issues report improved intentions to use RPE. Previous literature supports that safety climate influences safe behavior in work-environments (Cooper & Phillips, 2004; Dejoy et al., 1995; Neal, Griffin, & Hart, 2000). The focus of the current project was to investigate individual factors related to RPE use and results from the safety climate scale was not further investigated. However, on an organizational level this may be of interest. The industry should recognize the link between safety climate, its determinants, and the use of RPE. Explained variance in our model was comparable to results from previous literature, however, there were some discrepancies. While Armitage and Conner (2001) reported similar explained variance, in contrast to our results, they note that the subjective norms construct was generally not a good predictor of intention. Aside from discrepancies, our results indicate that smelter workers are not unique, i.e. they are likewise influenced by their surroundings as the rest of us. The social influence of colleagues and organization should not be overlooked when working to improve behavior in the workplace. The social influence of colleagues should thus be incorporated in strategies to improve safe behaviors. For instance, one could attempt to introduce a “buddy system”, where each employee has a specific person they are advised to keep an eye on for checking that their equipment is up to

date, discussing work issues and more. Such an approach could help improve individual accountability while at work.

An unexpected result from our study was the inefficiency of perceived behavioral control (PBC), discussed in paper II. As described by Fishbein and Ajzen (2009), PBC should positively influence intention and behavior. In our study, the PBC - intention relationship was negative and not significant. It could be argued that the model described by the current project supported the TRA more than the TPB. However, a possible explanation for our result is that participants did not feel in control of when they had to use RPE. Some plants have mandatory areas where RPE is a must with sanctions if employees are caught not following regulations. In these situations, the employee may not feel in control at all, i.e. being forced to use RPE. As items included in the model measure autonomy of RPE use, this explanation is plausible. Another probable explanation could be that the instrument may have been flawed by items designed to measure PBC which did not work as intended.

In sum, the modified version of the TPB applied in this study was partially successful, as *Attitudes* and *Subjective norms* performed according to theory, with adequate psychometric values and explained variance. Godin and Kok (1996) reviewed 56 studies (1985 - 1996) using the TPB to investigate health-related behaviors, overall observing an average variance explained of 41% for the prediction of intention, and an average variance explained of 34% for the prediction of behavior. Godin and Kok (1996) note that the efficacy of the theory seems to vary somewhat between health-related behavior categories, perhaps indicating that the theory fits better in some behavioral aspects than others. Armitage and Conner (2001) reviewed 185 studies employing the TPB published until1997 and showed that the variance explained by the model was 39% for the prediction of intention and 27% for the prediction of behavior.

In order for employees to properly protect themselves, they need to have correct knowledge, allowing them to perceive risk as close to real risk. The understanding of work environment, potential risks and how to deal with those risks is paramount. Griffin and Neal (2000) showed in two studies that safety knowledge was an important mediator between safety climate and safety performance for employees of mining and manufacturing sites. Burke et al. (2006) provided further evidence for the link between safety training, safety knowledge and improved safe behaviors in a review of 95 studies. Specifically, they found that as training methods were more engaging, better knowledge acquisition and less accidents, illnesses and injuries were observed. Christian et al. (2009) reported similar results, concluding that safety knowledge and safety motivation were strongly related to safety performance behaviors.

One hypothesis in the current project was that by increasing knowledge, we could influence cognitive components of attitudes towards RPE use, leading to an improvement in intention in accordance with the TPB. According to findings in Paper I, barriers against the use of RPE comprised factors like comfort issues. These barriers represented affective components which could influence intention negatively. The fit-testing reported in paper III could possibly have accounted for the improved attitudes for Group 1 by providing participants with correctly fitted RPE (Robertsen, Hegseth, Føreland, Siebler, et al., 2018). Group 2 also showed improved attitudes post intervention, however the results were non-significant. Based on the findings described in paper 2, the theoretical framework was applicable in our sample, and altering knowledge should accordingly result in a change in the other factors, i.e. attitudes, intention. Dealing with workplace risks is normally not employees´ primary concern, as attention is aimed at their job-tasks. However, an employee with correct knowledge of the distribution and potential effects of harmful exposures will be in a better position to guard themselves than someone without that knowledge. While some

exposure is clearly visible in the atmosphere, ultrafine dust, fumes and gases are not. One anecdote emerged from several plants described workers behavior when the sun shone onto the floor of production halls. As the sun shone through dust and fumes, a clearly visible column of light appeared. Workers were observed walking around these columns, not through them. This speaks to our behavior as human beings, things we can clearly see, we can avoid. However, particles reflecting light are everywhere, although not always perceived and therefore not taken into account. Hence, knowledge of the potential hazardous exposures encountered is an essential premise for optimal protective behaviour. One of the main aims of the current project was to apply an intervention to provide employees with correct and up to date knowledge regarding exposure in the workplace, how such exposure can affect the human body over time and how RPE can be useful in protecting against such exposure. Interventions to improve health-related behaviors can comprise many different aspects. In the current intervention a classroom lecture was included. The lecture covered all the topics mentioned above. In addition, a complementary intervention was applied in the form of respirator fit testing, as it involved the participants in a more interactive way. Two separate groups where used to investigate whether fit-testing by itself would be an effective method of improving attitudes and knowledge and if the added knowledge of exposure and health effects provided by the lecture would be more effective. The interactive approach was intended to help participants gain a deeper understanding of exposure and protection, such that they would be more aware of ultrafine particles and how RPE can act as a barrier. By letting participants involve themselves in the lecture, it was assumed that they might better retain the knowledge provided. This was done to emphasize that the lecture was relevant to them and their work-site. The lecture included information on possible health effects that could be interpreted as frightening. The lecture was intended to operate through the central route of persuasion, however, information of negative health effects could lead participants to fear for

consequences. Fear operates mainly through the peripheral route of persuasion (Woods & West, 2010). In some situations however, fear may operate through the central route by stimulating participants to more thoroughly evaluate arguments (Das, De Wit, & Stroebe, 2003). By peripherally inducing behavior through negative attitudes, and centrally by influencing positive attitudes, participants are prompted to evaluate arguments more thoroughly. Since it is ethically questionable to induce fear in order to improve behavior and it can even have adverse effects on attitude change, the lecture was designed to be as devoid of fear inducing information as possible.

Furthermore, testing the RPE would allow the participant to find a RPE that provided proper levels of protection. It was assumed that if participants improved their knowledge of RPE and RPE fit, they would improve their attitudes and knowledge of RPE use. Based on the results in paper III and IV, the intervention groups had a small but positive effect on several of the measured variables, where the control group did not improve in any variables between baseline and two weeks. Results from paper III indicated that Group 1 improved knowledge, attitudes, organizational perception and inconveniences. Group 2 improved scores for knowledge, subjective norms and inconveniences. The control group showed no improvements on any variable. In knowledge and attitudes there were also significant differences between the two intervention groups. Previous studies have shown that training in fit-checking can improve successful donning rates of RPE (Myers et al., 1995), and that one-to-one training in qualitative fit-testing was effective in improving fit (Hannum et al., 1996). Furthermore, Or et al. (2012) demonstrated that participants who were trained in fit-checking achieved better fit-testing prior to intervention than those who did not receive fit-check training. Indicating that fit-checking can be an important tool to improve individual protection. Overall, the results indicate that training participants in fit-checking and using fit-testing has positive effects.

Carrico et al. (2007) used classroom training to improve knowledge of the mechanisms behind disease transmission, precautions and appropriate RPE use. In addition, one group received an intervention where they saw a doll coughing and dispersing fluorescent powder into a room, in order to visualize how particles disperse and how personal protective equipment efficiently stops contagion. The authors found that both groups improved knowledge, while the intervention group that received visual training more often placed RPE on patients than the lecture only group. Donham et al. (2011) used a multifaceted intervention program featuring education, training, occupational screenings and more to aid farmers to select and properly use RPE. Their intervention groups showed significant improvement in both RPE use and a decrease in acute symptoms. Dressel et al. (2007) used a two-part lecture-based intervention where one lecture comprised general information asthma and allergies, environmental influences, medication and prevention. The second lecture gave information about relevant occupational allergens that cause asthma, with a special focus on prevention. The results indicated that those participating in the educational intervention were less likely to report at least one symptom post intervention. Gjerde et al. (1991) used an educational intervention aiming to improve knowledge, attitudes and behaviors related to respiratory disease. Participants in the intervention group were mailed home-study modules with reference materials on swine confinement topics bi-monthly for a year. They found that the intervention group scored significantly better than the controls on all three measured aspects, indicating that increasing knowledge and attitudes can be effective in hazard prevention. Kim et al. (2012) used a single-session intervention with rotating stations where participants received information on work-related asthma and agricultural causes, spirometry testing, RPE demonstration and fit-testing, exposure reduction strategies and barriers to personal protective equipment use. Their intervention group showed positive changes in important measures such as RPE use. Shamsi et al. (2015) employed a social marketing intervention, where

intervention participants were given a free set of personal protective equipment (helmet, gloves and respirator). In addition to the equipment set, they received an information pamphlet describing the advantages of using the equipment and which risks they can reduce. Face-to-face counseling was provided for the unschooled participants, presumably those who were illiterate. The helmet had a sticker with an emotionally tailored message to remind them of caring for themselves because it was important to their families. The message was based on focus group discussions conducted prior to the intervention. Furthermore, engineers and foremen supervised the use of the equipment and motivated participants to use the equipment package. The results indicated that the intervention group significantly improved their use of helmet and respirator compared to the controls. The latter study indicates that novel interventions can be influential in improving the use of personal protective equipment. The interventions performed in the current project have comparable results to those found in literature. As current results were in accordance with previous findings, the conclusion that the interventions had an effect is viable.

The psychological factors comprising the Theory of planned behavior have previously been applied to measure intervention effect (Beale & Manstead, 1991; Orbell, Hodgkins, & Sheeran, 1997; Sheeran & Orbell, 1999; Van Ryn & Vinokur, 1992). TPB has also been used to both design- and measure effect of interventions (Brubaker & Fowler, 1990; Jemmott III et al., 1998; Murphy & Brubaker, 1990; Parker, Stradling, & Manstead, 1996; Rodgers & Brawley, 1993). Although the model has been widely applied, it has not been free of criticism. For instance, Sniehotta, Presseau, and Araújo-Soares (2014) refer to criticism accusing the TPB of being too rational, ignoring possible unconscious influences to behavior (Sheeran, Gollwitzer, & Bargh, 2013). Furthermore, they assert that the TPB is too rigid in its explanatory nature, failing to account for the effects of behavior on cognition (McEachan, Conner, Taylor, & Lawton, 2011). Moreover, they mention concerns of validity and utility,

stating that mediation assumptions in the TPB are conflicting with regards to evidence (Araújo-Soares, Rodrigues, Presseau, & Sniehotta, 2013; Conner, Godin, Sheeran, & Germain, 2013) and that the TPB does not help researchers develop meaningful interventions which are difficult to test experimentally and do not perform better than other theories (Sutton, 2003). Ajzen (2014) responded to the criticism stating that the theory is not as static as proposed by the critics, that it does indeed describe feed-back loops from behavior to antecedent factors. Furthermore, he stated that the relationship between intention and behavior is more difficult to predict due to the differences between a cross-sectional situation when the participants respond to a questionnaire versus a real-life situation, possible accounting for situations where there are readily available positive intentions to perform a behavior when responding to a questionnaire and not available at the time to execute a behavior. While the criticism may be legitimate, applying the model in a real life situation is difficult. It would be extremely impractical, if not impossible, as it would require participants to respond to the questionnaire while in working situations. However, the TPB describes aspects of behavior and is not claiming to fully explain all nuances of human behavior. The fact that the structures of the model were reflected in the data lends credibility to the efficacy of the model, even if there were some discrepancies (Robertsen, Siebler, et al., 2018).

The current project used the TPB to design a model of the TPB sub-structures with the addition of safety climate and WEMS, and to measure effect by investigating changes in factors between pre and post intervention. Additionally, basic factors were constructed addressing perceived knowledge, inconveniences, organization and previous use of respirators. As indicated by the results, participation in either intervention group was positively related to intent to use respirators two weeks post intervention. Participants in the intervention groups also improved in their scores for perceived knowledge. An improvement in intention should lead to an improvement of behavior as well, as discussed in paper II,

further supported by (Armitage & Conner, 2001; Fishbein & Ajzen, 2009). However, the common theme for not using RPE related to practical issues such as comfort, communication and poor compatibility between respirator and other protective equipment. These issues may have represented a barrier for individuals who actually intend to use respirators. It is possible that these barriers were causal effects and negatively affected reported RPE use, despite shown improvements in variables such as knowledge and attitudes. This notion is strengthened by the subjective analysis of the pilot study in paper II, where some focus group participants, in addition to employees from the participating smelters stressed the point that they wanted to use respirators and knew that they were effective in reducing the possibility of detrimental health effects. Some also mentioned laziness for not always using RPE, by knowing they were only going to be in an exposed area for a very brief period of time, they would sometimes not bother to use RPE. It is important to attempt to dissuade employees from taking this route, and we believe it can be accomplished by making them more aware of the potential dangers of non-use. The finding that workers participating in the intervention reduced their perception of inconvenience regarding RPE use, shows that this may very well be effective. It may be that those who reported less inconvenience had improved their cognitive attitudes to such a degree that they negated negative affective components of attitudes, i.e. perceptions of discomfort.

As previously stated, the intervention groups scored higher in more of the measured variables than the control group, indicating that the intervention had a positive effect. The regression model presented in paper III partially reproduced the results from paper II, however, in paper III, subjective norms did not influence intention to the same degree as in paper II. The model used was not quite the same as in paper II, with the addition of previous use as a predictor of intent. In paper III, the strength of the relationship of the TPB constructs changed somewhat compared to the baseline model. *Previous use* was the best predictor,

followed by *attitudes towards the behavior*, *subjective norms* and *perceived control*. All TPB factors were significant. Participation in Group 1 influenced intent while participation in Group 2 was marginally significant. The results indicate that participation on the intervention had a positive effect on intention to use respirators, strengthening the results from the single-factor analysis between groups over time. The changes in relationship strength for subjective norms in this regression might have been due to the inclusion of previous behavior, which may have controlled for some previously unexplained variance.

Baker et al. (2015) reviewed literature on tailored interventions taking into account and identifying barriers that could influence efficacy of the interventions. They conclude that tailored interventions can be effective, however effects were variable and tended to be small to moderate. While the interventions designed in the current project were not based on predetermined barriers, it was assumed that tailoring the interventions to specific job-tasks and environments would make the contents perceived as more relevant, and therefore perhaps be more effective than general information.

Paper IV evaluated if the effects of the intervention maintained or decayed after three-nine months post intervention. Evaluating the scores of measured variables at these points in time and comparing them to the measures reported at two weeks gave an indication of how the intervention effect persisted over time. Previous literature on interventions performed in relation to weight loss indicates that unless participants are followed up, a fading of intervention effect can be expected over time. One study even showed intervention fading among participants who also received routine counseling (Elmer et al., 1995). Few intervention studies regarding RPE use present longitudinal data extending over one year. Donham et al. (2011) showed effect of intervention, in addition to maintenance of results over four years. However, their participants were routinely followed up during the project period.

It is unclear whether such a design would have produced better results than the current study presents.

There is some evidence in previous literature that the effect of knowledge based interventions decay after 12 months (Elmer et al., 1995). The current project only measured up to nine months, but any positive or negative changes could indicate future trends.

Although some groups improved significantly in score between two weeks and three-nine months, the size of the change was arguably small. Group 1 showed improved scores in subjective norms, while Group 2 showed improved scores in organizational perception and the controls showed improved scores in attitudes (Robertsen, Hegseth, Føreland, Eisemann, et al., 2018). Suggesting that those who participated in Group 1 saw their colleagues as more focused on safe work-behaviors. While both intervention groups reported less perceived inconveniences immediately two weeks post intervention, there were no differences between two weeks and three or nine months for any group in this variable, although visually the trend seems to be further declining. Our results indicate that both interventions made participants feel less inconvenience regarding the use of RPE post intervention. It may be that barriers have not changed, but the perception of the barriers changed, such that the employees perceived them as less inconveniencing.

The need for better solutions and better compatibility between personal protective equipment, i.e. glasses, helmet and RPE is apparent. The findings revealed that scores for attitudes, subjective norms, intention to use respirators and reported respirator use were relatively high in all smelters included in this study. While engineering solutions are effective in reducing exposure, the results of this project give reason to believe that an effort to improve knowledge and attitudes may have had a positive impact on factors influencing RPE use.

In sum, participation in either intervention group had small but positive effects on employees´ attitudes and knowledge. A central route of persuasion chosen for the intervention

with competent lecturers, relevant information and engaging fit-testing may have aided participants´ assimilation of the information, and lead to changes according to psychological theory (Bohner & Wänke, 2002; Fishbein & Ajzen, 2009; Petty & Cacioppo, 1986; Petty et al., 1999). Indicating that basing interventions on theoretical aspects may be effective in changing attitudes in relation to RPE use.

Practical implications and future perspectives

The project set out to design and test a strategy for optimizing RPE use in Norwegian smelters. During our project, industry personnel indicated that there was an ongoing shift from mostly using disposable respirators to powered filtering respirators. While this may be an optimal and desired path, our data showed that disposable respirators were still the most used RPE. We found that 79% reported that they used disposable respirators, while 17% used powered air filtering respirators (paper 1). This indicated that fit testing and optimizing the use of disposable filtering respirators still represented a challenge for the Norwegian smelter industry. Furthermore, it implied that our intervention also could be a useful tool for the industry after the study period. RPE fit-testing proved effective in not only testing and providing employees with proper protection, but as our results indicate, can also serve as an educational tool. Combined with a lecture condensing important, relevant information and disseminating it in a stepwise easily to understand manner, this strategy was deemed successful. Safety behavior is relevant in almost any industrial setting where people interact with heavy machinery and equipment. The principles described in the current project should be applicable in other areas of work apart from heavy industries, such as construction or fisheries. It could also be applied in the general public, i.e. in areas with heavy traffic loads which are known to produce particulate matters.

A striking result in our study was that 17% of respondents did not always have RPEs easily accessible. If participants feel that necessary RPE equipment is not properly supplied,

this may have reduced perception of management investment in creating a safe working environment. A reduced perception of managements' investment may have influenced safety climate negatively, subsequently leading to less use of RPE. Inaccessibility and inconveniences are to a certain extent management issues. Indeed, ensuring sufficient and proper RPE and training were two main points in a list of recommendations by Graveling et al. (2011). The selection of proper RPE equipment, training, availability was emphasized and they stress that the foundation of a well-functioning RPE program is management´s responsibility. Management at all levels should recognize the need for RPE, and ensure that technically appropriate RPE is selected and readily available and that information and training needs are met. A few participants in our study reported being dissatisfied with managements' focus on exposure reduction. Although they were few in number, such concerns should not be taken lightly. Employees could thus perceive that management ignores the steps referred to by the hierarchy of controls (NIOSH, 2016), possibly losing motivation to take preventive action.

Future research could apply the model used in this project to a larger sample to further validate our results. It would be very interesting to see the questionnaire applied across cultures and industries to investigate differences in attitudes, safety climate, and use of respirators. The link between personality and RPE use would also have been interesting to investigate.

The thesis answers some important questions in relation to the use of RPE in Norwegian smelters. Future research could make use of the model and intervention described to validate the current findings in other smelting plants and comparable occupations. The intervention described can be applied in order to update and maintain current employees’ knowledge as well as disseminate crucial information to new employees. Management can use the thesis' conclusions for future health- and safety work by employing the principles discussed.

Methodological considerations and limitations

The procedures of data collection in this project warrant some discussion. First and foremost, the foundation of our data relies on the reliability and validity of our questionnaire. As with any questionnaire-based study, the results must be interpreted cautiously. The construction of items intended to measure psychological constructs were performed by us as a research group, with the intention of using it for a specific purpose and setting. We based our TPB scales on the description of item creation from Fishbein and Ajzen (2009). The single-items were created on the basis of the focus groups conducted at the pilot smelting plant. Because all items were ultimately created by our research group, we cannot completely disregard any bias in item creation on our part. The TPB items were created with the help of an open answer pilot questionnaire sent to only 10 employees from three different smelters (Robertsen, Siebler, et al., 2018). The finished questionnaire was not thoroughly validated previous to the main study, which could also be a methodologically limiting factor.

Although the open answer questionnaire was completely anonymous, it was distributed via email to the participants which might have made them feel like their anonymity was compromised, which easily could influence responses.

The nature of the research question may also be a source of limitations. Due to the behavior in question being respirator use, it is logical for the respondents to assume that RPE use is a good thing. Responses given may therefore be subject to a social desirability bias, i.e. management or colleagues/family wants them to wear RPE. In addition they may also perceive some social pressure from their colleagues to do so. These perceptions may influence participants to report a higher use of respirators because they want to be perceived as good employees. We also saw differences between the plants on reported RPE use (results not shown), which may indicate different safety cultures/climates. Possibly employees at some plants were more open-minded, because they were more confident that they would not be

under scrutiny for under-reporting use than at other plants, where they perhaps enforce RPE use by consequences. Further investigation into these different cultures could be warranted.

One of the main aims of the study was to improve RPE use. The results did not indicate improved RPE use for either intervention group. While the median scores for reported RPE use improved, there were no statistically significant results. The method used to measure RPE use was discussed at the start of the project. Observational methods were discussed, but were found overly elaborate. Additionally, if researchers were to perform the observations, there would have been the risk of social desirability affecting the results. For these reasons, self-reported behavior was the choice. Some of the RPEs tested were not supplied by plants at the time of the interventions. It may have taken time for the plants to order these respirators in order to supply them to employees. If this was the case, employees may have been less inclined to improve use of ineffective RPE until the new ones were in stock. Anecdotal evidence from some plants indicated that there had been an improvement in both awareness and use of RPE post interventions, suggesting that our instruments to detect changes was not sufficiently sensitive to changes.

One of the concerns prior to conducting the interventions was the randomization design. The intra-plant design was chosen over inter-plant to control for potential confounding factors that may differ between locations. The intra-plant design may suffer from potential spillover effects between groups. There is no reason to assume that those in the intervention groups would not talk to curious colleagues in the control group, thereby discussing the contents of RPE fit-testing and the lecture. Also, if some employees gained new knowledge about their workplace, they might be eager to educate their peers.

Part of the reasoning behind the project was to develop a strategy for creating awareness around RPE and to disseminate up to date knowledge to the Norwegian smelting industry. RPE fit-testing has become more common in Norway during the last 5-10 years.

However, prior to the current project, most smelters had not implemented an RPE fit testing program, and their employees were unfamiliar with the concept.

RPE testing and lectures were provided for all participants once the intervention period was over. To our knowledge there were no planned RPE awareness work at the participating intervention smelters during the project period. However, there was some perceived pressure on behalf of the researchers to conduct RPE fit testing for the plants as soon as possible, as some of the plants had already started to discuss how they were going to implement RPE testing and wear eager to get started. The researchers took steps to ensure minimal interference by informing the plants that any RPE awareness work performed could interfere with results. For participants in the study, the act of answering questionnaires may have made them more aware of RPE issues and could have affected their responses. However, such an effect is hard to control or measure.

The baseline n of 567 may not have been adequate for the model described in paper II. In addition, the response rate for the baseline questionnaire was ~45%, with numbers dropping for each measure taken at two weeks, three and nine months post intervention. It might be that only participants who were interested in RPE use were the ones who responded. No non-responder analysis was conducted in this project. There might be systematic differences between respondents and non-respondents. Furthermore, the number of variables included in the analysis of paper II may have led to the discovery of spurious correlations and increase the probability of type I errors (false positive). The number of participants used in the paired testing in paper III and IV ranged from 23-153. The requirements for paired testing of participants are not as stringent as with structural equation modeling. However, when conducting any analysis, it is preferable to have as many respondents as possible. More respondents usually entail a smaller standard deviation and make detecting any differences easier, leading to more confident inferences. Ideally, a larger sample would have made

analysis easier. The project timeframe made a more thorough process for constructing and validating the final questionnaire difficult. Optimally, validation of the questionnaire on a larger sample prior to the main study would have been preferable. The number of available participants to conduct the pilot study was limited, as the main study sample needed to be prioritized. There was also a discrepancy in the response rates on the E-questionnaires vs. the paper questionnaires. The researchers spent some time visiting plants participating in the intervention to provide hands on information to both upper management and shift-managers, this discrepancy may be explained by the increased presence at the intervention plants. Reminders were sent to email recipients, which gave some more responses, for intervention plants, contact personnel motivated participants to respond. For follow-forms at intervention plants, there were no reminders, as the response time was set relatively short to have better control of when they responded.

Conclusion

The project revealed that Norwegian smelter workers spend time in exposed areas and that they are aware of being exposed to potentially harmful respiratory particles. Furthermore, some respondents report that they do not always use RPE while exposed due to practical reasons. The modified TPB model achieved satisfactory psychometric properties and indicated that *subjective norms* and *attitudes* towards RPE use were the two most important factors in predicting intention to use respirators.

The interventions designed to influence respirator use was evaluated and showed positive effects on several of the outcome measures, although not for the most important, namely reported respirator use. Two weeks post intervention it was shown that participation in the intervention had positive results on several of the measured variables compared to the controls. The intervention did not show any decay between two weeks and nine months post intervention. This shows that conducting interventions to improve attitudes, knowledge and behavior regarding RPE use in the Norwegian smelting industry had positive effects on some variables. However, there are clear barriers to RPE use that the intervention did not address, comfort and practical issues exerted possible negative influences on behavior according to our results.

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2. Robertsen, Ø., Siebler, F., Eisemann, M., Hegseth, M. N., Føreland, S., & Vangberg, H. C. B. (2018). *Predictors of respiratory protective equipment use in the Norwegian smelter industry. The role of the theory of planned behavior, safety climate and work experience in understanding protective behavior.* Frontiers in Psychology, 9(1366). doi:10.3389/fpsyg.2018.01366. Published.

3. Robertsen, Ø., Hegseth, M. N., Føreland, S., Siebler, F., Eisemann, M., & Vangberg, H. C. B. (2018). *The efficacy of a knowledge based and cognitive intervention to improve attitudes towards- and the use of respirators in the Norwegian smelter industry*. Under review in Annals of Work Exposures and Health

4. Robertsen, Ø., Hegseth, M.N., Føreland, S., Eisemann, M., Vangberg, H. C. B. (2018). *Longitudinal effects of an intervention to improve attitudes towards- and respirator use in the Norwegian smelter industry.* Unpublished manuscript.

Appendix I

ID-kode: ☐☐☐☐☐☐

UNIVERSITETSSYKEHUSET NORD-NORGE
DAVVI-NORGGA UNIVERSITEHTABUOHCCEVIESSU

Dine meninger om forebygging, sikkerhet og helse på jobb

Ferrolegeringsindustriens Forskningsforening (FFF)
The Norwegian Ferroalloy Producers Research Association

FINNFJORD · ERAMET NORWAY · GLENCORE MANGANESE NORWAY AS · Elkem · FESIL · SAINT-GOBAIN · WASHINGTON MILLS · SINTEF · ST. OLAVS HOSPITAL TRONDHEIM UNIVERSITY HOSPITAL · STAMI STATENS ARBEIDSMILJØINSTITUTT · Forskningsrådet

Invitasjon til deltakelse i forskningsprosjektet

"DeMaskUs"

Bakgrunn og formål

Formålet med studien er å forbedre arbeidshverdagen for smelteverksarbeidere i Norge. Studien består av flere deler og i denne delen av studien vil vi undersøke hvilke faktorer som spiller inn på bruken av verneutstyr, med hovedfokus på åndedrettsvern. Denne undersøkelsen inngår i en doktorgradsstudie ved Universitetet i Tromsø/Universitetssykehuset Nord-Norge. Prosjektet i sin helhet er et samarbeid mellom NTNU, SINTEF, Statens arbeidsmiljøinstitutt (STAMI), St.Olavs Hospital, Universitetssykehuset Nord-Norge og UiT – Norges arktiske universitet. Prosjektet er finansiert av Norsk Forskningsråd og Ferrolegeringsindustriens Forskningsforening samt norske Silisiumcarbid (SiC)-produsenter,

For å kunne si noe om hvilke faktorer som påvirker bruk av sikkerhetsutstyr er vi avhengig av deltakelse fra dere som jobber i industrien. Derfor inviteres du til deltakelse i dette prosjektet.

Hva innebærer deltakelse i studien?

Deltakelse i studien kan innebære en eller flere av følgende aktiviteter: Besvarelse av spørreskjema, gjennomføring av masketetthetsmåling og undervisning. I pilotstudien vil deltakerne også kunne bli spurt om å delta i fokusgrupper og gjennomføre en noe mer omfattende masketetthetsmåling enn vanlig, samt å besvare og evaluere et test-spørreskjema.

Hva skjer med informasjonen om deg?

Alle personopplysninger vil bli behandlet konfidensielt og anonymt. Det er kun stipendiaten og hans veiledere som vil behandle data ved endt innsamling. Innsamlet data vil lagres på Helse-Nords nettverk på Universitetssykehuset i Nord-Norge.

Deltakere vil ikke kunne identifiseres via spørreskjemaer. Ingen navn knyttes til disse.

Prosjektet skal etter planen avsluttes 01.07.2018.

Frivillig deltakelse

Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger om deg bli slettet. Å trekke seg fra studien vil ikke ha noen innvirkning for ditt arbeidsforhold.

Dersom du har spørsmål til studien, ta kontakt med Prosjektleder (arbeidspakke 2) Marit Nøst Hegseth på epost: marit.nost.hegseth@unn.no tlf: 776 26611. Stipendiat Øystein Robertsen, epost: oystein.robertsen@gmail.com / oystein.robertsen@unn.no. Tlf: 992 58188

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS og Regionale Komiteer for Medisinsk og Helsefaglig Forskningsetikk (REK).

Ved å svare på dette spørreskjemaet samtykker jeg til deltakelse i studien.

Vi understreker at deltagelse er frivillig, og at informasjonen du gir vil bli behandlet strengt konfidensielt. Takk for at du deltar i denne undersøkelsen.

Takk for at du deltar i denne undersøkelsen.

Identifikasjonsnøkkel

For at du skal kunne svare anonymt på spørreskjemaet skal du nå lage din egen ID-kode. Denne koden skal du bruke hver gang du svarer på et spørreskjema fra DeMaskUs. ID-Koden skal skrives inn øverst til høyre på første side av spørreskjemaet

Koden består av 6 tegn og den lager du slik:

Tegn nummer 1: Velg bokstav som tilhører verket du jobber på, se liste under

Tegn nummer 2: Første bokstav i din mors fornavn

Tegn nummer 3: Antall eldre brødre som du har (ett tall)

Tegn nummer 4 og 5: Nummeret på måneden som du er født i (to tall)

Tegn nummer 6: Første bokstav i mellomnavnet ditt. Hvis du ikke har mellomnavn, så bruk bokstaven X. Har du flere mellomnavn, velg første bokstav i første mellomnavn

Eksempel:

Tegn 1: Jeg jobber på Finnfjord. Første tegn blir derfor A
Tegn 2: Min mor heter Else. Andre tegn blir derfor E
Tegn 3: Jeg har ingen eldre brødre. Tredje tegn blir derfor 0
Tegn 4 og 5: Jeg er født i Juni. Fjerde og femte tegn blir derfor 06
Tegn 6: Mitt mellomnavn er Nilsen. Sjette tegn blir derfor N

Min ID-kode er da:

ID-kode: | A | E | 0 | 0 | 6 | N |

Liste over smelteverk:

Finnfjord = A
Glencore = B
Fesil = C
Wacker = D
Eramet Sauda = E
Eramet Porsgrunn = F
Eramet Kvinesdal = G
Washington Mills = H
Saint Gobain = I
Elkem Salten = J
Elkem Solar = K
Elkem Bjølvefossen = L
Elkem Bremanger = M
Elkem Thamshavn = N
Elkem Solar Herøya = O

Nummer på måneder:

Januar= 01
Februar = 02
Mars = 03
April = 04
Mai = 05
Juni = 06
Juli =07
August = 08
September= 09
Oktober=10
November = 11
Desember = 12

Informasjon om utfylling av skjemaet:

Du vil i dette spørreskjemaet bli bedt om å svare på forskjellige spørsmål og påstander. Enkelte spørsmål vil du kanskje oppleve som merkelige, men det er viktig at du svarer så godt du kan. Dersom det er spørsmål du av ulike grunner ikke har lyst å svare på, så er det helt i orden, men vi håper at du vil svare på alle. Det finnes ingen rette eller gale svar og vi er bare ute etter din mening. Skjemaet er satt sammen av flere forskjellige typer spørsmål. Vi vil blant annet spørre om historikk, kunnskap arbeidsforhold, din helse, holdninger og hvordan man opplever arbeidsplassen.

Skjemaet skal leses maskinelt, så du må bruke blå eller svart penn. Vennligst bruk blokkbokstaver og skriv så tydelig som mulig.
Det er også viktig at du krysser av presis inni rutene.

Slik: ☒ Ikke slik: ☐ X

Skriv tallet 1 som en rett strek. Slik: | Skriv tallet syv slik: 7

Hvis du har krysset av feil, korriger ved å sette en strek over feil kryss og sett kryss i riktig rute. Eksemplet under viser at riktig kryss er ved 1.

☒ 0 ☒ 1 ☐ 2 ☐ 3

Hvis du har skrevet feil tall, korriger ved å sette en strek over tallet som er feil og skriv det riktige tallet over eller ved siden av.

"DeMaskUs" - Riktig bruk av riktig maske

ID-kode: ☐☐☐☐☐☐

Dato for utfylling av skjemaet: ☐☐.☐☐.☐☐☐☐

Bakgrunn

1. Kjønn: ☐ Mann ☐ Kvinne

2. Alder: ☐☐ år

3. Hva er din nåværende sivilstatus?

☐ Enslig ☐ Gift ☐ Samboer ☐ Enke/ Enkemann ☐ Skilt/ Separert

4. Hvilket ansettelsesforhold har du?

☐ Fast ansatt ☐ Vikar/ Ekstrahjelp ☐ Har tidsbegrenset kontrakt ☐ Lærling ☐ Annet

5. Hvor mange barn har du? ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ Flere enn 3 barn

6. Hva er ditt høyeste utdanningsnivå?

☐ Grunnskole
☐ Videregående / Yrkesfag
☐ Fagbrev som privatist
☐ Universitet/ Høyskole (3 årig)
☐ Universitet/ Høyskole (mer enn 3 årig)

7. Har du tidligere gjennomført masketetthetsmåling? ☐ Ja ☐ Nei

Arbeidshistorikk

8. Hvor mange år har du arbeidet i smelteverksindustrien? ☐☐ år

9. Hvilken av de følgende kategorier beskriver best din stilling? *(Sett bare ett kryss)*

☐ Produksjon og vedlikehold

☐ Ledelse (Alle ledelsesnivå, inkludert skiftledelse)

☐ Annet (Administrasjon/ Lager/ Kantine o.l.)

10. Hvor tilbringer du det meste av arbeidstiden din? *(Sett bare ett kryss)*

☐ På kontor/ inne
☐ I kontrollrommet
☐ I produksjonslokalet/ ovnshall
☐ Kran/ Truck/ Hjullaster/ osv.
☐ Verksted
☐ Renseanlegg
☐ Lab
☐ Annet

Hvis annet, hvor: ☐

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11. I gjennomsnitt, hvor mange timer per arbeidsdag tilbringer du inne i ovnshall/produksjonslokale?

☐ Mindre enn 1 time ☐ 1 - 3 timer ☐ 4 - 6 timer ☐ 6 - 9 timer ☐ 10 + timer

12. Har du gjennomført sikkerhetskurs på din nåværende arbeidsplass?

☐ Ja ☐ Nei

Hvis ja, når gjennomførte du sist sikkerhetskurs i din bedrift?

☐ I løpet av siste år ☐ Siste 1 - 2 år ☐ Mer enn 2 år siden

Eksponering på arbeidsplassen

13. Hvilke av følgende blir du eksponert for jevnlig (oftere enn 1 gang per uke) i ditt arbeid?
(Du kan krysse av for flere alternativer)

☐ Kvartsstøv
☐ Polysykliske aromatiske hydrokarboner (PAH)
☐ FeSi-støv
☐ Si-støv
☐ Manganholdig-støv
☐ SiC-støv
☐ CO-gass
☐ CO_2-gass
☐ Svovelholdige gasser
☐ Sveiserøyk
☐ Støy
☐ Sterke elektromagnetiske felt
☐ Dieseleksos
☐ Ingen av disse
☐ Annet

14. Hvor farlig er de følgende? Ranger hver av påstandene fra 1-5, hvor 1 er minst farlig.

☐ Støv og gass ☐ Støy ☐ Varme, eksplosjon og brann ☐ Ulykker (fall, få ting i hodet, påkjørsel etc) ☐ Elektrisitet

15. Hvilke av de følgende anser du å være risikofaktorer som følge av din jobb?
(Du kan krysse av for flere alternativer)

☐ Strømstøt
☐ Muskel- eller skjelett-plager
☐ Lungesykdom
☐ Hørselsskade
☐ Stress/ utbrenthet
☐ Synskade
☐ Akutte skader (f. eks. brekke et ben eller få noe i hodet)
☐ Brannskade
☐ Annet
☐ Det er ikke sannsynlig at jeg kan oppleve noe av dette i min jobb

16.

1. Å bruke maske regelmessig i løpet av neste arbeidsuke vil for meg være..

	1	2	3	4	5	6	7	
Meget skadelig	☐	☐	☐	☐	☐	☐	☐	Ikke skadelig i det hele tattt
Meget ubehagelig	☐	☐	☐	☐	☐	☐	☐	Meget behagelig
Meget upraktisk	☐	☐	☐	☐	☐	☐	☐	Meget praktisk
Meget belastende	☐	☐	☐	☐	☐	☐	☐	Ikke belastende i det hele tatt
Veldig lite ønskelig	☐	☐	☐	☐	☐	☐	☐	Veldig ønskelig
Veldig irriterende	☐	☐	☐	☐	☐	☐	☐	Ikke irriterende i det hele tatt
I veien	☐	☐	☐	☐	☐	☐	☐	Ikke i veien i det hele tatt
Veldig tungt	☐	☐	☐	☐	☐	☐	☐	Veldig lett

2. Å alltid bruke maske inne på smelteverket i løpet av en arbeidsuke vil ha betydning for helsen min

	1	2	3	4	5	6	7	
Meget usannsynlig	☐	☐	☐	☐	☐	☐	☐	Meget sannsynlig

3. Å alltid sette helsen først er...

	1	2	3	4	5	6	7	
Meget uviktig	☐	☐	☐	☐	☐	☐	☐	Meget viktig

4. Jeg tror de fleste jeg kjenner setter pris på at jeg bruker maske på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

5. De fleste arbeidere som meg bruker maske hele tiden på jobb

	1	2	3	4	5	6	7	
Meget usannsynlig	☐	☐	☐	☐	☐	☐	☐	Meget sannsynlig

6. Familien min setter pris på at jeg bruker maske på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

7. Alle mine kolleger bruker maske hele tiden i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Veldig usannsynlig	☐	☐	☐	☐	☐	☐	☐	Veldig sannsynlig

8. Få arbeidere på smelteverket er flinke til å bruke maske på jobb i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Veldig usannsynlig	☐	☐	☐	☐	☐	☐	☐	Veldig sannsynlig

9 Mine kolleger på smelteverket bruker stort sett maske på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

10 Jeg ønsker stort sett å gjøre slik som mine kolleger når det gjelder maskebruk

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

11 Familen min synes jeg burde bruke maske hele tiden jeg er i utsatte områder på smelteverket

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

12 Når det gjelder bruk av maske på jobb vil jeg å gjøre det som familien min ønsker

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

13 Det er opp til meg om jeg bruker maske i smelteverket i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

14 Jeg tilpasser masken korrekt hver gang jeg tar den på

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

15 Jeg bestemmer selv i hvilke situasjoner jeg skal bruke maske i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

16 Jeg kan ikke bruke maske i alle situasjoner som krever det i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

17 Jeg bruker masken i arbeidssituasjoner selv om det krever mye av meg

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

18 Det at jeg bruker masken i krevende arbeidssituasjoner gjør at jeg alltid er beskyttet på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

19 Jeg kommer ikke til å bruke maske i smelteverket i løpet av neste arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

20 Jeg kommer til å bruke maske selv om den gjør det vanskeligere å puste

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

21 Jeg vil bruke maske i absolutt alle påkrevde situasjoner i løpet av neste arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

22 Jeg har tenkt å bruke maske selv om det er varmt og ubehagelig

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

23 Jeg har tenkt å bruke maske hele tiden jeg er inne i smelteverket i løpet av neste arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

24 Jeg tenker å bruke maske selv om det er upraktisk

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

I løpet av forrige arbeidsuke har jeg ...

25 alltid brukt masken i eksponerte områder

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

26 alltid brukt maske i påkrevde situasjoner

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

27 alltid byttet maske/filter ved behov

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

28 alltid brukt maske i henhold til reglementet

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

29 aldri brukt maske der det er behov

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

17.

	Helt uenig 1	2	3	Helt enig 4
1. Nyansatte lærer raskt at de er forventet å følge gode rutiner for helse og sikkerhet.	☐	☐	☐	☐
2. Ansatte får beskjed når de ikke følger gode rutiner for helse og sikkerhet.	☐	☐	☐	☐
3. Ansatte og ledelsen jobber sammen for å sikre at forholdene er så trygge som mulig.	☐	☐	☐	☐
4. Det tas ingen store snarveier når de ansattes helse og sikkerhet står på spill.	☐	☐	☐	☐
5. De ansattes helse og sikkerhet er høyt prioritert hos ledelsen på min arbeidsplass.	☐	☐	☐	☐
6. Jeg føler jeg kan rapportere problemer med sikkerheten på min arbeidsplass.	☐	☐	☐	☐

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Masker / Verneutstyr

18.

	Helt uenig 1	2	3	4	5	6	Helt enig 7
Jeg syns at masken er behagelig å bruke	☐	☐	☐	☐	☐	☐	☐
Jeg synes at hjelm, maske og briller fungerer godt sammen	☐	☐	☐	☐	☐	☐	☐
Jeg tror skjegg påvirker hvor godt masken beskytter	☐	☐	☐	☐	☐	☐	☐
Jeg er trygg på at den masken jeg bruker fungerer som den skal	☐	☐	☐	☐	☐	☐	☐
Jeg synes det er vanskelig å kommunisere med kolleger når jeg har masken på	☐	☐	☐	☐	☐	☐	☐
Jeg tar av masken for å snakke med kolleger	☐	☐	☐	☐	☐	☐	☐
Enkelte arbeidsoppgaver gjør det umulig for meg å bruke maske	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at det er praktisk umulig å følge reglementet for bruk av verneutstyr	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at støvmasken blir fuktig og ubehagelig ved bruk	☐	☐	☐	☐	☐	☐	☐
Det er for mye styr å bytte maske ofte nok	☐	☐	☐	☐	☐	☐	☐
Det hender at jeg ikke orker å bytte maske selv om jeg vet at jeg burde det	☐	☐	☐	☐	☐	☐	☐
Det er uproblematisk for meg å få tak i maske når jeg trenger det	☐	☐	☐	☐	☐	☐	☐
Organisasjonen er velvillig innstilt til innkjøp av tilpasset verneutstyr	☐	☐	☐	☐	☐	☐	☐
Jeg står fritt til å bruke så mange masker jeg vil	☐	☐	☐	☐	☐	☐	☐
Påbud fører til mer bruk av maske	☐	☐	☐	☐	☐	☐	☐
Bedriften har fokus på at det skal brukes maske	☐	☐	☐	☐	☐	☐	☐
Ledelsen virker å være fokusert på å forbedre innemiljøet	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at tiltak som foreslåes av de ansatte blir tatt opp og diskutert på en redelig måte	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at bedriften ønsker å gjøre det som er riktig for sine ansatte	☐	☐	☐	☐	☐	☐	☐

	Helt uenig 1	2	3	4	5	6	Helt enig 7
Jeg holdes hele tiden oppdatert på nye sikkerhetsprosedyrer	☐	☐	☐	☐	☐	☐	☐
Bedriften gir meg god informasjon om hva jeg kan bli utsatt for i arbeidsmiljøet	☐	☐	☐	☐	☐	☐	☐
Jeg føler jeg har fått god informasjon om hvorfor jeg bør bruke maske	☐	☐	☐	☐	☐	☐	☐
Jeg vet hva masken beskytter meg mot	☐	☐	☐	☐	☐	☐	☐
Kommunikasjon mellom ledelsen og ansatte er god	☐	☐	☐	☐	☐	☐	☐
Opplæringen av nyansatte er god	☐	☐	☐	☐	☐	☐	☐
Jeg er kjent med retningslinjene for bruk av personlig verneutstyr	☐	☐	☐	☐	☐	☐	☐
Jeg er ofte redd på jobb	☐	☐	☐	☐	☐	☐	☐
Jeg bruker alltid påkrevd verneutstyr	☐	☐	☐	☐	☐	☐	☐
Jeg har selv ansvaret for om jeg bruker maske eller ikke	☐	☐	☐	☐	☐	☐	☐
Å bruke maske betyr noe positivt for helsen min	☐	☐	☐	☐	☐	☐	☐
Mine kollegaer er påpasselig med å bruke maske i påkrevde situasjoner	☐	☐	☐	☐	☐	☐	☐
Dersom man glemmer å bruke verneutstyr blir man påminnet av kollegaene	☐	☐	☐	☐	☐	☐	☐
Erfarne smelteverksarbeidere er mer opptatt av å bruke verneutstyr enn uerfarne	☐	☐	☐	☐	☐	☐	☐
Bruken av verneutstyr er noe som ofte diskuteres på min arbeidsplass	☐	☐	☐	☐	☐	☐	☐
Jeg føler at jeg har god kontroll over mine arbeidsoppgaver	☐	☐	☐	☐	☐	☐	☐
Jeg nekter å fullføre arbeidsoppgaver dersom jeg føler at det ikke er trygt	☐	☐	☐	☐	☐	☐	☐

Selvrapportering, helse

19. Har du i løpet av de siste 12 måneder hatt piping i brystet? ☐ Nei ☐ Ja

Hvis ja på spørsmålet over, var du tungpustet også? ☐ Nei ☐ Ja

20. Hoster eller harker (kremter) du vanligvis om morgenen? ☐ Nei ☐ Ja

Hvis ja på spørsmålet over, hoster du vanligvis opp spytt/slim? ☐ Nei ☐ Ja

21. Hoster du nærmest daglig til sammen i 3 måneder eller lenger i løpet av et år? ☐ Nei ☐ Ja

22. Hvordan vurderer du din egen helse sånn i alminnelighet?

☐ Meget dårlig ☐ Dårlig ☐ Verken god eller dårlig ☐ God ☐ Meget god

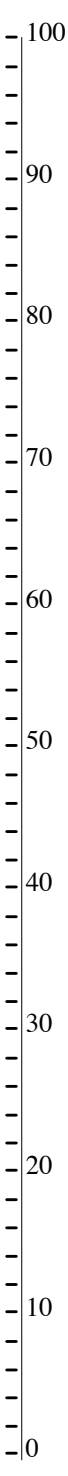
23.

Vi vil gjerne vite hvor god eller dårlig helsen din er I DAG

Denne skalaen er nummeret fra 0-100
100 betyr den beste helsen du kan tenke deg
0 betyr den dårligste helsen du kan tenke deg

Sett en X på skalaen for å angi hvordan helsen din er I DAG
Skriv deretter tallet du merket av på skalaen i boksen nedenfor:

Helsen din i dag: | | | |



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24.

	Helt uenig						Helt enig
	1	2	3	4	5	6	7
På de fleste måter er livet mitt nær idealet mitt	☐	☐	☐	☐	☐	☐	☐
Mine livsforhold er utmerkede	☐	☐	☐	☐	☐	☐	☐
Jeg er tilfreds med livet mitt	☐	☐	☐	☐	☐	☐	☐

25. Hender det at du røyker?

- ☐ Aldri
- ☐ Av og til
- ☐ 1 - 10 om dagen
- ☐ 10 - 20 om dagen
- ☐ Mer enn 20 om dagen
- ☐ Tidligere røyker, har sluttet

Maskebruk

26. Hvis du har brukt åndedrettsvern i løpet av det siste året, hvilke av de følgene beskriver best den typen?
(Du kan krysse av for flere alternativer)

- ☐ Filtrerende halvmaske (engangsmaske)
- ☐ Flergangs halvmaske med utskiftbare filter
- ☐ Helmaske med utskiftbare filter
- ☐ Motorassistert overtrykksmaske
- ☐ Kompressormaske
- ☐ Bærbart selvforsynt utstyr (f. eks. trykkluftflasker)

27. Det hender kanskje at du ikke bruker maske selv om du burde. Hva er grunnen til det?
(Du kan krysse av for flere alternativer)

Jeg bruker ikke alltid maske fordi ...

- ☐ ... den ikke gir meg god beskyttelse
- ☐ ... den er tung å puste i
- ☐ ... den ikke er tilgjengelig
- ☐ ... ingen andre rundt meg bruker den
- ☐ ... den er ubehagelig å ha på seg
- ☐ ... den er upraktisk å bruke
- ☐ Jeg bruker alltid maske
- ☐ Annet: ☐

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28. Hva er den viktigste grunnen til at du bruker maske? *Ranger fra 1 - 5, hvor 1 er viktigst og 5 minst viktig.*

Jeg bruker maske fordi ...

... ledelsen sier jeg må	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... jeg vet at den beskytter meg mot skadelig eksponering	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... de andre gjør det	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... jeg vil være et godt forbilde for de andre	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... jeg vil unngå straff	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Annet:

29. Hvor stor del av tiden bruker du maske når du er i utsatte (støv / gass) / påbudsområder?
(Sett kryss på linjen)

0% - 100%

30. Hvordan mottar du informasjon om ditt åndedrettsvern?
(Kryss av ALLE som passer)

- ☐ Kollegaer
- ☐ Arbeidsgiver
- ☐ Fagforening
- ☐ Verneombud
- ☐ Yrkesmagasiner
- ☐ Aldri mottatt informasjon
- ☐ Maske-emballasje / innpakning / eske
- ☐ Annet:

31.

Støttende forhold på arbeidsplassen

Vennligst ta stilling til følgende påstander om din arbeidssituasjon
Jo lenger til høyre du krysser av, desto mer enig er du i påstanden

	Helt uenig 1	2	3	4	5	Helt enig 6
Vi oppmuntrer og støtter hverandre på jobben	☐	☐	☐	☐	☐	☐
Det er god stemning på arbeidsplassen min	☐	☐	☐	☐	☐	☐
Jeg synes vi har rutiner som fungerer godt på arbeidsplassen min	☐	☐	☐	☐	☐	☐
Jeg får tilbakemelding på det arbeidet som jeg utfører	☐	☐	☐	☐	☐	☐
Jeg trives på arbeidsplassen min	☐	☐	☐	☐	☐	☐
Jeg synes arbeidsgiver satser på min helse	☐	☐	☐	☐	☐	☐
Jeg får råd og praktisk hjelp av andre når jeg trenger det	☐	☐	☐	☐	☐	☐

Individuelle indre opplevelser

Vennligst ta stilling til følgende påstander om din arbeidssituasjon
Jo lenger til høyre du krysser av, desto mer enig er du i påstanden

	Helt uenig 1	2	3	4	5	Helt enig 6
Arbeidet mitt føles meningsfylt	☐	☐	☐	☐	☐	☐
Jeg føler at jeg utvikler meg i arbeidet mitt	☐	☐	☐	☐	☐	☐
Arbeidet mitt er variert	☐	☐	☐	☐	☐	☐
Jeg utfører det arbeidet som jeg er utdannet til	☐	☐	☐	☐	☐	☐
Jeg går på jobb med glede	☐	☐	☐	☐	☐	☐
Arbeidet mitt er utfordrende	☐	☐	☐	☐	☐	☐

Selvbestemmelse

Vennligst ta stilling til følgende påstander om dine arbeidsoppgaver
Jo lenger til høyre du krysser av, desto mer enig er du i påstanden

	Helt uenig 1	2	3	4	5	Helt enig 6
Jeg bestemmer selv **når** ulike oppgaver skal utføres	☐	☐	☐	☐	☐	☐
Jeg bestemmer selv **hva** som skal utføres i arbeidet mitt	☐	☐	☐	☐	☐	☐
Jeg bestemmer selv **hvordan** arbeidet mitt skal utføres	☐	☐	☐	☐	☐	☐
Jeg bestemmer selv mitt arbeidstempo	☐	☐	☐	☐	☐	☐

Tidsopplevelse

Vennligst ta stilling til følgende påstander om arbeidssituasjonen din
Jo lenger til høyre du krysser av, desto mer enig er du i påstanden

	Helt uenig 1	2	3	4	5	Helt enig 6
Jeg rekker å utføre arbeidsoppgavene mine i løpet av ordinær arbeidstid uten tidspress (stress)	☐	☐	☐	☐	☐	☐
Jeg rekker som regel å avslutte en arbeidsoppgave før jeg må begynne på en ny	☐	☐	☐	☐	☐	☐
Det er sjelden slik at jeg må bli igjen på jobben etter ordinær arbeidstid	☐	☐	☐	☐	☐	☐

Ledelse

Vennligst ta stilling til følgende påstander om personen som er din nærmeste leder.
(Den person/leder som du henvender deg til i ditt daglige arbeid)
Jo lenger til høyre du krysser av, desto mer enig er du i påstanden

	Helt uenig 1	2	3	4	5	Helt enig 6
Min leder er tilgjengelig når jeg trenger det	☐	☐	☐	☐	☐	☐
Min leder er flink til å skape interesse og engasjement for arbeidsoppgavene	☐	☐	☐	☐	☐	☐
Min leder bidrar til at arbeidsoppgavene blir rettferdig fordelt	☐	☐	☐	☐	☐	☐
Min leder diskuterer saker med arbeidsgruppen før det tas viktige avgjørelser	☐	☐	☐	☐	☐	☐
Lederen min har evne til å ta egne beslutninger når det trengs	☐	☐	☐	☐	☐	☐
Min leder sørger for at informasjon om virksomhetens mål og visjoner er tilgjengelig for arbeidsgruppen	☐	☐	☐	☐	☐	☐

32.

Som regel er jeg trygg på at alt vil ordne seg, selv i situasjoner som bekymrer folk flest.	☐ Galt	☐ Riktig
Vanligvis bekymrer jeg meg mer enn de fleste for at noe kan gå galt i fremtiden.	☐ Galt	☐ Riktig
Hvis jeg blir flau eller ydmyket, kommer jeg svært raskt over det.	☐ Galt	☐ Riktig
Jeg forblir omtrent alltid avslappet og ubekymret, selv når nesten alle andre engster seg.	☐ Galt	☐ Riktig
Jeg holder ofte opp med det jeg gjør fordi jeg blir bekymret, selv når vennene mine forteller meg at alt vil gå bra.	☐ Galt	☐ Riktig
Ting går ofte galt for meg med mindre jeg er svært forsiktig.	☐ Galt	☐ Riktig
Ofte må jeg holde opp med det jeg gjør fordi jeg begynner å bekymre meg for at det kan gå galt.	☐ Galt	☐ Riktig
Jeg tror jeg vil ha hellet med meg i fremtiden.	☐ Galt	☐ Riktig
Uansett om jeg har midlertidige problemer som må overvinnes, tror jeg alltid at alt vil ordne seg.	☐ Galt	☐ Riktig
Jeg bekymrer meg aldri om forferdelige ting som kan tenkes å hende i fremtiden.	☐ Galt	☐ Riktig
Jeg har vanligvis flaks med alt jeg prøver å gjøre.	☐ Galt	☐ Riktig
Ofte gjør jeg ting på grunnlag av hvordan jeg føler meg der og da, uten å tenke på hvordan det er gjort tidligere.	☐ Galt	☐ Riktig
Vanligvis tar jeg alle detaljer i betraktning før jeg tar en avgjørelse.	☐ Galt	☐ Riktig
Jeg følger ofte mine instinkter, innfall eller intuisjoner, uten å tenke gjennom alle detaljer.	☐ Galt	☐ Riktig
Jeg liker å ta raske avgjørelser, slik at jeg kan komme i gang med det som må gjøres.	☐ Galt	☐ Riktig
Jeg liker å tenke grundig gjennom ting før jeg tar en avgjørelse.	☐ Galt	☐ Riktig
Jeg er vanligvis i stand til å få andre til å tro på meg, selv når jeg vet at det jeg sier er overdrevet eller usant.	☐ Galt	☐ Riktig
Selv når de fleste ikke synes det er så viktig, krever jeg ofte at ting skal gjøres på en ryddig og ordentlig måte.	☐ Galt	☐ Riktig
Jeg bryter ofte regler og bestemmelser når jeg tror jeg kan slippe unna med det.	☐ Galt	☐ Riktig

Jeg har ofte vanskelig med å komme i gang når jeg skal begynne med noe nytt.	☐ Galt	☐ Riktig
Jeg er ikke så flink til å snakke meg ut av problemene når jeg blir tatt i å gjøre noe galt.	☐ Galt	☐ Riktig
Jeg har vanskelig for å fortelle løgner, selv når det er for å skåne en annens følelser.	☐ Galt	☐ Riktig
Vanligvis gjør jeg ting på min egen måte - heller enn å gi etter for andres ønsker.	☐ Galt	☐ Riktig
Jeg bryr meg ikke så mye om hvorvidt folk liker meg eller måten jeg gjør ting på.	☐ Galt	☐ Riktig
Jeg tror ikke det er så lurt å hjelpe svake mennesker som ikke kan hjelpe seg selv.	☐ Galt	☐ Riktig
Jeg umaker meg sjelden for å glede andre.	☐ Galt	☐ Riktig
Andre synes ofte at jeg er for selvstendig fordi jeg ikke vil gjøre det de vil.	☐ Galt	☐ Riktig
Individuelle rettigheter er viktigere enn noen gruppes behov.	☐ Galt	☐ Riktig
Jeg føler meg ofte som et offer for omstendighetene.	☐ Galt	☐ Riktig
Jeg føler meg sjelden fri til å velge hva jeg vil gjøre.	☐ Galt	☐ Riktig
Handlingene mine styres i stor grad av forhold utenfor min kontroll.	☐ Galt	☐ Riktig
Andre mennesker har for sterk kontroll over meg.	☐ Galt	☐ Riktig
Omstendighetene tvinger meg ofte til å gjøre ting mot min vilje.	☐ Galt	☐ Riktig
Holdningene mine bestemmes i stor grad av forhold jeg ikke er herre over.	☐ Galt	☐ Riktig
Som regel er jeg fri til å velge hva jeg vil gjøre.	☐ Galt	☐ Riktig
Andre mennesker og forhold har ofte skylden for problemene mine.	☐ Galt	☐ Riktig

Appendix II

ID-kode: ☐☐☐☐☐☐

UNIVERSITETSSYKEHUSET NORD-NORGE
DAVVI-NORGGA UNIVERSITEHTABUOHCCEVIESSU

Dine meninger om forebygging, sikkerhet og helse på jobb

Oppfølgingsskjema nr 3

Ferrolegeringsindustriens Forskningsforening (FFF)
The Norwegian Ferroalloy Producers Research Association

FINNFJORD · ERAMET NORWAY · GLENCORE MANGANESE NORWAY AS · Elkem · FESIL · SAINT-GOBAIN · WASHINGTON MILLS · SINTEF · ST. OLAVS HOSPITAL TRONDHEIM UNIVERSITY HOSPITAL · STAMI STATENS ARBEIDSMILJØINSTITUTT · Forskningsrådet

Invitasjon til deltakelse i forskningsprosjektet

"Oppfølgingsskjema"

Bakgrunn og formål

Formålet med studien er å forbedre arbeidshverdagen for smelteverksarbeidere i Norge. Studien består av flere deler og i denne delen av studien vil vi undersøke hvilke faktorer som spiller inn på bruken av verneutstyr, med hovedfokus på åndedrettsvern. Denne undersøkelsen inngår i en doktorgradsstudie ved Universitetet i Tromsø/Universitetssykehuset Nord-Norge. Prosjektet i sin helhet er et samarbeid mellom NTNU, SINTEF, Statens arbeidsmiljøinstitutt (STAMI), St.Olavs Hospital, Universitetssykehuset Nord-Norge og UiT – Norges arktiske universitet. Prosjektet er finansiert av Norsk Forskningsråd og Ferrolegeringsindustriens Forskningsforening samt norske Silisiumcarbid (SiC)-produsenter,

For å kunne si noe om hvilke faktorer som påvirker bruk av sikkerhetsutstyr er vi avhengig av deltakelse fra dere som jobber i industrien. Derfor inviteres du til deltakelse i dette prosjektet.

Hva innebærer deltakelse i studien?

Deltakelse i studien kan innebære en eller flere av følgende aktiviteter: Besvarelse av spørreskjema, gjennomføring av masketetthetsmåling og undervisning. I pilotstudien vil deltakerne også kunne bli spurt om å delta i fokusgrupper og gjennomføre en noe mer omfattende masketetthetsmåling enn vanlig, samt å besvare og evaluere et test-spørreskjema.

Hva skjer med informasjonen om deg?

Alle personopplysninger vil bli behandlet konfidensielt og anonymt. Det er kun stipendiaten og hans veiledere som vil behandle data ved endt innsamling. Innsamlet data vil lagres på Helse-Nords nettverk på Universitetssykehuset i Nord-Norge.

Deltakere vil ikke kunne identifiseres via spørreskjemaer. Ingen navn knyttes til disse.

Prosjektet skal etter planen avsluttes 01.07.2018.

Frivillig deltakelse

Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger om deg bli slettet. Å trekke seg fra studien vil ikke ha noen innvirkning for ditt arbeidsforhold.

Dersom du har spørsmål til studien, ta kontakt med Prosjektleder (arbeidspakke 2) Marit Nøst Hegseth på epost: marit.nost.hegseth@unn.no tlf: 776 26611. Stipendiat Øystein Robertsen, epost: oystein.robertsen@gmail.com / oystein.robertsen@unn.no. Tlf: 992 58188

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS og Regionale Komiteer for Medisinsk og Helsefaglig Forskningsetikk (REK).

Ved å svare på dette spørreskjemaet samtykker jeg til deltakelse i studien.

Vi understreker at deltagelse er frivillig, og at informasjonen du gir vil bli behandlet strengt konfidensielt. Takk for at du deltar i denne undersøkelsen.

Takk for at du deltar i denne undersøkelsen.

Identifikasjonsnøkkel

For at du skal kunne svare anonymt på spørreskjemaet skal du nå lage din egen ID-kode. Denne koden skal du bruke hver gang du svarer på et spørreskjema fra DeMaskUs. ID-Koden skal skrives inn øverst til høyre på første side av spørreskjemaet

Koden består av 6 tegn og den lager du slik:

Tegn nummer 1: Velg bokstav som tilhører verket du jobber på, se liste under

Tegn nummer 2: Første bokstav i din mors fornavn

Tegn nummer 3: Antall eldre brødre som du har (ett tall)

Tegn nummer 4 og 5: Nummeret på måneden som du er født i (to tall)

Tegn nummer 6: Første bokstav i mellomnavnet ditt. Hvis du ikke har mellomnavn, så bruk bokstaven X. Har du flere mellomnavn, velg første bokstav i første mellomnavn

Eksempel:

Tegn 1: Jeg jobber på Finnfjord. Første tegn blir derfor A
Tegn 2: Min mor heter Else. Andre tegn blir derfor E
Tegn 3: Jeg har ingen eldre brødre. Tredje tegn blir derfor 0
Tegn 4 og 5: Jeg er født i Juni. Fjerde og femte tegn blir derfor 06
Tegn 6: Mitt mellomnavn er Nilsen. Sjette tegn blir derfor N

Min ID-kode er da:

ID-kode: | A | E | 0 | 0 | 6 | N |

Liste over smelteverk:

Finnfjord = A
Glencore = B
Fesil = C
Wacker = D
Eramet Sauda = E
Eramet Porsgrunn = F
Eramet Kvinesdal = G
Washington Mills = H
Saint Gobain = I
Elkem Salten = J
Elkem Solar = K
Elkem Bjølvefossen = L
Elkem Bremanger = M
Elkem Thamshavn = N
Elkem Solar Herøya = O

Nummer på måneder:

Januar= 01
Februar = 02
Mars = 03
April = 04
Mai = 05
Juni = 06
Juli =07
August = 08
September= 09
Oktober=10
November = 11
Desember = 12

Informasjon om utfylling av skjemaet:

Du vil i dette spørreskjemaet bli bedt om å svare på forskjellige spørsmål og påstander. Enkelte spørsmål vil du kanskje oppleve som merkelige, men det er viktig at du svarer så godt du kan. Dersom det er spørsmål du av ulike grunner ikke har lyst å svare på, så er det helt i orden, men vi håper at du vil svare på alle. Det finnes ingen rette eller gale svar og vi er bare ute etter din mening. Skjemaet er satt sammen av flere forskjellige typer spørsmål. Vi vil blant annet spørre om historikk, kunnskap arbeidsforhold, din helse, holdninger og hvordan man opplever arbeidsplassen.

Skjemaet skal leses maskinelt, så du må bruke blå eller svart penn. Vennligst bruk blokkbokstaver og skriv så tydelig som mulig.
Det er også viktig at du krysser av presis inni rutene.

Slik: ☒ Ikke slik: ☐X

Skriv tallet 1 som en rett strek. Slik: | Skriv tallet syv slik: 7

Hvis du har krysset av feil, korriger ved å sette en strek over feil kryss og sett kryss i riktig rute. Eksemplet under viser at riktig kryss er ved 1.

☒0 ☒1 ☐2 ☐3

Hvis du har skrevet feil tall, korriger ved å sette en strek over tallet som er feil og skriv det riktige tallet over eller ved siden av.

"DeMaskUs" - Riktig bruk av riktig maske

ID-kode: ☐☐☐☐☐☐

Dato for utfylling av skjemaet: ☐☐.☐☐.☐☐☐☐

Oppfølging: 3

Bakgrunn

1. Hva er din nåværende sivilstatus?

☐ Enslig ☐ Gift ☐ Samboer ☐ Enke/ Enkemann ☐ Skilt/ Separert

2. Hvilket ansettelsesforhold har du?

☐ Fast ansatt ☐ Vikar/ Ekstrahjelp ☐ Har tidsbegrenset kontrakt ☐ Lærling ☐ Annet

3. Hvor mange barn har du? ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ Flere enn 3 barn

4. Har du tidligere gjennomført masketetthetsmåling? ☐ Ja ☐ Nei

5. Har du deltatt i masketetthetsmåling i regi av DeMaskUs prosjektet? ☐ Ja ☐ Nei

6. Har du deltatt på kurs om støv og helse i regi av DeMaskUs prosjektet? ☐ Ja ☐ Nei

Arbeidshistorikk

7. Hvilken av de følgende kategorier beskriver best din stilling? *(Sett bare ett kryss)*

☐ Produksjon og vedlikehold

☐ Ledelse (Alle ledelsesnivå, inkludert skiftledelse)

☐ Annet (Administrasjon/ Lager/ Kantine o.l.)

8. Har du skiftet jobb/stilling internt på smelteverket siden forrige spørreskjema? ☐ Ja ☐ Nei

Hvis ja, hvilken kategori beskrev din forrige stilling?

☐ Produksjon og vedlikehold

☐ Ledelse (Alle ledelsesnivå, inkludert skiftledelse)

☐ Annet (Administrasjon/ Lager/ Kantine o.l.)

9. Hvor tilbringer du det meste av arbeidstiden din? *(Sett bare ett kryss)*

☐ På kontor/ inne

☐ I kontrollrommet

☐ I produksjonslokalet/ ovnshall

☐ Kran/ Truck/ Hjullaster/ osv.

☐ Verksted

☐ Renseanlegg

☐ Lab

☐ Annet

Hvis annet, hvor: ☐

4540

10. I gjennomsnitt, hvor mange timer per arbeidsdag tilbringer du inne i ovnshall/produksjonslokale?

☐ Mindre enn 1 time ☐ 1 - 3 timer ☐ 4 - 6 timer ☐ 6 - 9 timer ☐ 10 + timer

11. Har du gjennomført sikkerhetskurs på din nåværende arbeidsplass?

☐ Ja ☐ Nei

Hvis ja, når gjennomførte du sist sikkerhetskurs i din bedrift?

☐ I løpet av siste år ☐ Siste 1 - 2 år ☐ Mer enn 2 år siden

Eksponering på arbeidsplassen

12. Hvilke av følgende blir du eksponert for jevnlig (oftere enn 1 gang per uke) i ditt arbeid?
(Du kan krysse av for flere alternativer)

☐ Kvartsstøv
☐ Polysykliske aromatiske hydrokarboner (PAH)
☐ FeSi-støv
☐ Si-støv
☐ Manganholdig-støv
☐ SiC-støv
☐ CO-gass
☐ CO_2-gass
☐ Svovelholdige gasser
☐ Sveiserøyk
☐ Støy
☐ Sterke elektromagnetiske felt
☐ Dieseleksos
☐ Ingen av disse
☐ Annet

13. Hvor farlig er de følgende? Ranger hver av påstandene fra 1-5, hvor 1 er minst farlig.

☐ Støv og gass ☐ Støy ☐ Varme, eksplosjon og brann ☐ Ulykker (fall, få ting i hodet, påkjørsel etc) ☐ Elektrisitet

14. Hvilke av de følgende anser du å være risikofaktorer som følge av din jobb?
(Du kan krysse av for flere alternativer)

☐ Strømstøt
☐ Muskel- eller skjelett-plager
☐ Lungesykdom
☐ Hørselsskade
☐ Stress/ utbrenthet
☐ Synskade
☐ Akutte skader (f. eks. brekke et ben eller få noe i hodet)
☐ Brannskade
☐ Annet
☐ Det er ikke sannsynlig at jeg kan oppleve noe av dette i min jobb

15.

1. Å bruke maske regelmessig i løpet av neste arbeidsuke vil for meg være..

	1	2	3	4	5	6	7	
Meget skadelig	☐	☐	☐	☐	☐	☐	☐	Ikke skadelig i det hele tattt
Meget ubehagelig	☐	☐	☐	☐	☐	☐	☐	Meget behagelig
Meget upraktisk	☐	☐	☐	☐	☐	☐	☐	Meget praktisk
Meget belastende	☐	☐	☐	☐	☐	☐	☐	Ikke belastende i det hele tatt
Veldig lite ønskelig	☐	☐	☐	☐	☐	☐	☐	Veldig ønskelig
Veldig irriterende	☐	☐	☐	☐	☐	☐	☐	Ikke irriterende i det hele tatt
I veien	☐	☐	☐	☐	☐	☐	☐	Ikke i veien i det hele tatt
Veldig tungt	☐	☐	☐	☐	☐	☐	☐	Veldig lett

2. Å alltid bruke maske inne på smelteverket i løpet av en arbeidsuke vil ha betydning for helsen min

	1	2	3	4	5	6	7	
Meget usannsynlig	☐	☐	☐	☐	☐	☐	☐	Meget sannsynlig

3. Å alltid sette helsen først er...

	1	2	3	4	5	6	7	
Meget uviktig	☐	☐	☐	☐	☐	☐	☐	Meget viktig

4. Jeg tror de fleste jeg kjenner setter pris på at jeg bruker maske på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

5. De fleste arbeidere som meg bruker maske hele tiden på jobb

	1	2	3	4	5	6	7	
Meget usannsynlig	☐	☐	☐	☐	☐	☐	☐	Meget sannsynlig

6. Familien min setter pris på at jeg bruker maske på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

7. Alle mine kolleger bruker maske hele tiden i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Veldig usannsynlig	☐	☐	☐	☐	☐	☐	☐	Veldig sannsynlig

8. Få arbeidere på smelteverket er flinke til å bruke maske på jobb i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Veldig usannsynlig	☐	☐	☐	☐	☐	☐	☐	Veldig sannsynlig

9 Mine kolleger på smelteverket bruker stort sett maske på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

10 Jeg ønsker stort sett å gjøre slik som mine kolleger når det gjelder maskebruk

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

11 Familen min synes jeg burde bruke maske hele tiden jeg er i utsatte områder på smelteverket

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

12 Når det gjelder bruk av maske på jobb vil jeg å gjøre det som familien min ønsker

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

13 Det er opp til meg om jeg bruker maske i smelteverket i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

14 Jeg tilpasser masken korrekt hver gang jeg tar den på

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

15 Jeg bestemmer selv i hvilke situasjoner jeg skal bruke maske i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

16 Jeg kan ikke bruke maske i alle situasjoner som krever det i løpet av en arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

17 Jeg bruker masken i arbeidssituasjoner selv om det krever mye av meg

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

18 Det at jeg bruker masken i krevende arbeidssituasjoner gjør at jeg alltid er beskyttet på jobb

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

19 Jeg kommer ikke til å bruke maske i smelteverket i løpet av neste arbeidsuke arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

20 Jeg kommer til å bruke maske selv om den gjør det vanskeligere å puste

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

21 Jeg vil bruke maske i absolutt alle påkrevde situasjoner i løpet av neste arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

22 Jeg har tenkt å bruke maske selv om det er varmt og ubehagelig

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

23 Jeg har tenkt å bruke maske hele tiden jeg er inne i smelteverket i løpet av neste arbeidsuke

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

24 Jeg tenker å bruke maske selv om det er upraktisk

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

I løpet av forrige arbeidsuke har jeg ...

25 alltid brukt masken i eksponerte områder

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

26 alltid brukt maske i påkrevde situasjoner

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

27 alltid byttet maske/filter ved behov

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

28 alltid brukt maske i henhold til reglementet

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

29 aldri brukt maske der det er behov

	1	2	3	4	5	6	7	
Helt uenig	☐	☐	☐	☐	☐	☐	☐	Helt enig

Masker / Verneutstyr

16.

	Helt uenig 1	2	3	4	5	6	Helt enig 7
Jeg tror skjegg påvirker hvor godt masken beskytter	☐	☐	☐	☐	☐	☐	☐
Jeg er trygg på at den masken jeg bruker fungerer som den skal	☐	☐	☐	☐	☐	☐	☐
Jeg tar av masken for å snakke med kolleger	☐	☐	☐	☐	☐	☐	☐
Enkelte arbeidsoppgaver gjør det umulig for meg å bruke maske	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at det er praktisk umulig å følge reglementet for bruk av verneutstyr	☐	☐	☐	☐	☐	☐	☐
Det er for mye styr å bytte maske ofte nok	☐	☐	☐	☐	☐	☐	☐
Det hender at jeg ikke orker å bytte maske selv om jeg vet at jeg burde det	☐	☐	☐	☐	☐	☐	☐
Det er uproblematisk for meg å få tak i maske når jeg trenger det	☐	☐	☐	☐	☐	☐	☐
Organisasjonen er velvillig innstilt til innkjøp av tilpasset verneutstyr	☐	☐	☐	☐	☐	☐	☐
Jeg står fritt til å bruke så mange masker jeg vil	☐	☐	☐	☐	☐	☐	☐
Bedriften har fokus på at det skal brukes maske	☐	☐	☐	☐	☐	☐	☐
Ledelsen virker å være fokusert på å forbedre innemiljøet	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at tiltak som foreslåes av de ansatte blir tatt opp og diskutert på en redelig måte	☐	☐	☐	☐	☐	☐	☐
Jeg opplever at bedriften ønsker å gjøre det som er riktig for sine ansatte	☐	☐	☐	☐	☐	☐	☐
Jeg føler jeg har fått god informasjon om hvorfor jeg bør bruke maske	☐	☐	☐	☐	☐	☐	☐
Jeg vet hva masken beskytter meg mot	☐	☐	☐	☐	☐	☐	☐
Jeg er kjent med retningslinjene for bruk av personlig verneutstyr	☐	☐	☐	☐	☐	☐	☐
Dersom man glemmer å bruke verneutstyr blir man påminnet av kollegaene	☐	☐	☐	☐	☐	☐	☐
Bruken av verneutstyr er noe som ofte diskuteres på min arbeidsplass	☐	☐	☐	☐	☐	☐	☐

Maskebruk

17. Det hender kanskje at du ikke bruker maske selv om du burde. Hva er grunnen til det?
(Du kan krysse av for flere alternativer)

Jeg bruker ikke alltid maske fordi ...

- ☐ ... den ikke gir meg god beskyttelse
- ☐ ... den er tung å puste i
- ☐ ... den ikke er tilgjengelig
- ☐ ... ingen andre rundt meg bruker den
- ☐ ... den er ubehagelig å ha på seg
- ☐ ... den er upraktisk å bruke
- ☐ Jeg bruker alltid maske
- ☐ Annet: ____________

18. Hva er den viktigste grunnen til at du bruker maske? *Ranger fra 1 - 5, hvor 1 er viktigst og 5 minst viktig.*

Jeg bruker maske fordi ...

... ledelsen sier jeg må	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... jeg vet at den beskytter meg mot skadelig eksponering	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... de andre gjør det	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... jeg vil være et godt forbilde for de andre	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
... jeg vil unngå straff	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Annet: ____________

19. Hvor stor del av tiden bruker du maske når du er i utsatte (støv / gass) / påbudsområder?
(Sett kryss på linjen)

0% - 100%

20. Jobber du skift? (Turnus med veksling mellom dag/aften/natt)

☐ Ja ☐ Nei

4540