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LIVE LONG AND PROSPER  
HEALTH-PROMOTING CONDITIONS  
AT WORK

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# ABSTRACT

The aim of this thesis is to contribute with knowledge concerning health-promoting conditions at work, and to investigate how individual, workplace and organisational conditions are interrelated. In the thesis, work-related flow, i.e. an experience of motivation, absorption and work enjoyment, is used as a holistic notion of occupational health. In Paper I, work-related flow is investigated in relation to decision latitude, social capital and an innovative learning climate at work. Paper II investigates whether the use of tools inspired by lean production, such as standardisation and value stream mapping, is positively associated with conditions for innovative learning in organisations. The aim of Paper III is to identify conditions for health and performance in organisation and at work; further, to investigate the association between work-related flow and performance. Paper IV reports on a longitudinal investigation of work-related flow in relation to lean tool use and conditions at the workplace. The empirical material is based on data from 10 organisations, including 4442 employees. Papers I-III are cross-sectional, whereas Paper IV is longitudinal. Papers II-IV utilise multilevel analyses.

The results show that decision latitude, social capital and an innovative learning climate are associated with an increase in work-related flow (Papers I, III & IV), and with performance (Paper III). Individuals' decision latitude enables an increased benefit from the social capital and innovative learning climate at work (Paper I). The effect of tools inspired by lean production on work-related flow (Papers III & IV), and on conditions for innovative learning (Paper II) differs, depending on which tools are used, and on workplace conditions. These tools enable innovative learning mainly where decision latitude is low (Paper II), and it is primarily the lean tool value stream mapping which has the potential to create an arena for innovative learning (Paper II) and work-related flow (Paper IV).

It is concluded that the individual is embedded in a social work context that has the potential to strengthen the ability to act with motivation, absorption and enjoyment. In order to utilise collective health-promoting conditions at work, individuals need to have authority to make their own decisions and use their skills. The effect of tools inspired by lean production depends on the specific tools that are used, and on individuals' decision latitude at work. Their potential to enable innova-

tive learning is most evident for employees who have few opportunities for autonomous decision-making and skill use in their work. For those with a high degree of decision latitude, the use of lean tools has a smaller effect. Work-related flow may in itself serve as a resource that improves performance and increases engagement in health-promoting work conditions. In order to promote health as well as performance, work needs to be organised so that employees have opportunities to decide over their own work, and utilise their skills, individually and collectively within the workgroup.

# SVENSK SAMMANFATTNING

Syftet med den här avhandlingen är att öka kunskapen om förutsättningar som främjar hälsa i arbetet, och att undersöka hur individuella, arbetsplats- och organisatoriska förutsättningar är relaterade till varandra. I avhandlingen används arbetsrelaterad flow, dvs. en upplevelse av motivation, absorption och arbetsglädje, som ett mått på positiv arbetsrelaterad hälsa. Med ökande ohälsa och ökande krav på effektivitet och prestation, är upplevelser av arbetsrelaterad flow av vikt för både individer och organisationer.

Avhandlingen består av fyra separata artiklar. Syftet med artikel I är att undersöka arbetsrelaterad flow i relation till beslutsutrymme, socialt kapital, och innovativt lärandeklimat på arbetet. I artikel II undersöks om användningen av verktyg som är inspirerade av Lean produktion, som till exempel standardiserat arbete och värdeflödesanalys, är relaterat till bättre förutsättningar för innovativt lärande i organisationer. Syftet med artikel III är att identifiera förutsättningar för hälsa och prestation. Dessa förutsättningar undersöks i organiseringen av arbete och på arbetsplatsen. Artikel III testar även hypotesen att det finns ett positivt samband mellan arbetsrelaterad flow och prestation. Artikel IV belyser sambandet mellan en ökning i arbetsrelaterad flow över tid, och användning av lean-verktyg samt beslutsutrymme, socialt kapital och innovativt lärandeklimat på arbetsplatsen.

Det empiriska materialet bygger på data från 4442 anställda i 10 organisationer. Artikel I-III är av tvärsnittdesign, medan artikel IV använder longitudinella data. Flernivåanalys används i artikel II-IV.

Resultatet visar att beslutsutrymme, socialt kapital och innovativt lärandeklimat är associerat med en ökning i arbetsrelaterad flow (artikel I, III & IV), och med bättre prestation (artikel III). Ett gott beslutsutrymme möjliggör att kollektiva resurser såsom socialt kapital och innovativt lärandeklimat på arbetet kan tillvaratas i högre grad (artikel I). Sambandet mellan användningen av lean-verktyg och arbetsrelaterad flow (artikel III & IV) respektive förutsättningar för innovativt lärande

(artikel II) skiljer sig beroende på vilka verktyg som används, samt på förutsättningar i arbetet såsom individers beslutsutrymme. Främst lean-verktyget värdeflödesanalys kan skapa en arena för innovativt lärande (artikel II) och arbetsrelaterad flow (artikel IV). Lean-verktyg möjliggör innovativt lärande framför allt när beslutsutrymmet är lågt (artikel II).

Slutsatsen är att individen befinner sig i en social kontext i arbetet som kan stärka handlingsförmågan och möjliggöra upplevelser av motivation, absorption och arbetsglädje. Individers beslutsutrymme är av vikt för att öka den positiva effekten av kollektiva hälsofrämjande förutsättningar som socialt kapital och innovativt lärandeklimat.

Effekten av lean-verktyg beror på vilka verktyg som används, och på vilka möjligheter individer har att fatta beslut som rör sitt arbete, och använda sina färdigheter i arbetet. Dessa verktyg kan skapa förutsättningar för innovativt lärande främst där individer har lågt beslutsutrymme. Beslutsutrymme är i sig en förutsättning för innovativt lärande. När detta är högt har användningen av lean-verktyg en mindre effekt.

Upplevelsen av arbetsrelaterad flow kan i sig själv ses som en resurs som främjar prestation. För att främja hälsa såväl som prestation, bör arbete organiseras så individer har möjligheter att fatta beslut som rör sitt eget arbete, och att använda sina färdigheter i arbetet, både individuellt och kollektivt i grupp.



# LIST OF PAPERS

This thesis is based on the following four papers:

- I. Fagerlind, A-C., Gustavsson, M., Johansson, G. & Ekberg, K. (2013). Experience of work-related flow: does high decision latitude enhance benefits gained from job resources? *Journal of Vocational Behavior*, 83, 161-170
- II. Fagerlind Ståhl, A-C., Gustavsson, M., Karlsson, N., Johansson, G. & Ekberg, K. (2015). Lean production tools and decision latitude enable conditions for innovative learning in organizations: a multilevel analysis. *Applied Ergonomics*, 47, 285-291
- III. Fagerlind Ståhl, A-C., Gustavsson, M., Karlsson, N., Johansson, G. & Ekberg, K. Associations between organisation of work, work conditions, work-related flow and performance: a multi-level analysis. Manuscript
- IV. Fagerlind Ståhl, A-C., Gustavsson, M., Karlsson, N. & Ekberg, K. The effect of lean tool use and work conditions on employee health: a longitudinal multilevel study. Submitted



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# INTRODUCTION

Today, common mental disorders such as depression and exhaustion are the dominating causes for sickness absence in Sweden, and the rates have increased during recent decades (Försäkringskassan, 2014; Danielsson, Heimerson, Lundberg, Perski, Stefansson & Åkerstedt, 2012; SBU, 2014). This can in part be explained by a more and more intensive working life and changes in psychosocial work conditions (Lidwall, Bergendorff, Voss & Marklund, 2009). It is well known that work conditions such as demands, control over work, support and justice are associated with adverse health outcomes such as depression and exhaustion (Van der Doef & Maes, 1999; de Lange, Taris, Kompier, Houtman & Bongers, 2003; Belkic, Landsbergis, Schnall, & Baker, 2004; Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Magnusson Hansson, Theorell, Oxenstierna Hyde & Westerlund, 2008; Theorell, Hammarström, Gustafsson, Magnusson Hansson, Janlert & Westerlund, 2012; SBU, 2014). Since the beginning of the 1980s, growing numbers of individuals have reported a higher work pace (Försäkringskassan, 2014) and that their work is more and more mentally taxing (Danielsson et al., 2012; SOU, 2015). One explanation for the changes in work conditions is the changing organisation of work (Kompier, 2006; Danielsson et al., 2012). In Sweden, implementations of lean production and similar systems that aim to improve performance and efficiency are common in virtually all sectors (Johansson & Abrahamsson, 2009; Härenstam et al., 2004; Poksinska, 2010; Poksinska, Pettersen, Elg, Eklund & Witell, 2010). Although these approaches may lead to better performance (Mazzocato, Savage, Brommels, Aronsson & Thor, 2010; Holden, 2011), they also involve a risk of increasing work pace, demands and stress, and consequently adverse health outcomes (Koukoulaki, 2014). The question remains how to combine high demands for productivity and efficiency with work conditions that do not have an adverse effect on employee health (Westgaard & Winkel, 2011), and how to build up individual re-

sources and promote health at work within the limits of these changing demands (Parker, 2014).

Work is an important arena for health promotion, as it affects employees' everyday experience, and provides the opportunity to affect the health of the majority of the adult population (Chu, Breucker, Harris, Stitzel, Gan, Gu & Dwyer, 2000). A risk-prevention perspective, based on a biomedical definition of health as the absence of disease (Boorse, 1977), has dominated occupational health research (Tetrick & Quick 2003). This perspective has been more and more complemented by a salutogenic (Antonovsky, 1996) or positive health perspective (Seligman, 2008), where health is viewed as more than the absence of illness. The aim of the positive health perspective is to identify conditions for health rather than illness; for positive work experiences such as work-related flow and work engagement; and for individual- as well as organisational growth and prosperity (Shimazu & Schaufeli, 2009; Fullagar & Kelloway, 2012).

The antecedents for health and illness are unlikely to simply be each other's opposites (Bakker & Demerouti, 2007; Seligman, 2008; Bakker & Schaufeli, 2008), and more knowledge is needed concerning how to create arenas for health at work. Although work is potentially enjoyable, motivating and an opportunity for individual growth, where energy can be gained rather depleted (Debus, Deutsch, Sonnentag & Nussbeck, 2012; Demerouti, Bakker, Sonnentag & Fullagar, 2012), half of all employed women today report that they have little or no energy after work (Arbetsmiljöverket, 2014). To increase the knowledge about conditions that promote health at work is especially important when considering increasing demands for efficiency that require employees to be proactive and motivated (Parker, 2014), but also in order to reverse the trend of higher rates of exhaustion and other common mental disorders (Försäkringskassan, 2014) and enable individuals to successfully return to work after sickness absence (Holmgren, Ekbladh, Hensing & Dellve, 2013). A health-promoting workplace is likely to not only have beneficial consequences for the individual, but also improve the produc-

tivity of organisations (Pot & Koningsveld, 2012; Lohela Karlsson, Björklund & Jensen, 2010) and reduce the costs for society (Chu et al., 2000).

## Work-related flow

Flow is a state of well-being and intense involvement in an activity in which the person feels simultaneously efficient, in control of the activity, motivated and happy (Csikszentmihalyi, 1997). This experience occurs when individuals are able to act with high skill in challenging situations (Csikszentmihalyi & LeFevre, 1989; Eisenberger, Jones, Stinglhamber, Shanock & Randall, 2005; Fullagar & Kelloway, 2009; Llorens, Salanova & Rodriguez, 2012). In such situations, activities are experienced as being under control, successfully mastered without hindrances, and as absorbing, positive, and inherently rewarding (Csikszentmihalyi, 1997; Fullagar & Kelloway, 2012).

Work offers challenges and opportunities for skill use, and flow has been found to occur more often at work than in leisure time (Csikszentmihalyi & LeFevre, 1989). Applied to the work context, flow is often defined as a more persistent and pervasive state, consisting of the dimensions *absorption*, *work enjoyment* and *intrinsic motivation*, and refers to the way in which employees have experienced work during the past weeks (Bakker, 2008). There are also other conceptualisations of flow at work that also refer to the situation, in terms of perceived balance between skills and challenges, and feelings of having control over the situation (Engeser & Rheinberg, 2008; Nielsen & Cleal, 2010). In this thesis, work-related flow is defined in line with Bakker (2008). Absorption refers to the intense concentration that is experienced when individuals are able to immerse themselves completely in an activity, when there are no disturbances or doubt concerning their ability. The experience is simultaneously an enjoyable and intrinsically motivating experience, reflecting a desire to engage in the activity for its own sake. Thus, flow refers to an overarching construct of absorption, enjoyment and intrinsic motiva-

tion, and it has been argued that this corresponds to a broad notion of occupational health (Demerouti, 2006) and well-being (Fullagar & Kelloway, 2009; Xanthopoulou, Bakker & Ilies, 2012; Salanova, del Líbano, Llorens & Schaufeli, 2014).

In this thesis, it will be argued that flow is an expression of holistic health. A holistic perspective on health emphasises the interaction between the individual and the environment, and the ability of an individual to function in relation to environmental conditions (Nordenfelt, 1996). Health can be defined as the ability to act and achieve vital goals under standard circumstances (Nordenfelt, 1996; 2007). In other words, health is seen as the equilibrium between the ability to act, and the goals an individual needs to achieve in order to reach a minimum of happiness, given everyday social and cultural circumstances. This can be compared with the experience of flow being a manifestation of high ability to act (or use skills) in relation to situational conditions (or challenges).

It is argued that experiences of flow make individuals seek out further challenges, leading to the learning of new skills which stretch their abilities (Csikszentmihalyi & LeFevre, 1989; Csikszentmihalyi, 1997). The mastery of challenges and experience of flow are likely to increase experiences of self-efficacy (Bandura, 2001; Salanova, Bakker & Llorens, 2006). When they believe that challenges can be successfully mastered, individuals are more inclined to engage in further challenges and opportunities for skill use, with new skills and abilities, which further enables experiences of flow (Salanova et al., 2006; Engeser & Rheinberg, 2008). Thus, the experience of flow can be considered a resource (Hobfoll, 1989) that broadens the individual's repertoire of thought and action (Fredrickson, 2004), in a spiral of flow, learning and increasing self-efficacy (Csikszentmihalyi, 1997; Salanova et al., 2006). Through learning of skills, abilities are strengthened and reinforced, which makes individuals able to change the environment, shaping a health-promoting workplace (Rütten & Gelius, 2011). This makes work-related flow not only an important outcome of health promotion, but also a condition that has the potential to shape health-promotion activities.



Flow is an aspect of positive holistic health, and does not take ill health into account, although this is no less important. However, positive health is also likely to reduce illness (Seligman, 2008). Individuals who frequently experience flow at work have more energy, and feel more vigorous and less exhausted after work (Rodríguez-Sánchez, Schaufeli, Salanova, Cifre & Sonnenschein, 2011; Demerouti et al., 2012; Zito, Cortese & Colombo, 2015). Students who experience flow have been found to report higher mental as well as physical well-being (Eisenberger et al., 2005; Fullagar & Kelloway, 2009; Steele & Fullagar, 2009), and the peak experience of flow has also been found to correlate with physiological expressions (muscle activity, heart rate and respiration) of positive emotions (de Manzano, Theorell, Harmat & Ullén, 2010). This indicates that work-related flow is likely to have beneficial effects over time, both within and outside the work context.

It could be questioned whether absorption is always positive and an aspect of health. For instance, overcommitment is a personal characteristic that reflects a pattern of excessive commitment to work in combination with a high need for control, desire to gain esteem from others, and an inability to withdraw from work (Siegrist, Starke, Chandola, Godin, Marmot, Niedhammer & Peter, 2004). This is a well-established risk factor for illness such as cardiovascular diseases (van Vegchel, de Jonge, Bosma & Schaufeli, 2005). It should be emphasised that work-related flow is a concept that includes motivation and enjoyment, and is more than absorption and dedication to work. Work-related flow should also be differentiated from so-called workaholism, which is an excessive investment in work that is accompanied by negative affect (Shimazu, Schaufeli, Kamiyama & Kawakami, 2015). Workaholism is empirically different from work engagement, which is a concept similar to work-related flow consisting of absorption, dedication and vigour (González-Romá, Bakker, Schaufeli & Lloret, 2006). While work engagement increases job satisfaction and reduces the risk of burnout over time, workaholism has the opposite effect (Shimazu et al., 2015).

# Health-promoting conditions at work

Health promotion has been defined as a process that strengthens the ability of individuals and groups to take individual and collective action (Nutbeam, 1998; 1996), and thereby also take control over their health, by adapting or changing the environment (WHO, 1986). Work-related flow is likely to be promoted by conditions at work that have the potential to improve skills and hence increase the ability to act with motivation, enjoyment and absorption.

In the demand-control model (Karasek & Theorell, 1990) and the job demand-resources model (Bakker & Demerouti, 2007), it is predicted how conditions at work can either cause adverse health outcomes, or enable experiences of work-related flow. Most of the research conducted on flow at work has been done within the framework of the job demand-resources model. According to the job demand-resources model, job resources are aspects of work, the person or the organisation, that reduce the negative effect of demands, that are functional in achieving work goals, and/or stimulate personal growth, learning and development (Bakker & Demerouti, 2007). Both demands and resources differ between occupations, but are considered to generally affect the individual through a health-impairing process where demands are associated with adverse health outcomes, and a motivational process where resources promote outcomes such as experiences of work-related flow and goal accomplishment. The model draws on the Conservation of Resources Theory (Hobfoll, 1989), according to which the accumulation of resources is a central motivational force that leads to well-being. Stress is considered a consequence of threat to resources or the actual loss of resources. Job resources such as autonomy, social support, feedback and opportunities for development are hence considered motivating (Bakker & Demerouti, 2007), as they fulfil basic human needs for autonomy, belongingness and competence (Deci & Ryan, 2000; Van den Broeck, Vansteenkiste; de Witte & Lens, 2008). This allows individuals to learn, grow and develop themselves in their job and organisation, to dedicate their efforts and abilities to the work task, achieving work goals and ex-

periencing work-related flow (Bakker, Demerouti & Vebeke, 2004; Mäkikangas, Bakker, Aunola, & Demerouti, 2010).

Research supports the motivational hypothesis of the job demand-resources model, and relates autonomy, social support, task clarity and feedback, and opportunities for learning, professional development and creativity, to work-related flow (Bakker, 2008; Demerouti, 2006; Salanova et al., 2006; Mäkikangas et al., 2010; Moneta, 2012). As most of the studies are cross-sectional, conclusions concerning causality are limited, and it is possible that individuals experiencing flow also perceive more favourable job resources. The few longitudinal studies indicate both a causal and a reciprocal association between work-related flow and the above-mentioned work conditions (Mäkikangas et al., 2010). Work-related flow is also longitudinally associated with clear rules and goals and opportunities to think in new ways and innovatively (Salanova et al., 2006). However, Nielsen & Cleal (2011) found that flow among managers was not associated with these more stable characteristics of the job, but rather with specific activities, such as planning, problem-solving and evaluation. The motivating job resources that are associated with work-related flow can also be considered to be health-promoting conditions at work, as they increase the skills of individuals, and hence strengthen the ability to act (Nutbeam, 1996).

## Decision latitude

According to the demand-control model (Karasek & Theorell, 1990), flow is hypothesised to occur at work in situations where there are high demands and the individual simultaneously has a high degree of decision latitude (i.e. active jobs). Decision latitude, or control, consists of two dimensions: the autonomy employees experience in relation to decision-making concerning the work task, and the degree of skill use that is possible at work. These dimensions are combined as they are closely related, and a high level of skill use gives the individual control over which skill to use to accomplish a task. Opportunities for autonomous

decision-making concerning work tasks mean that it is possible to explore a wider range of solutions, and choose strategies to deal with work demands, thus reducing potential strain (Karasek & Theorell, 1990). According to the demand-control model, strain occurs when high demands are combined with low decision latitude (high strain jobs). It is hypothesised that situations where demands are high and the individual has a high degree of decision latitude (i.e. active jobs) lead to learning and acquisition of new skills, which can be used to face future demands and reduce the effect of demands on adverse health outcomes (Karasek & Theorell, 1990).

Research has consistently shown the risks of high demands at work and low decision latitude on adverse health outcomes such as cardiovascular disease, exhaustion and depression (van der Doef & Maes, 1999; De Lange et al., 2003; Belkic et al., 2004; Magnusson Hansson et al., 2008; Magnusson Hansson, Theorell, Bech, Rugulies, Burr, Hyde, Oxenstierna & Westerlund, 2009; Häusser et al., 2010; Theorell et al., 2012). The active-learning hypothesis has been little investigated compared with the strain hypothesis. Mastery has been found to be highest where decision latitude is high, and demands low (i.e. low strain jobs), rather than in active jobs (Parker & Sprigg, 1999). Both active- and low-strain jobs (where demands are low and decision latitude high) have been found to improve self-efficacy, experiences of personal accomplishment and motivation to learn (Taris, Kompier, de Lange, Schaufeli & Schreurs, 2003), and engagement in problem-solving activities (Bergman, Ahlberg, Johansson, Stretzer, Åborg, Hallsten & Lundberg, 2012). In cross-sectional analyses, the highest level of learning was found in active jobs (de Witte, Verhofstadt & Omey, 2007). Both active and low-strain jobs increased skill use among call-centre employees, which in turn reduced future strain and depression (Holman & Wall, 2002), while other operationalisations of learning, such as motivation to learn, have failed to predict a reduction in strain (Taris & Feij, 2004). In some studies it has also been found that active jobs are associated with long-term sickness absence (Lidwall et al., 2009). Although demands such as time pressure create motivating challenges, demands are also hindrances that

lead to adverse health outcomes (Ohly & Fritz, 2010; LePine, Podsakoff & LePine, 2005).

Together, the results indicate that it is decision latitude in itself, rather than in combination with high demands, that has a positive effect on health, motivation to learn, problem-solving, and learning new skills. Authority over decision-making at work is associated with motivation (Wielenga-Meijer, Taris, Kompier & Wigboldus, 2010) and supports learning and use of skills over time (Westerberg & Hauer, 2009).

Both the job demand-resources models and the demand-control model include learning as being important for buffering negative effects of demands on stress, and for promoting positive experiences such as flow as well as performance. In this thesis, decision latitude refers to the work situation of the individual, and is seen as a potentially health-promoting work condition that enables the learning of new skills. Decision latitude is assumed to increase the ability to act, which might be expected to lead to experiences of work-related flow. However, individuals do not exist or act in isolation at work, but as a part of a context where people work together towards a mutual goal (Engeström, 2001). Conditions beyond the individual's work tasks, such as collaborative capacities within work groups and the trust that is experienced between individuals, influence employee health (Kristensen, 2010). Assuming that the learning of skills is important for health promotion at work, social practices and structures also need to be considered as conditions for learning in order to mobilise the ability to act (Nutbeam, 1996).

## Social capital at work

In several studies, it has been found that social capital is associated with various health-related outcomes such as depression, hospitalisation, and death (Islam, Merlo, Kawachi, Lindström & Gerdtham, 2006; Murayama, Fujiwara & Kawachi, 2012). Social capital has been defined, and measured, in many ways. Definitions share the common core no-

tion of networks, trusting relationships and norms of reciprocity (a mutual give and take) that make it possible for individuals or groups to act together (Szreter & Woolcock, 2004). According to Putnam (2000), social capital is embedded within the networks between individuals and is a feature of the social organisation that facilitates efficacy, coordination and cooperation for mutual benefit. This is created by shared experience and joint actions (Putnam, 2000). Coleman (1988) sees social capital as an asset of individuals, which is created in the connections among individuals in social groups.

At work, social capital reflects opportunities to work together within the work group, to share and access information, and to collaborate and form supporting and trusting relations in work groups (Kouvonen et al., 2006). A low degree of social capital is associated with reduced work ability (Kiss, De Meestro, Kristensen & Braeckman, 2014) and depression (Kouvonen et al; 2008; Oksanen, Kouvonen, Kivimäki, Pentti, Virtanen, Linna & Vahtera, 2008; Oksanen, Kouvonen, Vahtera, Virtanen & Kivimäki, 2010), while good social capital has been found to increase vigour (Carmeli, Ben-Hador, Waldman & Rupp, 2009). This can be attributed to the instrumental and emotional support, and feelings of trust, that can be derived from social capital, making it possible for individuals to master demands and challenges. Helpful social interactions at work, from colleagues and superiors, can for instance reduce exhaustion (Magnusson Hansson et al., 2008; 2009; Häusser et al., 2010). But the networks and links between individuals are also likely to be health-promoting as they facilitate dispersion of information and access to further resources (Szreter & Woolcock, 2004). Social capital is a resource for action that brings about skills and abilities which enable individuals to act in ways beyond what is possible in isolation (Coleman, 1988). In the present thesis, social capital is defined as the individual's perception of the social climate at work, in terms of interactions, trust and norms of reciprocity in relation to co-workers and managers. It refers to a work condition that concerns the group or collective aspects of work.

# Innovative learning climate

Opportunities for new thinking, development of new ways of working, and for trying out new ideas, can be used as means to master work demands when confronted with problems that cannot be resolved by relying on established work routines (Martín, Salanova & Peiró, 2007; Ellström, 2010). Actively changing aspects of work in order to solve problems is associated with positive affect, reduced anxiety and depression (Daniels, Boocock, Glover, Hartley & Holland, 2009; Daniels, Beesley, Wimalasiri & Cheyne, 2013).

Innovative learning is the exploration of new solutions and actions; this occurs when individuals question ways of acting and the established knowledge, collectively analyse the situation, and create and implement a new form of work activity (Engeström, 2001; Ellström, 2001; Engeström & Sannino, 2010). A climate where new thinking and trying out new ideas is encouraged, is important in order to support innovative learning. The learning climate can be defined as the space for learning in an organisation, as perceived by individuals, which enables or hinders them from taking advantage of structural conditions and learning (Westerberg & Hauer, 2009). The extent to which work encourages employees to take initiative, and explore innovative approaches and suggestions for improvement, has been found to increase work-related flow (Salanova et al., 2006) and employee well-being (Tafvelin, Armelius & Westerberg, 2011). Arenas for discussing the job may strengthen the ability of individuals to act collectively in order to exert control over, and change, conditions that are conducive to health in everyday work, and thus promote health (Nutbeam, 1998; Gustavsson & Ekberg, 2014). In this thesis, an innovative learning climate is defined as the extent to which individuals perceive that there is an openness to new ideas, new thinking is encouraged, and there are opportunities to question the work process, express opinions and collectively explore new ways of working. Similar to social capital, it thus refers to the group and collective aspects of work.

## Organisation of work

Organisational structures affect the conditions that support individual and collective abilities to act (Nutbeam, 1996). The formal structure of organisations, procedures and rules affect work conditions such as demands, decision latitude and the complexity of work tasks, and employee health (Härenstam et al., 2004; Marklund, Bolin & von Essen, 2008; Bolin, 2009). Although the job demand-resources model acknowledges the importance of demands and resources at the level of the organisation (Bakker et al., 2004; Bakker & Demerouti, 2007), the impact of work organisation has largely been neglected in relation to health.

In Sweden, organisation of work has traditionally had a strong sociotechnical focus, emphasising that work should provide opportunities for learning, variety, decision-making and responsibilities (Thorsrud & Emery, 1969; Johansson & Abrahamsson, 2009). These characteristics of work organisation could be considered motivational, and as leading to job satisfaction as well as performance (Humphrey, Nahrgang & Morgeson, 2007). Since the 1990s, in parallel with the sociotechnical tradition, organisations have been more and more influenced by the lean production approach, which is a resource-efficient production system aiming to improve production quality and quantity (Womack & Jones, 1996; Johansson & Abrahamsson, 2009). How this affects work conditions and health is still debated (Hasle, Bojesen, Langaa Jensen, Bramming, 2012; Koukoulaki, 2014). Lean production has its origins in the Toyota production system (Womack & Jones, 1996; Liker & Meier, 2006), and is based on the assumption that processes in organisations include actions that are required in order to produce what is requested by the customer or the client (i.e. value), and actions that are not (i.e. waste). Through the understanding of value, and through the use of tools or techniques where employees are involved in the identification of value and waste, the aim of lean production is to continuously improve the work process (Womack & Jones, 1996; Liker & Meier, 2006).

The lean production system has developed over the years (Hines, Holweg & Rich, 2004), and tools inspired by lean production have



spread from production organisations to service and healthcare (Härenstam et al., 2004; Poksinska, 2010; Mazzocato et al., 2010; Holden, 2011; Delleve, Eriksson, Fredman & Kullén Engström, 2013). The concept of “lean” is interpreted and applied differently in different organisations, and has influenced local production systems that may or may not label themselves as lean (Brännmark, Langstrand, Johansson, Halvarsson, Abrahamsson & Winkel, 2012). The transfer of lean production methods into sectors outside manufacture, such as healthcare, is often restricted to the application of technical tools in order to improve performance, with less focus on creating a culture of continuous improvement (Joosten, Bongers, & Janssen, 2009; Poksinska, 2010; Mazzocato et al., 2010; Radnor, Holweg & Waring, 2012). Commonly applied tools are: value stream mapping, standardisation of the work process, resource reduction, housekeeping (or 5S), and visual monitoring of results (Pettersen 2009). Value stream mapping is the analysis of the work process in order to assess which actions are useful, and which are not, and see how the process can be improved (Womack & Jones, 1996; Liker & Meier, 2006). Housekeeping, or 5S (Sort out what is wasteful, Straighten up and put in the right place, Shine and keep tidy, Standardise and Sustain this housekeeping process) can be considered a form of visual monitoring and standardisation, in which the workplace is ordered. The standardisation of the best and most efficient way of working is thought to not only improve performance, but also provide a standard on which to make improvements (Liker & Meier, 2006). Standardisation may free up time and effort from disturbances in the work process, which can be invested in further improvements to the work process. However, it also implies the risk of reducing the potential for skill use and opportunities to make autonomous decisions concerning the work (Koukoulaki, 2014). As processes are made more efficient, unnecessary actions and buffers are reduced (i.e. resource reduction); this is considered to make disturbances and opportunities for improvements more visible (Liker & Meier, 2006). However, reduction of so-called unnecessary and wasteful time and activities might also reduce time and opportunities for reflection and social interaction. The visualisation of results and goals for all is

considered to provide feedback and goal clarity, but it has also been argued that this places high demands on the employees' performance, and individual responsibility (Jackson & Mullarkey, 2000; Conti, Angelis, Cooper, Faragher & Gill, 2006; Cullinane et al., 2014).

The aim of all these tools is to facilitate participation in problem-solving and continuous improvements of the work process, and as such, these tools could be assumed to improve the ability of individuals to act. However, they might also make work more monotonous and less challenging, and increase work pace and demands. The effect of lean tools on health and related work conditions is predominantly negative (Landsbergis, Cahill & Schnall, 1999; Hasle et al., 2012; Koukoulaki, 2014). Lean production has been found to lead to increased anxiety, depression and reduced job satisfaction (Parker, 2003), and tools such as standardisation and resource removal are associated with employee stress (Conti et al., 2006).

As the definition of "lean" differs across studies and settings, it is difficult to draw any generalised conclusions. Most studies focus on single or similar organisations, and few investigate the effect of lean production methods in healthcare on work conditions and health (Mazzocato et al., 2010; Dellve et al., 2013). There are also cross-sectional studies that show more positive or mixed effects of lean production in relation to work conditions. Lean production has been associated with improved social relations (Seppälä & Klemola, 2004) and may improve teamwork (Ulhassan, Westerlund, Thor, Sandahl & von Thiele Schwarz, 2014). Aspects of lean production such as focus on performance feedback are associated with work engagement (Cullinane et al., 2014), and participation in developmental activities is associated with decreased stress (Conti et al., 2006). It is suggested that the effect of lean production on health and work conditions depends on what tools are applied (Parker, 2003; Conti et al., 2006; Cullinane et al., 2014), but also on the context where the tools are implemented (Hasle, 2011; Hasle et al., 2012).

Lean production has not been investigated in relation to work-related flow, but the use of lean tools might provide conditions for work-

related flow, such as clear goals and feedback (Salanova et al., 2006; Mäkikangas et al., 2010), and remove disturbances that prevent individuals from focusing on the work task, which is important for experiences of work-related flow (Csikszentmihalyi, 1997). Analyses of the work process and identification of potential for improvements could create challenging situations and encourage engagement in problem-solving, planning and evaluation of work processes, which in turn could increase flow at work (Nielsen & Cleal, 2010).

Although lean production is potentially an efficient approach to increase performance, the question is how to keep employees motivated and committed to work that risks being governed by standardised processes, and focus on efficiency to a high degree (Niepce & Molleman, 1996). It has been suggested that in Scandinavian countries, the lean approach combines the use of tools with sociotechnical aspects of participation and decision-making, leading to organisation of work with a more positive impact on the work environment and health (Seppälä & Klemola, 2004; Hasle, 2011; Hasle et al., 2012; Radnor et al., 2012; Sederblad, 2013).

The degree to which organisations and departments use lean tools or are characterised by sociotechnical aspects is likely to affect work conditions as well as health and performance. In this thesis, the use of tools inspired by lean production and the emphasis on sociotechnical characteristics are considered to be conditions within organization of work that are likely to affect conditions at the workplace, health and performance.

## Healthier and more productive

Working life places greater demands on individuals for efficiency and high performance, at the same time as rates of stress and exhaustion are increasing; it therefore becomes evident that performance must be considered in relation to health and health promotion. Studies indicate that

performance is associated with work conditions such as autonomy, skill variety, job complexity and an open and trusting environment at work (Humphrey et al., 2007; van den Heuvel, Geustens, Hooftman, Kopps & Bossche, 2010). It has been found that social climate and decision latitude are longitudinally associated with better performance in the occupations studied (Lohela Karlsson et al., 2010; Nagani, Tsutsumi, Tsuchiya & Morimoto, 2010). The networks between individuals at workplaces where there is good social capital are associated with knowledge-sharing (Henttonen, Janhonen & Johansson, 2013) and performance (Henttonen, Johansson & Janhonen 2014). Social capital and an innovative learning climate are likely to facilitate performance beyond what individuals can achieve alone without these work conditions (Coleman, 1988), and enable the exploration of new ways of working (Engeström, 2001; Ellström, 2010). When there are arenas for sharing and discussing ideas, and for spreading new ideas within work groups and the organisation, the new ideas can be integrated into the work process, and work activities can be developed and improved (Crossan, Lane & White, 1999). This in turn is likely to make work processes more efficient, thus improving productivity. Health-promoting interventions that focus on conditions for participation, development and collaboration are also likely to be beneficial for performance (Pot & Koningsveld, 2012).

Health may also in itself be a resource for production. Performance is negatively associated with depression and anxiety (Ford, Cerasoli, Higgins & Decesare, 2011), and positively connected with well-being (Taris & Schreurs, 2009), work engagement (Merrill, Aldana, Pope, Anderson, Coberley & Grossmeier, 2013), commitment to work and satisfaction with work (Christian, Garza & Slaughter, 2011). In the presence of psychosocial problems at work, health can be considered a resource that hinders production loss due to these problems (Lohela-Karlsson et al., 2010). It has been suggested that motivation and positive attitudes are of importance both for perceptions of the work environment and for performance (Parker, Baltes, Young, Huff, Altman, Lacost & Roberts, 2003). Employees who experience flow are motivated, enjoy what they do, and are therefore likely to take on further challenges.

Flow at work has previously been found to be cross-sectionally associated with performance among music teachers (Bakker, 2008) and in a smaller sample of different occupations (Eisenberg et al., 2005; Demerouti, 2006), and students who frequently experience flow perform better (Shernoff et al., 2003; Engeser & Rheinberg, 2008; Aubé, Brunelle & Rousseau, 2014). Some of these studies have also found that the association between flow and performance is conveyed by the degree to which employees feel they are able to succeed in mastering challenges (Engeser & Rheinberg, 2008), focus and direct their efforts towards work goals and relevant actions (Demerouti, 2006), and the desire to achieve high goals (Eisenberger et al., 2005). Thus it is still not clear whether work-related flow is associated with better performance. Research on organisation of work, workplace conditions, health and performance suggests that in order to understand how both health and performance can be promoted, the interrelationships between the individual, the workplace, and organisation of work need to be considered.



# AIM

Health-promoting conditions at work were defined in the introduction as conditions that have the potential to strengthen the ability of individuals and groups of individuals to act. The aim of this thesis is to contribute with knowledge concerning health-promoting conditions at work, and to investigate how individual-, workplace- and organisational conditions are interrelated. The specific aims of the four papers included in this thesis are to investigate:

- I. How work-related flow is associated with combinations of demands and decision latitude (active, low strain, high strain and passive jobs), and with the degree of social capital and innovative learning climate at work.
- II. The association between lean tool use and conditions for innovative learning in organisations, and the role of decision latitude in this association.
- III. The association between organisation of work, work conditions, work-related flow and self-rated performance.
- IV. The longitudinal effect of lean tool use, decision latitude, social capital and innovative learning climate on work-related flow.





# METHOD

The following chapter describes the design, material, measures, non-response analyses, and statistical analyses in the respective papers.

## Design

Data were collected within the research project *Leadership and Organisation for Health and Production* (LOHP), which is a prospective cohort study. The overall aim of LOHP is to investigate associations between organisational characteristics, work conditions, employee health and production. Ten private and public organisations participate in LOHP, in their entirety or with selected departments. Papers I-III in this thesis are based on cross-sectional data, while Paper IV is longitudinal and based on data from baseline and follow-up two years later.

When the data collection was completed within each organisation, the data were analysed and presented to representatives of the organisations. This approach enabled a validation of the results.

## Material

The material is based on questionnaire data collected from employees in the ten organisations. Prior to the distribution of the questionnaire, organisational schedules and lists containing names, age, and gender of employees were collected from the organisations. Respondents were coded in order to determine how they were nested in departments within the organisations.

During 2010-2012, employees in the ten organisations received a paper- or electronic questionnaire. The paper questionnaires were distributed in individually addressed and closed envelopes which included

a coded survey, an informative letter concerning the project, and a pre-stamped response envelope. The electronic version was sent along with an informative letter to employees' personal work e-mail. Employees were allowed to fill in the questionnaire during working hours. Questionnaires were sent out to a total of 7935 employees in ten organisations, and 4442 were returned (56%). This cross-sectional cohort constitutes the empirical foundation for the first three studies in this thesis. In Paper I, only nine of the ten organisations were used, as the tenth organisation joined the project later. The empirical data in this paper consists of 3667 employees (response rate 57%).

In 2013-2014, seven of the original ten organisations agreed to participate in the follow-up, with selected departments. This resulted in a cohort of 2696 employees who had participated at baseline and were available at follow-up. Organisational schedules and lists of employees were collected, and questionnaires sent out, as during baseline. The final longitudinal sample, which was used for Paper IV, consisted of 1772 employees (response rate 64%). The organisations included in the four papers are presented in Table 1.

**Table 1.** *Overview of participating organisations in the four studies*

<b>Organisation</b>	<b>Paper I</b>	<b>Papers II &amp; III</b>	<b>Paper IV</b>
Government organisation 1		492	256
Government organisation 2	173	174	
Government authority	773	773	322 <sup>1</sup>
Private production	605	597 <sup>2</sup>	295
Private care	604	633	183
County council (healthcare)	39 <sup>1</sup>	303	68 <sup>1</sup>
Municipality (various occupations)	809	809	477
Municipal care	249	248 <sup>2</sup>	121 <sup>1</sup>
Municipal civil servants	63	63	
Municipal upper secondary school staff	352	350 <sup>2</sup>	
<b>Total</b>	<b>3667</b>	<b>4442</b>	<b>1722</b>

<sup>1</sup> Participated only with selected departments in the material used in Papers I and IV

<sup>2</sup> Participants were excluded due to missing data concerning department, which is required for multilevel analyses

# Measures

## Work-related flow

Work-related flow was measured with the work-related flow inventory, WOLF (Bakker, 2008). This consists of 13 items, where employees are asked to assess their experience of work, thinking about the past two weeks (e.g., I do my work with a lot of enjoyment. I get my motivation from work itself, and not from the reward for it. When I am working, I think about nothing else.) (Bakker, 2008). Answers were given on a five-point Likert scale (1: never; 5: always) and a sum mean score was calculated (Internal consistency at baseline and follow-up: Cronbach's  $\alpha$  .85 and  $\alpha$  .86 respectively).

## Performance

Self-rated performance, concerning employees' satisfaction with the content and quality of their performance, was measured by means of two items: "Are you content with the quality of the work you do?" and "Are you content with the amount of work you get done?" (Lindström et al., 2000). Answers were given on a five-point Likert scale (1: very seldom or never; 5: very often or always) and a sum mean score was calculated (Internal consistency: Cronbach's  $\alpha$  .73).

## Demands and decision latitude

Demands and decision latitude were measured with the Swedish Demand Control Questionnaire (Karasek & Theorell, 1990; Sanne, Trop, Mykletun & Dahl, 2005). Decision latitude was measured with six items concerning opportunities for skill use and decision-making at work (e.g., Do you have the opportunity to decide for yourself how to carry out

your work? Do you have the opportunity to learn new things in your work?) (Internal consistency: Cronbach's  $\alpha$  .67).

Demands were measured with five items (e. g., Do you have to work very hard? Is there enough time to perform work tasks?). Answers were given on a four-point Likert scale (1: yes, often; 4: no, never), and a sum mean score was calculated (Internal consistency: Cronbach's  $\alpha$  .79).

## Social capital at work

Social capital at work was measured with eight items (e.g., People keep each other informed about work-related issues in the work unit. I trust my manager. Members of the work unit build on each other's ideas in order to achieve the best possible outcome.) (Kouvonen, et al. 2006). Answers were given on a five-point Likert scale (1: do not agree at all; 5: fully agree), and a sum mean score was calculated (Internal consistency: Cronbach's  $\alpha$  .90).

## Innovative learning climate and collective dispersion of ideas

The items measuring innovative learning climate and collective dispersion of ideas were inspired by research on expansive work environments, with good conditions for innovative learning (Fuller & Unwin, 2004; Engeström & Sannino, 2010; Ellström, 2001; 2010). A varimax-rotated principal component analysis confirms that the items load on two different factors.

Innovative learning climate was measured by an index constructed of six items (In our unit, we are recognised for new thinking and innovative work. The management encourage new ideas. It is easy to obtain sufficient resources if you want to try out new ideas. My views concerning work are listened to and respected. We can affect our situation at work during changes. I have the opportunity to try out new ideas with uncertain outcomes). Answers were given on a five-point Likert scale (1:

do not agree at all; 5: fully agree), and a sum mean score was calculated (Internal consistency: Cronbach's  $\alpha$  .86).

In the first study, based on employees from nine organisations, a seventh item was included in the scale measuring innovative learning climate: I feel that there are opportunities for career development at my workplace (Internal consistency of the scale in Paper I: Cronbach's  $\alpha$  .85). Based on the results of a principal components analysis, this item was omitted when the tenth organisation was included.

Collective dispersion of ideas within and between units and departments in the organisations was measured by five items (At our workplace we openly discuss how we can handle the difficulties we encounter at work. How well do new solutions and improvements spread within the unit/department? How well do new solutions and improvements spread to other units/departments? In this work group, people are able to express different ideas without being called stupid. In this work group, members make use of each others' ideas in order to achieve the best possible results). Answers were given on a five-point Likert scale, and a sum mean score was calculated (Internal consistency: Cronbach's  $\alpha$  .81).

## Organisation of work

Organisation of work was assessed with the question "To what degree is your work characterised by the following", reflecting what is commonly characterised as lean production (Pettersen, 2009), and sociotechnical organisation of work (Thorsrud & Emery, 1969). Answers were given on a five-point Likert scale (1: not at all; 5: to a very high degree). A sixth answer (Do not know.) was possible, coded as missing, and omitted from further analyses. A varimax-rotated principal components analysis was performed in order to derive these items into the two dimensions *lean tool use* and *sociotechnical characteristics*.

For the combination of lean tool use and sociotechnical characteristics in Paper III, items with a factorloading above .50 were included in

the two indexes. Sociotechnical characteristics were measured with 14 items (physically and mentally varied work, communication and feedback, opportunities to make decisions, cooperation and social support, work groups, hopes for the future, acknowledgement of work effort, participation and respect, continuous learning, values, customer orientation, responsibilities and authorities). A mean score was calculated (Internal consistency at baseline: Cronbach's  $\alpha$  .91). Lean tool use was measured with six items: standardised work, housekeeping, value flow analysis, visualisation of results and resource reduction and just-in-time production (Internal consistency: Cronbach's  $\alpha$  .77).

For the measurement of lean tools in Papers II and IV, five items with a factor loading above .55 were included. This omitted the item just-in-time production (Internal consistency: Cronbach's  $\alpha$  .77).

## Demographic variables

Analyses were adjusted for demographic variables in terms of age, gender, education and income.

## Statistical analysis

### Paper I

In Paper I, the likelihood of experiencing work-related flow in relation to the four job-strain categories, and in relation to social capital and innovative learning climate, was investigated with binary logistic regression analyses. Analyses were adjusted for age, gender, education and income.

The interaction between social capital/innovative learning climate and the job-strain categories was investigated by comparing differences in work-related flow between one exposure after stratification by level of

the other. Binary logistic regressions were utilised, adjusting for confounders.

Non-response analysis and differences in the experience of work-related flow between men and women, age-, educational- and income groups, and with respect to passive-, active-, high-strain and low-strain jobs, were investigated using the chi-squared test. All statistical analyses were conducted using SPSS version 19.0.

## Paper II

In Paper II, the association between lean tool use and conditions for innovative learning in terms of innovative learning climate and collective dispersion of ideas were analysed with three-level multilevel logistic regressions, with organisation at the third, department at the second, and individual at the first level. In order to investigate a possible interaction between decision latitude and lean tool use, effect modification analysis was performed by adding the interaction term, and the models that excluded and included the interaction parameter were compared using the likelihood ratio test.

Mean differences between organisations were assessed by analysis of variance. Differences between respondents and non-respondents were assessed with the chi-squared test and analysis of variance. All preliminary analyses were performed using SPSS version 20, and multilevel analyses were performed using STATA version 13.

## Paper III

In Paper III, associations between organisational conditions, work conditions, and work-related flow and self-rated performance were analysed using three-level multilevel logistic regressions, with organisation at the third, department at the second, and individual at the first level. To investigate the combination of the dimensions *lean tool use* and *sociotechnical*



*principles*, these variables were aggregated at department level, dichotomised at the median, and combined into four categories (high/low degree of lean tool use combined with a high/low degree of sociotechnical characteristics).

Differences between organisations were examined with the chi-squared test and analyses of variance. All preliminary analyses were performed using SPSS version 20, and multilevel analyses were performed using STATA version 13.

## Paper IV

In Paper IV, the longitudinal effect of lean tool use, decision latitude, social capital and innovative learning climate at baseline on work-related flow at follow-up was investigated using two-level linear regression multilevel analyses, with individuals at the first level and organisation at the second. Associations between separate lean tools at baseline and work-related flow at baseline and follow-up were investigated using two-level linear regression multilevel analyses. Longitudinal associations were adjusted for age, gender, education and baseline levels of work-related flow. Differences in mean levels of decision latitude, social capital, innovative learning climate, lean tool use and flow between respondents and non-respondents were investigated with the independent samples T-test.

## Non-response analyses

Differences between respondents and non-respondents at baseline were analysed in terms of gender and age. There was no significant difference concerning gender or age in Paper I. In Papers II and III, respondents were older than the non-respondents ( $p < .01$ ).

In the longitudinal cohort, respondents at baseline were older than non-respondents ( $p < .05$ ). There was no significant difference concerning gender at baseline. Those who remained to follow-up were older ( $p < .01$ ), reported higher decision latitude and higher demands ( $p = .05$ ) compared with those in the longitudinal cohort who only participated at baseline. There were no significant differences concerning gender, education, work-related flow, social capital, innovative learning climate or lean tool use at baseline, compared with dropouts.

## Ethical considerations

Ethical principles for the social sciences were fulfilled, and the study was approved by the Ethics Committee at Linköping University. Participants in the project received information about the study and its purpose, and participation was voluntary. Questionnaires were returned in pre-stamped envelopes or by e-mail, and they were only managed by people in the research group. The responses were handled confidentially and all results were analysed and presented at department level, ensuring that no individuals could be identified in any presentation of results.

# FINDINGS

In this chapter, the results found in the four papers are presented.

## Paper I: Experience of work-related flow: Does high decision latitude increase benefits gained from job resources?

The aim of this paper was to investigate how work-related flow is associated with the four job-strain categories of the demand-control model, and with social capital and innovative learning climate at work. In addition, interaction effects between the job-strain categories and social capital/innovative learning climate in relation to work-related flow were investigated.

Work-related flow was found to be positively associated with active- as well as low-strain jobs, and with the social capital and innovative learning climate at work. The results show that work-related flow occurs in jobs where there is a high degree of decision latitude, irrespective of the degree of demands, in contradiction to the active-learning hypothesis of the demand-control model. Social capital and innovative learning climate are work conditions that shape the collective activity at work and the quality of the social context, reflecting trust and openness to new ways of thinking and working. These work conditions, rather than time pressure and workload, are likely to provide challenges at work. An interaction effect was found between the degree of decision latitude and social capital and innovative learning climate. When decision latitude is high, an increased benefit is gained from engagement in collaborative and developmental activities.

The conclusion is that besides decision latitude, health may be promoted by conditions at work that enable joint action, and by the

social context in terms of strength and quality of interactions, trust and reciprocity, opportunities to jointly work towards a mutual goal and development of the work process. Individual-level skill utilisation and decision authority at work is not only health-promoting in itself, but also important in order to benefit from additional health-promoting work conditions, such as social capital and innovative learning climate, at the collective level of work.

## Paper II: Lean tool use and decision latitude enable conditions for innovative learning in organizations: a multilevel analysis

In the second paper, the aim was to investigate whether the use of tools inspired by lean production is associated with conditions for innovative learning; further, to investigate what role decision latitude plays in this association.

The use of tools inspired by lean production and the degree of decision latitude at work were positively associated with the experience of innovative learning climate and opportunities to share ideas within and between units in the organisations. Psychological demands were negatively associated with conditions for innovative learning. It was mainly the lean tool *value stream mapping* that was positively associated with conditions for innovative learning. Value stream mapping may enable employees to collectively analyse and question the work process, and identify possible improvements. An interaction effect was found between lean tool use and decision latitude in relation to collective dispersion of ideas: for employees with a low degree of decision latitude, lean tools were associated with a larger increase in opportunities to build on each others ideas, share and spread ideas in the workgroup and organization, than for employees with a high degree of decision latitude.

In conclusion, the use of lean tools may have positive effects on work conditions, such that it improves conditions for innovative learning. This is in turn likely to have beneficial effects on employee health as well as the development of organisations. Especially value stream mapping is a tool that may create an arena where the work process can be questioned, and new ideas shared and dispersed within and between groups. The use of lean tools can be experienced as more enabling for sharing ideas when decision latitude is low. For employees who have few opportunities to use their skills and make autonomous decisions over their work, the use of lean tools may make mutual and collective decision-making and skill use possible, and provide an arena for sharing and spreading ideas within the organisation. For employees who have a high degree of decision latitude over their work, the use of lean tools might be experienced as more constraining, and hinder such collective dispersion of ideas.

### Paper III: Associations between organisation of work, work conditions, work-related flow and performance: a multilevel analysis

In the third paper the aim was to investigate organisation of work in relation to work-related flow and self-rated performance, and the association between work-related flow and performance. Organisation of work was investigated in terms of sociotechnical characteristics and the use of tools inspired by lean production, aggregated at department level. Work conditions were investigated in terms of decision latitude, social capital, and innovative learning climate.

A high degree of lean tool use, combined with a low degree of sociotechnical characteristics, was negatively associated with work-related flow. When analyses were adjusted for work conditions, this negative effect was no longer significant, and a high degree of lean tool use com-

bined with a low degree of sociotechnical characteristics was positively associated with self-rated performance. Descriptive data show that decision latitude is lower in organisations that use lean tools to a high degree.

In conclusion, decision latitude, social capital, and innovative learning climate are important, not only in relation to health but also for performance. These work conditions are important for lean tool use to have a positive effect on performance, and in order to buffer potentially negative effects on health. Health is in itself not only a valued outcome, but also a condition for better performance.

## Paper IV: The effect of lean tool use and work conditions on employee health: a longitudinal multilevel study

The aim of the fourth paper was to investigate the longitudinal effect of lean tool use, decision latitude, social capital, innovative learning climate and psychological demands on work-related flow.

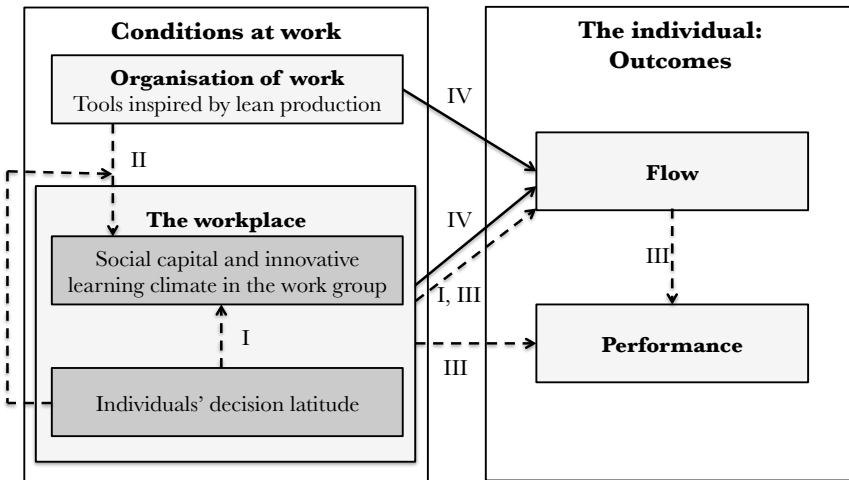
The use of lean tools was positively associated with work-related flow at follow-up. When the lean tools were investigated separately, only value stream mapping remained significant. Decision latitude, social capital and innovative learning climate were longitudinally associated with work-related flow. Work-related flow at baseline and follow-up were strongly associated, and adjustment for work-related flow at baseline reduced the associations between work conditions and flow.

It is concluded that decision latitude, social capital and innovative learning climate are work conditions that increase the ability to act with enjoyment, absorption and motivation, and experience flow over time. Experiences of work-related flow are likely to also increase engagement in such health-promoting work conditions. Organisation of work, in terms of lean tool use, has a minor effect on health compared with con-

ditions at work, and the effect depends on which tools are used. Value stream mapping may to a higher degree than other lean tools create opportunities for challenges and learning, enable more efficient ways of working, and lead to experiences of work-related flow.

## Summary of findings

The findings of the four papers are illustrated in Figure 1.



**Figure 1:** Conditions at work in relation to health and performance. Numbers refer to the papers in which associations were investigated. Dashed lines indicate cross-sectional associations, and solid lines show longitudinal ones.

Work-related flow was found to be associated with conditions at work in terms of decision latitude, social capital at work and innovative learning climate, in both cross-sectional and longitudinal analyses (Papers I, III

and IV). The cross-sectional analyses (dashed arrows in Figure 1) were confirmed in longitudinal analyses (solid arrows in Figure 1). At the organisational level, the use of tools inspired by lean production was positively associated with work-related flow in longitudinal analyses (Paper IV). Lean tool use was also associated with conditions at the workplace, in terms of an innovative learning climate and collective dispersion of ideas (Paper II). The experience of work-related flow can in itself be considered a resource that is associated with better performance (Paper III), and reciprocal associations are possible where work-related flow increases engagement in health-promoting work conditions (Paper IV). The degree of decision latitude was found to interact with conditions at workplace level in relation to work-related flow (Paper I), and with the use of lean tools in relation to conditions for innovative learning (Paper II). The effect of lean tool use on health (Paper IV) and conditions for innovative learning (Paper II) depends on what tools are used. A significant variation in flow, performance and conditions for innovative learning was explained by variations between organisations as well as departments (Papers II, III and IV), showing that organisations and departments differ in how they support health and performance.



# DISCUSSION

In this chapter, the findings are discussed, along with some methodological considerations. Finally, conclusions and implications are presented.

## Workplace conditions, work-related flow and performance

Cross-sectional analyses show that decision latitude, social capital and an innovative learning climate are associated with work-related flow (Papers I and III). These findings are confirmed in longitudinal analyses (Paper IV).

Decision latitude is a condition at the individual level of work (Figure 1). By being able to use one's skills and make autonomous decisions concerning how to carry out work tasks, it is possible for the individual to master demands without loss of control, and also to learn new skills (Karasek & Theorell, 1990; Ellström, 2001; Westerberg & Hauer, 2009). Learning of new skills strengthens the individual's ability to act, to engage in future challenging situations with a higher degree of skill, to be absorbed and motivated, and to enjoy work (Paper IV).

It has been suggested that demands such as time pressure and workload provide the challenges that are necessary for flow and thus the learning of new skills (Karasek & Theorell, 1990). The job demand-resources model suggests that job resources are especially motivational in situations where the demands are high (Bakker & Demerouti, 2007; Bakker, Hakanen, Demerouti & Xanthopoulou, 2007). However, this was contradicted by the results in Paper I, which show that work-related flow is more or less equally associated with active- and low-strain jobs. In other words, the degree of decision latitude is associated with work-related flow, irrespective of the level of demands at work. This was fur-

ther supported by longitudinal analyses, where demands were not significantly associated with work-related flow (Paper IV).

Social capital and innovative learning climate are conditions that reflect the group or collective aspects of work (Figure 1). Discussing problems with others in order to solve them has previously been found to reduce negative affect and fatigue (Daniels et al., 2009; Daniels et al., 2013), and good social capital at work may give access to social support, informational as well as emotional, which buffers the negative effect of demands (Magnusson Hansson et al., 2008; 2009). Social support is also important for learning skills and increasing the use of knowledge (Westerberg & Hauer, 2009). The learning of skills at work can be supported by participation in communities of practices and informal connections between individuals, by sharing knowledge and experiences, and learning from others (Wenger, 2000). A community of practice is bound together by the social capital, norms of reciprocity and collaborative relationships that create mutual engagement and goal pursuit (Wenger, 2000).

When trusting each other and relying on mutual aid and support, a shared understanding of the mutual work activity and a shared repertoire of knowledge and skills for joint action is developed. Hence, through collaboration and collective action, individuals are able to master demands, gain control over work, and engage in challenging work situations, which may contribute to the experience of work-related flow (Papers I, III, IV).

A learning climate that allows and encourages the expression of ideas, questioning and trying out new ideas, makes it possible for individuals to create novel solutions with which to face demands (Martín et al., 2007), and explore and develop work activities and processes (Ellström, 2010; Engeström, 2001). An innovative learning climate strengthens individuals' control over changing demands at work, but also enables and encourages changes in disturbing, demanding or stressful work processes (Engeström, 2001). Hence, individuals are able to jointly increase the health-promoting potential of work (Nutbeam, 1996; Gustavsson & Ekberg, 2014). When thinking in new ways and trying out

new ideas is encouraged, employees' skills and abilities to improve the work process are recognised, respected and rewarded. This potentially reinforces change efforts and encourages skill use and engagement in challenging activities.

The relationship between social capital at work and innovative learning climate is not investigated in the present papers, but they are likely to be mutually related; social support and opportunities for developing work processes are both part of the learning climate at work (Westerberg & Hauer, 2009). Trust and cooperation is necessary in order to feel that it is safe to express ideas and try out new ways of working, and to collectively shape an understanding of the joint work activity (Wenger, 2000). Management acknowledgement and recognition of new thinking may also build trust and encourage cooperation (Tafvelin et al., 2011).

The longitudinal associations between work-related flow and collective work conditions such as social capital and innovative learning climate show that the ability to act with motivation, absorption and enjoyment is strengthened by social structures at work, and that individuals are embedded in a social work context. However, opportunities to act – to make autonomous decisions and utilise skills – affect how individuals benefit from these health-promoting conditions. A high degree of decision latitude was found to enable an increased benefit from the social capital and innovative learning climate, in relation to work-related flow (Paper I). It has been found that individuals' participation in informal social networks has been increased by mastery of their own decisions regarding work demands, and by using the breadth of their skills (Lindström et al., 2006). A low degree of decision latitude increases stress and exhaustion (Magnusson Hansson et al., 2009), which is likely to hinder the ability and willingness to collaborate, share and receive information within the work group. Trust, reciprocity, mutual give and take, and new and innovative thinking concerning the work process, is likely to depend on the extent of this individual-level decision latitude. Authority to define the task at hand, evaluate outcomes and choose methods at the individual level of work, makes it possible to think in new

ways and jointly question work processes (Ellström, 2001). This is confirmed in Paper II, where a positive association between decision latitude and conditions for innovative learning was found. Hence, in order to be able to utilise health-promoting conditions within the collective context of work, individuals need to have authority to make their own decisions concerning work tasks and be allowed to use the breadth of their skills.

Further, Paper II shows that demands in terms of time pressure and high work load are negatively related to conditions for innovative learning. These demands might reduce time for reflection and opportunities for learning (van Ruysseveldt & van Dijke, 2011). Time to observe, think in new ways, reflect, exchange ideas with each other in the work group and participate in collective activities, are prerequisites for innovative learning (Ellström, 2001). If there is excessive focus on production, efficiency and demonstrable results, little time is available for discussions in the work group and participation in informal networks, which are necessary activities for building trust and social capital (Edmonson, 2003).

Paper III shows that the health-promoting work conditions are also associated with higher ratings of performance (Figure 1). If individuals are able to decide over their work and use a broad range of skills, this is likely to also motivate performance. Although the present results are cross-sectional, previous research has found that a high degree of decision latitude improves performance over time (Nagami et al., 2010). The cooperation and mutual problem-solving that is fostered by good social capital can be assumed to facilitate goal achievement and performance beyond that of individuals alone (Coleman, 1988; Putnam, 2000) and enable knowledge-sharing and improved performance (Henttonen et al., 2013; 2014). Conditions for innovative learning are important for development of work processes in organisations (Ellström, 2001; 2010; Engeström, 2001; Engeström & Sannino, 2010). This is likely to create better and more efficient ways of working, but participation in development of the work process may also be motivating in itself. Hence, an

innovative learning climate is likely to increase employee willingness to perform, as well as develop more efficient ways of working.

Work-related flow has previously been found to differ between occupations (Nielsen & Cleal, 2010; Llorens et al., 2013), and it may depend on specific tasks rather than decision latitude, social capital and innovative learning climate. In the present studies, differences in flow between occupations are reflected in the differences between genders: women experience flow to a higher degree (Papers I, III and IV). The organisations included in the present studies reflect the segregated Swedish labour market, where women and men work in different occupations and organisations. One interpretation of the results is that women to a higher degree than men have work tasks that promote work-related flow, or work in organisations where there are more opportunities or incentives to engage in challenging situations and using skills. On the other hand, educational level was not found to be important for work-related flow in the longitudinal study, indicating that experience of work-related flow is not a white-collar phenomenon but can also be promoted in a wider range of occupations.

The findings show the potential of work as a motivating and enjoyable activity, leading to learning and growth. Individuals who experience work-related flow also have more energy after work (Demerouti et al., 2012; Debus et al., 2014). This shows that work has a potentially positive spill-over effect to leisure time. For the experience of flow to have a positive effect also after work, the individual must have the opportunity to take a break from work and have time for recovery (Demerouti et al., 2012; Debus et al., 2014). As work is becoming more and more flexible, the boundaries between work and leisure risk to become blurred. Constant demands for performance and excellence can lead to stress and sickness presence as well as absence, when individuals are encouraged to set their own work hours, and work from home also when ill (Robertson, Leach, Doerner & Smeed, 2012). The ability to control work hours and reduce levels of overtime is associated with reduced sickness absence (Schell, Theorell, Nilsson & Sarastre, 2013), and clear boundaries for overtime and performance, as well as encourage-

ment to take breaks from their work are important for work-related flow (Demerouti et al., 2012).

## Organisation of work, work-related flow and performance

The use of tools inspired by lean production was found to be associated with work-related flow, performance, and conditions for innovative learning (Figure 1). In Paper IV, an increase in work-related flow is longitudinally associated with lean tool use. Standardisation of work, visualisation of results, and reduction of unnecessary activities and buffers may reduce disturbances in the work process and improve it, as well as providing clear feedback concerning performance and goals with a subsequent positive effect on work-related flow (Bakker, 2008; Mäkikangas et al., 2010). Further investigation of the effect of the specific tools showed that the association remained only in relation to value stream mapping. When engaging in value stream mapping, individuals are gathered around a collective activity with the aim of analysing the work process, and identifying hindrances and potential for improvement. When analysing the work process together with co-workers, the work of an individual can be perceived as part of a whole work process, making the isolated work tasks more meaningful and motivating (Humphrey et al., 2007), and increasing the experience of work-related flow (Demerouti, 2006). Peak experiences of flow have previously been found to occur when engaging in problem-solving, evaluation and planning activities at work (Nielsen & Cleal, 2010). Working with value stream mapping may be a challenging activity, similar to social capital and innovative learning climate, which calls for skill utilisation and enables learning of skills through cooperation and collective problem-solving. As shown in Paper II, value stream mapping is associated with conditions for innovative learning. Value stream mapping may create an arena for questioning, trying out new ideas, and sharing these within and between units in the

organisation. Housekeeping and visual monitoring were also associated with conditions for innovative learning. These tools make the work processes visible for employees, which is likely to enable identification of problems and improvements in the work process.

The findings, in relation to work-related flow as well as conditions for innovative learning, show that the effects of lean production depend on which lean tools are used; this has also been suggested in previous research (Parker, 2003; Conti et al., 2006; Cullinane et al., 2014). In addition, the effect on the sharing of ideas was found to differ depending on the degree of decision latitude (Paper II); when decision latitude is low, the use of lean tools is to a higher degree associated with sharing and building on each others' ideas to achieve better outcomes, than when decision latitude is high. Decision latitude is in itself a condition for innovative learning (Ellström, 2001). It has been suggested that standardised procedures and joint problem-solving give a sense of collective authority over decisions as well as collective skill use (De Treville & Antonakis, 2006). This might also make it possible for employees with a low degree of decision latitude to share ideas. However, in situations where work is characterised by a high degree of autonomous decisions and skill use, tools such as standardisation of work may on the other hand be experienced as a constraint rather than enabling (Adler & Borys, 1996). Thus, the use of lean tools has positive potential mainly for employees with a low degree of decision latitude.

Work-related flow was negatively associated with lean tool use when there was little simultaneous focus on traditional sociotechnical characteristics (Paper III). Sociotechnical characteristics such as varied work, continuous learning and participation may be necessary for lean tool use not to have a negative effect on work-related flow. These characteristics could also be of importance for health by influencing work conditions such as demands and decision latitude (Bolin, 2009). The negative effect on work-related flow was rendered non-significant when conditions at the workplace were included in the analyses. Previous research shows that the use of tools inspired by lean production may increase workload and work pace (Landsbergis et al., 1999; Sprigg & Jack-

son, 2006; Cullinane et al., 2014). When organisation of work focuses to a high degree on lean tools and does not include sociotechnical characteristics, there may be few challenges and opportunities for skill use; this is also indicated by descriptive data (Paper III). The results (Paper III) show that this may lead to negative health effects unless there are conditions available at the workplace that enable learning of skills and strengthen the ability of individuals and groups to act. In lean production organisations, it has previously been found that opportunities for feedback and learning not only buffer the negative effect of potentially monotonous work and a more time-efficient work process, but are also positively associated with work engagement (Cullinane et al., 2014). It should be noted that Paper IV did not include just-in-time production, which is included in Paper III and might affect the findings. Just-in-time practices have been identified to risk adverse health due to increased work pace (Koukoulaki, 2014).

Employees who used tools inspired by lean production to a high degree also reported better performance. The use of tools such as visual monitoring, standardisation and value stream mapping may develop and ameliorate work processes, leading to better performance. The association was enhanced when decision latitude, social capital, and innovative learning climate were included in the analyses, indicating that they are important in order to improve performance when lean tools are used. As discussed previously, these work conditions can be considered motivating (Humphrey et al., 2007) and provide support for mastering demands (Oksanen et al., 2008; Häusser et al., 2010).

Due to cross-sectional analyses, it is not possible to determine whether there is a long-term improvement in performance due to work conditions or lean tool use, and the use of lean tools may facilitate the assessment of performance rather than improve performance as such. Lean tool use could also facilitate the assessment of performance, as there is a common standard to compare with, and results are visually monitored. Self-rated performance was found to be positively associated with the same type of organisation of work that was negatively associated with work-related flow, and where and decision latitude was low –



that is, where there were few other conditions for performance. This can be interpreted as an effect of selection and that it is more common, and also easier, to assess performance (and be satisfied with it) in departments where lean tools are used to a high degree, for instance assembly-line work. As shown in Paper III, self-ratings of performance are also negatively associated with education. For more qualified work tasks, it could be more difficult to assess and be satisfied with performance.

In this thesis, health-promoting conditions have been defined as conditions of work and work organisation that enable skill use and strengthen the ability of individuals to act. Other factors than those investigated in the present thesis are also likely to be important for both work-related flow and performance. For instance, feedback has previously been found to be associated with work-related flow (Bakker, 2008; Mäkikangas et al., 2010), and is likely to be especially significant for health as well as performance in occupations and tasks where it is difficult to assess or be satisfied with actions and performance. Leadership has previously been found to be positively associated with the development of trusting interactions in work groups (Carmeli, Ben-Hador, Waldman & Rupp, 2009). Managers are likely to influence both sharing of knowledge and innovative learning climate at work (Westerberg & Hauer, 2009; Tafvelin et al., 2011; Gustavsson & Ekberg, 2014). In this thesis, the effect of leadership is not explicitly investigated. However, trust in, and perceived justice of, managers is an aspect of the social capital at work (Kouvonen et al., 2006), and an innovative learning climate includes managements' support.

## Health as a resource

Individuals' experiences of absorption, motivation and enjoyment in day-to-day work could be considered not only an outcome, but also a predictor, of the creation and construction of health-promoting conditions at work. Health promotion is an interactive process where the in-

dividual is an active agent who affects and shapes the conditions for health in the environment (Rütten & Gelius, 2011). Individuals decide how they participate and engage in the opportunities for learning that are offered by the workplace, and their willingness to engage in this way affects what they learn (Billett, 2004). There is a strong association between work-related flow at baseline and follow-up (Paper IV), which renders the longitudinal association between innovative learning climate and work-related flow non-significant. As there are strong cross-sectional associations between innovative learning climate and work-related flow (Papers I and III), this finding indicates that there are reciprocal associations between health and work conditions, as shown in previous research (Salanova et al., 2006; Mäkikangas et al., 2010; Xanthopoulou, Bakker, Demerouti & Schaufeli, 2009; Brauchli, Schaufeli, Jenny, Fülleman & Bauer, 2009).

According to the broaden-and-build theory (Fredrickson, 2004), positive experiences such as flow broaden the repertoire of thought and action, and strengthen the ability to act. In Paper III, work-related flow was found to be positively associated with performance (Figure 1) and may hence serve as a resource that increases performance. This confirms previous cross-sectional analyses (Bakker, 2008; Demerouti, 2006), but in a larger, and more heterogeneous sample of employees. Due to cross-sectional analyses, conclusions concerning causality cannot be drawn. It is possible that good performance facilitates experiences of work-related flow, through the direct and positive feedback that comes from performing well (Csikszentmihalyi, 1997; Mäkikangas, 2010). However, experiences of flow have been found to increase self-efficacy (Salanova et al., 2006), which is likely to make individuals engage in further challenges (Bandura, 2001). It has previously been found that the effect of work conditions on performance is mediated by health (Lohela Karlsson et al., 2010) and work engagement (Tims, Bakker & Derks, 2014). The experience of work-related flow may lead to increased engagement in challenges and opportunities for individual as well as collective skill utilisation at work. According to such reasoning, work-related flow is a resource for action and performance that enables indi-

viduals to benefit from resources in the environment, and simultaneously contributes to the construction of health-promoting conditions (Hobfoll, 1989). This makes work-related flow not only a goal in itself, but also a resource for health-promoting workplaces and performance.

## Methodological considerations

The longitudinal associations between work-related flow and conditions at work (Paper IV) were supported and nuanced by the cross-sectional studies (Papers I-III). As discussed previously, reversed and reciprocal causality is possible. Work-related flow may affect perceptions of, or the creation of, health-promoting conditions, and good performance may lead to experiences of work-related flow.

The material used in the present thesis is a strength. The sample is large and consists of data from ten organisations, in the public and private sector, dealing with production, public service and healthcare. This reduces the risk that findings are caused by characteristics of specific occupations, and supports the external validity of the findings. The material also enables multilevel analyses, which takes into account the random effects of variability between departments and organisations.

It became evident that there were some practical difficulties with regard to conducting longitudinal studies in organisations. The longitudinal cohort was reduced considerably, as individuals were no longer employed within the participating departments, had left the organisations, or moved to other departments that did not participate in the follow-up. Several organisations and departments were not able to participate in the follow-up, and there were major changes within organisations as departments merged or were divided. This shows the dynamic of organisations, which made it impossible to conduct a three-level analysis at follow-up.

The measurement of work-related flow concerns work enjoyment, absorption and intrinsic motivation, referring to work as experienced

during the past two weeks. This is an instrument and method that has been validated and used in previous studies (Bakker, 2005; Demerouti, 2006; Salanova, Bakker & Llorens, 2006; Bakker, 2008; Mäkikangas et al., 2010), but it can be questioned whether it reflects the peak experience of flow. However, the aim of this thesis was to identify health-promoting conditions at work. With this aim in mind, the analyses have investigated conditions at work in relation to employee ability to act with enjoyment, motivation and absorption at work, and findings have been interpreted as such. It has been suggested that motivation actually precedes enjoyment and absorption (Sánchez, Salanova, Cifre & Åborg, 2008), and that motivation and enjoyment actually are one composite dimension (Happell, Gaskin & Platania-Phung, 2015). However, this is not likely to affect the conclusions drawn in this thesis.

When using a questionnaire it is necessary to refer to retrospective and more long-term experience of work-related flow; but this method has the advantage of making it possible to identify conditions across a broad range of organisations and occupations. The measurement of tools inspired by lean production captures what is applied and used by employees, rather than what is stated by the management, which could be considered a strength.

## Conclusions and implications

The aim of this thesis was to increase knowledge concerning health-promoting conditions at work, and to investigate how individual, workplace and organisational conditions were interrelated. Individuals' decision latitude, and the social structures at work in terms of social capital and innovative learning climate, were found to be associated with increasing work-related flow. The findings show the potential of work as a motivating and enjoyable activity, leading to learning and growth.

The conclusion is that the individual is embedded in a social work context that has the potential to strengthen the ability to act with moti-

vation, absorption and enjoyment. However, in order to be able to utilise collective health-promoting conditions at work, individuals need to have the authority to make their own decisions concerning work tasks, and be allowed to use the breadth of their skills to master and develop their work. Work-related flow may in itself serve as a resource that increases the engagement in health-promoting work conditions, and a resource for improved performance.

The effect of tools inspired by lean production depends on the specific tools that are used, and on individuals' decision latitude at work. The lean tool *value stream mapping*, which is an activity that unites individuals around a joint problem that demands an analysis of the work process, facilitates innovative learning and work-related flow. The use of lean tools enables collaboration and sharing of ideas mainly for employees who have a low degree of decision latitude in their work. Conversely, the use of lean tools has a smaller effect for those with a high degree of decision latitude.

The implications for the design of health-promoting work can be summarised as follows:

- Organisations that intend to use tools inspired by lean production should consider which tools are implemented, and the conditions under which employees work. In order to improve health and contribute to organisational development, the tools must enable employees to use their skills to develop the work process. Lean tools such as value stream mapping have the potential to create arenas for innovative learning, especially in work where there are few opportunities for individual decision authority and skill use. In work that is characterised by a high degree of decision latitude, the effect of these tools is likely to be limited, and

the same effect could also be achieved by maintaining and increasing decision latitude.

- A focus on health promotion is likely to have long-term effects on performance. In order to promote health as well as performance, work needs to be organised so that employees have opportunities to decide over their work, utilise their skills, and learn new ones. This enables individuals as well as organisations to prosper.

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