

A New Perspective On Resilience; Cognitive Approach

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Abstract

The term ‘resilience’ is now widely accepted as a concept relating to the protection of critical functions of society and the ‘cognitive resilience’ term is very similar, only it plays out in the cognitive domain as opposed to the physical domain. It has to do with world views and interpretative schemata used by the news consumers to make sense of information. This study examines the individual, social and organizational factors affecting the incidence of cognitive resilience.

Key Words: Resilience, Cognition, Cognitive Resilience, Approach

1. Introduction

In highly volatile and uncertain times, organizations need to develop a resilience capacity which enables them to cope effectively with unexpected events, bounce back from crises, and even foster future success. Although academic interest in organizational resilience has steadily grown in recent years, there is little consensus about what resilience actually means and how it is composed. More knowledge is particularly needed about organizational capabilities that constitute resilience, as well as conditions for their development. This paper aims to make a contribution to this heterogeneous research field by deepening the understanding of the complex and embedded construct of organizational resilience. There are profound differences in how people respond to all sorts of environmental adversities at the individual level. The fact that some people cope with stressful experiences better than expected, given the nature of adversity, is the essence of the concept of resilience. Thus, a reasonable working definition of resilience is the demonstration of a relatively good outcome given exposure to adverse circumstances (Rutter, 2006). Or, as defined by Masten (2011, p. 494) resilience can be viewed as “the capacity of a dynamic system to withstand or recover from significant threats to its stability, viability or development”. As pointed out by Rutter (2012), such notions imply that resilience is an interactive concept that has to be inferred from individual variations in outcome among those who have been exposed to significant stress or adversity. In other words, resilience can only be understood in the context of responding to significant adversity. At a cognitive level, adversity is typically conceptualized as a perceived discrepancy between the situation an individual is

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confronted with and a desired conception of reality specified by their goals, needs, investments, and aspirations for the future (Schwager & Rothermund, 2013). The purpose of this article is to review the individual, social and organizational factors of resilience from a cognitive perspective, which is considered a pristine and new topic.

2. What is resilience?

In physics the term resilience is “a property by which the energy stored in a deformed body is released when elastic deformation ceases”. Other fields, including psychopathology, also use the term to refer to the heterogeneity of coping responses utilized by children in face of major life stressor such as disease, socioeconomic difficulties, parental, psychopathology and ruptures in the family unit, whereby one succumbs to such experiences, escapes unharmed or becomes stronger. The study of resilience in the field of psychology started around 30 years ago, when development psychologists began to observe that exposure to adversities posed a likely risk for child development. The attention given to resilience in adult life and old age was influenced by a movement known as positive psychology and notions such as intra – individual plasticity and capacity for cognitive reserve.

Currently, the term resilience is used in various academic contexts, including the individual, social and organizational performance. A bibliographical review carried out by Suzan and Ceverny of the period 1986 to 2004 utilizing the Medline (Medical Literature Analysis and Retrieval System Online), Lilacs (Latin American and Caribbean Center on Health Sciences Information) and APA (American Psychological Association) databases and using resilience as a keyword, showed that the number of publications tripled in each five-year period. Resilience is the capacity and dynamic process of adaptively overcoming stress and adversity while maintaining normal psychological and physical functioning. Every individual experiences stressful events and the majority are exposed to trauma at some point during life. Therefore, understanding how one can develop and enhance resilience is of great relevance to not only promoting coping mechanisms but also mitigating maladaptive coping and stress response in psychiatric illnesses such as depression and posttraumatic stress disorder (PTSD). Although the understanding of resilience is overall still at an early stage, recent investigations have identified mechanisms encompassing genetic, epigenetic, developmental, psychological, and neurochemical factors that underlie the development and enhancement of resilience and factors that predict vulnerability to stress and susceptibility to psychiatric disorders in the face of stress and trauma.

3. Definition of cognition

Cognition is mainly inspired by human as a reaction to the stimuli that it receives and the actions it takes. The main capabilities related to cognition include perception, attention, memory, reasoning, problem-solving and learning. Perception refers to “the process of selecting, organizing, and interpreting sensory data into a usable mental representation of the world”. That is, the sensory data are being transformed into entities that we can utilize in our process of problem-solving. Attention comes into play in order to be able to identify what we need and where we need to intervene. “Attention is the process whereby an abundance of stimuli is

ordered and integrated within the framework of current tasks and activities: it integrates ongoing activity and newly arriving information. This integration results in the apparent selection of information” (Huffman et al., 2017). In this regard, sustained attention comes into play, where from all available stimuli; we direct and focus our cognitive abilities to selected ones. Having our attention focused and sustained in order to realize problem-solving, we need to evoke past knowledge and experience from our memory. In particular, our working memory enables us to temporarily store and in turn manipulate all information that we need so as to execute a complex cognitive task. Another process of cognition pertains to reasoning. Broadly defined, reasoning is a process by which we derive conclusions. With regard to problem solving, Newell and Simon. in their seminal work proposed that in order to solve a given problem, humans involve a mental representation of an initial state of the problem, a goal state (objective) and the possible intervening states (i.e., the problem space) as well as different strategies for moving through the problem space towards the end goal state (i.e., the search heuristics). Finally, upon the completion of a complex task (e.g., problem solving), the overall output, process, etc. can induce learning, i.e., become new knowledge if the outputs are stored in our long term memory by taking specific paths towards what type of memory is now formed to be saved, i.e., semantic, episodic, procedural, automatic and emotional (Li et al., 2021).

4. Principles of cognitive resilience

4-1. Individual principles

Lifelong cognitive resilience depends on the capacity to adapt to internal factors (e.g., senescence) and external factors (e.g., stressors, culture-bound expectations) to maintain habits of personally satisfying mental engagement. Agency in sustaining an engaged lifestyle does not just derive from naive optimism (e.g., the “little engine that could”), but rather from a whole constellation of resources crafted over the life span that puts force behind one’s sense of agency. Cognitive capacity does not come for free. By some estimates, proficiency in a substantive skill requires about 10,000 hours of deliberate practice. The normalization of optimal life span cognitive development, then, will ultimately derive from cultural and social institutions (e.g., health care, educational resources) that position individuals for effective engagement in experiences and activities that nurture cognition on a large scale over extended time. In the pages that follow, we consider the factors that have potential to contribute to cognitive resilience through the life span. Resilience is a sociocultural process as well, insofar as affordances for adaptation are co-constructed by the individual and the sociocultural context in which one is embedded (Baltes, Reuter-Lorenz, & Rösler, 2006). In this article a number of broad factors that contribute to processes of life span cognitive resilience: (a) health; (b) education and cognitive reserve; (c) knowledge; (d) lifelong intellectual engagement; (e) dispositions, temperament, and motivational reserve; (f) social support; and (g) sociocultural context will be considered.

4-1-1. Physical Health

A burgeoning literature has emerged in recent years suggesting that a healthy mind requires a healthy body. Health is not simply the absence of disease, but rather a coordinated system of

regulatory capacities that afford wellness. Aerobic Exercise Among the most consistently demonstrated health effects on cognition is that of physical activity. For example, in a meta-analysis of intervention studies in which late middle-aged and older adults were randomly assigned to an exercise condition (either aerobic or aerobic combined with strength training) or a control condition, Colcombe and Kramer (2003) showed that change in the exercise group from pretest to posttest (effect size = .49) was reliably greater than change in the control group (effect size = .16). Exercise was found to improve an array of cognitive components, but the strongest of the effects was on executive function (effect size = .68), which was robust even for interventions of a relatively modest duration (1–3 months). Effects of aerobic conditioning on cognition were found to be somewhat greater when it was augmented with strength training. One of the most reliable effects of exercise is increased growth and survival of cells in the dentate gyrus of the hippocampus, a brain structure essential for memory consolidation. This cell growth is supported by the growth of vasculature needed for transport of nutrients and stimulated by increased up regulation of brain-derived neurotropic factor (BDNF). fMRI data suggest that physically fit individuals exert more top-down control to avoid response conflict and show different patterns of neural recruitment (more middle frontal gyrus and superior parietal, but less activation of the anterior cingulate) that support better selective attention performance. Collectively, then, fitness engendered by aerobic exercise is an important facet of cognitive resilience (Hillman, Erickson, & Kramer, 2008).

4-1-2. Manage Stress

We are designed to adapt to challenging circumstance. Our physiology is wired for “fight or flight” as needed for adaptation to changing situations. This capacity to dynamically adjust to external demands, of course, has survival value, but unchecked chronic stress is toxic. Preparation to deal with a stressor involves the release of cortisol that impacts carbohydrate metabolism to release energy reserves, suppresses the immune system, and affects cognitive function by both suppressing processing of information that is not relevant to the situation and promoting memory consolidation—all effects that enable coping with challenge in the short run. However, chronic exposure to cortisol sets up a cascade of processes that can self-perpetuate damage to neurons, especially in the hippocampus.

One’s emotional response to challenging situations may moderate the stress response. Although some individuals respond to challenge with positive affect, some may be more likely to perceive challenge as threatening and react with negative affect. Such a disposition (typically characterized as neuroticism, as we will detail in the following text) may exacerbate the damaging effects of stress on cognition. Neupert, Mroczek, and Spiro (2008) analyzed diary reports of participants from the Normative Aging Study over 8 days and found that reports of stress were coupled with reports of memory failures, but that this effect was heightened for those higher in neuroticism (Oitzl, Champagne, van der Veen, & de Kloet, 2010).

4-1-3. Sleep

Sleep can play an important role in protecting cognition through adulthood. It has long been known that insomnia predicts poorer cognitive performance, but it is also the case that even minor sleep disturbances in otherwise healthy, community-dwelling elders can negatively impact

cognition. Nebes, Buysse, Halligan, Houck, and Monk (2009) found that individuals with better sleep quality (e.g., who fell asleep more quickly and were able to stay asleep) performed significantly better on measures of working memory, abstract problem solving, and executive control. Variation in sleep quality did not significantly relate to speed of processing or inhibition, suggesting that sleep specifically protects the ability to sustain focus in complex tasks. Day-to-day variation in sleep can impact cognitive performance as well. Gamaldo, Allaire, and Whitfield (2010) assessed sleep and cognitive performance on 8 different days across a period of 2–3 weeks, and showed that within individual deviations (either more or less) away from one's mean level of sleep (in this sample, about 6 hours) was coupled with relatively poorer cognition the next day. The causal mechanisms for this relationship are unclear. Although it seems entirely plausible that variations in sleep could directly impact cognition, it is also the case that (as noted previously) daily stress covaries with daily cognitive performance, so it may also be that stress is a third variable that compromises both cognition and sleep.

Collectively, the empirical literature suggests that consistency in good quality sleep is an important source of cognitive resilience. Interestingly, poor sleepers often have higher resting levels of cortisol, so it is probably the case that good sleep and managing stress are inevitably linked in protecting cognition.

4-1-4. Education and Cognitive Reserve

An important factor contributing to lifelong resilience in cognition is an extended period of engagement in formal education early in the life span, an effect that has been attributed to “cognitive reserve” (Stern, 2009). The explanation is that early educational experiences, when brain and behavior are at their maximum potential for plasticity, build neural networks and behavioral strategies that buffer against subsequent insults, so that the manifestation of brain pathology or damage is delayed. Approximately a quarter of community-dwelling individuals who show no obvious performance impairments before death will show evidence of brain pathology at autopsy. This proportion is greater for individuals with higher educational levels than it is for lower levels of education, suggesting that education builds a reserve, in terms of efficiency of neural networks, capacity, and/or flexibility in the use of networks or strategies that enable individuals with incipient pathology to recruit this reserve to preserve function. A number of studies have shown that more highly educated individuals tend to be diagnosed with AD at later ages than less educated adults, but once diagnosed, their cognitive decline is more precipitous. Also, data from the Nun Study, in which a number of long-term lifestyle factors are controlled, have suggested that the rate of AD is lower among those with more years of formal education early in the life span. However, based on a large sample from the Canberra Longitudinal Study, Batterham, Mackinnon, and Christensen (2011) concluded that this may depend on the particular cognitive domain assessed. Collectively, educational experiences early in the life span impact cognitive resilience via a number of routes. Education builds a cognitive and neural reserve that buffers late-life pathology, but also affords skills and regulatory capacities that engender continued engagement.

4-1-5. Knowledge

Knowledge developed throughout the life span is a key resource for resilience in cognition. The growth of knowledge occurs in multiple arenas. Verbal ability, including vocabulary knowledge and proceduralized skills in reading, can show positive development into adulthood with continued practice in literacy activities. Domain knowledge continues to develop with continued investment in occupational and a vocational activities. Such particularized knowledge can be complex and build a reservoir of declarative knowledge that can provide a context through which to assimilate new information, as well as skills that engender both effective selection and greater efficiency in domain-related learning (Miller, 2009).

4-1-6. Cognitive Stimulation and Intellectual Engagement

The aphorism to “use it or lose it” has become a commonplace, and in fact, there is a well-replicated relationship between a lifestyle that incorporates engagement in intellectually stimulating activity and level of cognitive ability (e.g Jopp & Hertzog, 2007; Parisi, Stine-Morrow, Noh, & Morrow, 2009). Intellectual stimulation has been assessed in myriad ways, including complex work or leisure activities, and frequency of participation in novel activities. Many of these studies provide interesting data consistent with the idea that habits of intellectual engagement can buffer age-related declines, with demonstrations of a cross sectional or a prospective correlation. There are two difficulties with drawing firm conclusions about causation, however. First, if an intellectually stimulating lifestyle really acts as a buffer, one might expect for age declines or age differences to be reduced among those who are more intellectually active (statistically, an age by experience interaction), but there is actually little evidence for this. Rather, intellectually active individuals (either measured as disposition or self-reported activity) often have a cognitive advantage over inactive individuals that is sustained over the life span, but they do not age better (Salthouse, 2006).

However, assuming that the senescence process places some constraints on the developmental trajectory of cognition, the expectation for differential cognitive growth among intellectually active people throughout the life span may set a bar for evidence that is too high. A more serious concern with drawing causal conclusions from these studies is that they are vulnerable to the interpretation that those who are cognitively impaired may differentially withdraw from activity, so that it is the decline in mental capacity that leads to withdrawal from cognitive activity, rather than the reverse. Rohwedder and Willis (2010) took a clever approach to addressing this issue by comparing cognitive scores cross-nationally as a function of retirement policies—over which individuals have minimal direct control. To do this analysis, they took advantage of data from three cross-national surveys that were collaboratively designed to provide comparable assessments: the Health and Retirement Study in the United States; the English Longitudinal Study of Aging; and the Survey of Health, Ageing, and Retirement in Europe, which collected data from 11 European countries. Surveys were based on large nationally representative samples and administered over the phone. The cognitive assessment incorporated into the larger survey was delayed recall for 10 concrete nouns, a task that very often shows reliable age declines in the literature.

4-1-7. Disposition, Temperament, and Motivational Reserve

Aside from the particular habits of intellectual engagement that are likely to build behavioral and brain reserve, there may be certain aspects of disposition and temperament that can impact the value of ordinary experience as an avenue for cognitive enrichment, as well as engendering or inhibiting stimulating behavioral repertoires. A rich literature is developing, which examines interrelationships between cognition and personality traits. For example, openness to experience—a trait marked by enjoyment of novelty, fantasy, and emotional experience; attunement to the environment; and mental flexibility—has been shown in a number of studies to be related to measures of cognitive performance, as well as to reduced risk of AD. This is perhaps not that surprising inasmuch as habitual enjoyment with intellectual activity would presumably enhance routine engagement of cognitive capacities to incorporate mental exercise into everyday activities, thereby building intellectual capacity. In fact, there is evidence that those who are high in the intellect facet of openness recruit more neural resources during a working memory task (DeYoung, Shamosh, Green, Braver, & Gray, 2009). By contrast, neuroticism, a tendency to worry and to feel anxious and threatened in ordinary situations, has been hypothesized to be a risk factor for cognitive impairment. Such thought patterns—of course—are likely to create distraction from the intellectual aspects of experience, but also neuroticism is related to higher levels of production of cortisol, which as noted earlier is a stress hormone known to damage the hippocampus. Neuroticism has been shown to be a risk factor for AD. However, evidence for a negative relationship between neuroticism and cognitive function in a healthy sample has been mixed, and the effect of neuroticism on cognition may depend on its context in the larger structure of personality. Belief that one is an active agent in effecting outcomes in the world has a profound effect on how the mind works. In a clever demonstration of this principle, Rigoni, Kühn, Sartori, and Brass (2011) measured event-related potentials for undergraduates as they performed a volitional motor task after being randomly assigned to either an experimental condition to weaken the belief in free will (subjects read Crick's argument that free will is an illusion) or a control condition that did not (they read another passage from the same book about consciousness). The early component of the readiness potential, a negative-going wave that precedes the conscious experience of the intention to move was reliably reduced among those whose beliefs in free will were challenged, a finding the investigators interpreted as indicating a reduced effort to formulating the intention to perform the motor act (Duberstein et al., 2011).

4-2. Social principles

4-2-1. Social Context

Resilience is a broad concept that is not simply a trait of an individual. Resilience has been conceptualized as a dynamic system that arises from processes and interactions beyond the boundaries of the individual. Social engagement is an essential part of the dynamic system that enables positive adaptation when an individual confronts challenges or threat and has been widely studied in light of its impact on health in general. For example, social and community ties have been found to be associated with mortality and the occurrence of dementia. We will focus on how social engagement may have an impact on individuals' adaptation in the cognitive domain. Social engagement can be characterized along a number of distinct dimensions. Social

network size is the number of people with which an individual has significant contact. Social activity is the engagement in experiences that involve other people. Social support is the subjective evaluation of the quality of social relations as warm, affirming, and a resource for help in times of stress (Krueger et al., 2009).

4-2-2. Sociocultural Context

Sociocultural context includes the social institutions and cultural practices that offer opportunities for cognitive engagement (e.g., by defining roles) and influence access to resources that impact cognition (e.g., social communities, health care, technology). Resilience at the cultural level has been increasingly discussed (Zautra, Hall, & Murray, 2010) since Baltes (1997) argued that life span psychology research has largely ignored cultural and historical context. In particular, the co-constructionist approach emphasizes the interactions between biological and cultural evolution. On the one hand, individuals navigate the sociocultural milieu, negotiate the resources needed for their development, and thereby shape the culture. On the other hand, communities and cultures adapt to individual needs. Some cultures are more able than others to mobilize existing resources to buffer the effects of stress at the individual level. Few studies have investigated sociocultural effects on cognition, though there are emerging examples. Recent evidence from neuroimaging studies also showed differences in neurocognitive processes, neural activation patterns, and neural structures between individuals from individualistic and collective cultures. Individualistic (Western) cultures that value individual achievement appear to wire brains so that processing is biased toward processing central objects, whereas collectivistic (Eastern) cultures that place more value on collaboration and interdependence appear to wire brains for more holistic processing (Park & Huang, 2010).

4.3. Organizational Cognitive and behavioral dimensions of resilience

Connecting the gained insights with the differentiation of cognitive, behavioral, and contextual dimensions of resilience. It can be said that the three resilience stages always contain cognitive and behavioral dimensions, and that the successful completion of those stages always depends on an interplay between cognitive and behavioral capabilities and actions. Cognitive capabilities (e.g., mindfulness, sense making, and critical reflection) are needed to understand environmental developments and make appropriate decisions. In this context, Hamel and Vaelikangas (2003) talk about the 'cognitive challenge'. "A company must become free of denial, nostalgia, and arrogance. It must be deeply conscious of what's changing and perpetually willing to consider how those changes are likely to affect its current success". Behavioral capabilities (e.g., improvisation, experimentation, and knowledge implementation) ensure that resources are used and necessary actions are taken. They are "the engine that moves an organization forward". Our conceptualization shows that each resilience stage demands cognitive actions to generate and select action alternatives, and behavioral actions to implement the best alternatives and respond effectively to the crisis situation. This means that resilient organizations can only emerge when cognition and behavior are in conjunction. It is not enough to change behavior without any cognitive development or to create knowledge without any accompanying change in behavior. Beside the interplay of cognitive and behavioral elements of resilience, contextual factors (e.g., resources, social capital, and power) are important to the successful accomplishment of the three

resilience stages as well as the development of resilience capabilities. Organizational capabilities that underlie the three resilience stages—and thus the meta-capability of organizational resilience—depend on various context factors. As mentioned earlier, resilience capabilities are extremely complex and deeply embedded in social contexts, which means that it is far from easy to define relevant factors and conditions for their accomplishment and development. However, there are some main antecedents (knowledge base) and drivers (resource availability, social resources, and power/responsibility) that are of particular importance (Lengnick-Hall and Beck 2005).

4-3-1. Knowledge base

An important role in the resilience process plays the organization's knowledge base. From the innovation literature, we already know that anticipation capabilities largely depend on a firm's prior knowledge base, which enables and hinders the acquisition of new knowledge equally. On the one hand, this prior knowledge base facilitates a firm's discernment of knowledge by defining the locus of knowledge search. On the other hand, prior knowledge restricts a firm's scanning activities to familiar and proximate areas. Firms might then recognize only external information that is close to their existing knowledge base and ignore other knowledge sources. The results are narrow perceptions inappropriate for uncertain worlds. Therefore, it could be argued that, to be resilient, organizations should develop a broad and diverse knowledge base to anticipate both internal and external change, even if this knowledge is far away from the organization's core business. This can be ensured by parallel exploration, experimentation, and investments in diversity. Beyond that, the other resilience stages also depend on the organization's prior knowledge (e.g., knowledge about the environment, knowledge about former crisis, knowledge about successful actions). A broad and diverse knowledge base can help organizations to develop multiple ideas for crisis reaction and decide for the most suitable solution. For example, Sutcliffe and Vogus (2003) maintain that experiential diversity can enlarge the ability to grasp a situation and cope with the details. Pregoner (2014) argues that diversity of skills, personalities, and perspectives can enhance creativity and innovation, which results in an improvement of decision-making and problem-solving. A broad and diverse knowledge base can also help organizations to learn from experience and internalize the new knowledge. It forces organizations to avoid simple interpretations through constructive conflict and deeper discussions about actions to take. Thus, a diverse knowledge base may reduce the tendency to focus on the surface and promote the organizational function logic instead of individual blame when explaining failures

4-3-2. Resource availability

Many studies point to the need of a broad and accessible set of resources as a foundation for quick and adequate reactions under challenging conditions. In particular, time, financial and human resources are vital to build organizational resilience. First, those resources allow for an effective anticipation of adverse events. To observe the environment and identify critical developments, organization members need time and the allowance to invest their time into scanning activities. If employees are too much involved into operational business and do not have the capacity to scan the environment, the organization would not be able to identify critical

developments. Furthermore, environmental scanning and preparation for critical future events require financial (i.e., cash flow) and human resources (i.e., skills) to develop recovery plans, simulate crisis management, or train employees and leaders. Second, resources are also important to the coping and adaptation phases. For example, financial resources can serve as a buffer or shock absorber and thus contain the negative consequences of a crisis. Previous research agrees that financial resources can help to handle acute crises and recover from them (e.g., de Carvalho et al. 2016). Analyzing airline industry responses to September 2011, Gittell et al. (2006) found that airlines with greater financial resources (low levels of debt and high levels of cash on hand) were able to retain staff (instead of laying off staff) and thus had more human resources to recover. In sum, it can be said that organizations need slack resources—a cushion of spare resources which can be flexibly used. In this respect, organizations also need some degree of redundancy such as unused capacity, multiple sourcing, or parallel processes. which allow for adequate functioning even if parts of the organization fail. The important question is at what point the costs of redundancy lose their positive influence and turn into a disadvantage (Linnenluecke and Griffiths, 2010).

4-3-3. Social Resources

After the early anticipation of upcoming crises, it is particularly important to react in a resilient manner and develop appropriate solutions to overcome those situations. In this context, social resources are often considered as source of organizational resilience. For example, deep social capital can enhance resilience by offering contextual benefits (e.g., information sharing, resource exchange, or cross functional collaboration). Social capital helps to achieve coordinated and successful action in times of crisis (McGuinness and Johnson 2014). Similarly, it is argued that relationships of shared goals, shared knowledge, and mutual respect lead to high levels of coordination and positive performance effects. A shared vision among the organization's members can also help to successfully implement a solution, especially during a crisis. Based on social capital and positive relationships, "organizations can tap into their networks when responding to adverse events for needed insight and assistance". Empirical evidence could be found for the relationship between relational reserves and recovery, relational coordination and resilient response as well as social capital resources and the resilience of family firms. Social resources may be achieved through supportive mental processes that have been discussed as situated cognition, distributed cognition, or joint cognitive systems. In this context, Weick (1993) points to the importance of virtual role systems in which each member cognitively reproduces the organization. Lengnick-Hall et al. (2011) argue that social resources result from respectful interactions [that means face-to-face dialogues rooted in trust, honesty, and self-respect]. Comfort (1999) proposes that it can be helpful to connect members' perceptions through enhanced communication and imaging technology. Finally, researchers call for an open, trustful, and learning oriented organizational.

4-3-4. Power and Responsibility

Crises can open "windows of opportunity" for adaptation processes (see, e.g., Tyre and Orlikowski 1994). However, crises alone do not automatically lead to learning and overall change. Organizations often generate new knowledge ("lessons learned"), but fail to translate

this knowledge into new behaviors. In this context, power and responsibility play an important role.

From the innovation and learning literature, we know that cognitive processes, learning, and capabilities in organizations are associated with power relationships. With the endeavor to achieve their goals, powerful actors can foster as well we hinder organizational learning or change processes. In particular, they have an impact on the use of new knowledge and solutions via resource allocation processes. For example, Dougherty and Hardy (1996) could show that the inability to connect new products with organizational resources results from rigidity of power structures. Thus, power relationships can explain why some new knowledge is used for change, while other knowledge is not; and why some organizations are better able to use new knowledge than others. As it is nearly impossible to learn when power relationships impede or deny this process (Todorova and Durisin 2007). Figure 1 shows all the individual and organizational factors affecting cognitive resilience.

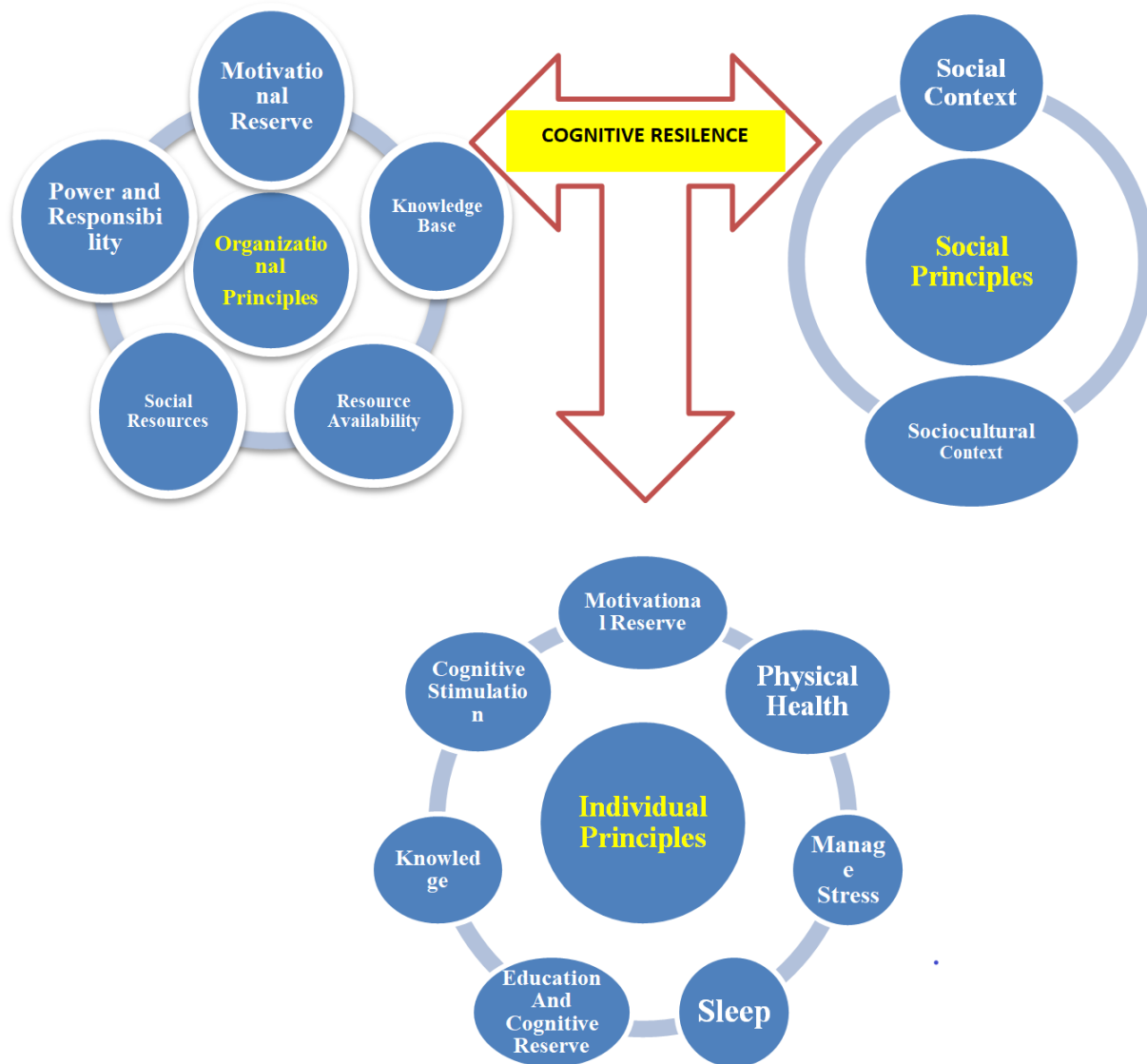


Figure 1- The Principles of cognitive resilience

CONCLUSIONS AND IMPLICATIONS FOR RESEARCH AND PRACTICE

Cognitive resilience is a multidimensional process in which resources assembled through the life span buffer against late life threats to cognitive health (Lachman & Agrigoroaei, 2010). In our view, the nexus of the resilience process is a sense of personal agency, engendered by an array of individual factors (e.g., health; cognitive and motivational reserve), social factors (e.g., social support and sociocultural factors (e.g., social equity, effective structures for life span education) and organizational factors (e.g., Knowledge Base, power and responsibility,

resource availability, social resource and motivational factors). Certainly, all of these elements contribute to the individual capacity for adaptations (e.g., SOC) that give rise to continued autonomy. To be sure, cognitive resilience is certainly a resource for autonomy through which to maintain and nurture health, social networks, and behavioral repertoires that are rich and satisfying.

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