The relation between knowledge integration processes, team member sense of coherence and stress

Philip Runsten[*] & Andreas Werr[+]

[*]Stockholm School of Economics Institute for Research

[+]Stockholm School of Economics

(philip.runsten@hhs.se; andreas.werr@hhs.se)

Abstract

With teamwork proliferating in modern organizations, it is surprising that research on work-related stress has to a large extent neglected how team processes affect individual perceived stress. The current study addresses this void by investigating the relationship between two team knowledge processes, bringing expertise to bear and learning behaviour, the salutogenic variable sense of coherence (SoC), and perceived stress. Based on a multi-level study of 344 individuals in 54 knowledge intensive work teams, we find that team knowledge processes are positively related to work SoC and that work SoC fully mediates the relationship between team knowledge processes and individual perceived stress. The study further investigates whether a team intervention (self-facilitated team debrief) can positively affect knowledge processes and thereby work SoC. Comparing before and after measures in 30 treatment teams with those in 24 control teams we find that the intervention improved the team knowledge process bringing expertise to bear and individual work SoC.

Introduction

Stress and deteriorating (mental) health among employees represent an increasing challenge to societies, organizations, and individuals. In a study by the Swedish Work Environment Authority, high workload was the most common reason for ill health caused by work, other than accidents. This applied regardless of sex, age, income, industry, education, or form of employment. Among employed persons with ill health caused by work, 74 percent suffered from fatigue. In the age group

16-49 years almost every second employed person with work related ill-health experienced worry or anxiety, often in the form of depression or exhaustion disorder (Ponton Klevestedt, 2021).

With teamwork gradually becoming the dominant form of organizing in contemporary specialized and complex organizations (O'Neill & Salas, 2018), it is surprising that research on stress and employee well-being has paid rather limited attention to the role of the team (Busch et al., 2013; Carbonell & Rodriguez-Escudero, 2020; Chen et al., 2018; Cruz & Pil, 2011; Espedido et al., 2020). As organizations come to depend more on teams, so does the individual. When essential knowledge is distributed among team members, individual work performance becomes increasingly dependent on other team members' expertise and behaviours. Consequently, team members' sense of work-related demands, control and support, and thus their stress and well-being, is closely related to the functioning of the team (Chen et al., 2018). However, research on teams has mainly been concerned with the efficiency of teams while team members' stress and well-being has been a less studied outcome. The limited existing research shows, however, that the structure and composition of teams (Gallie et al., 2012; Jex & Thomas, 2003; Liu & Liu, 2018; Rasmussen & Jeppesen, 2006) as well as team processes, such as team reflexivity (Chen et al., 2018), may affect individual stress and well-being. The way in which team structure and processes are related to employee stress may, however, be debated. While some research points at a positive relationship between a better leveraging of the team's knowledge resources and stress (e.g. Chen et al., 2018) it may also be argued that an increasing focus within the team on the team's collective resources though processes such as team reflexivity and team learning may increase the demands perceived by team members and surface conflicts in ways that instead increase perceived stress.

The current study aims at furthering the understanding of the relationship between teamwork and perceived employee stress by focusing specifically on the relation between team processes of knowledge integration (team learning behaviour and bringing expertise to bear), individual sense of coherence (a key salutogenic condition that has been demonstrated to buffer the effect of stressors) and individual stress. With this focus we want to contribute to previous research in several ways.

First, previous research on the relation between team characteristics and team member well-being and stress has mainly focused on the structural conditions of teams and team design, such as organizational climate, policies, practices and procedures (Dollard & Bakker, 2010), team autonomy (Van Mierlo et al., 2007), the level of self-direction (Gallie et al., 2012; Rasmussen & Jeppesen, 2006), team decision making, team leader appointment and team responsibility (Cruz & Pil, 2011). The extent to which team processes – the processes through which the team makes use of its resources and leverages its structural conditions – affect team members' stress and health

conditions has received much less attention (Carbonell & Rodriguez-Escudero, 2020; Chen et al., 2018). In line with e.g. Mayo and Wolley (2021) we argue that teams may vary in their ability to transform their resources and conditions into outcomes, and that team processes may account for these differences. Evidence of such a relationship between team processes and employee well-being outcomes has been found in some previous research showing, for example, that team reflexivity effects burnout (emotional exhaustion, cynicism, inefficacy) via influence on job demand and control (Chen et al., 2018); that transactive memory systems (TMS) affect job stress (Carbonell & Rodriguez-Escudero, 2020); that individual and team level social systems create key resources used in the process of evaluating and managing stressors (Busch et al., 2013); and that open group processes and group cohesiveness have positive effects reducing anxiety as well as musculoskeletal discomfort among team members (Carayon et al., 2006). The current study aims to contribute to this previous research by focusing specifically on knowledge integration processes on the team level as an antecedent to employee level well-being outcomes. In contemporary work, individuals are increasingly dependent on their team-members' knowledge and expertise to successfully perform their work tasks. The specific processes of leveraging expertise within a team context and their relation to employee well-being have, however, only been studied to a very limited extent with Carbonell & Rodriguez-Escudero's (2020) study of the relation between TMS and job stress being a recent exception.

Second, the current study complements the dominating pathogenic focus of previous research on teams and stress with a salutogenic approach (Antonovsky, 1987). The focus of previous research has been on the factors that cause stress. However, as many stressors in contemporary work-life are difficult or impossible to remove it has been suggested to also investigate the factors that may explain employees' resilience to stressors. By investigating the concept of "sense of coherence" (SoC), the current study turns attention to what in previous research has been found to be an important antecedent of employee health and well-being by increasing individuals' resilience to stressors (Eriksson et al., 2006). In the current study we investigate the role of SoC as a mediator between team knowledge integration processes and employee perceived stress and thus complement stress research dominated by the perspective of the job demand-control model (DCM) (Karasek, 1979) and later models, such as the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007), with a complementary mechanism explaining individual work-place stress.

Third, the current study talks to previous research on how team-processes may be purposefully improved through organizational interventions. Previous research has investigated a broad set of interventions (Klein et al., 2009; Salas et al., 2008) and found that one of the more successful ones is team debrief (Smith-Jentsch et al., 2008; Tannenbaum & Cerasoli, 2013). While team reflexivity has

also been found effective in reducing stress in the team context (Chen et al., 2018), the team-level mechanisms through which this intervention alleviates stress remain to be investigated. In the current study we explore team knowledge integration processes as such a mechanism through which a team intervention may support employee well-being outcomes such as SoC and perceived stress.

The current study is based on a longitudinal, multi-level dataset consisting of 344 employees nested in 54 teams in 10 Swedish government agencies.

Theoretical foundations and hypotheses development

Model overview

The current study follows the input, process, output framework presented by Liu & Liu (2018) in their attempt to synthesize the literature on teamwork and stress. It takes a knowledge perspective on teams and thus views team members as possessing complementary knowledge and expertise which is needed in the pursuit of their joint task (Edmondson, 1999; Faraj & Sproull, 2000) A key condition for team members' ability to master their work, and manage their job demand and resources, thus becomes access to and ability to leverage their colleagues' knowledge and expertise. This ability is to a large extent manifested in team knowledge integration processes such as team learning behavior (Edmondson, 1999) and expertise coordination (Faraj & Sproull, 2000).

Based on the assumption that these team level processes increase the individual team member's ability to master their job, previous research founded in the job demand-control model (Karasek, 1979) and Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007), would predict that team level knowledge processes decrease demands on the individual and increase the perceived resources available to the individual employee and thus reduce stress (see e.g. Busch et al., 2013; Carbonell & Rodriguez-Escudero, 2020; Tucker et al., 2013). However, building on the salutogenic approach to work-related stress and health developed by Antonovsky (1987) we investigate a complementary mechanism through which team processes may affect stress – the individual's sense of coherence – i.e. their understanding of their situation as comprehensible, manageable and meaningful. This concept has been shown to increase individuals' resilience to stressors in relation to both mental (e.g. perceived stress) and physical well-being (Antonovsky, 1987; Eriksson et al., 2006). SoC has also been found to interact with both job demands and resources (Holmberg et al., 2004; Söderfeldt et al., 2000). In the current study we argue that team level knowledge processes that increase the access and use of team members' complementary knowledge and expertise will support individual level sense of coherence and thereby contribute to reduced perceived stress. In

the following we will explore the key concepts and their relationships in more detail and develop the hypotheses to be tested.

Sense of coherence – a salutogenic approach to stress and health

The dominating understanding of stress in current research is that it originates from a mismatch between job demands on the one hand, and control and resources on the other. Stress is experienced when control and access to resources do not match demands and work is perceived as unmanageable (Bakker & Demerouti, 2007; Lesener et al., 2018).

While this model focuses on the causes of stress and thus suggests a reduction or avoidance of stressors or an increase in job resources, Antonovsky (1987) proposes a complementary approach. In addition to focusing on what causes stress, he argues for a focus on what increases individuals' resilience to stressors. Core to this "salutogenic" approach is to understand the conditions that enable individuals to successfully cope with stressors and stay well, both physically and mentally when under pressure. Empirical evidence suggests a strong relationship between sense of coherence (SoC) and perceived health, especially mental health (Eriksson et al., 2006)(Albertsen et al., 2001; Eriksson & Lindström, 2006; Feldt, 1997; Söderfeldt et al., 2000).

According to Antonovsky (1987), individuals' sense of coherence consists of three interrelated components – comprehensibility, manageability, and meaningfulness. *Comprehensibility* refers to the extent to which the stimuli confronting an individual are perceived as making cognitive sense, e.g. whether the information is ordered, consistent, structured, and clear, and hence predictable, or if it is perceived as chaotic, disordered, random, or accidental, and thus unpredictable. Comprehensibility can be viewed as the clarity and order in an individual's perception of demands and control in relation to the environment.

Manageability refers to the extent to which the individual perceives that the resources at their disposal are adequate to meet the demands posed by the stimuli. This is similar to the concept of control, widely used in models of stress. However, Antonovsky (1987) argues that there is a crucial difference in that most current research models assume that resource control must be in the hands of the person seeking to cope. However, it is also possible to perceive high manageability when resources for coping are seen as being legitimately controlled by other well-disposed and reliable persons, such as colleagues and leaders.

Meaningfulness, finally, refers to the extent to which an individual feels that life (or an aspect thereof) makes sense, emotionally as well as cognitively; that at least some of the problems and demands encountered are worth an investment in energy, commitment, and engagement, and are

welcome challenges rather than burdens. Meaningfulness is essential for the individual to mobilize resources. As Antonovsky concludes (1987:156) "[one] must care to cope".

As individuals see their situation as more comprehensible, manageable and meaningful, and thus perceive a stronger sense of coherence, previous research has shown that they perceive less stress. Studies have found strong positive relationships between SoC and job demands and resources such that SoC was positively related to job control and negatively related to job demands (Holmberg et al., 2004). Previous studies have also found a direct effect of SoC on job stress (Söderfeldt et al., 2000). Against this background we predict that higher levels of SoC will be associated with lower levels of stress:

H1: Individual SoC is negatively related to individual stress.

Team knowledge processes and individual sense of coherence

While SoC has originally been viewed as a rather stable personal trait that does not change much after the age of 30 (Antonovsky, 1987), it has increasingly been recognized that the environment, social relationships and support, and behavioural and perceptual mechanisms are related to and effect individuals' SoC and that it can be changed through interventions in these areas (for a review, see Hochwälder, 2019). In the context of work, SoC has been shown to be related to work processes and work organizing (Albertsen et al., 2001; Feldt et al., 2000) and it has been argued that SoC provides a model for the analysis of how working conditions strengthen or weaken employees' ability to cope with stressors (Antonovsky, 1987:158). As examples of alterable working conditions that may influence SoC, Antonovsky mentions participation in decision-making, social and individual valuation of the enterprise, occupation or industry, and discretionary freedom in the role. In addition, the social structure in which work is embedded must also be perceived to provide the appropriate environment and equipment needed to carry out work well. Also, the feeling of working well comes from the perception that others on whom the work is dependent are also working well, e.g.: "At times, the character of social relations is of even greater importance than the worker's own resources or those that the formal structure places at his disposal: if he is feeling unwell, can he count on others to take over; if he makes a mistake, can he count on others to understand and help to rectify it?" (Antonovsky, 1987:165).

Against this background, previous research has investigated a number of work-environment variables as antecedents to SoC, including conflict at work, meaning at work, decision authority, predictability and social support from colleagues and supervisors (Albertsen et al., 2001) as well as organizational climate (Feldt et al., 2000). Additional aspects of the social structures (including the team) that have been argued to support individuals' sense of coherence include various types of

social relationships and support (e.g., parent–child relationship, peer-group relationship) and various types of behavioural and perceptual variables, e.g., empowerment and reflection processes (Hochwälder, 2019).

In the current study we build on and extend this research on organizational antecedents to individual sense of coherence by exploring relationships between team knowledge processes and SoC. Marks et al. (2001:357) define team processes as: ”members’ interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioural activities directed toward organizing taskwork to achieve collective goals”. Previous research on team processes and stress has mainly focused on how stressors tend to have a negative influence on team processes such as team learning behaviours (Savelsbergh et al., 2012) and transactive memory (Ellis, A. P. J., 2006). In the current study, we instead focus attention on how team knowledge processes affect individual team members’ perceived SoC and stress. In a context where knowledge is distributed among members of a team, we will in the following argue that the perceived comprehensibility, manageability and meaningfulness of work are partly a collective achievement based on the team’s ability to mobilize and leverage its collective knowledge resources. We will focus specifically on two team level knowledge processes that may enable this – making knowledge available amongst team members (bringing expertise to bear) and using joint knowledge to act and make sense of the work situation (team learning behaviour).

Bringing expertise to bear

Mastering work in the context of knowledge intensive teams (and thus perceiving a high sense of coherence) relies on access to team members’ knowledge and skills. In such teams, where knowledge is distributed, team members will have to rely on other members of the team for specific expertise rather than acquiring it on their own (Faraj & Sproull, 2000). Both team and members of such teams thus rely on an understanding of where specific expertise is located and the processes by which this expertise is made available to the team members in a timely manner. A well-functioning and timely exchange of knowledge extends team members’ knowledge resources in dealing with their work challenges and has in recent research been shown to contribute to reduced stress. In a study of NPD teams, Carbonell & Rodriguez-Escudero (2020) show that a strong transactive memory system (TMS: is a mechanism through which groups collectively encode, store, and retrieve knowledge (Wegner, 1987)) reduces job demands, increases team members’ sense of control and provides a supporting work environment, together decreasing team members’ stress. Faraj & Sproul (2000) conceptualize this team level process of making expertise available in a timely manner to other team members engaged in addressing the team’s tasks as “bringing expertise to bear”. In this process “team members integrate individual outputs, and problem solve through an emergent

process of informal and interactive sharing of expertise" (Faraj & Sproull, 2000p. 1556). This team level process of bringing expertise to bear extends the resources available to the individual team member faced with challenging stimuli and we thus predict that it will increase the perceived *manageability* and facilitate *comprehensibility* of their environment, and thus be positively related to team members' perceived SoC:

H2: The team level processes of bringing expertise to bear is positively related to individual SoC

Learning behaviour

While the team process of bringing expertise to bear focused on the team making knowledge available to its members, an additional important knowledge process of teams addresses the exploitation of this complementary knowledge in understanding and dealing with the challenges posed to the team members. Edmondson (1999) conceptualizes this as the team's learning behaviour, "…an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing error or unexpected outcomes" (Edmondson, 1999:353).

This process of exploiting team members' knowledge resources in an ongoing process of "reflection and action" has by Edmondson (1999) been argued to lead to a better understanding by teams of their environment. We thus argue that team learning behaviour may increase individual team members' perceived *comprehensibility* of the stimuli they are facing. The joint process of making sense of the team's task and environment by "asking questions, seeking feedback, experimenting, reflecting on results, and discussing error or unexpected outcomes" supports team members in creating cognitive sense in the stimuli regarding the team's task and thus make this more ordered and predictable – and thus more comprehensible – contributing to increased sense of coherence. Carter & West (1998) also found that team reflexivity (reflecting on and modifying team functioning) helped team members to better comprehend what is expected of them.

Learning behaviour may also support SoC by increasing perceived *manageability*. As demonstrated by Edmondson (1999), and in other studies (Chen et al., 2018; Ellis, S. et al., 2010; Schippers et al., 2003) learning behaviour is positively related to team efficacy; "the team's belief that it can successfully perform a specific task" (Gully et al., 2002). Team reflexivity was further found to support helping and workload sharing within the team (Vashdi et al., 2013) and Carter & West (1998) found that team reflexivity helped team members develop new understandings and methods to respond to emerging challenges. Assuming that the team's belief in its ability to perform its task is related to the individual team members' belief to successfully perform this task we expect team learning behaviour to also support individual SoC by increasing perceived manageability. With

learning behaviour increasing both comprehensibility and manageability we predict a positive relationship between team level learning behaviour and individual level SoC:

H3: Team level Learning behaviour is positively related to individual SoC

Sense of coherence as mediator of the relation between team knowledge processes and individual stress

Previous research on the relationship between SoC and occupational stress has shown that SoC has both a main effect on stress (individuals with higher SoC perceive less stress) but also a mediating effect. SoC was shown to mediate the association between work environment and stress symptoms (Albertsen et al., 2001; Feldt, 1997; Söderfeldt et al., 2000) and the relation between organizational climate and leadership and individual well-being (Feldt et al., 2000). Based on these findings and our above formulated hypotheses regarding the relationship between team knowledge processes and work SoC we hypothesize that individual SoC mediates the relationship between these processes and individual stress:

H4a: Individual SoC mediates the relationship between bringing expertise to bear and stress

H4b Individual SoC mediates the relationship between learning behaviour and stress.

Improving team processes and sense of coherence through a team reflexivity intervention

The current study further takes an interest in to what extent an intervention can improve team knowledge processes and team members' SoC. Previous research has shown that team processes can be developed by interventions such as team building (Klein et al., 2009), team training (Salas et al., 2008) and team debriefs (e.g. Eddy et al., 2013). Especially team reflexivity interventions (such a team debriefs), supporting teams to "collectively reflect on the team's objectives, strategies and processes and adapt accordingly" (Chen et al., 2018) have been found effective in improving team processes and performance (Tannenbaum & Cerasoli, (2013). Research on how such interventions affect the psychological well-being of team members and through which mechanisms is, however, scarce. In one of the few studies, Chen et al (2018) demonstrate that a team reflexivity intervention positively affected three central burnout dimensions and that these positive effects were mediated by increases in employees' perceived control and support. Previous research has also shown that team reflexivity interventions can improve team interpersonal processes (Eddy et al., 2013) and especially team supportive interpersonal processes (Eddy et al., 2013; Smith-Jentsch et al., 2008; Chen et al., 2018). As the team knowledge process "bringing expertise to bear" is about proactively providing knowledge support to team members we hypothesize:

H5a: Self-guided team debriefs will contribute to an increase in bringing expertise to bear

The team knowledge process of "learning behaviour" focuses on the teams' engagement in reflecting on both its task and process and is conceptually close to team reflexivity with its focus on "reflection and action". Against this background we hypothesize:

H5b: Self-guided team debriefs will contribute to an increase in learning behaviour

Finally, previous research suggests a direct relationship between team reflexivity and team members' conception of their work context and thus their work-related SoC. Chen et al (2018), for example, found that a team reflexivity intervention led to an increase in team members' perceived job control. With job control defined as "the belief or cognition that one is able to influence or change a salient job-related situation" (Chen et al., 2018:446) it overlaps well with the perception of manageability in the work context in the SoC concept. Espedido et al (2020) also found that proactive coping strategies (although not initiated through intervention) in the form of problem prevention behavior in teams moderated the relation between problem-solving demands and stress-appraisal, so that the effect of problem-solving demands on challenge appraisal turned from negative to positive. This supports the idea that reflexivity could have a positive effect on job control and stress coping. With team debriefs involving joint reflection on both teamwork and taskwork (Eddy et al., 2013) we expect that the three dimensions of SoC – comprehensiveness, manageability and meaningfulness – are directly addressed. We thus predict that:

H5c: Self-guided team debriefs will contribute to an increase in SoC.

The overall 2-level research model described above is summarized in figure 1.

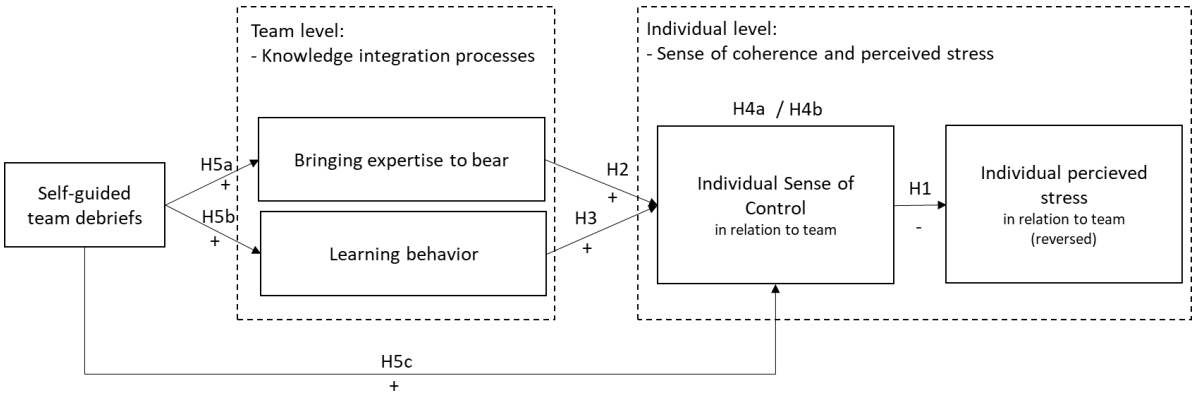

Figure 1: The research model

Method

Data and sample

To test the above hypotheses, we recruited 54 teams from 10 public Swedish organizations (e.g. Region Stockholm, The City of Stockholm, The Ministry of Foreign Affairs, The Swedish Transport Administration). Of the teams, 30 were randomly selected for an intervention and 24 to be a control group[1]. Teams in the control group were offered the intervention later, after the intervention was completed in the first set of teams. The organizations were selected through the network of the researchers and some through the program "Hållbart arbetsliv" ("Sustainable worklife"), an initiative for Swedish government organizations organized by Partsrådet (The Social Partners' Council[2]) in which the researchers participated as experts.

The organizations were contacted and asked to select teams that could participate in an eight-week intervention study, using approximately 1-2 hours of their time per week. The teams selected consisted of management, work and project teams. The criteria for selection were a team size of 5-8 people, with team members having different roles and expected knowledge contributions. The team's tasks should be complex and ambiguous in the sense that they had to be interpreted by the team as they developed practical actions, agreed on priorities, and defined roles and responsibilities within the team.

This resulted in a sample of 344 participants (183 females, 141 men, 13 non-disclosed and 7 unanswered) in 54 teams with an average team size of 6,5. Due to changes within the organizations and teams, the smallest team included in the sample ended up being only 3 members. The largest team had 11 members.

The response rate before intervention was 335 usable surveys (97%) representing 54 teams (100%). After the intervention we received 250 usable surveys (73%), representing 47 teams (87%).

Procedure

The study was designed as a quasi-experiment with two points of data collection over a period of approximately 8 weeks. The first round of data was collected before the intervention, where a survey was sent to the members of the 54 teams, generating two level data (individual and team).

[1] Ethical approval of the study from the Ethical Review Agency of Sweden was received on the 27th of January 2020 (application 2019-05720).

[2] The Social Partners' Council is a non-profit organisation funded by state agencies in cooperation with unions. The purpose is to support social partners in the workplaces of all 250 agencies and organisations in the Swedish government sector.

This data is used for the testing of the above hypotheses 1-4. The second round of data was collected using a follow-up survey after the completion of an 8-week intervention in 30 of the teams and with 24 teams acting as a control group. This second round of surveys was, together with the first round, used to test the effects of the intervention (Hypothesis 5).

Survey design

To test the model in figure 1, a survey was developed. The survey was designed for self-assessment by team members and distributed by e-mail using Qualtrics. Data were collected during the spring of 2020. The survey was based on scales originally developed in the English language. For Swedish speaking teams a Swedish version was developed. The scales were translated into Swedish and back to English using three independent persons with good skills in English. Differences were compared and made into translations that all could agree on.

Measures

Independent variables at team level

Bringing expertise to bear measures team members' initiatives to make expertise available in a timely manner to address the team's tasks. In this process "team members integrate individual outputs, and problem solve through an emergent process of informal and interactive sharing of expertise" . This is measured by a 4-item construct developed by Faraj & Sproull (2000). Sample items include:

- "If someone in our team has some special knowledge about how to perform the team task, he or she is not likely to tell the other member about it." (reversed)
- "There is virtually no exchange of information, knowledge, or sharing of skills among members." (reversed)

Team members were asked to what extent they agreed with these statements on a 7-point scale ranging from strongly disagree – strongly agree.

Learning behaviour is measured by a scale developed by Edmondson (1999) consisting of seven items. Sample items include:

- "In this team, someone always makes sure that we stop to reflect on the team's work process."
- "People in this team often speak up to test assumptions about issues under discussion".
- "We invite people from outside the team to present information or have discussions with us".

Team members were asked to what extent they agreed with these statements on a 7-point scale ranging from strongly disagree – strongly agree.

Control variables at team level

Expertise needed. While the current study focuses on team level knowledge processes as key to successful teamwork, even the best processes may not be fully able to compensate for a lack of relevant knowledge in the team. To control for the availability of relevant knowledge we include the measure "expertise needed" as a control variable on the team level. *Expertise needed* is measured by a 3 items scale developed by Faraj & Sproull (2000) which captures team members' view on whether the team has the necessary knowledge and skills to contribute to the successful completion of the team's tasks. Example items include:

- "Some team members do not have the necessary knowledge and skill to perform well, regardless of how hard they try." (reversed)
- "Some people on our team do not have enough knowledge and skill to do their part of the team task." (reversed)

Team members were asked to what extent they agreed with these statements on a 7-point scale ranging from strongly disagree – strongly agree.

Team size. We further control for team size as larger teams may increase perceived stress and make it more difficult for team members to develop a sense of coherence related to the team. Team size has been found to have a negative relationship with team processes (Curral et al., 2001) (Wheelan, 2009), the quality of group experience (where four categories of counterproductive behaviors: parasitism, interpersonal aggression, boastfulness, and misuse of resources played a mediating role in the relationship) (Aubé et al., 2011), and to have a positive relation to affective conflicts (Amason & Sapienza, 1997).

Time as a team. As team members work together in a team over time, they have been found to develop a joint understanding of their task and roles and thus support the development of team members sense of coherence. Along with more mature interaction we could expect this to reduce perceived stress in relation to teamwork. Wheelan, Davidson and Tilin (2003) found a significant relationships between the length of time that teams had been meeting and the verbal behavior patterns and perceptions of team members. Specifically, members of teams that had been meeting longer made significantly less dependency and fight statements and significantly more work statements. They also perceived their groups to be functioning at higher stages of group development.

Mediator at individual level

Sense of coherence. Following the call by Hochwälder (2019), to use more domain specific scales to measure SoC, we chose a scale developed and tested by Vogt, Jenny & Bauer (2013) to measure SoC in relation to individuals' work situation (*Work-SoC)*. The scale was modified so that the headline "How do you personally find your current job and work situation in general?" was changed into "How do you personally find your current job and work situation in relation to this team?". Respondents were presented to nine different scales with anchoring's such as Unmanageable - Manageable, Meaningless – Meaningful and asked to indicate their position on these on a 7-point scale.

When testing the scale two of the items did not load on the same factor as the other items but formed a factor of their own. Since the scale has been thoroughly evaluated (Vogt et al., 2013), the deviating items did not mix with other factors (scales) within this study and the scale showed high internal reliability (Cronbach's alpha 0,89), we chose to keep the scale unchanged.

Dependent variable at individual level

Individual perceived stress. To measure individual stress, we chose a modified Swedish version of the perceived stress scale (Nordin & Nordin, 2013; Vogt et al., 2013). This scale originally consists of 10 items and has been shown to provide approximately normally distributed data, have good internal reliability, and high construct validity in relation to anxiety (r=0.68), depression (r=0.57), and mental/physical exhaustion (r=0.71). Since we wanted to measure stress in relation to work in a specific team, we modified the scale. To each item we added a subordinate clause, "in your work in this team". We also omitted four items that we deemed more difficult to relate specifically to the team, since they would include conditions outside the team. These were in original: *In the last month, how often have you…*

- … felt difficulties were piling up so high that you could not overcome them.
- … felt confident about your ability to handle your personal problems.
- … been able to control irritations in your life.
- … felt you were on top of things.

The remaining 6 items, included questions such as the following:

- "During the past month, how often have you felt upset because something unexpected happened while working with the team in question?"
- "During the past month, how often have you felt that you have not been able to control important things in the work with the team in question?"

Respondents were asked to provide their response on a 5-point scale ranging from never to very often.

During evaluation of the stress scale one of the remaining items did not load as expected on the same factor as the other items. Instead, it was mixed with the same factor as the Work-SoC items. After excluding this item ("During the past month, how often have you felt that things were going your way, in relation to the specific team"), the remaining 5 items had a Cronbach's alpha of 0,81 and the sum of the remaining squared factor loadings was 0,5.

Control variables at individual level

It could be argued that individuals' ability to focus and control their scope of work is an antecedent to Work-SoC and stress. Pluut et al. (2014) found that the fragmentation of time across different roles in multiple teams was perceived as a teamwork-related job demand and led to increased role strain. We include two controls regarding team members' possibility to focus on the specific team in focus.

Percentage of time spent on the specific team measures the significance of a specific team in the team members' overall work and was measured by the question "Approximately how much of your total work hours have you spent on this specific team during the last month?" The question was answered using a 10-point scale ranging from 0 to 100 percent, in intervals of 10.

Total number of teams a team member is involved in. The ability to focus on a specific team was further assessed through asking team members to indicate the total number of teams they were currently involved in.

Evaluation of measures

The measures of the model were selected from proven and evaluated scales. The Cronbach's alpha of the scales varied between 0,74 and 0,89 (see Table 1). As correlations between variables are rather high (table 1) we specifically tested for discriminant validity. To indicate discriminant validity, the sum of squared factor loadings should preferably be above 0,5 (Hair et al., 2006). This was not the case for learning behavior (0,41), bring expertise to bear (0,48), individual work-SoC (0,48) and individual perceived stress (0,42). However, complementing the test of discriminant validity with an exploratory factor analysis of all variables of the model together showed that all the variables loaded as expected, forming their own factors, except individual work-SoC and individual perceived stress.

Individual work-SoC had two items loading as their own factor, but as this formed an independent factor in relation to the other variables, and the second strongest loading of these items were along with other items of the scale, we made no adjustments to the variable.

Means, standard deviations, reliabilities and correlations amongst variables													
	#	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9
Team level	1	# Teammembers	6,33	1,95	*n/a*	0,16	-0,09	0,01	0,12	-0,11	0,15	-0,05	-0,06
	2	Time as team	5,76	0,48	,26**	*n/a*	-0,05	-0,01	0,04	-0,21	0,06	0,08	-0,13
	3	Expertise needed	5,22	0,85	-0,10	0,01	*0,88*	,36**	,63**	,36**	-,59**	-0,25	0,14
	4	Learning behavior	4,55	0,66	0,02	0,01	,33**	*0,82*	,65**	,64**	-,54**	0,00	-0,11
	5	Bring expertise to bear	5,71	0,57	0,05	0,04	,39**	,54**	*0,74*	,56**	,54**	-0,10	-0,05
Individual level	6	Work-SoC	5,4	0,87	-0,08	-0,11	,29**	,54**	,45**	*0,89*	-,67**	-0,10	-0,10
	7	Stress	3,83	0,65	0,12*	0,018	-0,36**	-,37**	-,35**	-,53**	*0,81*	-0,15	-0,10
	8	Time on team in %	36	29	0,00	0,02	-0,09	0,03	0,01	-0,04	-0,06	*n/a*	-,53**
	9	# of teams in	3,67	2,46	-0,07	-0,06	-0,05	-0,03	0,02	-0,05	-0,07	-,22**	*n/a*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Cronbach's alpha for the scales in the diagonal

Pearson correlations at individual level below diagonal (N=336). Pearson correlations at team level above diagonal (N=54)

Table 1: Means, standard deviation, reliabilities and correlations

Individual perceived stress had two items loading on the same factor as individual work-SoC. For one of the items, the difference in loading between the factors individual work-SoC and individual perceived stress was marginal (diff. = 0,103) and the item did not have a negative effect on Cronbach's alpha. The other item[3] we decided to remove, which increased the sum of squared loadings to 0,49 and Cronbach's alpha from 0,78 to 0,81.

The ICC of all the team level variables ranged between 0,30 and 0,36 and were all significant (see Table 2), supporting the aggregation of the variables to the team level.

Analysis of Variance and Intraclass Correlation Coefficients for Team-level Scales			
Variables	$F_{(54,336)}$	*p*	ICC
Expertise needed	2,62	<,001	0,33
Learning behavior	2,95	<,001	0,36
Bringing expertise to bear	2,31	<,001	0,30

Table 2: Intra Class Correlation Coefficients for team level (Level-2) variables, N=335

Data analysis

Our analytical strategy has been to test hypotheses in two steps. First, we use the baseline survey of the entire sample of 54 teams to test our model (figure 1, hypotheses 1-4). Second, we use the change in scores between baseline (T0) and the second survey (T1) to test hypothesis 5 regarding the effects of the intervention on team knowledge processes and SoC.

[3] "During the past month, how often have you felt that things have gone your way, in working with the team in question?"

Investigating the research model

The hypotheses 1-4 related to the research model are tested using hierarchical linear modelling. We hypothesize that team level variables (i.e., *learning behaviour* and *bringing expertise to bear*) impact the individual level mediator (Work-SoC) and through this the dependent variable (perceived stress). The proposed model reflects a 2–1–1 multilevel mediation model. Following Zhang, Zyphur & Preacher (2009), we use modelling techniques that avoid the confounding of effects as we test for mediation. The variance of our mediator (Individual Work SoC) was separated into between-team and within-team components. Since the team level independent variables (i.e., *learning behaviour* and *bringing expertise to bear*) vary only between teams, their effects on the mediator and outcome variable should also be measured at team level. The direct and indirect effects of the independent variables on the mediator (*SoC*) and outcome variable (*individual perceived stress*) were tested while controlling for the within-team variance components of the mediator. Monte Carlo simulation was used to test the significance of the effects[4].

Investigating the effects of an intervention

To test the effects of an intervention (hypothesis 5) we compared the results of the baseline survey with those of a second survey sent to the 54 teams, now consisting of 30 teams that had received an intervention and 24 teams, representing a control group, that had not received an intervention. The teams under the control condition were offered to participate in the intervention after the 8 weeks in which they were in the control condition[5]. These conditions were known in advance so that over a period of approximately 16 weeks the only difference between teams under control and intervention conditions was the timing of the intervention and that control teams had to fill out surveys at three points in time. Their second survey was used as after-values for control conditions and before-values for intervention conditions.

The intervention received by the treatment teams was a team debrief application developed in a previous study, which showed that the intervention positively affected team knowledge processes

[4] The computations were made using SPSS Version: 28.0.1.0 (142) with the macro MLmed Beta 2 (Hayes, A. F. & Rockwood, N. J., 2020)

[5] We originally planned to use these teams as part of the intervention sample as well. However, their intervention coincided with the first wave of the Covid 19 pandemic (March to June 2020). Due to different forms of restrictions all these teams had to reorganize their practical work when it came to meeting formats, using different forms of digital meetings or combinations of physical and digital meetings. Most teams also had to replan their work, and some had to take on different tasks due to reprioritizations in their organizations. As we compared data from the first wave of intervention teams with that of the second wave, where teamwork had been influenced by covid-19 effects, we found significant differences in several measures that we did not expect. Because of these extensive externally induced changes to these teams we could not guarantee their comparability with the first set of intervention teams and thus chose to exclude them from the analysis of intervention effects (hypothesis 5).

and team performance (Runsten & Werr, 2020). The application was designed to cover the five features of an effective team-led debrief identified by Eddy, Tannenbaum & Mathieu (2013):

a) allow team members to reflect independently and anonymously, for psychological safety and to avoid being influenced by the most vocal team member.
b) ensure all team members provide input to enhance their sense of ownership and capture all perspectives.
c) focus attention on teamwork and not just taskwork, because teamwork also drives team effectiveness and groups tend not to discuss it.
d) guide the team to discuss divergent or high priority needs early in the debrief and not simply areas of agreement or comfortable topics.
e) lead to the formation of future-looking action plans and agreements.

The purpose of using an application, rather than expert coaches, was to develop an intervention concept that could be used cost-effectively, by all types of teams, in large organizations. After a one-hour introduction, the application was possible to use autonomously by the teams during the eight-week period. The application consisted of two integrated parts. The *first* part was a digital training module in which team members could learn about knowledge integration between individuals in teams. The purpose was to develop a model that could be used as a reference for team discussions on the topics. The training module consisted of 10 video lessons ranging from 3 to 10 minutes. The same content was available in text as well as in presentation slides, within the application. Some videos were also integrated in the debrief processes, while the others were to be viewed when preferred by the team members.

The *second* part was a digitally guided debrief process, consisting of 8 sessions to be carried out over approximately two months, with a frequency of one debrief per week. Each session took approximately one hour (15 min individual pre-meeting preparations, 45 min meeting) to complete. The team members were instructed to use a pre-meeting module before each debrief, where they individually were asked to answer questions or fill in short surveys. This information was then compiled for the debrief meetings, where the individual answers were presented, anonymized. Debrief meetings could be carried out face to face, or on-line. During the meetings, the participants were instructed by the application to perform different tasks. For example: to enter individual answers to questions, watch videos or have open discussions and enter answers they had to agree on. During the meeting, all comments entered in the application were anonymous as well. The eight debrief sessions varied in focus and format. For an overview of debrief content, see Table 3.

Session	1	2	3	4	5	6	7	8
Pre-meeting content	Individual reflection on "best team"	Preparing personal presentation	Individual analysis of representation	Survey on Relation and Representation	Analyzing personal behavior vs that of other team members	Watch video: Reflection	Survey on Integration and Reflection	Individual strongest impression of the team's
		Watch video: Relation	Watch video: Representation		Watch video: Integration			
Meeting content	Discussion on "best team"	Sharing personal presentation	Sharing mental models	Common analysis of survey result	Common discussion	Perform an unstructured reflection	Common analysis of survey result	Common discussion
	Video introduction on teamwork	Common reflection	Individual committment	Discussing conclusions	Individual committment	Perform a structured	Discussing conclusions	Planning continued work
	Quick diagnosis of team capabilities			Identifying actions		Discuss difference	Identifying actions	Relationship exercise
						Summarize conclusions		

Table 3: Content of intervention debrief-sessions

The application had been tested in a previous study on 50 work- and management teams in 22 knowledge-intense private and public organizations (e.g. global telecommunications company, national food chain, The Swedish National Financial Management Authority) with a focus on improving team knowledge structures and processes in order to improve performance. The results showed effects on both knowledge structures and processes as well as on observer-assessed team performance suggesting that the format and timeframe of the intervention leads to measurable changes in team processes (Runsten & Werr, 2020).

To investigate the effects of the intervention we analysed the before and after mean values of the teams' knowledge integration process variables, and the individual mean values of Work-SoC and perceived stress, comparing the teams in treatment (30 teams) and control teams (24 teams).

A comment on the effects of the Covid-19 pandemic on the interventions

The intervention period and measurement started in January and February 2020 for 50 of the 54 teams. For these teams the baseline survey responses were collected before the covid-19 pandemic became known to the general public in Sweden. Four of the teams started the intervention or control period in April of 2020. The second round of survey responses was collected approximately 8 to 10 weeks after start. This means that the conditions for the teams, as they made the second self-assessment, were influenced by the measures and restrictions taken by the Swedish government and employers (e.g. recommendations to work from home) as a result of the pandemic.

The effects of these actions are likely to have caused changes in the work habits of the teams, the most common change being to have less physical and more digital meetings. Since many of the involved organizations were part of the Swedish authorities their workload increased. It is likely that this has had an effect on the study. Here we suggest some possible effects to caution the reader.

- External crises tend to increase activity in teams and increase the effort of team members within the team. This may have influenced the level of learning behavior as well as team members' support to each other and made them increase more than they would have just by introducing the intervention
- External crises and government reactions to them may have altered work task, their objectives and priorities, causing a decrease in individual work-SoC
- The external crises may have increased the general stress level of individual, and in combination with increasing workload and reorganizations within the teams this may have caused a higher stress level at the end of the study

However, the experimental and control groups suffered the same conditions. All teams except three teams in the experimental group started their participation in the study before the pandemic was known, and all teams but one in the control group finished in the months following the initiation of government and employer restrictions.

Results

Team knowledge processes and Work SoC

The results of the Hierarchical Linear Modelling (HLM) of the relation between the *team knowledge processes* and *Individual work-SoC* are presented in Table 4. Model 0 is the null model, which suggests that 15% (ICC=0,15) of the variance in SoC occurred between teams (level 2) and was significant at $p<=0,01$. This supports an important premise of the current study – that individual SoC is partly determined by team level phenomena. Schwarz's Bayesian Criterion (BIC) for the null model was 861.

In Model 1 and 2 we add *learning behavior* and *bringing expertise to bear* respectively to the model, one variable at the time, to test hypotheses 2 and 3. The level-2 (team) control variables are also included in these models. The coefficients of the independent variables were $\beta = 0,46$, $p = < .01$ (learning behaviour), $\beta = 0,53$, $p = < .01$ (bringing expertise to bear) respectively, and significant over and beyond the three team-level control variables: number of team members, time as team and expertise needed. Model 1 reduced BIC (Bayesian Information Criterion) with 163 and model 2 with 154. A Lower BIC indicates a better fit, and a difference greater than 10 indicates "very strong" evidence for the more complex model (Raftery, 1995).

We used Snijders and Bosker's (2011) formulas to calculate pseudo-R^2 and we calculate the effect size using Cohen's f^2, following the recommendations of Lorah (2018). The results show that the models with *learning behaviour* and *bringing expertise to bear* respectively accounted for 10,66% and 7,24% of the variance in Individual Work SoC (Table 4: models 1-2), the effects sizes f^2 being 0,12

and 0.08 are considered small[6] (Cohen, 1992). With both variables in the same model pseudo-R^2 was 11,18 with effect size: f^2=0,13 (Table 4: model 3).

Hypotheses 2 and 3 are therefore supported. However, with both process variables in the same model (3), only learning behaviour remains significant and Pseudo R^2 only increase with 0,52 points over model 1, indicating that the two knowledge processes are highly overlapping in their effect.

Unstandardized Coefficients Estimates and Standard Errors in the Model Individual Work SoC																
	Estimates of fixed effects	Model 0				Model 1				Model 2				Model 3			
	Variables	Estimate	Std Error	t		Estimate	Std Error	t		Estimate	Std Error	t		Estimate	Std Error	t	
	Intercept	5,41	0,06	84,01	**	4,08	0,79	5,13	**	3,84	0,94	4,07	**	3,73	0,83	4,47	**
Team level	# Teammembers					-0,02	0,03	-0,78		-0,04	0,03	-1,17		-0,03	0,03	-1,04	
	Time as team			,		-0,20	0,12	-1,72		-0,22	0,13	-1,67		-0,21	0,12	-1,78	
	Expertise needed					0,10	0,07	1,37		-0,01	0,10	-0,05		0,04	0,08	0,51	
	Learning behavior					0,46	0,09	5,44	**					0,38	0,11	3,44	**
	Bring expertise to bear									0,53	0,13	3,98	**	0,19	0,15	1,27	
	Estimates of covariance parameters	Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z	
	Residual	0,65	0,06	11,84	**	0,67	0,06	10,71	**	0,67	0,06	10,73	**	0,67	0,06	10,72	**
	Intercept (teams)	0,11	0,04	2,56	**	0,01	0,03	0,23		0,04	0,03	1,17		0,00	0,03	0,17	
	ICC	0,15															
	BIC	861				698				707				702			
	Change in BIC					163	**[a]			154	**[a]			159	**[a]		
	# estimated parameters	3				7				7				8			
	Pseudo R^2	-				10,66%				7,24%				11,18%			
	Effect size index, f^2 [b]					0,12				0,08				0,13			
	*p<=0,05; **P<=0,01																
	[a]= in relation to model 0																
	[b]= calculated as Cohen's f^2																

Table 4: HLM results of the relationships between team level knowledge integration process variables and individual Work SoC. Unstandardized Coefficients Estimates and Standard Errors in Models 0-3, N=335.

Stress, Team knowledge processes and work SoC

Models 4 to 8 in table 5 investigate the relationship between team knowledge processes, work SoC, and individual perceived stress. The null model (Model 4) shows that 13% of the variance (ICC=0,13) in stress could be found at the team level (level 2), and BIC was 668.

Model 5 (Table 5) shows that individual Work-SoC has a significant coefficient in relation to perceived stress (β = -0,38, p = < .01) above and beyond the control variables *Time on team in %* and *# of teams in.* The model gives a reduction of BIC with 83, which is "very strong" evidence for the more complex model. Along with the insignificant control variables, *Individual Work-SoC* accounted for 28,13% of the variance in *Individual perceived stress*, with the effects size, f^2 = 0,39, considered large (Cohen, 1992). This gives support for hypothesis 1.

[6] Interpretation of effect size, f^2: small ≥ 0,2, medium ≥ 0,15, large ≥ 0,35, which is equivalent to interpretation of effect size, pseudo-R^2: small ≥ 0,0196, medium ≥ 0,1304, large ≥ 0,2592

Unstandardized Coefficients Estimates and Standard Errors in the Model individual perceived stress									
	Estimates of fixed effects	Model 4				Model 5			
	Variables	Estimate	Std Error	t		Estimate	Std Error	t	
	Intercept	2,16	0,05	46,32	**	4,146	0,208	19,97	**
Team level	# Teammembers								
Team level	Time as team								
Team level	Expertise needed								
Team level	Learning behavior								
Team level	Bring expertise to bear								
Individual level	Time on team in %					0,00	0,00	0,57	
Individual level	# of teams in					0,02	0,01	1,27	
Individual level	Individual Work SoC					-0,38	0,04	-10,91	**
	Estimates of covariance parameters	Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z	
	Residual	0,37	0,03	11,96	**	0,28	0,02	12,00	**
	Intercept (teams)	0,06	0,02	2,51	*	0,02	0,01	1,82	
	ICC	0,13							
	BIC	668				582			
	Change in BIC					86	**[a]		
	# estimated parameters	3				6			
	Pseudo R^2	-				28,13%			
	Effect size index, $f^{2\,b}$					0,39			
	*p<=0,05; **P<=0,01								
	[a]= in relation to model 4								
	[b]= calculated as Cohen's f^2								

Table 5: HLM results of the relationships between team level knowledge integration process variables and individual perceived stress. Unstandardized Coefficients Estimates and Standard Errors in Model 4-6, N=335.

In model 6-7 (Table 6) we further explore the relationship between the two team knowledge processes and individual perceived stress. These models show significant coefficients (*learning behavior:* β = -0,20, p = < .01 and *bringing expertise to bear* β = -0,23, p = < .05). The pseudo-R^2 were 15,60 and 14,42%, with moderate effect sizes of 0,18 and 0,17 respectively. A reduction in BIC also confirmed the significance of these more complex models in relation to the null model. However, the control variable *expertise needed* had similar strength and significance in both models, β = 0,26, p = < .01 and β = 0,21, p = < .01 (Table 6: model 6-7), indicating that perceived stress is also related to the extent to which the team has available knowledge resources and not only the extent to which available resources are leveraged (team knowledge processes).

Finally, combining all level 2 and level 1 variables in model 8 further decrease BIC to the lowest level of all models, 467, indicating very strong support for the higher explanatory value of this model. The pseudo R^2 of the final model (8) is 36,88%, with a large effect size of 0,58. In this model, *individual work-soc* has a coefficient of β = - 0,35, p = < .01. In the same model, expertise needed remains significant, β = -0,23, p = < .01.

Unstandardized Coefficients Estimates and Standard Errors in the Model individual perceived stress												
	Estimates of fixed effects	Model 6				Model 7				Model 8			
	Variables	Estimate	Std Error	t		Estimate	Std Error	t		Estimate	Std Error	t	
	Intercept	4,19	0,59	7,15	**	4,30	0,64	6,73	**	5,53	0,56	9,91	**
Team level	# Teammembers	0,02	0,02	1,06		0,03	0,02	1,30		0,02	0,02	0,85	
Team level	Time as team	0,02	0,09	0,17		0,02	0,09	0,26		-0,05	0,07	-0,68	
Team level	Expertise needed	-0,26	0,05	-4,75	**	-0,21	0,06	-3,25	**	-0,23	0,06	-4,18	**
Team level	Learning behavior	-0,20	0,06	-3,19	**					-0,04	0,07	-0,50	
Team level	Bring expertise to bear					-0,23	0,091	-2,558	*	0,00	0,10	0,04	
Individual level	Time on team in %									0,00	0,001	0,207	
Individual level	# of teams in									0,02	0,01	1,83	
Individual level	Individual Work SoC									-0,35	0,04	-9,23	**
	Estimates of covariance parameters	Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z					
	Residual	0,35	0,03	10,77	**	0,35	0,03	10,75	**	0,265	0,025	10,78	**
	Intercept (teams)	0,01	0,01	0,43		0,01	0,01	0,67		0,002	0,009	0,193	
	ICC												
	BIC	525				528				469			
	Change in BIC	143	**[a]			140	**[a]			199	**[a]		
	# estimated parameters	7				7				11			
	Pseudo R^2	15,60%				14,42%				36,88%			
	Effect size index, $f^{2\,b}$	0,18				0,17				0,58			
	*p<=0,05; **P<=0,01												
	[a]= in relation to model 4												
	[b]= calculated as Cohen's f^2												

Table 6: HLM results of the relationships between team level knowledge integration process variables, individual Work-SoC and individual perceived stress. Unstandardized Coefficients Estimates and Standard Errors in Models 7-8, N=335.

Hypotheses 4a-b predict that work SoC mediates the relationship between team knowledge processes and individual perceived stress. This mediation can be tested using models 1-8 (table 4-6). Following the traditional guidelines for testing mediation (Hair et al, 2006), the *first* condition to show full or partial mediation is that the independent variables of interest must be significantly associated with the outcome variable. As demonstrated in the *Individual perceived stress* models 6-7 (Table 5) *Learning behavior* and *Bringing expertise to bear* satisfy this condition. The *second* condition is that the independent variables must be significantly associated with the mediating variable. *Learning behavior* and *Bringing expertise to bear* meet this condition in the Individual Work SoC Models 1-2 (Table 4). The *third* condition is that the mediating variable must be significantly associated with the outcome variable. This condition is satisfied in *Individual perceived stress* Model 5 (Table 5). Finally, the last condition to be satisfied for full mediation is that the independent variables lose their significance, while the mediating variable remains significant as all variables are entered into the same equation. If the significance of the independent variables is reduced but

remains significant, the mediation is only partial. In model 8 (table 6) none of the independent variables are significant along with *individual work-SoC,* indicating full mediation. The significance of *individual work-SoC* in relation to *individual perceived stress* is further confirmed by the large increase in pseudo-$R^{2.}$ As the variable is introduced in the equation, the pseudo-R^2 increase from 15,84% to 36,88%.

However, Zhang, Zyphur & Preacher (2009) argue that potentially confounding effect estimates can arise in HLM-based multilevel mediation models. Therefore, the multilevel mediation effects need to be decomposed into Level-1 and Level-2 effects. To confirm our mediation result we ran an additional analysis following their recommendations. Their first recommendation is that the hypotheses should be supported by strong multilevel theory. This study is based on, and designed for, a 2-1-1 model, where team processes are related to individual experiences such as Work-SoC and Stress. Second, if using a 2-1-1 model, centring within context with reintroduction of the subtracted means at Level-2 (CWC(M)) is recommended for formulating a multilevel mediation model. Their third recommendation is that results should be reported at both levels of analysis, regardless of the level at which the effect should theoretically exist. Reporting both the Level-1 and Level-2 coefficients and mediation effects would facilitate the comparison between levels.

To follow these guidelines, we ran complementary models for testing mediation (models 9-12 in table 7). In a model with *Individual work-SoC* as both group-mean at level-2 and as CWC at level-1, *learning behaviour* had a non-significant direct effect on *Individual perceived stress* of 8% (direct effect = 0,080, 95% CI [-0,071; 0,232]) and a significant indirect effect of 19% (indirect effect = 0,192, 95% CI [0,087; 0,316])[7]. *Bringing expertise to bear* had a non-significant direct effect of 15% (direct effect = 0,147, 95% CI [-0,008; 0,302]) and a significant indirect effect of 17% (indirect effect = 0,172, 95% CI [0,073; 0,295]). The results give support for hypotheses 4a-b.

[7] The between-level confidence interval was Monte Carlo simulated

Unstandardized Coefficients Estimates and Standard Errors in the Model								
Individual Work SoC								
Estimates of fixed effects	Model 9				Model 10			
Variables	Estimate	Std Error	t		Estimate	Std Error	t	
Intercept	3,23	0,37	8,72	**	2,81	0,60	4,70	**
Learning behavior	0,48	0,08	5,91	**				
Bring expertise to bear					0,45	0,10	4,35	**
Estimates of covariance parameters	Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z	
Within-group variance	0,64	0,05	11,90	**	0,64	0,05	11,93	**
Between-group variance	0,03	0,03	1,13		0,07	0,03	1,96	*
Individual percieved stress								
Estimates of fixed effects	Model 11				Model 12			
Variables	Estimate	Std Error	t		Estimate	Std Error	t	
Intercept	4,68	0,42	11,14	**	5,05	0,45	11,13	*
Learning behavior	-0,08	0,08	-1,06					
Bring expertise to bear					-0,15	0,08	-1,90	
Individual Work SoC group-mean	-0,40	0,10	-3,98	**	-0,38	0,09	-4,28	**
Individual Work SoC CWC	-0,36	0,04	-9,21	**	-0,36	0,04	-9,21	**
Estimates of covariance parameters	Estimate	Std Error	Wald Z		Estimate	Std Error	Wald Z	
Within-group variance	0,28	0,02	12,02	**	0,28	0,02	12,04	**
Between-group variance	0,03	0,01	1,90		0,02	0,01	1,76	
Indirect effect through Indivdidual Work-SoC								
Variables	Estimate	Std Error	Z		Estimate	Std Error	Z	
Learning behavior	-0,19	0,06	-3,27	**				
Bring expertise to bear					-0,17	0,06	-3,01	**
*p<=0,05; **P<=0,01								

Table 7: HLM of *learning behavior* and *bringing expertise to bear* on *Individual Work-SoC* and *Individual perceived stress* Unstandardized Coefficients Estimates and Standard Errors in Models 9-12, N=335.

Post-hoc analysis – SoC as a buffer in the relationship between expertise needed and stress

Model 8 (table 6) indicates that a significant amount of the variation in individual perceived stress (37%) is explained by two variables – *expertise needed* and *work SoC*. Stress is thus related to both the resources that are available to the team (*expertise needed*) and the team members' understanding of their situation as comprehensible, manageable and meaningful (work SoC). The parameters in model 8 indicate that stress related to the work in teams can be reduced both by adding knowledge resources and by increasing work SoC. SoC can thus be viewed as buffering the effects of stressors deriving from deficiencies in knowledge resources.

This is in line with previous research that argues that SoC increases individuals' resilience to stressors (Antonovsky, 1987; Eriksson et al., 2006). To further investigate this, we split our sample and compared the groups of individuals with work SoC higher respectively lower than one standard deviation from sample mean. After grand mean centring *expertise needed* an ANCOVA confirmed that employees in different SoC categories differed significantly in what stress they experienced in

relation to different levels of expertise available to the team (F(1,85)=88,354, p<0,001). An interaction variable created of work SoC category and *expertis*e needed was insignificant (F(1,85)=0,098, p=0,755), confirming that the slopes of the relation between expertise needed and stress were homogeneous. The intercepts for the relationship however varied (figure 2)

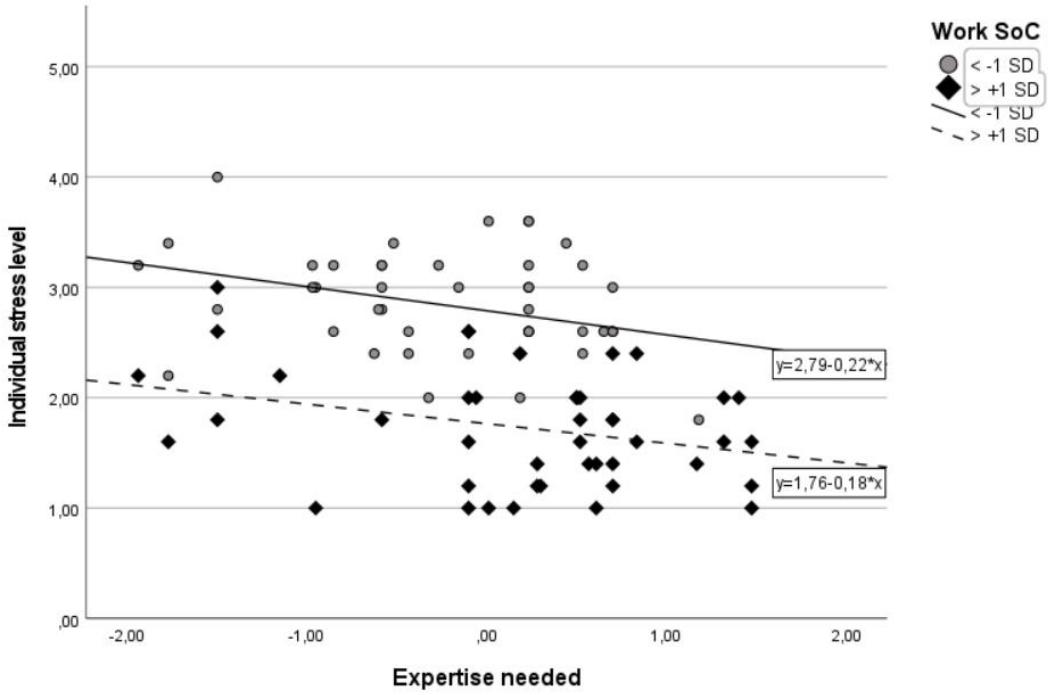

Figure 2: The relationship between expertise needed and individual stress under different levels of Work Sense of Coherence

This indicates that for a specific level of stressors (*expertise needed*) the *perceived individual stress* is significantly lower among those individuals that have a high work SoC as compared to those that have a low work SoC. Work SoC (supported by team knowledge processes) thus buffers individuals' stress reactions in relation to (a lack of) resources available to the team.

Intervention effects

Hypotheses 5a-c predict that a self-guided team debrief intervention will positively affect team knowledge processes and individual SoC. Before the intervention, the mean values of treatment and control teams did not differ significantly from each other, except for the control variable "# of teams in" where the intervention groups had a significantly higher mean (4) than the teams in the control group (3.22) (table 8). However, as this variable was not found to be related to any of the other variables in this study, we view this difference as negligible in this context.

Comparison of Experimental and Control Groups before intervention							
		Experimental Groups		Control Groups			
Variables at baseline T0		*M*	*SD*	*M*	*SD*	*t*	Sig.
Team level	# Teammembers	6,50	2,18	6,14	1,71	-0,60	0,55
	Time as team	5,77	0,53	5,76	0,44	-0,07	0,94
	Expertise needed	5,37	0,77	5,03	0,91	-1,47	0,15
	Learning behavior	4,54	0,63	4,57	0,71	0,18	0,86
	Bring expertise to bear	5,75	0,51	5,66	0,65	-0,59	0,56
	Gender distribution (male 1, female 2)	1,54	0,37	1,60	0,30	0,59	0,56
Individual level	Time on team in %	34	27	39	30	-1,44	0,15
	# of teams in	4	2,57	3,22	2,25	2,89	0,00
	Work-SoC	5,40	0,89	5,39	0,84	-0,14	0,89
	Stress	2,21	0,66	2,12	0,63	-1,19	0,24
* $p \leq 0{,}05$; ** $p \leq 0{,}01$							

Table 8: Comparison of means and standard deviation between experimental and control groups before intervention. Team level N=54, individual level N=336

To test hypotheses 5a-c regarding the effects of the intervention on the team knowledge processes and individual SoC, we first used a T-test comparing the changes in mean values in the variable of interest between T0 and T1 (table 9). The 25 teams in the intervention group demonstrated significantly higher increases in mean values of *bringing expertise to bear (M* = 0,31, *SD* = 0,31), than the 22 teams in the control group (M = 0,07, SD = 0,44; t(45) = 2,17, p = 0,04). Also learning behaviour increased more in the intervention group (M=0,35, SD=0,39), than in the control group; (M=0,14, SD = 0,43). However this difference was only statistically significant at a 10% level (*t*(45) = 1,74, p= 0,09).

On the individual level, the 145 team members that were subject to the intervention increased their individual work-SoC with M = 0,29, SD = 0,69 while the work SoC among the 106 team members in the control group remained rather unchanged (*M* = 0,06, *SD* = 0,74). The differences in the change in work SoC were significant at the 1% level (*t*(249) = 2,56, *p* = 0,01). The change in *individual perceived stress* was not significantly higher in the intervention group (*M* = 0,14, *SD* = 0,58) compared to the control group ((*M*=0,09, *SD*=0,56), *t*(249) = 0,72, *p* = 0,47). Also, the comparison of change over time thus confirms hypotheses 5a and c, while hypothesis 5b is only supported at a 10% level.

Comparison of Experimental and Control Groups change of mean values during intervention							
		Experimental		Control			
Δ Variables between T0 and T1		*M*	*SD*	*M*	*SD*	*t*	Sig.
Team	Δ Learning behavior	0,35	0,39	0,14	0,43	-1,74	0,09
	Δ Bring expertise to bear	0,31	0,31	0,07	0,44	-2,17	0,04
Ind. level	Δ Work-SoC	0,29	0,69	0,06	0,74	-2,56	0,01
	Δ Stress	-0,14	0,58	-0,09	0,56	0,72	0,47

Table 9: Comparison of change in mean values during intervention period between Experimental and Control Group, Team-level N=47, individual level N=250

To adjust for the empirical data being repeated measures by the same individuals and teams respectively, at T0 and T1, we ran the final test as a mixed-effects model, using individual and team as subjects at respective level. We used a difference-in-difference regression model to verify the significance of the intervention effects.

$$Y = \beta 0 + \beta 1*[Time] + \beta 2*[Intervention] + \beta 3*[Time*Intervention] + \beta 4*[Covariates] + \varepsilon$$

An intervention has a significant effect on a variable if the interaction variable (Time*Intervention) is significant. The results are presented in table 10 below.

		Interaction variable		Confidence interval	
	Variable	β3	Sig	Lower	Upper
Team level	Learning behavior	0,202	0,1	-0,04	0,444
	Bring expertise to bear	0,254	0,027	0,031	0,447
Ind level	Work SoC	0,233	0,012	0,051	0,414
	Stress	-0,053	0,481	-0,199	0,094

Table 10: Difference in difference, interaction variable, Team-level N=47, individual level N=250

The result verifies a support for hypotheses 5 a and c, while hypotheses 5b is still only supported at the 10% level.

Discussion and implications

This study demonstrates that team level knowledge processes through which individual expertise is made available to the team and through which this expertise is exploited in team learning processes are positively related to individual work Sense of Coherence and that Sense of Coherence mediates the relation between team knowledge processes and individual perceived stress. We also show that providing teams with an application supporting them to perform a self-guided team debrief during eight weeks significantly can improve certain team knowledge processes (bringing expertise to bear) and work SoC.

These findings make several contributions to our current understanding of the relationship between teamwork and stress. First, previous research on the relation between teamwork and stress has mainly focused on work-design aspects such as team autonomy (Cruz & Pil, 2011; Gallie et al., 2012; Van Mierlo et al., 2007), team structure (So et al., 2011), team resources (Busch et al., 2013), work (2021) environment (Li et al., 2013) and team-based job rotation (Cruz & Pil, 2011). While these studies provide important insights into the structural conditions that promote sustainable work in team settings, they fail to account for the team processes trough which team outcomes are

produced (see for example Mayo & Woolley, (2021)). Recent research has indicated that team reflexivity may be such a process that reduces stress in teamwork (Chen et al., 2018). The current study extends this line of research by identifying additional team processes, especially in knowledge-intensive teams, that alleviate stress, namely the team knowledge process (Behfar et al., 2008) bringing expertise to bear through which team members actively share their knowledge and expertise and team learning behaviour in which team members engage in reflection on both their team and task work. As team learning behaviour is conceptually close to team reflexivity as studied by Chen et al (2018) the current study confirms their findings. The importance of team members actively sharing their knowledge and expertise for reducing stress, however, provides new insights. These findings indicate a potential for further research to look deeper into team processes in general and team knowledge processes in particular, in order to better understand and address work-related stress in organizations where teamwork is a dominating work mode. Examples of such processes include conflict resolution processes (Behfar et al., 2008; Greer et al., 2008; Tekleab et al., 2009) and team communication processes (De Vries et al., 2006; Marlow et al., 2018). A better understanding of how team processes are related to employee well-being points at the responsibility of not only team leaders but each team member to contribute to the other team members' stress reduction and well-being.

Second, the findings of the current study complement our understanding of the mechanisms shaping perceived stress in teamwork by introducing the concept of Sense of Coherence. Our findings indicate that individual work SoC may function as an important buffer of individual stress in relation to team stressors such as a lack of relevant competence. Building individual SoC thus makes team members more stress resilient in relation to aversive team conditions.

While previous research has shown that sense of coherence can have direct, mediating and moderating relationships with work-related stress (e.g. Albertsen et al., 2001; Söderfeldt et al., 2000) its relation to team processes has not been previously explored. The findings of the current study demonstrate a positive relation between team knowledge processes and work SoC and indicate that SoC fully mediates the relation between team knowledge processes and individual stress. However, the current study also indicates a significant effect of SoC on perceived stress beyond the team knowledge processes. With SoC being positively related not only to stress but a wide range of physical and mental health outcomes, the findings of the current study open up new research avenues related to the team (knowledge processes) that may contribute to team-members' work SoC and thereby not only to reductions in perceived stress but also to improvements of other mental and physical health outcomes. With organization members spending an increasingly large proportion of their work-time in different team settings, the team processes that contribute to team members'

SoC could become a focused target for interventions with a potentially broad impact on employee health and well-being. With a large majority of stress interventions focusing on the individual, it has been pointed out that adopting more of a team perspective could hold a large potential for new kinds of interventions (Liu & Liu, 2018)

Third, the current study increases the understanding of what interventions may strengthen individual work SoC. Previous research has focused mainly on therapeutic interventions directed at the individual (Davidson et al., 2012; Kähönen et al., 2012). The app-facilitated team debrief intervention applied in this study demonstrates that interventions aimed at team knowledge processes may affect both the knowledge process bringing expertise to bear and work SoC directly. However, a lower effect of the intervention on the team learning behaviour was found which is puzzling as the intervention specifically addressed reflection on both current processes and outcomes of the teamwork. In several of the exercises carried out in the intervention, participants were instructed to reflect on different aspects of their tasks, resources and processes. One potential explanation may be that participants perceived the engagement in the facilitated team debrief sessions as separate from their regular work with the team and thus did not include these activities when assessing to what extent they "always made sure that we stop and reflect on the team's work" or "often spoke up to test assumptions about issues under discussion" as some of the items representing learning behaviour probed. Overall, however, the findings in relation to the intervention indicate that work SoC can be improved by interventions directed at team level processes. This provides new avenues towards addressing employee stress and health through means that are directly related to the processes through which work is performed and through means (team debrief) that have also been shown to be supportive of team performance (Eddy et al., 2013; Smith-Jentsch et al., 2008; Tannenbaum & Cerasoli, 2013). Further research may focus on identifying and testing additional team and leadership interventions that support the development of individual SoC.

Limitations and future research

While the current study provides new insights into the relationships between team level processes and individual level stress, it also comes with several limitations offering opportunities for further research. First, while our findings indicate a strong relation between knowledge integration processes, work SoC and perceived stress the design of the current study does not enable us to establish causality between these concepts. Research focusing on stress in teams has typically explored the effects of stressors on team processes rather than the relationship between team processes and individual stress in focus in this paper. This calls for a further disentangling of the causal relationships between team level stressors, team level processes and individual perceived

stress. Future longitudinal and experimental studies may help better understand how the stress and team process dynamics on different levels interact and how team processes may be exploited as a mechanism for mitigating stress. The findings of the current study, together with previous team-level stress research may indicate a reciprocal relationship between individual stress and team processes that could trigger both virtuous cycles (well-functioning team processes buffer the effects of team stressors on individuals and thus reinforce effective team processes) and vicious cycles (inefficient team processes amplify the effect of team stressors on individuals thus further deteriorating the conditions for effective team processes).

Second, the longitudinal intervention setup of the current study was challenged by the outbreak of Covid 19, leading to unexpected disturbances to tasks as well as work procedures and a general increase in stress levels among individuals in organizations. While effects of the intervention on one of the knowledge processes and sense of coherence were found a follow-up study under more normal conditions would be desirable to verify the found intervention effects.

Third, while the current sample comprises a variety of different kinds of teams, indicating generalizability across types of teams and different team sizes, all teams were working in a public sector context in Sweden. Previous research has identified Swedish work-culture as relatively non-hierarchical and teamwork-oriented (Benders et al., 2001) and future research should test the generalizability of the current findings in the context of other sectors and cultures.

Finally, the current study indicates that work SoC has considerable ability to explain variations in perceived stress, making it an interesting variable to engage with for management. The current study has investigated two antecedents of SoC that provide some explanation to variations in SoC. A large proportion of SoC, however, remains unexplained in the current model calling for additional research into the organizational and team-level antecedents to work SoC.

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