Health and flow: does the experience of work related flow act as a buffer for stress related illness in high-strain environments?¹

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Abstract

A person's health is greatly affected on how much stress one is exposed to in one's work environment. Fagerlind et al. (2013) showed that flow is correlated with high control defined by the demand/control model. The aim of this study was to examine if work related flow affects health in a high strain population. The study used a cross sectional design with 4904 participants. The result showed that work related flow may act as a buffer for health in a high strain environment, highflow ($M=83.39$, $SD=16.9$) and lowflow ($M=80.22$, $SD=15.3$), $t(221) =2.14$, $p = 0.03$. Age, gender, educational level, country of birth, years lived in Sweden, hierarchical position, children at home and marital status were controlled for as potential confounders to health.

Keywords: work related flow, health, organizational psychology, stress.

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Hälsa och flow: fungerar upplevelsen av arbetsrelaterad flow som en buffer för sjukdomar relaterade till hög stress på arbetsplatsen?

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Sammanfattning

En persons hälsa är i hög grad beroende av hur mycket påfrestningar man är utsatt för på arbetet. Fagerlind et al. (2013) visade att flow är korrelerat med hög kontroll definierat av krav/kontroll modellen. Syftet med denna studie var att undersöka om arbetsrelaterad flow påverkar hälsa i en population med höga påfrestningar. Studien utgörs av en tvärsnittsstudie med 4904 deltagare. Resultatet visar att arbetsrelaterad flow är en buffer för ohälsa i en miljö med stora påfrestningar. Flow ($M=83.39$, $SD=16.9$) and låg flow ($M=80.22$, $SD=15.3$), $t(221)=2.14$, $p = 0.03$. Ålder, kön, utbildningsnivå, födelseland antal år i Sverige, hierarkisk position, hemmavarande barn samt äktenskaplig status kontrollerades som eventuella ovidkommande variabler.

Nyckelord: arbetsrelaterad flow, hälsa, organisationspsykologi, stress.

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Health and flow: does the experience of work related flow act as a buffer for strain related illness in high-stress environments?

Different workplaces have different challenges and hazards. The risk for development of ill-health are typically higher in some workplaces others. According to the demand/control model the employee most vulnerable to ill health is the one that has low control over ones work situation while at the same time having high demands, i.e. high-strain jobs (Karasek & Theorell, 1990). Is it possible to encourage employers to design work environments in an effort to combine effectiveness and good health? Flow is an experience of intense positive emotion that is fulfilling and highly self-motivating (Csikszentmihalyi, 1997) that has significantly been linked to the occurrence of positive mood, such as happiness, involvement, alertness, excitement etc. (Fullgar & Kelloway, 2009). Fagerlind, Gustavsson, Johansson and Ekberg (2013) showed that flow is an unusual - but certainly not unachievable - experience for people with high strain working conditions, i.e. with low control over the work environment and simultaneously experiencing high demands. The aim of this study is to examine if health is affected by flow and if flow may act as a buffer against ill health for groups who work in a high strain environment.
1.1 Work environment

Two strategies seem to take form in an effort to make companies more flexible and adaptive to the new demands of global style competition. Simple tasks are becoming more controlled and the employment relationship can sometimes be completely replaced by temporary work agencies, resulting in the fact that it will be easier to learn a new job but it will also be easier to replace staff, making the workforce exchangeable. For jobs where work description is not entirely clear or objectives are not clearly defined, the organizational framework are becoming more relaxed (Allvin, Aronsson, Hagström, Johansson & Lundberg, 2005) but often with an increasing workload (Landsbergis, Cahill, & Schnall, 1999). These new rules and standards require that individuals must adapt their work to the changing demands placed on it.

Both of these strategies require new skills from the employees. When the outer framework reduces the demand for the employee's ability to self-plan, organize and be responsible for carrying out the work increases. Whereas a tightened regulatory framework increases the demands on the employee's ability to adapt in a tighter framework. (Allvin et. al 2006)

In other words the tayloristic era is changing from the traditional assembly-line approach to new forms of work design; the old-school organizational work system is taking its place in new types of organizations in order to try and improve product quality, production and profitability. Organizational work systems such as lean production, total quality management and other high- performance work organization systems are emerging and with this the rate of high strain jobs may be increasing. With the introduction of new models with lower emphasis on control and higher demands the necessity of research on stress prevention rises. (Landsbergis et al, 1999)
1.2 Health

Throughout history health has been defined in different ways by different thinkers deriving from different schools of philosophy, religion, medicine and psychology (Medin & Alexandersson, 2000). The word health derives from the Indo-European word “kailo” meaning “good omen, whole, uninjured” (Marks, Murray, Evans, & Willig, 2005). Even today health is usually seen as to be truly whole and free from illness or injury. One of the more influential definitions of health in the modern era is the one from The World Health Organisation (WHO, 1946) that specified health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. As seen in the WHO definition health is more of an ideal mental and physical state; a goal which a person may pursue but may never expect to fully reach. Looking on the other side of the health spectrum illnesses like heart disease, exhaustion and depression are seen by most people as the total opposite of good health. One factor that has been proven to correlate with these illnesses is long time exposure to stress (Karasek & Theorell, 1990). Karasek and Theorell (1990) lay forth the assumption that stress is the outcome of high strain as a function or interaction of 1) low decision latitude: skill discretion aka authority over decisions (control) and 2) high demand: the subjective view over ones working tasks (demand).

Health promotion has for some time been a goal of several governments and organizations (Medin & Alexandersson, 2000). Not only is there a personal interest of health for the individual worker but workplaces with a good health policy and health practice are more likely to fair good in business (Black, 2008).

Downie (1996) made the meaningful distinction between "true health" and "subjective health". To the concept of true health Downie counts objective facts such as food supply and housing whereas subjective health is defined as the personal thoughts and feelings of a person
towards one's health. A number of studies argues that asking people about their subjective health has several advantages over medical examination and has a good predictive value of future sickness (Helmer, Barberger, Gateau, Letenneur, & Dartigues, 1999; Medin & Alexandersson, 2000; Miilunpalo, Vuori, Oja, Pasanen & Urponen, 1997). They thereby agree on the assumption that subjective health is to prefer in relation to true health.

1.3 Stress

Since the nineteen thirties there has been extensive research on stress and stress related illness. From then on there has been a range of different approaches to identify and explain the phenomena of stress. The main approaches seems to outline in four models: stimulus-based; response-based; an interaction between these two or; transactional models. The stimulus-based rationale aims to identify an individual potential stressor and eliminate what otherwise could start a strain reaction in the individual (Cooper, Dewe, & O'Driscoll, 2001). The response based approach can be explained in terms of universal response stages; stressor acts on an individual and the individual responds in predetermined physiological, physiological and behavioral ways. The interactional-based stress models focuses on the structural and quantitative aspects of where the response and stimulus approaches meet and provides descriptives but not causality. Finally, the transactional approach were the focus lies on the relationship between the individual and the environment as an ongoing exchange (Cooper et al, 2001). Either way one chooses to identify the core issue, stress have been found to be correlated to individual problems ranging from minor illnesses to heart diseases and looking at a wider context social problems such as drug and child abuse (Watts & Cooper, 1998). Individual stress symptoms within an organization can for example be, high absenteeism, high staff turnover, poor morale, reduced safety and reduced operational capability (Bridger, Day & Morton, 2013). One explanation for this is that “stress
‘gets into the body’ activating the hypothalamic–pituitary–adrenocortical (HPA) axis” (Bridger et al 2013). There may also exist a link between the endocrinological measures of stressful job strain and job-based measures from a subjective measurement (Sluiter, Frings-Dresen, van der Beek, Meijman, & Heisterkamp, 2000). In this article we follow McGrath’s definitions; stress as the subjective experience, strain as the subjective response and stressor as the mechanism that triggers the stress experience (McGrath, 1976).

1.4 The demand/control model

![Diagram of the demand/control model](image)

*Figure 1. The demand/control model. From Karasek & Theorell (1990)*

The demand/control model postulates that the work experience can be understood by looking at two dimensions: decision latitude (also called control) and psychological demands (Karasek 1976; Karasek & Theorell 1990). It is these two parameters, demand and decision latitude, interacts and in a sense creates the perceived work environment for the employee.
Karasek and Theorell describes decision latitude (control) as a combination between two factors: task authority and skill discretion. With the former Karasek and Theorell describe social authority over making decisions over ones work, i.e. a form of empowerment. With the latter the authors mean the skills that are applicable and needed to get the work done: for a waitress this would mean a specific set of know-how and skills that are different from a librarian, just to name two examples. If both task authority and skill discretion is high, the overarching entity of decision latitude is also high, and vice versa. Another way to describe decision latitude is to talk about resources of the employee that are closely related of the framework of the workplace and, at the same time, is the fruit of personal learning and development. Psychological demands have been defined as how hard the individual is required to work (Karasek 1976; Karasek and Theorell, 1990). These demands can be divided into psychological demands and physical demands: by psychological demands the authors mean the cognitively perceived load of the work, such as; deadlines, items that are required to be produced per time unit etc. With physical demands Karasek and Theorell talk about actual stressors on the body. These exposures to lasting physical strain are still a large part of many workplaces, this is especially true when it comes to less qualified and low paid jobs. Of course, there is a degree of interaction and overlap between psychological demands and physical demands making them not mutually exclusive as mind and body are indeed inseparable.

Looking closer on the demand/control model four categories of work emerges (figure 1): high-strain jobs, active jobs, low-strain jobs and passive jobs (Karasek 1976; Karasek and Theorell, 1990). High strain jobs are defined by having low decision latitude (control) and high demands, active jobs are high on both demand and control, low-strain jobs are high on control while low on demands (Karasek 1976; Karasek and Theorell, 1990). The high-strain work
category is more associated with ill health compared to the other work categories. Negative health consequences will be an effect, Karasek and Theorell (1990) argues, because of the high levels of demands, such as tight deadlines and high workload, are added to a low level of decision latitude (control), such as low autonomy and low levels of autonomy and low skill discretion. The strain that is consequence of this high level of demands and low control is in fact a fight-flight response going on for too long (Lundberg, 2006). In this study we are primarily interested in high strain since it has shown to be correlated with low health: examples on high-strain jobs are waitress, nurses aids and assembly line workers (The New Wellness Encyclopedia, 1995).

The demand/control model can be viewed from two different perspectives; health buffering aspect or health strain aspect. Buffering in the sense that the decision latitude (control aspect) can buffer the negative health aspect of high demands and the health strain aspect were high demands and low decision latitude (control) creates psychosocial strain for the individual (Van der Doef & Maes, 1999).

Well-being and health in relations to the demand/control model has been a matter of extensive research for some time: In a systematic review Van der Doef and Maes (1999) analyzes the support for the demand/control / (support) model(s) in 63 studies. Van der Doef and Maes conclude that there is considerable support that low decision latitude (control) may affect health in a negative way, in accordance with the assumption made by Karasek and Theorell (1990). Similar results is shown in another review, there is a relation between demand/control and well-being (Häusser, Mojzisch, Niesel & Schulz-Hardt, 2010). In another recent meta-study the job strain categories with low decision latitude, i.e. passive and high-strain, were found associated with stress and psychological illness (Statens beredning för medicinsk utvärdering -
Worth to notice is the social dimension that in some cases has been added to the demand/control model resulting in the somewhat more elaborated demand/control/support-model (Johnson & Hall, 1988; Johnson, Hall & Theorell, 1989). The social dimension is theorized to act as a buffer in the high strain and passive work categories. However, Van der Doef and Maes (1999) has shown that the evidence for the demand/control/support hypothesis is low and that the factor most related to health, or the absence of it, is primarily decision latitude (control); not social support. The lack of social support under conditions of low control may, nevertheless, be related to psychological illness such as depression and burnout (Van der Doef & Maes, 1999).

1.5 Work related flow

Flow has been explained as a fluid peak experience in which a person is fully present in the moment and at the same time experiencing a deep sense of enjoyment with her current work at hand (Csikszentmihalyi, 1997). In a broader sense, flow may be seen as a component of a deep, fulfilling and meaningful life (Seligman, 2012). Flow adds a positive and salutogenic element to organizational health psychology (Schaufeli, 2004; Fagerlind et al, 2013).
The theory behind of how flow arises is described via the flow channel theory (figure 2); flow is as a state were the individual skills meet the challenge of the current task (Csikszentmihalyi, 1990). If the challenge is too great for the subjective skills the person will experience anxiety, according to the flow channel theory. On the other hand, if the challenge is limited in contrast to the subjective skills of the individual she will experience boredom. Thus the flow channel is where the individual is most likely to experience flow. The theory suggests that the individual may fluctuate between these three states: anxiety, flow and boredom, depending on the subjective demands on the individual (Csikszentmihalyi, 1990). In other words; it is salutogenic and health beneficial, Csikszentmihalyi (1990) argues, to be situated within the flow channel; as opposed to be situated in anxiety or boredom. Csikszentmihalyi (1997) also
argues that clear goals and instant feedback both are essential in order to achieve flow.

It has been discussed whether one should look at flow as a state or a trait (Fullgar & Kelloway, 2009). The state viewpoint sees flow as an individual behavior that is performed occasionally in response to situational conditions: after the moment has passed the flow experience too ceases to exist (Fullgar & Kelloway, 2009). The trait viewpoint (Csikszentmihalyi, 1990), on the other hand, looks at flow as a more permanent internal disposition that makes a person more or less prone to exhibit flow. Fullgar & Kelloway (2009) has shown in an experimental study where they followed 40 participants during 15 weeks that the flow experience to a great extent can be attributed to situational characteristics in the workplace which supports the state viewpoint.

The flow experience is usually considered being consisted of three separate and indispensable elements: enjoyment, absorption, and intrinsic motivation, that all are experienced simultaneously, creating a synergy effect (Csikszentmihalyi, 1997).

The three elements of the flow experience seems to correlate to different aspects of health: Demerouti, Bakker, Sonnentag, and Fullagar (2012) has shown that the elements of absorption and enjoyment at work are associated with energy and vigour, in opposite to exhaustion, after work. Fredrickson and Levenson (1998) has shown that enjoyment and positive emotion gives a more rapid recovery after patient has had medical heart problems and builds psychological resilience. Muraven and Slessareva (2003) argues that motivation reduces negative consequences of fatigue and resource depletion.

Fagerlind et al (2013) shows that high decision latitude (control) in the demand/control model correlates with high occurrence of flow; however, at the same time showing that work related flow may exist even when decision latitude is low.
1.6 Similarities in models

As far as we know, in exception to Fagerlind et al (2013), the demand/control model has not been seen in comparative terms to the flow-channel theory. The fact that both the two models measure subjective experiences in the working life could imply a common ground for the theories. The concept of decision latitude (control), and most especially the element of skill discretion, does show some striking similarities to the skill element from the flow channel theory; so much that one could argue that they closely interact. The same could be argued for demand from the demand/control theory and challenges from the flow channel-theory. However, it is worth to note that even though there are similarities there are also differences: the skill parameter from the flow channel-theory does not capture the authority element from the demand/control model. The possibility to have power and authority over ones working time and condition is an essential part of the demand/control model and in the following categorization of ones workplace: high-strain jobs cannot be measured properly without authority. We suspect that demand and decision latitude are related to skills and challenges but that they have substantial differences and that stress cannot be understood without authority within the demand/control model.

Hypothesis

The aim of this study is to examine if health is affected by flow and if flow may act as a buffer against ill health for groups who work in a high strain environment. We have seen that health best is described as a subjective statement and that the demand/control model may offer insights to how health and stress is being perceived in one's workplace (high-strain jobs being bad and active jobs being good etc.). The social dimension may not act as a buffer for health, that flow is a state and not a trait. However, evidently not all employees on workplaces with stress
and high-strain are suffering from ill health. If the social dimension isn't a buffer then what is? Fagerlind et al (2013) has shown, somewhat surprising, that flow may occur even in workplaces with low decision latitude (control) and high demands. We suspect that there is an overlap between these two observations and therefore hypothesize that the peak experience of work related flow, created through right amount of skill and challenge, can create a health buffer even in a high-strain environment.

_Hypothesis:_ Work related flow counterweights the negative health consequences associated with stress i.e. high-strain jobs according to the demand/control model.

**Method**

**2.1 Procedure and participants**

10 Swedish companies and organizations participated in the study. The study was tested and approved by the Ethical comity of Research at Linköping University. The organizations consisted of one state agency, two state organizations, one municipality in its whole, parts of three other municipalities, one private production company, one private healthcare company and parts of a county council. A questionnaire was sent from Linköping University to 8476 participating employees (and managers) during the years of 2010-2012. The authors gained access to relevant data from the questionnaire thorough a collaboration and discussion with researchers from Linköping University.

**2.2 Measures**

A questionnaire that was used, called Leadership and Organisation for Health and Production Development (LOHP), that included several topics and scales on e.g. leadership, social support, organization of work and production etc., where relevant items on health, psychological demands and decision latitude and flow, as well as background variables, were
selected and analyzed.

A total of \( n = 4904 \) employees answered LOHP at a response rate of 57.8 %. The response rate were in line with a similar study (Fagerlind, 2013). Of the population \( n = 3131 \) were female (63.8 %) and \( n = 1740 \) were men (35.5 %). \( N = 33 \) of the respondents did not report gender. The mean age of the study population was 50 years.

2.2.1 Health. Health was measured by using a self-report scale from the EQ VAS, which is part of the EQ-5D questionnaire. In the EQ-5D, five dimensions of health are being measured: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. These questions were not taken into account in this study. In the EQ VAS the participants were able to assess their subjective level of health on a 20 cm visual “thermometer” ranging from 0 (worst possible health state) to 100 (best possible health state). Participants were asked to draw a line from a black box marked “your current health” to the thermometer; in that way describing their subjective level of health. The EQ-5D has been indicated to have good validity and reliability in studies on chronically impaired patients (Hurst, Kind, Ruta, Hunter & Stubbings, 1997).

2.2.2 Psychological demands and decision latitude. Demand and decision latitude (control) was determined by use of the Swedish Demand Control Support Questionnaire (DCSQ) constituting of five items on demands and six items on control. The questionnaire included item such as “does your work demand that you work very hard?”, “do you have freedom to decide what should be executed in your work?” etc. Answers were given on a four-point scale ranging from 1: often to 4: never. Internal consistency (Karasek, Choi, Östergren, Ferrario & De Smet, 2007; Sanne et al., 2005), test–retest reliability (Mase et al., 2012), and convergent (Hökerberg et al., 2010) and concurrent validity (Karasek et al., 2007; Mase et al., 2012) have all been found satisfactory. The internal consistency for the demand scale in the present sample were \( \alpha = .79 \) (n
Health and flow

= 4757) and α = .68 (n = 4810) for the decision latitude scale. Median scores were calculated for both scales and the scales were dichotomized at this point creating two new scales, combining these scales formed the variable for demand/control (low-strain/active/passive/high-strain) in accordance with previous research (Fagerlind et al, 2013).

2.2.3 Work-related flow. Work related flow was measured via the Work-related Flow Inventory (WOLF), which was developed and tested for reliability by Bakker (2005; 2008) with satisfactory results. WOLF consists of questions concerning how an employee during the last two weeks has experienced his/her work. WOLF asks, for example: “I feel excited when I work”; “when I work I don't think about anything else”; “I get motivated by the work itself, not by the rewards the work gives” etc. In all, a total of 13 items were used. Originally the WOLF questionnaire had possible answers on as seven point scale. However, in LOHP, the numbers of possible answers were narrowed down to five (from “never” to “always”) (Salanova, Bakker & Llorens, 2006).

In accordance to previous research (Fagerlind et al., 2013) the flow sample was divided into three groups with the highest scoring tertile (T3) determined as experiencing flow during the last two weeks and the two remaining tertile (T1 and T2) determined as not experiencing flow during the last two weeks.

2.2.4 Control variables. Age, gender, educational level, country of birth, years lived in Sweden, hierarchical position (i.e. manager or employee), children at home and marital status and were considered potential confounders to health. Income was not added as a control variable as economy itself may be seen as an independent variable correlated to age and gender.
Results

1: First stage were to determinate how the construct Flow and possible confounders correlated to Health. We created a correlation grid using Pearson product-moment correlation coefficient (Table 1). 2: To determinate if there were any significant health difference between the populations defined by the demand / control model (low-strain, active, passive and high-strain) the data was first visually controlled (Table 2). 3: We conducted a univariate ANOVA to determinate if there were any significant differences between the same groups (low-strain, active, passive and high-strain) (Table 3). 4: A Tukey B test was now conducted to determinate between which groups there was a significant difference. 5: The construct Flow was created using the population of the top tertile on the flow scale and the High strain population was then divided using the Flow construct creating High-strain - lowflow and High-strain - highflow. 6: We could now use a T-test to see if there was a significant difference the Highstrain-lowflow and Highstrain-Highflow populations.

1. We initially tested if there were any significant correlation between Flow, health and possible confounders. Hierarchical position $r(4441) = .06 \ p = .00$ and marital status $r(4416) = .04, \ p = .01$ were correlating on a significant level but the correlation were not considered large enough for any additional statistical testing.
Table 1. Correlations between flow, health and confounders

<table>
<thead>
<tr>
<th>Subscale</th>
<th>1. Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Health</td>
<td></td>
</tr>
<tr>
<td>2. Flow</td>
<td>.18**</td>
</tr>
<tr>
<td>3. Age</td>
<td>-.01</td>
</tr>
<tr>
<td>4. Hierachical</td>
<td>.06**</td>
</tr>
<tr>
<td>5. Marital status</td>
<td>.04**</td>
</tr>
<tr>
<td>6. Children at home</td>
<td>.00</td>
</tr>
<tr>
<td>7. Education</td>
<td>-.00</td>
</tr>
<tr>
<td>8. Years lived in Sweden</td>
<td>-.12*</td>
</tr>
</tbody>
</table>

** p<0.01, * p<0.05

2. The means of differences between high-flow and low-flow was visually inspected by a descriptive table (Table 2). The mean in the high-strain group indicated a lower subjective health than in the other groups. High-flow was an indicator for higher health compared to low-flow.

Table 2. Health interaction between flow and stress

<table>
<thead>
<tr>
<th></th>
<th>Subjective health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low-flow M(sd)</td>
</tr>
<tr>
<td>Lowstrain</td>
<td>85.48(11.98)</td>
</tr>
<tr>
<td>Active</td>
<td>80.81(14.60)</td>
</tr>
<tr>
<td>Passive</td>
<td>82.88(14.58)</td>
</tr>
<tr>
<td>Highstrain</td>
<td>80.22(15.26)</td>
</tr>
</tbody>
</table>
3. In order to investigate the possibility of significant differences in health outcome between the job strain categories (low-strain, active, passive and high-strain) a one-way ANOVA was conducted. There was a significant difference between the job strain categories on health at the $p < .05$ level for the three conditions $[F(3, 4437) = 35.7, p = 0.00]$. 

Table 3. ANOVA on Health regarding low-strain, active, passive, and high-strain job-categories.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>20472.83</td>
<td>3</td>
<td>6824.28</td>
<td>35.37</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>855966.60</td>
<td>4437</td>
<td>192.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>876439.43</td>
<td>4440</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Post hoc comparisons using the Tukey test $p < 0.05$ indicated that the mean score for the high-strain ($M = 80.95$, $SD = 15.61$) was significantly lower than the Active ($M = 82.80$, $SD = 13.98$) and Passive ($M = 83.76$, $SD = 14.32$) categories. Low-strain ($M = 86.87$, $SD = 12.23$) was significantly higher than passive, active and high strain categories.

5. The flow variable was dichotomized into high flow and low flow variables were flow was defined by the highest tertile of the sample scores on the flow scale. The two variables were then applied on the high-strain category creating two new variables: High-strain - highflow and High-strain - lowflow.

6. An independent sample t-test was conducted to compare health in the high-strain group with highflow and lowflow conditions. There was a significant difference in the scores for highflow ($M = 83.39$, $SD = 16.9$) and lowflow ($M = 80.22$, $SD = 15.3$) conditions; $t(221) = 2.14$, $p = 0.03$. 
The main findings in this study was that the individuals experiencing flow in a Highstrain population also have a significantly higher health than the individuals in the same group who is not experiencing flow.

**Discussion**

5.1 Result discussion.

In this study the question whether flow may act as a buffer against negative health consequences for stressful jobs is answered. In confirmation of the hypothesis it does indeed seem like work related flow in itself is a buffer against stress related illness measured by the high strain category of the demand/control model. Thus, for employees who work in a high strain environment the experience of flow is beneficial health wise. Fagerlind et al (2013) showed that flow is more common within the high control work categories of the demand/control model (i.e. the low-strain and active job categories). The result is now amplified with further information about the “exception to the rule” - the high-strain jobs working conditions. This is important since a healthy approach is not only good for employee’s individual health but also beneficial for organizational productiveness (Black, 2008).

Fullgar and Kelloway (2009) showed that flow is a construct of state rather than trait which implicates that we could change the individual context in order to create an environment that is beneficial for work related flow. This could hopefully have implications in the future design of stressful workplaces such as waitress, nurse’s aids and assembly line workers etc. Identifying the context may possible take starting-point in the three elements of flow enjoyment, intrinsic motivation and concentration. How the context contributes to the individual experience of work related flow should be an important aim of future studies.

We hope our finding that flow is a strain preventive phenomena will be a genuine
contribution to positive psychology and a finding that expands our knowledge about health, flow and job characteristics (i.e. the demand/control model). This is especially important as new ways of organizing and designing workplaces are becoming more common, such as lean-production (Landsbergis et al, 1999). With these new forms of organizational work systems, with high possibility of lower levels in decision latitude (control) there is an increasing risk of negative health outcome, which makes the importance of preventive research even more relevant.

The fundamental question of why work-related flow acts as a health benefactory buffer has not been the aim to investigate in this study. It is however a great and intriguing question that future researchers should have reason to return to. Csikszentmihalyi (1990) proposes that flow could have a salutogenic effect through the central nervous system which he argues could be strengthened by the experience of flow. If this manipulation by flow of the central nervous system is the “source” of flows salutogenic effect remains to be answered. The fact that mind and body are not two separate entities but one unified unit (in line with modern psychology and as opposed to Cartesian philosophy) points to the fact that the mind and body interacts indistinguishable, as one. Also, taken into account that flow is a powerful experience the phenomena may be seen in light of a coping mechanism in a high stress environment: as it has a component of “escape” from reality. This is however unlikely since Fagerlind et al (2013) showed that flow tend to exist in low strain work environments.

5.2 Method discussion

The concept of flow is a peak experience Csikszentmihalyi (1975; 1990; 1997). A peak experience - whether it is flow, euphoria, or a drug induced high - is a powerful psychological state that is far from everyday routine. How does one best capture such an experience? It is, to say the least, a challenging methodological task. In this study we have measured flow in
accordance with previous research (Bakker, 2008; Fagerlind et al., 2013) as the top tertile of the populations flow results (from the WOLF questionnaire) over the last two weeks of work. One may argue that this method may not fully capture the true essence of the experience of flow. In the future researchers will surely find better ways of capturing flow we hope the work to find even more reliable methods of defining and measuring flow continues.

The demand/control model has several features in common with the flow channel model. We initially suspected that demand and decision latitude were related to skills and challenges. Through this study we have not had reason to doubt this suspicion; as a matter of fact when we have looked at the individual items that measure demand/control and flow (skill/challenge) an interesting pattern occurs. Firstly it looks like items that measure demand from the demand control model overlap motivation and concentration from flow. One could argue that if a person is experiencing high demands on her workplace she will be motivated and concentrated in order to reach those demands. For example, the item “does your work require that you work very hard?” (demand/control) could indeed interact with the item “I am totally absorbed by my work” (flow, concentration) since they may very well measure two sides of the same coin. Secondly, there may also exist an interaction between the enjoyment of flow and skill discretion of the demand/control model. If a person perceives herself to be adequate at her work she would, we suspect, also score higher at the items measuring enjoyment at work. For example the items “I do my work with great enjoyment” (flow, enjoyment) could, if scored high, influence how a person scores on the demand/control item “Does your work require skill?”. With that in mind it is easier to examine a healthy population than a population with ill health, as we have done with the high-strain job category. Ergo, we have been strengthened in our suspicion that the demand/control model and the flow channel model are related and that the exact nature of the relationship needs
to be further examined by future studies. We also notice the fact that authority does not seem to fit the overlap between the models. As the concept of authority is essential for decision latitude (control) this too is in need of further study: Is it true that task authority is not as essential to flow as we suspect and, in that case; how and why?

A limitation in this study was the response rate which was measured to 57.8%. Unfortunately we did not have the data for the non-respondents. However the response rate were in line with a similar study (Fagerlind, 2013) in which age and gender did not differ between the respondents and the non-respondents. There could of course be differences between respondents and non-respondents for example a reason for not responding could be that non-respondents were on sick leave on the occasion the study were executed. Another possible reason for not responding could have been the large volume of the questioner which may have deterred the employees from responding.

The current study is a cross sectional study. Challenges that follow this common research design may be present in this study; cohort effects can be a confounder. In this study we have found a correlation between flow and health. However, it may also be the case that more healthy individuals with greater ease can experience flow, i.e that the correlation is reversed. The descriptive nature of the cross sectional study does make cause-and-effect hard to determine. The causality of flow being the moderator of health is not determined by this study. Future research could by a longitudinal design investigate this question. Also, in this study we have not examined the length of a person’s current job. One could suspect that a high-strain job not is a place where a person would stay for an extensive length of time, compared to a, say, active job. A high-strain job could therefore, possibly, be more temporary of nature (part time job, first job etc.) and could thereby not have affected the worker with the ill health that is traditionally
associated with low control and high demands. But as stated by The New Wellness Encyclopedia, (1995) this does not seem to be the case. High-strain jobs are primarily made out by professions such as waitress, nurse’s aids and assembly line workers. The internal validity of the results in this study is strengthened by the large number of participants. However the external validity (generalizability) is affected by the fact that the population is taken from a single country, Sweden. We can therefore only assume that this result is liable in Sweden and other countries which are a rather similar in history, cultural blend, set of ethics, political views, religion, language etc. Also, as the study has investigated individuals within the working force the results are only relevant to this population. Questions may still arise as to how work may affect health; one may suspect that health is rated lower by groups without jobs, i.e. people on sick leave and unemployed which could create a ceiling effect of health ratings in our sample. The current study contributes to the increasing knowledge about flow as a preventive construct against negative health consequences. This was a cross-sectional study in the future longitudinal and experimental studies of flow are required. In line with Bakker (2008) we suggest further investigations on the chronological order of appearance of the flow elements in order to design working activities that will evoke flow.
References


