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Working Paper 15/3

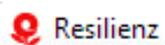
First and Second Order Resilience against Stress at the Workplace

Results of a workshop at the NES/ODAM conference 2014

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Abstract

Today's business environment is characterized by intense competition and constant change. Consequently, organizations, teams and employees have to deal with the permanent requirement to adapt to these changes. In this setting, personal resilience, defined as the dynamic process encompassing individuals' positive adaptation after adversity, becomes an essential concept to understand and investigate how to enable actors to respond to those challenges. While the concept of personal resilience addresses important issues in organizational design and management, considerable inconsistencies in definitions and conceptualization still exist. These inconsistencies, however, pose a severe hindrance to advance our understanding of personal resilience at the workplace. Therefore, the ForChange projects "Strategies against work-related stress" and "Resilience in Teams" developed a workshop in which, together with ergonomics researchers and practitioners, the core elements of personal resilience in workplace contexts were discussed. Central questions included which conditions are important to support personal resilience, and whether negative side effects should be considered when dealing with personal resilience as a desirable attribute. Definitions, ideas and examples from the participants as well as our own experiences built the basis of this conceptual work. In a second step, we took a look at an issue that comes along with resilience but that has not been addressed in previous studies. Research on resilience used to focus on a single unit of analysis, mainly on the individual level. However, because of the embeddedness of individual employees in teams and organizations, many interdependencies exist that affect the resilience of groups and individuals (second order resilience). Hence, we wanted to explore these interdependencies and discuss how they are shaped and how they influence views on resilience at the workplace.

First and Second Order Resilience against Stress at the Workplace - Results of a workshop at the NES/ODAM conference 2014

Workshop Overview

Workshop at the 11th Symposium on Human Factors in Organisational Design and management (ODAM) in Copenhagen

Title:

Resilience against stress at the workplace
August, 19th 2014, 10:30 - 12:15

Agenda:

- 1) Introduction and input from the organisers: Definitions of resilience at the workplace
- 2) Group discussion on questions:
 - How do you define resilience in your research?
 - What are important aspects with regard to research on resilience?
- 3) Input from the organisers: Resilience of first and second order
- 4) Group Work on questions:
 - What are supporting factors & barriers of first and second order resilience?
 - What is the relation between first and second order resilience?
- 5) Interactive poster session

Participants:

About 20 participants with diverse professional backgrounds in university research and ergonomics practice took part in the workshop.

1. Definitions of Resilience at the Workplace

Today's business environment is characterized by intense competition and constant change. Increasingly, change events are of disruptive nature. This creates a challenge for organizations, teams and employees, who have to deal with these changes. Because of organizational restructurings or the termination of projects employees might lose their status, their career prospects or even their current position. Those professional setbacks, which might be perceived as personal failure, generally lead to undesirable outcomes such as reduced employee satisfaction, commitment, motivation or even to an impaired health status (Moenkemeyer, Hoegl, & Weiss, 2012; Wanberg & Banas, 2000).

Against this background the concept of resilience is of importance for management research, since resilience is supposed to be elementary for successful adaption to setbacks and adverse events (Masten, 2001; Sutcliffe & Vogus, 2003). In line with this, several studies found that the employee's resilience is positively related to employee's job satisfaction, work happiness and organizational commitment (Avey, Reichard, Luthans, & Mhatre, 2011). But even though researchers agree that resilience enables actors to successfully deal with setbacks, considerable inconsistencies regarding definitions and conceptualization still exist. Table 1 gives an overview of definitions that are frequently used in research on resilience in the organizational context. Existing definitions share two elements: adversity and positive adaptation. Apart from that, definitions vary to a large extent. Nevertheless, they can be categorized in either taking a trait perspective or a process perspective on resilience.

Research that defines resilience as a trait has highlighted the importance of personal characteristics, such as self-efficacy and optimism. Those are supposed to predict social and personal success and to help people recover from adversity. In this stream of research a list of traits, states, characteristics and conditions has been identified as protective against challenging situations. This view assumes a moderating function of resilience. In line with this, resilient qualities can diminish the potential negative consequences of a setback on personal well-being (Coutu, 2002; Luthar, Cicchetti, & Becker, 2000; Shin, Taylor, & Seo, 2012; Wanberg & Banas, 2000).

In contrast to the view of resilience as a personal trait, the view of resilience as a process is more complex. This view highlights that early experiences shape later experiences. Therefore, the way in which employees interpret and deal with new challenges is affected by attitudes and expectations derived from earlier experience with adversities. In this sense, resilience is relative and not fixed and it is emerging and changing in response to a number of contingencies. Accordingly, a process perspective highlights the developmental notion of resilience and assumes that resilience does unfold in a recurring cycle (Luthar et al., 2000; Moenkemeyer, Hoegl, & Weiss, 2012; Sutcliffe & Vogus, 2003).

Table 1: Definitions of personal resilience used in research in the organizational context

Construct	Source	Definition	Used by, e.g.,
Career Resilience	London (1983) / London, 1985	"A person's resistance to career disruption in a less than optimal environment."	Carson and Bedeian (1994), London and Noe (1997), Noordin et al. (2002)
Career Resilience	Grzeda and Prince (1997)	"The ability to overcome career setbacks."	Grzeda and Prince (1997), Moenkemeyer et al. (2012)
Career Resilience	London (1997)	"The ability to adapt to change, even when the circumstances are discouraging or disruptive."	Bimrose and Hearne (2012)
Career Resilience	Noe et al. (1990)	"The individual's ability to adapt to changing circumstances and cope with negative work situations."	Noe, et al. (1990)
Cognitive Resilience	Hayward et al. (2010) based on Heath et al. (1998)	"The energy and enthusiasm with which entrepreneurs form positive judgments about starting new ventures after they leave prior ones."	Hayward, et al. (2010)
Emotional Resilience	Hayward, et al. (2010) based on Fredrickson et al. (2003)	"The positive behavioral adaptation that individuals can experience after adversity and loss."	Hayward, et al. (2010)
Entrepreneurial Resilience	Hayward, et al. (2010)	"Resources that enable entrepreneurs to establish a new venture."	Hayward, et al. (2010)
Innovator Resilience Potential	Moenkemeyer, et al. (2012)	"The potential for future innovative functioning and coping with future setbacks after having experienced a professional setback."	Moenkemeyer, et al. (2012)
Personal Resilience	Major et al. (1998)	"Resources that should contribute to more positive appraisals of and better adjustment to stressful life events."	Wanberg and Banas (2000)
Resilience	Block and Kremen (1996)	"A 'traitlike' (i.e., stable) ability to bounce back from adversity and hardship and to flexibly adapt to shifting demands."	Shin et al. (2012), van Erp et al. (2014)
Resilience	Carver (1998)	"Homeostatic return to a prior condition."	Moore et al. (2004)
Resilience	Coleman and Ganong (2002)	"A dynamic process encompassing positive adaptation within the context of significant adversity."	Jackson et al. (2007)
Resilience	Coutu (2002)	"The skill and the capacity to be robust under conditions of enormous stress and change."	Coutu (2002), Fleig-Palmer et al. (2009), West et al. (2009)

Table 1: Definitions of personal resilience used in research in the organizational context (Continued)

Construct	Source	Definition	Used by, e.g.,
Resilience	Greene (2002)	"The capability of individuals to cope successfully in the face of significant change, adversity, or risk."	Harland et al. (2005)
Resilience	Luthans (2002)	"Positive psychological capacity to rebound or 'bounce back' from adversity, uncertainty, conflict, failure or even positive change, progress and increased responsibility."	Avey et al. (2010), Luthans et al. (2008), Youssef and Luthans (2007)
Resilience	Luthar et al. (2000)	"Positive adaptation within the context of significant adversity."	Moenkemeyer, et al. (2012)
Resilience	Masten (2001)	"A set of processes that enables good outcomes in spite of serious threats."	Fleig-Palmer, et al. (2009)
Resilience	Masten (2007)	"The capacity of dynamic systems to withstand or recover from significant disturbances."	Graham and Oswald (2010)
Resilience	Reivich et al. (2011)	"The ability to persist in the face of challenges and to bounce back from adversity."	Reivich, et al. (2011)
Resilience	Richardson (2002)	"Growth or adaptation through disruption rather than just to recover or bounce back."	Harland, et al. (2005)
Resilience	Richardson (2002)	"The motivational force within everyone that drives them to pursue wisdom, self-actualization, and altruism and to be in harmony with a spiritual source of strength."	Bimrose and Hearne (2012)
Resilience	Sutcliffe and Vogus (2003)	"The capacity to rebound from adversity strengthened and more resourceful."	Carmeli et al. (2013), Gittell (2008)
Resilience	Tedeschi and Calhoun (2004)	"An ability to go on with life, or to continue living a purposeful life, after hardship or adversity."	Bullough et al. (2014)
Resilience	Wagnild and Young (1993)	"A personality characteristic that moderates the negative effects of stress and promotes adaptation."	Wagnild and Young (1993)
Resilience	Rutter (1985) / Rutter et al. (1979)	"An individual's ability to overcome adversity, cope with stress, and rise above liabilities."	Neveu (2007), Waldman et al. (2011)

Table 1: Definitions of personal resilience used in research in the organizational context (Continued)

Construct	Source	Definition	Used by, e.g.,
Resilience	Waldman, et al. (2011)	“The ability of individuals or organizations to: (1) Absorb strain and preserve and improve functioning while encountering both external and internal forms of adversity, and (2) recover or bounce back from untoward events.”	Waldman, et al. (2011)
Resilience	Walsh (1998)	“The capacity to rebound from adversity strengthened and more resourceful.”	Stephens et al. (2013)
Resilience	Windle (2011)	“The process of negotiating, managing, and adapting to significant sources of stress or trauma.”	Winwood et al. (2013)
Resiliency	McLarnon and Rothstein (2013)	“The processes and adaptive responses that assist recovery from an adverse event.”	McLarnon and Rothstein (2013)

2. Group Discussion: Other Facets of Resilience

After the short overview of definitions of resilience currently used in research, participants were asked how they defined resilience in their research and practice, what are important aspects with regard to research on resilience and what role resilience played in their research and practice. The results of the discussion were visualized as a mind map on a flipchart (Figure 1).

When brainstorming the different facets of resilience against stress, the following insights occurred:

- Resilience against stress can be seen at the individual, team, organizational and societal level. Different factors are important at each level, e.g. collaboration in teams, participation, tools, processes and culture in organizations.
- Resilience against stress can be synonymous with strength, endurance, being able to improvise in times of change, being prepared, being able to adapt. (Note that these are possibly contradicting: while adaptation means to go with the change and change oneself, strength and endurance suggest that change is not necessary but resisting change is the core concept).
- When talking about resilience, it needs to be specified which domain and levels of application are addressed: whether it is work performance, work-life balance, physical health etc. Resilience against stress may look different in different domains.
- Resilience is malleable. Successful coping with adverse conditions can enhance resilience and can widen the boundaries of an individuals’ zone of comfortable operation’. But to also have periods of rest seems necessary as too many challenges in close sequence may exhaust and actually lower resilience.
- Resilience can be supported or furthered by many resources (among these the classical resources against stress). Technical support, proactively designed, may be able to support resilience. Strong values can make individuals resilient against stress. But also, interestingly, knowing when to give up and when to let go may be an important factor of resilience against stress.

- Resilience may be dependent on the available arsenal of coping strategies against stress. Besides the coping strategies available to the individual, the influence of leaders who can provide training and other resources is important, as are other external influences. Participants opposed the idea that resilience against stress is an individual thing. They emphasized the role of the team, of the working conditions and of leadership behaviour as important factors determining personal resilience.

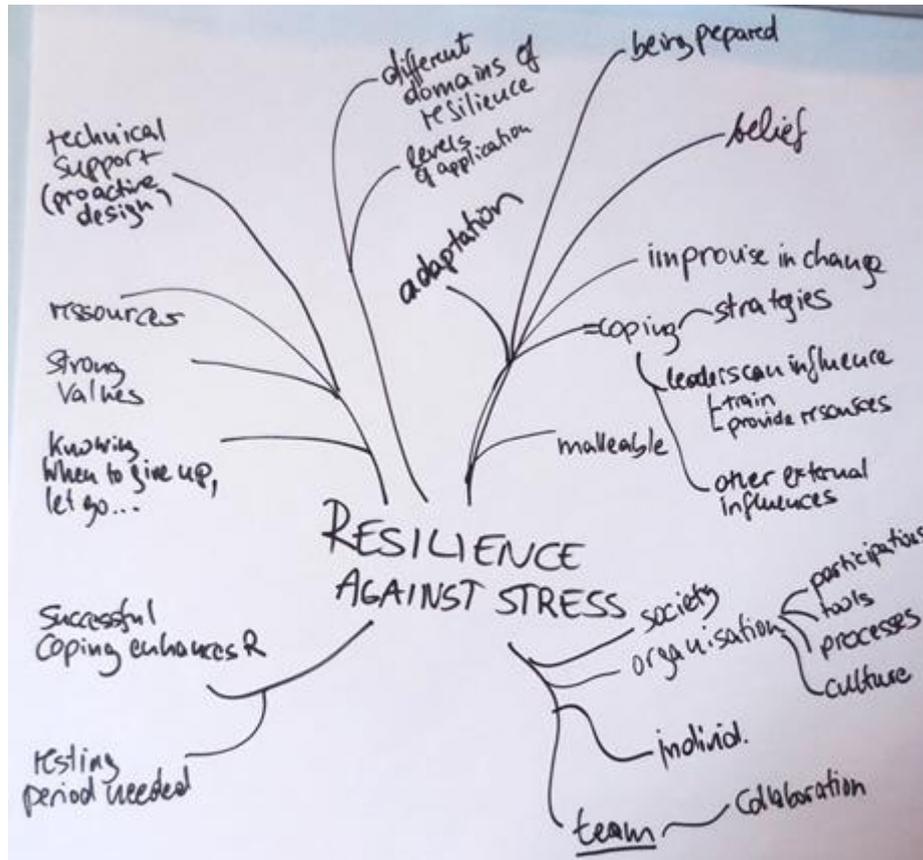


Figure 1. Brainstorming results: facets of resilience

3. First and Second Order Resilience

In a second step, we looked at an issue connected to personal resilience, but that has not been addressed in previous studies. Research on resilience used to focus on a single unit of analysis, mainly on the individual level. However, because of the embeddedness of individual employees in teams and organizations, many interdependencies exist that affect the resilience of groups and individuals. For that reason we introduced the distinction between first order and second order resilience.

First order resilience belongs to one entity (individual, organisation, etc.) and it is worthwhile for this entity. Because of first order resilience, for example, an entity knows how to handle setbacks, crises or exceptional circumstances like accidents, illnesses, floods, droughts, earthquakes and volcanic eruptions. A resilient entity prefers to avoid such situations but also knows how to handle if they happen. In the working context first order resilience can mean that an individual is able to recover from workplace stress and job setbacks.

Second order resilience might also be called "context resilience". It belongs to an entity if the resilience of this entity has a positive influence on the resilience of another entity. For example, first

and second order resilience belongs to an employee who is resilient against stress and this resilience promotes the resilience of the team. Outside the working context second order resilience, for example, belongs to a football player who is resilient against injuries and promotes – because of his first order resilience – the resilience of his team.

First order resilience can also exert a negative influence on the resilience of other entities. For example, first order resilience can be attributed to a tyrannical ruler who is resilient against international political pressure. For himself his resilience is worthwhile. But because his resilience has a negative influence on the population, second order resilience does not belong to him. In contrast, he even exerts a negative influence on the resilience of other entities. This example points out that the attribution of second order resilience to a resilient entity depends on whether this entity's resilience has a positive or a negative influence on other entities' resiliencies.

After this explanation the definitions of first and second order resilience and especially the question how to decide whether second order resilience can be attributed to an entity were critically scrutinized by the workshop participants. One central aspect was that the context and the point of view have a crucial importance in analyses about resilience. This was a good starting point for the questions we wanted to discuss with the participants in three groups.

4. Supporting Factors and Barriers to First and Second Order Resilience

The workshop participants were split into three groups and were asked to (1) find examples of supporting factors and barriers of first and second order resilience and (2) to discuss and find examples for the relations (dependencies and reciprocal relations) between first and second order resilience. The discussion was facilitated by providing a 2x2 matrix with supporting factors and barriers on one axis and first and second order resilience on the second axis (cf. Figures 2 through 5).

4.1 Results of Group 1

To be better able to discuss the cells in the matrix, the group started with an example. One participant had a suitable one. In her company, management is very successful in attracting a high number of customer orders (which is healthy for the survival of the company), but in order to fulfil these orders work has intensified a lot (which is not healthy for the employees). At first sight it seems that the company is enhancing its resilience by taking on many orders and that this would negatively affect the resilience of their employees. Thus, the company's first order resilience is not connected to a second order resilience with regard to the employees. At second sight, however, it is not clear whether taking on orders actually affects resilience or just performance healthiness expressed in business KPIs. Does overextending the company on customer orders really enhance the potential to sustain under adverse circumstances? It depends on the context and the types of adverse challenges that will be faced in the future.

As the task was not to talk about the first order resilience of companies but of employees, the group then worked on possible employee reactions aimed at keeping up their resilience under such adverse circumstances and the secondary effects of these. Then, the following coping mechanisms are *supporting employee resilience* and may have these → 2nd order effects (cf. Figure 2):

- Social support from colleagues → can either lead to a better organizational culture overall or may cause mutiny and uproar when employees build up too much resentment
- Lowering (personal) quality standards → unclear effects on company: may not be noticed at all until they have detrimental effects on sustainability and customer image
- Better information and coordination (by management) → organization runs more smoothly

- Absenteeism → not sustainable for company; the remaining colleagues are left with more work to do
- Being prepared, receiving training for new work situations → organization runs more smoothly, is prepared for future impacts
- Setting priorities with respect to the employees' work-life balance → unknown effects on company
- Setting priorities with respect to their work tasks → when priorities are set in alignment with company goals this can lead to better quality (because more time is spent on the right things) and company effectiveness (only doing the right things)

Barriers to employee resilience (no consideration of 2nd order effects):

- Having too much work to do
- Work pace too high
- Lack of tools, inappropriate tool support

The physical health of employees, it was thought, can be either a supporting factor (when good) or a barrier to resilience (when poor). The potential negative effects of bad health can be mitigated by compulsory fitness training – as has been introduced in several Indian IT companies.

Again, it was felt that one also needs to look into the opposite direction to see how measures of the company to enhance its resilience affects the resilience of the employees. One common measure is to enhance organizational flexibility by hiring temporary staff and issuing fixed-term employment contracts. The second-order effects on the health resilience of workers can be detrimental. As workers cannot predict their employment future beyond the end of contract, they develop a higher propensity to take on higher workloads hoping to get permanent contracts in future (which might then not benefit their health).

As to the *relations between 1st and 2nd order resilience*, the following comments were made:

- Predicting the secondary effects of measures to enhance first order resilience is hard. This is similar to predicting the side effects of introducing new strategies, technologies and structures in general.
- Different stakeholders may have different views on how resilient they and others are and how their and others' resilience is enhanced or compromised by external events and interventions. Whether something is a threat or a challenge is in the eye of the beholder. Thus, the whole concept of resilience may turn out to be highly subjective making objective measures of resilience hard to achieve.
- An important pathway to consider is that companies may enhance their 1st order resilience at the expense of workers' resilience. Thus, personal resilience can also be seen from a first and a second order perspective.
- It is very difficult to keep the concepts of well-being and resilience apart. It is sometimes hard to think of a conceptual distinction between the two. Hence, everything that is said in this workshop needs to be reviewed with regard to whether people were actually talking about resilience (or rather about well-being in general) and whether the same factors are influencing both. We also had a discussion of related concepts, e.g. whether Antonovsky's *sense of coherence* could be the same as resilience.
- Some participants saw resilience more as a defensive thing: as a protection against the harm caused by adverse effects. A new idea was to see that resilience could also mean to offensively take strategies to cope with future adverse conditions.

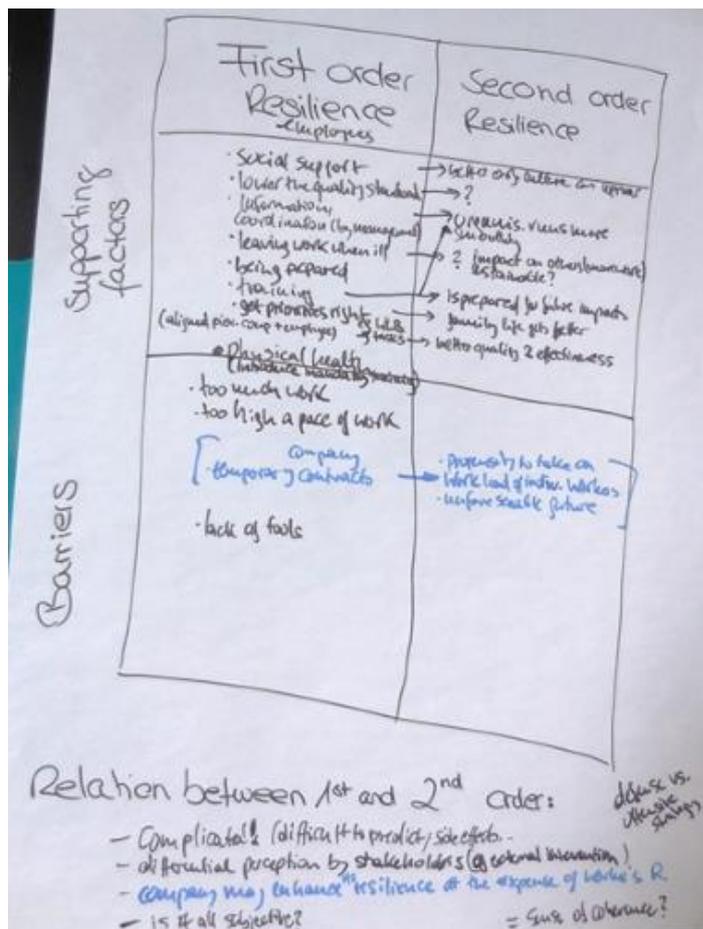


Figure 2. Flipchart of results of Group 1

4.2 Results of Group 2

The concept of resilience was discussed from many perspectives. The group pointed out that awareness about the level of argumentation plays a crucial role in studies on resilience (e.g. individual employee, team, organization). Moreover, the group came to the conclusion that workplace resilience can be considered a desirable resource for employees, since it helps them to adapt to unstable working environments and to deal with professional adversities. However and adding to a list of competences like know-how, flexibility and team skills, employers increasingly ask for a resilient workforce. Accordingly, resilience is framed and communicated as an additional job requirement by employers and the media, which can create an extra burden for employees. The group agrees that this aspect has to be acknowledged when discussing resilience from different perspectives. The perspective of the employee was taken during the group discussion.

The group intensively discussed the concepts of first and second order resilience, since those were new to the group. It came to the conclusion that interrelations between first and second order do exist, which are very complex and influenced by a lot of contingencies. In the following, the group discussion focused on the interrelations between individual resilience and team resilience as two different levels of analysis. Different scenarios were discussed (Figures 3 and 4):

Supporting factors for individual resilience:

- Strong personality and being inspired
- Trust in goals, clearly defined goals
- Personal meaning (e.g. through alignment of personal, team and company goals)

Supporting factors of team resilience:

- Proactive leadership and leadership support
- Social capital
- High social competences and ability of individuals to work in teams
- Strong personality of individual leaders that inspires team members
- Shared trust in goals, clearly defined goals
- Meaning (e.g. through alignment of personal, team and company goals)
- Team focus
- Team learning (competence wise and social wise)

Inhibiting factors of resilience (e.g. negative influence of individual resilience on team resilience)

- Self-focused individuals
- Attitude “survival of the fittest”; e.g. when team workload is high, the individual could refuse to go the extra mile in order to maintain own health and well-being but could in consequence lower team resilience

Further interrelations between individual and team resilience:

- Team resilience could foster individual resilience and enable it (team exhibits 1st and 2nd order resilience)
- Team resilience could exist because of collective resources or supportive leadership despite of missing team member’s individual resilience of team members

In conclusion, the group agreed that the constructs of 1st and 2nd order resilience are worth further investigation. Moreover the group pointed out that resilience in and of teams seems to be a fruitful avenue for future research.

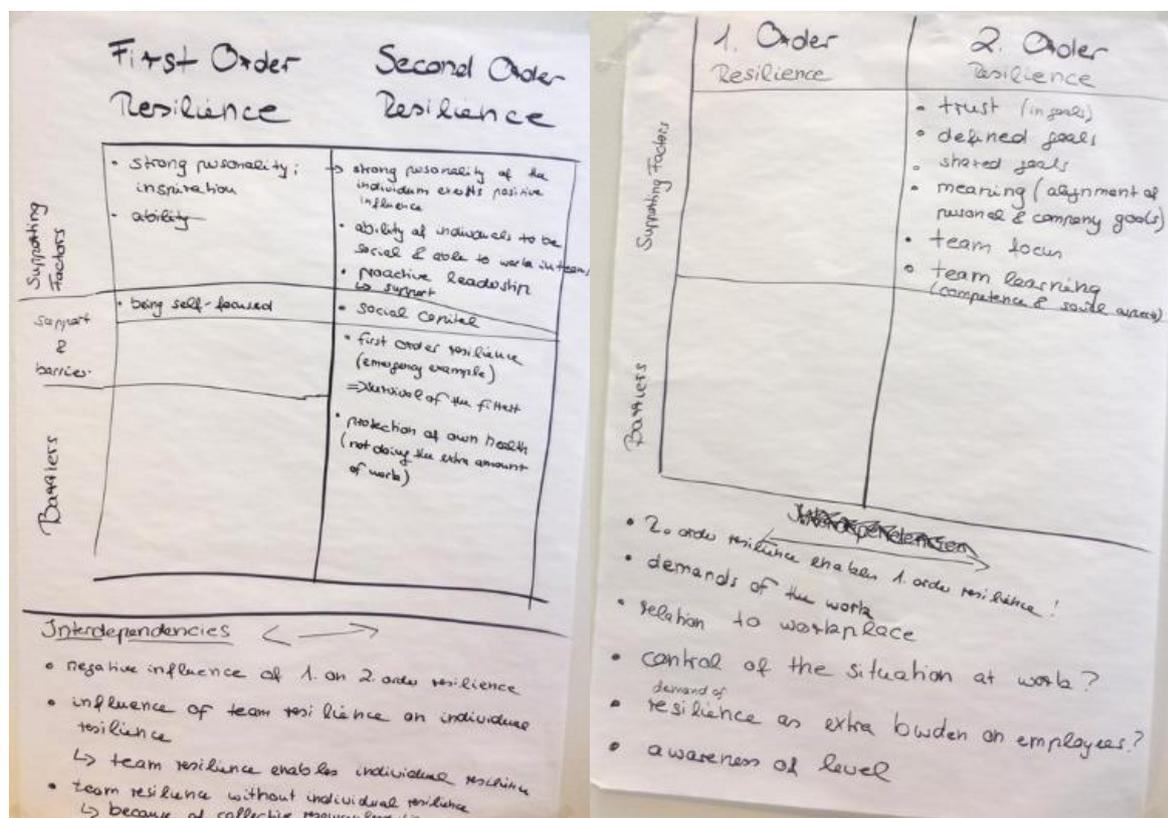


Figure 3. Flipcharts of the results of Group 2

4.3 Results of Group 3

The group discussion started with recognizing the need to more clearly define the time perspective of resilience when thinking about potential supporting factors or barriers. For example, when being affected by a newly emerging stressor such as getting assigned to additional tasks, some actions employees could perform in response to this stressor might help to maintain their performance in the short run (e.g., increased effort and working hours, efficiency improvements at work), but may be detrimental to their performance in the long run (e.g., due to health impairments, increasing likelihood of errors). Thus, it is important to define a priori which time perspective is focused on, given that the supporting/hindrance factors tend to be quite different for the two perspectives and even might interchange roles over time. The group largely agreed that it is more desirable to focus on resilience in the long term, but that competitive and institutional pressures might induce a tendency to focus on short-term resilience in business practice. Another aspect that came to the fore was that it might be difficult to grasp (and measure) resilience in the long run. (Authors' afterthought: indeed, most studies of resilience and related concepts applied a time frame that allows drawing conclusions only for the short term perspective)

Another aspect that, according to the group discussion, has to be defined when talking about supporting factors and barriers is also the reference point of resilience. Is it performance, or is it the well-being (or job satisfaction) of employees? While there was no in-depth discussion on this aspect, this reference point might substantially affect the identification of the supporting factors and barriers, although it was noted that (coming back to the time perspective), in the long run, these factors can be expected to converge due to strong interdependencies between the factors. For example, it is unlikely that employees perform well without well-being and job satisfaction, and performing well promotes job satisfaction.

Thus, it is important to keep in mind these considerations when looking at the *supporting factors of first order resilience* the group mentioned and discussed:

- Feedback was mentioned as a facilitator of first order resilience, as it is important to know about strengths and weaknesses or about specific room for improvement. In the case of failure (as the reason underlying the need for showing resilience), knowing about the actual causes of the failure is an important precondition to learn from it and to adapt at the right place.
- Similarly, recognition was mentioned to be important, since even in the case of failure not everything goes completely wrong and sometimes reasons that defy control of involved people are causing failure. Apparently, this aspect is interrelated with feedback.
- Self-confidence: If there is a low level of self-confidence, being affected by stress or failure might have more severe and detrimental influences on the respective persons, both in terms of performance (increased insecurity and decreased self-efficacy) and well-being (increasing rumination, reduced self-esteem, etc.). In contrast, self-confident people might recognize the adverse situation but do not fundamentally question themselves. This aspect is interconnected with recognition, as recognition of performance despite failure might help to maintain self-confidence.
- Growth mindset: A growth mindset means that people see adverse situations as a learning opportunity and might, for example, see failures not as such, but as some kind of feedback that facilitates improvement or change. Such a mindset was mentioned to help a lot to overcome adverse job situations since it actually takes out the adverse taste of these situations. Another term for this aspect might be flexible mindset.

Aspects that have been mentioned as *supporting factors of second order resilience*:

- Mutual trust and respect among the individuals within a team or organization.
- The knowledge of a desired goal state was seen as an important facilitator of second order resilience as it forms the basis of norms guiding the (direct and indirect) interpersonal interactions within a team or organization. When people know that they should also consider the side-effects of their actions on others they are more likely to do so. Strongly related to the aspect of culture, which is mentioned below.
- Generally, second order resilience was mentioned to depend on the role of the focal person showing first order resilience. In this regard, the adaptive behaviours and actions of leaders (both formal and informal leaders) have been argued to be more impactful for others', especially subordinates', resilience. To put it in other words, the focal person's degree of influence on others within an organizational entity is expected to amplify the second order resilience (or the detrimental effects of her/his actions) on others. This is why leadership was seen as an important precursor of second order resilience. Not only that leaders' actions are more impactful on others, leaders might also serve as role models with regard to first and second order resilience.
- Well managed diversity: Diversity, by itself, is not a facilitator of second order resilience. However, if managed well, it might be a resource for resilience since diverse viewpoints might, if managed well, cause positive spillover effects when those favourably receiving an adverse situation (see growth mindset) might directly or indirectly (through their attitude/behaviour) spirit up the others in the team or organization. In contrast, if managed poorly, diversity might represent an anchor for social categorization and thus as a trigger to be less sensitive to second order resilience effects on members of the out-group. Google was mentioned as an example of such well-managed diversity.

One aspect that gained particular prominence in the group discussion of supporting factors of first *and* second order resilience was (organizational) culture. As an example, in a company that is characterized by high internal competition people are less likely to be concerned about side effects of their actions on others when trying to attain first order resilience. The reverse can be expected to be the case in companies where the culture emphasizes mutual respect and internal coordination. Related to other aspects mentioned above, it has been seen as critical that there are clear cultural values and that these values are visible and promoted within a company. One cultural value of particular importance in the context of resilience, according to the group discussion, is a balance of failure tolerance. This means that while there should be failure tolerance established within a company's culture in order to secure a climate of safety, employees should still be aware that they are expected to learn from failures and not to repeatedly commit similar failures.

In the following, the barriers to first and second order resilience are summarized. More specifically, those barriers are listed that go beyond the absence of the supporting factors mentioned above (which, of course, would also constitute a barrier). Absence of the barriers, in turn, suggests supporting factors of resilience.

Barriers to first order resilience:

- In contrast to what was mentioned as a growth mindset above, a fixed mindset was mentioned to impede first order resilience as it precludes people from seeing positive aspects in adverse situations, and thus from realizing the opportunities that usually come along with such situations.

- Lack of competence: If people are less competent in their job or if they show a low person-job-fit (which not necessarily just depends on competence), they are less likely to recognize appropriate options to adapt to an adverse situation.
- Loss of self-preservation: Sometimes employees do everything that is in their power to maintain their performance and to achieve their goals. However, this might lead to a loss of self-preservation, or to people sacrificing themselves for their work and company, which, on the one hand, might preclude them from considering changes of the goals themselves (in case they are not achievable) or the status quo (changing work conditions). Moreover, in the long run, this is likely to have detrimental effects on performance, as mentioned above. When only relating to the employee's needs and not to performance (even in the short term view), this kind of reaction is also detrimental to resilience since it precludes the focal person from leaving the unsustainable situation (e.g., quitting the job).

Barriers to second order resilience:

- A lack of emotional intelligence was mentioned as a barrier to second order resilience. Even if individuals are aware of the need to consider the side-effects of their (resilience related) actions, they might negatively influence others' resilience when they are simply not able to evaluate how others might perceive their actions.
- Some organizational forms and incentive structures, respectively, are barriers to second order resilience if they emphasise individual performance, especially if the individual performance of people within a team/organization might (negatively) influence the performance of others. Two examples have been mentioned here, one refers to sales teams, especially without clear and non-overlapping customer responsibilities, where sales agents might actually cannibalize each other by competing for the same customers. Another example were pay-for-performance or piecework wages (e.g., in assembly lines) where performance of individuals might be evaluated more favourably if there is a bigger positive difference to other individuals on the same job. These structures provide some incentive for systematically disregarding (or even damaging) others' resilience.

In the discussion some specific tools were mentioned that might be used to develop the capacity for first and second order resilience. First, post-crisis debriefings provide the opportunity to reflect adverse situations and how they were handled and also to discuss and develop ways how to better manage such situations in the future. It has to be noted, however, that, if carried out improperly, such post-crisis debriefings might also amplify the negative emotions and experiences connected with an adverse event, thereby hampering the development of resilience. Second, trainings in the form of mild experiences of stress and failure have been suggested as a potential tool to develop the capacity for resilience.

Regarding the *relations between 1st and 2nd order resilience*, the following comments were made:

- There is a permanent spillover from first order resilience on second order resilience, and vice versa.
- The relation between first and second order resilience depends on the physical and mental organization and configuration of an organizational entity (e.g., a team). For example, the relation might depend on the physical proximity, the cohesion and the closeness of interaction among team members, or the personality of the team members.
- The relation is highly situation specific.

	First order resilience	Second order resilience
Supporting factors	<ul style="list-style-type: none"> - feedback - recognition - growth mindset 	<ul style="list-style-type: none"> - happy - desirable goal state - locus of control - roles - well managed diversity
Barriers	<ul style="list-style-type: none"> - fixed mindset - lack of competence - poor job-fit - loss of self-esteem - loss of self-efficacy 	<ul style="list-style-type: none"> - influence (formal vs. informal) - trust - lack of communication - leadership - gaps - crisis debriefing - scales teams - pay per performance teams

Handwritten notes on the flipchart:

- Culture** (Balance of failure tolerance)
- Transparency**
- Role**
- Pay**
- Trust**
- Leadership**
- Gaps**
- Crisis debriefing**
- Scales teams**
- Pay per performance teams**

Relation between first and second order:

- physical & mental organization, pay, of teams
- situation specificity
- spillover

Figure 4. Flipchart of the results of Group 3

5. Interactive Poster Session: Open Research Questions

After the group work all participants walked around to see and discuss the results of the other groups. Then all participants re-assembled in the plenum to discuss open research questions. We have noted the following questions for further research on resilience against stress:

- What are the relations between individual, team and organizational resilience?
- How does *resilience against stress* relate to *resilience engineering*, which is all about performance?
- How can teams (in contrast to individuals) develop resilience?
- How can the different definitions of resilience abound in the literature be consolidated into a single concept?

6. Conclusions

This workshop discussed the concept of resilience against stress at the workplace with a special emphasis on drawing out the distinctions and relationship between first and second order resilience. It turned out that resilience and particularly the distinction between the two types of resilience served a useful lens through which effects of stress and coping strategies can be seen on different levels of an organisation (individuals, teams, and whole organisations). This lens provides many different angles on who is influencing the resilience of whom and sensitises to see side effects and

consequences of certain strategies on others when enhancing the resilience of one entity. Thus it is useful as a heuristic tool for discussion.

The workshop has also shown that resilience remains a multifaceted concept that highly depends on who is looking at what domain and with which goal in mind. Depending on the perspective, factors supporting resilience in one view may be a barrier to the development of resilience in another view (e.g. short-term versus long-term view, view on well-being versus view on productivity). The locus of resilience is not fixed. Resilience can be seen as residing within a person (e.g. when exhibiting a growth mindset and self-confidence), in the outside world (e.g. resilience provided by social support, culture and leadership), or between the two (resilience as a form of person-environment fit). Also the diverse set of barriers and facilitators of first and second order resilience that were discussed in the workshop shows the dependency on viewpoints – as can also be seen by surveying the literature.

Useful as a tool for discussion, the question remains whether such a multifaceted concept usefully adds to the existing vocabulary of ergonomics. For the aims of ergonomics and occupational health practitioners who seek for general measures to lower stress at the workplace this concept may not turn out to be useful as it focuses too much on people and social entities and turns the view away from actually handling adverse working conditions that are the source of stress in the first place.

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