

THE OFFICIAL  
MAGAZINE  
OF THE CENTRE  
FOR STUDIES ON  
HUMAN STRESS

The Centre  
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Human Stress  
is dedicated to  
improving the  
physical and  
mental health  
of individuals  
by empowering  
them with  
scientifically  
grounded  
information  
about the effects  
of stress on the  
brain and body.



## Stress and Resilience

By Robert-Paul Juster & Marie-France Marin

**A**s stress scientists, we are a little tired of “doom and Agloom” views of stress. We know very well that chronic stress is bad for our health, but we have so much to learn from those who handle stress very well. Increasingly, we are focusing not just on who is vulnerable of developing problems related to stress, but those who are able to resist it as well despite difficult circumstances. A whole new field of stress devoted to the concept of “resilience” has emerged and is the focus of this issue of *Mammoth Magazine*. Resilience is defined as a process whereby people exposed to severe levels of stress, trauma, and adversity are able to thrive and survive despite their difficulties. Initially, the concept of resilience emerged serendipitously from clinical observations and an attempt to further understand a diverse range of psychological profiles among those deemed more vulnerable to stress.

In our **first article**, Olivier Bourdon will introduce you to a brief history of resilience from clinic to laboratory. Like the term “stress” itself, the term “resilience” originates from engineering that was borrowed by psychology and then shared by various other disciplines like biology and sociology.

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*Like the term “stress” itself, the term “resilience” originates from engineering that was borrowed by psychology and then shared by various other disciplines like biology and sociology.*

In our **second article**, Robert-Paul Juster spoke with Drs. Ilia N. Karatsoreos and Bruce S. McEwen about their views of stress and resilience. Both are world-renowned experts in neuroscience at the forefront of cutting-edge research and incredibly knowledgeable about how our brains can be positively shaped by the right doses of stress.

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In our **third article**, Robert-Paul Juster presents this issue's researcher profile of Dr. Dante Cicchetti, a pioneer in our understanding of how resilience can flourish despite maltreatment and harsh early life experiences. As one of the most distinguished and decorated researchers in the field of developmental psychology, this article will summarize Dr. Cicchetti's remarkable research findings.

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## Stress and Resilience

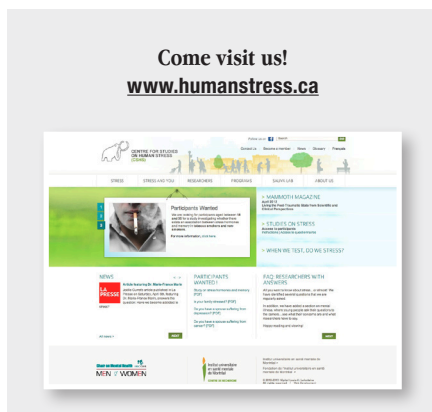
In our **forth article**, Alexandra Bisson Desrochers describes research devoted to protective factors that promote resilience. By cultivating our toolbox of protective factors such as social support and optimism, everyone can develop coping strategies and adaptive behaviors that help make more resilient.

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And lastly in our **fifth article**, Dr. Stéphane Guay highlights some important perspectives on resilience in the face of traumatic events. As the Director of the Centre for Studies on Trauma, he also announces an innovative new research program to help understand resilience and vulnerability among psychiatric hospital workers.

So now without further delay, we are delighted to offer you the 13<sup>th</sup> issue of Mammoth Magazine on resilience. As you will discover in this issue, the concept of resilience is one of the most fascinating phenomena to study in the field of stress science! 

***The concept of resilience is one of the most fascinating phenomena to study in the field of stress science!***



# Resilience: When Hope Becomes Possible for Everyone

By **Oliver Bourdon**, Summer Intern at the Centre for Studies on Human Stress  
Bachelor's Candidate in Psychology at University of Montreal

## Are We Born Equal?

Charles R. Darwin, famous for his ground-breaking work on the theory of evolution, stated that species able to survive throughout time are those best adapted to their environment. For any specific situation, what is different about people who successfully adapt to their environment and those that do not?

***When facing adversity, being able to positively adapt represents resilience.***

When facing adversity, being able to positively adapt represents *resilience*. In an attempt to prioritize the “glass is half full rather than half empty” belief, the resilience concept represents hope for those experiencing difficult times. This concept is however often misunderstood. In fact, it is far more complicated than how the media portrays it to be. According to them, they seem to think that anyone could just take a course to learn to be resilient and in so doing be able to fight through any and every obstacle thrown in their direction. This universal template to life's challenges is questionable.

The real origin of resilience goes back several decades now. It intersects with many domains and is similar to diverse concepts that we need to first distinguish.

## Knowing How to Bounce Back

The word resilience was coined at the beginning of the 17<sup>th</sup> century, taking its roots from Latin. As Anaut said, *Resilientia* was defined as a “material's resistance to shock and its ability to absorb kinetic energy without breaking apart”.

Let's decompose the word from its Latin roots. When we refer to something or someone as *resilient*, we are saying that the person is jumping (Latin ‘salire’) back (Latin ‘re’). Therefore, we literally mean that he/she/it is bouncing back to the state he/she/it was in before the situation in question.

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## 19<sup>th</sup> Century: From the Latin Root to Practical Use: Physics of Materials

The first work published on resilience goes back to 1818, when Thomas Tredgold first used it in his book *On the Transverse Strength and Resilience of Timber* as a property of materials. First of all, he stated that resilience influences timber as a strange property of sound. Second of all, he used the concept to explain why some types of wood could resist tons of weight without cracking.

In the middle of the 19<sup>th</sup> century, Robert Mallet used a measure named the *modulus of resilience*, with which he could predict at the same time the elasticity of a material as well as the force that could be applied to it before breaking: the higher its resilience, the more it could stretch and withstand force applied to it. This measure, included in the *Manual of Civil Engineering* in 1867, was instrumental in switching the material (wood to iron) used to build the British navy's fleet. In civil engineering, this measure of resilience is still used today.

## 20<sup>th</sup> Century: From Physics to Environment

Several years later, resilience appeared in the field of environmental sciences. Towards the end of the 19<sup>th</sup> century, two new measures concerning this interesting concept got attention: *ecological resilience*, by C. S. Holling around 1973, and *engineering resilience*, by Stuart Pimm around 1984. The first measure, which is far more popular, was defined by the author as “the measure of something's ability to absorb changes and still exist”. The second measure, as defined by Pimm, is defined as the “speed with which a system returns to its original shape”.

In summary, the first concerns the capacity of absorbing and staying the same in a situation, while the other concerns the capacity to return to an original, stable state after the situation. These are small nuances that are really all about how the system reacts to change. As defined here, these measures can be used in a myriad of situations. For example, if an ecosystem is resilient during a flood, the reconstruction of the wildlife will be much faster.

Being able to bounce back after living adversity is one thing, but changing to be better is another. A little bit later on in the resilience story, the link with the concept of adaptation appeared. In the 21<sup>st</sup> century onward, Neil Adger said that resilience is the capacity “to persist and adapt”,



while Brian Walker and his colleagues stated that resilience was demonstrated by systems that “continually change and adapt, yet remain within critical thresholds”. When some thinkers realized that there could be an analogy made between the resilience of materials and that of humans, the concept attracted much attention from the social sciences.

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## From Environment to Human

### When suffering was a disease

After exposure to difficult situations, many of us report experiencing psychological suffering. In some cases, this suffering can become a disease. To find out how this happens, researchers began asking themselves what could cause some people to be more or less resistant to adversity than others. *Vulnerability* was the catchword used that was deemed responsible for the negative mental health consequences after troubling situations. In this view, if someone vulnerable experienced adversity, we thought that psychological suffering or worst, mental illness, would inevitably occur. This belief lasted many years.

Philippe Pinel, a doctor with tremendous influence in the field of mental health towards the end of the 18<sup>th</sup> century and the beginning of the 19<sup>th</sup>, began asking newly admitted psychiatric patients if they had already experienced such situations. Because he strongly believed that adversity could create disorder, he asked questions so that he could better understand why they needed admission and psychiatric care.

### When hope was born

Yet, what Dr. Pinel found was that some individuals who had lived through hardship were able to get by unscathed. What made them different? Were they somehow unique? Given the fact that they were certainly vulnerable, did they possess some secret remedy? Consequently, the concept of *vulnerability* was dichotomized and the term *invulnerability* was created. As developed by Koupernik and Anthony in the 1970s, an analogy was made between someone living through adversity and dolls falling to the ground. The first doll made of steel representing *invulnerability* would not break when hitting the ground. On the other hand, the second doll made of glass representing *vulnerability* would shatter to pieces upon impact.

In the same line of thinking, the notion of *coping* appeared in the psychological literature, popularized most by Richard S. Lazarus and Susan Folkman in the 1980s. This concept represents the techniques used by someone when they attempt to adapt to a stressful situation that surpasses their personal resources and/or threatens their welfare.

This idea became very popular. That someone could use diverse techniques or possess innate characteristics that permitted them to bypass adversity without negative consequences began to blossom. Here, the concept of resilience emphasized the possibility of being able to live adversity without having a permanent path towards future problems. For the field of psychology, this was a very different way of looking at things. As such, the concept of *vulnerability* and *invulnerability* were quickly reconsidered, simply because someone cannot really always be strictly vulnerable or invulnerable. As for the concept of *coping*, it still remains an important concept today. Nonetheless, coping is very different from resilience in that it is considered one among many ways of adapting when faced with adversity.

When resilience shifted toward understanding humans, a new wind of fresh air blew in. Positivism in the domain of mental health was innovative, since all predecessors to the concept of resilience made perpetual reference to impending negativism brought forth from adverse situations.

### The Happiness Agenda

Eugen Bleuler was one of the first to investigate the concept of resilience in humans using real life situations. In 1972, he studied individuals afflicted with schizophrenia from Zurich, Switzerland. He discovered that among children of mothers with schizophrenia, many were a lot better off than people would have expected.

In the beginning of the 1970s, inspired by Bleuler's study, Norman Garmezy wanted to build the theoretical foundations needed to deepen research of those he called ‘stress-resistant’. He did not like the concepts of *vulnerability* and *invulnerability*. Instead of some steady trait working every time in every situation, he believed in an efficient process for specific situations that might not work every time for every situation. Without calling it *resilience*, Garmezy was a pioneer in the domain. In 1985, Garmezy and his colleague Ann S. Masten stated three conclusions based on their studies: (1) stress-resistance is relative; (2) stress-resistance is due to both genetic and environmental factors; and finally (3), stress-resistance depends on the situation.

In 1982, Emmy Werner published the results of her study started in 1955. She studied 700 children from Kauai, one of the Hawaiian Islands. Among them, 201 lived in adverse social and emotional environments with four or more risk factors such as poverty or negative parental relationships. Following this cohort for several years, the research team observed that one child out of three managed to get by quite well. They did not have the problems expected to emerge systematically for everyone exposed to such adversity. Previously, very influential psychologists like John Bowlby had argued that events during critical periods in childhood would have inevitable repercussions during the entire lives of the individual exposed.

**Without calling it resilience, Garmezy was a pioneer in the domain. In 1985, Garmezy and his colleague Ann S. Masten stated three conclusions based on their studies: (1) stress-resistance is relative; (2) stress-resistance is due to both genetic and environmental factors; and finally (3), stress-resistance depends on the situation.**

Apparently not! Among the studies done on resilience, this one by Werner is still one of the most cited today. In this study, it was found that a significant proportion of human beings can face important adversity and yet, go through life without any problems and even with a better way to manage stress. The concept of resilience was definitely born after this important study, and is now a very important concept in the field of stress research.

To conclude, someone considered resilient is resilient for a specific situation, but not necessarily for others. To use the analogy of Marie Anaut, a resilient person is more like Batman than Superman, because resilience is all about adapting rather than being invincible. Resilience is still a new concept being developed today and a work in progress. With the contributions of numerous authors from diverse domains, we will eventually succeed in having a 360-degree perspective of this exciting concept. Resilience represents hope for countless individuals facing adversity.

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# From Stressed Neurons to Resilient Neighborhoods:

Discussion with Drs. Ilia N. Karatsoreos and Bruce S. McEwen

By **Robert-Paul Juster**, Research Intern at the Centre for Studies on Human Stress, Doctoral Candidate in the Integrated Program in Neuroscience at McGill University

**S**tress is notoriously unpopular. It is generally expressed or exclaimed negatively and almost never espoused or embraced positively. Can stress be good for us? After all, an adrenalin rush has its' advantages, sometimes even delightfully so for daredevils and sensation-seekers. Stress also kept our ancestors sharp so they could continue breathing and breeding. Today, we no longer 'fight-or-flee' from mammoths like we used to, and yet here we are stressing out about our hostile boss, saved or spent money, conflicts and clashes, economic crises, and countless varieties of relatively mundane stressors. In the grand scheme of things, such stressors rarely threaten our survival, so why are we still so stressed out? Maybe stress in today's modern societies is merely an evolutionary hick-up leftover from our ancestral programming. True, our brain has not changed much in the last 10,000 years, so perhaps we're just wired to react as if saber-toothed tigers were still around. Is stress merely a repugnant residue forever part of our biological baggage? Or maybe stress has stuck around for the right reasons so we can thrive. Could stress therefore be our ally rather than our enemy?

Drs. Ilia Karatsoreos and Bruce McEwen think so. In their opinion, stress is essential to survival as well as for keeping our brains and bodies in optimal condition. In this article, Drs. Karatsoreos and McEwen share their knowledge and thoughts on stress and resilience using biological perspectives. As distinguished experts in neuroscience studying the mechanisms of stress with the help of

animal subjects, they will explain how stress and resilience are two sides of the same coin.

## Stress flavors: Positive stress, tolerable stress, and toxic stress

Dr. McEwen likes making the distinction between three types of stress; namely, (1) *positive stress*, (2) *tolerable stress*, and finally (3) *toxic stress*. Before we explore these three varieties in turn, it is important to mention that we shall be talking mostly about our biological stress response in this article. Central to the stress response is our brain's interpretation of a threat. Situations that are Novel, Unpredictable, Threaten our self/ego, and/or diminish our Sense of control (remember the acronym NUTS) will activate our biological stress response. This includes activation of our stress hormones to mobilize energy, increased blood pressure to help spread this energy all around our body (especially our brain and muscles), on-call standby of our immune system in case we get hurt, and a whole cascade of other adaptations that are meant to keep us alive.

When generating a biological response to stress when faced by NUTS situations, *positive stress* refers to these moderate activations of our stress response that are normal, short-lived, and deactivated quickly. The term *allostasis* refers to these processes whereby our body (re)allocates energy around to help us face challenges in our environment. We take it for granted that stress hor-

mones like adrenalin and cortisol work to speed up this adaption during stressful situations, but also normally in situations as simple as walking quickly or getting out of bed. Positive stress and allostasis are therefore fundamentally adaptive.

*Tolerable stress* refers to stress responses that are strong enough to potentially cause some damage to our brain and body, but fortunately get buffered out. This buffering can come in the form of supportive relationships that help minimize the risk of developing mental and physical health problems. Note that tolerable stress can be life threatening – for instance, traumatic events like a natural disaster – but it occurs for a limited period of time, giving the person the chance to recover as well as for others to intervene. Because this forces the person to face tough challenges and learn adaptive ways to cope, tolerable stress might help promote protection against future stressors by making people hardy. The expression “what doesn't kill you makes you stronger” comes to mind when discussing tolerable stress.

**Like stress itself, stress responses are diverse and span the spectrum from adaption to maladaptation. Drs. Karatsoreos and McEwen outline the 3-Rs: (1) resilience, (2) resistance, and (3) recovery.**

*Toxic stress* refers to fierce, frequent, and faltering activation of stress responses that is dangerous to our health. When an individual must face situations like severe adversity, dire poverty, physical and/or psychological abuse, and other horrific experiences without any support or crutches for an extended period of time, they fall down hard. When toxic stress abounds, allostatic mechanisms like our stress response get strained and contribute to *allostatic load* or 'wear and tear' on our brain and body. In this worst case scenario, our brain cells get fried, our memory blanks out, our heart works overtime, and our cells age quicker.

Toxic stress is the bad apple that gives the whole stress orchard a bad reputation. But we must bear in mind that doses of positive stress and tolerable stress can inoculate us and can even promote resilience. The notion that stress responses are inherently good and can help us resist and recover from stressors is important to tease apart.

## The 3-Rs of stress responses

Like stress itself, stress responses are diverse and span the spectrum from adaption to maladaptation. Drs. Karatsoreos and McEwen outline the 3-Rs: (1) *resilience*, (2) *resistance*, and (3) *recovery*. Here as elsewhere, *resilience* is defined as an organism's ability to 'rebound' from adversity when one's ability to function has been tampered with in some negative way. The tampering comes from tolerable stress, but the person is ultimately able to adapt by activating allostasis that can promote resistance.

## RESEARCHERS' PROFILES



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***Dr. McEwen likes making the distinction between three types of stress; namely, (1) positive stress, (2) tolerable stress, and finally (3) toxic stress.***

*Resistance* is defined as an organism's ability to withstand adversity and face future stressors with little or no stress response. One way to think of *resistance* is like a vaccination: as a kid, most of us dreaded them, but in the long-term, vaccinations immunized us to certain diseases. The term "stress inoculation" has been used to describe this process whereby a little bit of stress builds up our resistance to future stressors. Using monkeys as subjects, Drs. David Lyons and Karen Parker at Stanford University in California have shown that early life stressors that are successfully overcome enhance emotional adaptation, self-control, willingness to explore novel situations, and decrease stress responsivity. Because resistance is a kind of immunity, you might almost need to go through specific sets of stressors at least once to help build your resilience.

And lastly, *recovery* is defined as an organism's ability to chillax and stop the stress response and other related biological activities back to baseline levels. In the context of the 3-Rs, recovery can also be thought of as the processes of treatment and rehabilitation for individuals who are not resistant or resilient. Individuals are considered vulnerable when they are extremely sensitive to specific stressors and experience intense stress responses to them. Vulnerable individuals are generally believed to be at greater risk of experiencing stress-related conditions like depression, anxiety, burnout, and substance abuse that contribute to allostatic load. There is, however, often a light at the end of the dark tunnel.

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***We've all heard about "critical windows". For instance, kids past the age of ten have a tougher time learning new languages. Similarly, it has long been thought that severe stressors at specific critical windows in early life are particularly dangerous.***

Extremely stressful and traumatic situations, especially if they occur early in life, have long been thought to render individuals indefinitely vulnerable. The dogma in psychology and medicine has often assumed that brain development is embedded in the frame of these stressful circumstances, so a lack of resistance and a need for recovery. But the concept of resilience suggests that this is not always the case for everyone, since we are constantly learning ways to cope and adapt. We must also consider the great psychological and psychiatric advances made in mental health care that effectively help vulnerable individuals recover from and resist stress. At the heart of this paradigm shift driven by the concept of resilience is pioneering neuroscience research demonstrating just how flexible our brains are, and not just when we're young!



### **Critical windows, personality traits, and your brain**

We've all heard about "critical windows". For instance, kids past the age of ten have a tougher time learning new languages. Similarly, it has long been thought that severe stressors at specific critical windows in early life are particularly dangerous. Since different brain regions mature at different periods in early life, stress is believed to interfere with the construction of certain structures at specific time frames. Once all connected and cemented though, our neural architecture is set in stone. However, it turns out that this is not the end of the story. New findings demonstrate just how plastic and remarkably malleable our brains are with many chances to renovate throughout life.

Are there critical windows of adversity and resilience? "Given the number of people walking around the world that experience all kinds of trauma but function perfectly well, I would be hard-pressed to believe that resilience would be restricted to any real critical period. It may be that there are certain periods in life where certain experiences help you deal with stress and trauma better in the future, but I find it really difficult to believe that anybody at anytime can't at least show some signs of resilience" says Dr. Karatsoreos. For example, there are thousands of soldiers abroad that face horrible combat situations: some come back home fine, some don't. "Is this because of things that happened in childhood that changes the way that they respond to stress? Maybe. Or it could be that they have developed appropriate coping skills and positive experiences in adulthood. The answer is probably both" says Dr. Karatsoreos.

What about personality traits? Are some related more to vulnerability and others more to resilience? Dr. McEwen believes that the concept of self-esteem is important to consider. Research by Dr. Jens Pruessner at McGill University in collaboration with Dr. Sonia Lupien at University of Mon-

treil has shown that adults with low self-esteem do not habituate to stress very well when repeatedly exposed to a mild laboratory stressor. As a personality trait centered on self-worth that develops early on in life, people with low self-esteem are believed to have experienced some form of toxic stress like childhood adversity that renders them vulnerable to developing mental disorders later on in adulthood. Interestingly, low self-esteem is even related to smaller hippocampi, a sea horse shaped brain region deep in the brain's center that is principally involved in learning and memory.

An analogy to help understand how the hippocampus works is to think of an executive assistant that reviews files (memories) printed by interns from the various communication departments (brain regions involved in the perception of vision, smell, taste, touch, and sound senses) of a major company (your brain and body). The most important files are stored for safe keeping in an extensive filing cabinet (brain regions where memories are encoded and stored) for future retrieval, while other files are discarded (our brain does a pretty good job of shredding unimportant information). With the guidance of other brain regions like the amygdala and the frontal lobes that process threat further, the executive assistant gives priority to files that are highlighted with emotional features and stores these potentially life-saving memories in the executive's emergency

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***Do we need to have faced some level of adversity and rebounded in order to be considered resilient? For instance, would someone who reacts well to stress, but who has not faced adversity, be considered resilient? If we are discussing resilience from a biological perspective and in reference to a person's ability to adapt, then the simple answer is yes. It's all about how efficient the person's stress response is.***

# From Stressed Neurons to Resilient Neighborhoods

express cabinet for speedy retrieval. This makes evolutionary sense, since if you were Bambi in the forest coming face to face with a hunter, you'd better remember where he/she was and make sure to never go grazing there again!

In this way, the hippocampus actually communicates with our stress hormones and can even shut down our stress response. Dr. McEwen and colleagues were the first to show that the hippocampus communicates with stress hormones via matching neural receptors that function much like a key and a key-hole opening and locking the filing cabinet. Since this discovery, we now know that stress hormones are essential helpers for filing away memories, underlining yet again the important role stress has on optimal functioning. Work by Dr. Benno Rozendall and coworkers reveals that stress hormones are actually essential for enhanced encoding of memories. On the flip side, when our executive assistant experiences toxic stress when over-worked, he/she makes filing errors and cannot retrieve the files as efficiently.

Dr. Karatsoreos adds that early life experiences are indeed periods of intense brain change, but our brain is always able to change. Negative events or positive events can decrease or increase someone's self-esteem and consequently the connections in our brain. "That's why people who do get a lot of training, such as in medicine or in the military, go through tons of experiences that influence brain plasticity to help them adapt." What is so fascinating is that this process of brain plasticity is intricately connected to the right dose of stress hormones. For instance, tough physical and cognitive training can reopen brain plasticity beyond any critical window. On a very basic level, we so often gain self-confidence by facing our fears at every age. Therefore the development of self-esteem and the degree to which it is reflected in the size of brain regions like the hippocampus is truly exciting and pioneering work. "If we could elevate someone's self-esteem later on in their lives by somehow giving them a stronger sense of worth, achievement, whatever, could that actually change the brain circuitry that has been affected and allow them to be more resilient? We just don't know yet, but it's definitely possible", says Dr. McEwen.

## From neurons to neighborhoods

Do we need to have faced some level of adversity and rebounded in order to be considered resilient? For instance, would someone who reacts well to stress, but who has not faced adversity, be considered resilient? If we are discussing resilience from a biological perspective and in reference to a person's ability to adapt, then the simple answer is yes. It's all about how efficient the person's stress response is.

Is there anything we can all do to help bolster our chances of being resilient?

Dr. McEwen cautions against searching for magic bullets to solve everything. He highlights how medicine's historical success using penicillin to cure countless infectious diseases has made us a little over-confident with quick fixes. For example, we hear of the polypill that combines statins to lower cholesterol, diuretics or beta-blockers to lower blood pressure, as well as Aspirin to help prevent cardiovascular disease. While these inventions might work, there are other things we can do to protect ourselves against toxic stress. It sounds cliché, but good quantity and quality of sleep, nutritious and balanced diets, and regular physical activity are fantastic for our health and wellbeing. In fact, there is increasing evidence that these behaviors have positive effects even on brain plasticity.

***In conclusion, Dr. Karatsoreos says: "the ability to adapt – to actively resist, to 'bend and not break', or to 'bounce back' and recover – are all components of resilience".***

A recent study by Dr. Maria Spolidoro and colleagues showed that a short period of food restriction in rats increased stress hormone levels, but in a positive way that influences brain plasticity that helps cure the rats of amblyopia or "lazy eye". Mild food restriction is known to keep animals trim and healthy, demonstrating how targeted behavioral interventions can be extremely beneficial for correcting conditions otherwise thought to be irreversible. In another study by Dr. François Chollet and colleagues that looked at French stroke patients, those treated early with anti-depressant medication in conjunction to physiotherapy showed the greatest recovery over time for motor problems. This doesn't mean that anti-depressants or exercise are the simple cures to brain damage after stroke, but rather that something about the combination of the two seems to have a positive influence on brain plasticity that might help offset biological damage. When we look at these two studies together, it is becoming increasingly evident that our behaviors make a big difference on brain functions and our ability to adapt. In a way, these changes in brain plasticity can be thought of as biological resilience. Since neuroscience is really just hitting the tip of the iceberg, we can expect many exciting discoveries in the future.

In conclusion, Dr. Karatsoreos says: "the ability to adapt – to actively resist, to 'bend and not break', or to 'bounce back' and recover – are all components of resilience". What is the take-home message for families and societies? Should we challenge our youth to face stressors and successfully overcome them to build their self-esteem? Will this

help them positively connect neurons together and render them a little more resilient and resistant? At this point it is perhaps premature to draw any conclusions, but there is definitely evidence that pampering youth can be damaging as well. For instance, kids from wealthier families have an advantage in terms of top schools and enriched environments, but they are sometimes ill equipped to face reality. Since many have not developed a sense of street-smarts or coping strategies, these youths are not prepared to face the harsh realities that life throws at them. From this perspective, environments that are overprotective might be bad as well, so we must understand not just the two sides of the coin but a coin bag full of a diversity of possibilities. On the flip side, when families from lower socio-economic backgrounds are given the chance to move into better neighborhoods, they benefit from reduced risk of becoming obese and diabetic. The bottom line is that positive changes can make a world of difference!

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## Researcher's Profile: **Dr. Dante Cicchetti, Ph.D.**

Professor Child Psychology and Psychiatry, Institute of  
Child Development, University of Minnesota

By Robert-Paul Juster

Research Intern at the Centre for Studies on Human Stress

Doctoral Candidate in the Integrated Program in Neuroscience at McGill University

**Dr. Dante Cicchetti is an internationally renowned researcher** in developmental and clinical psychology who has revolutionized our understanding of the complex spectrum spanning from psychopathology to resilience in children exposed to child maltreatment, maternal depressive disorder, and other forms of high risk. When we think of maltreatment, we are talking about extreme adversity in the form of physical abuse, sexual abuse, emotional maltreatment, and neglect that can have devastating effects on the child's normal development. On the flip side, many children exposed to such horrific circumstances fortunately pull through and manage well. By investigating diverse profiles, Dr. Cicchetti and his colleagues are able to identify what makes individuals and groups of individuals more resilient in the face of significant adversity, trauma, and abuse. In this article, we shall explore some of his collaborative projects and fascinating research findings related to resilience in youths. In addition to extensive developmental research on high-risk individuals from infancy into adulthood, many of Dr. Cicchetti's discoveries come from data collected among children from low social economic backgrounds – some maltreated and others non-maltreated – who have attended a summer camp in existence for thirty years. This research summer

camp has two fundamental goals: (1) to help teach these youths adaptive behaviors in an emotionally supportive context and (2) to provide an avenue to systematically collect data for research purposes. Throughout Dr. Cicchetti's inspiring career, he has been a pioneer and staunch advocate of a powerful field of life science known as *developmental psychopathology* that we shall first explore together.

### **What is developmental psychopathology?**

The following are some key concepts that developmental psychopathologists apply to help better understand the array of factors that affect psychopathology (i.e., mental disorders) throughout life (i.e., development). First and foremost, focus in developmental psychopathology is placed on understanding the interactive processes of causes and outcomes related to mental health. Mental health and mental disease are not simplistic static states but rather complex dynamic expressions of a whole array of factors that must be looked at together in order to be understood. Each and every one of us embody unique sets of risk and protective factors based on our genes, our environments, our experiences, and our choices. No one factor can be used to say "Aha! Such and such gene

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causes depression." Rather, it's the combination of these factors. For example, a certain genetic vulnerability combined with a really rough early environment can maximize a potential vulnerability to develop psychopathologies. In this manner, genes and experience influence the probability of developing in a certain way, but they do not determine it completely. Developmental psychopathologists, like other modern thinkers, no longer believe in the divide between Nature *versus* Nurture, but instead see them together because both synergize each other. In fact, genetics alone often has very little influence on psychological conditions. Yet, when certain gene variants are combined with adversities, then everything changes. This is an example of what scientists call *Gene x Environment* interactions that provide additional ways of understanding resilience. Drs. Dante Cicchetti and Fred Rogosch have recently confirmed that one's genetic makeup in concert with environmental adversities powerfully explain diverse profiles of resilience.

*Mental health and mental disease are not simplistic static states but rather complex dynamic expressions of a whole array of factors that must be looked at together in order to be understood.*

Secondly and relatedly, developmental psychopathology focuses heavily on understanding the developmental mechanisms of normal, abnormal, and resilient profiles of human functioning. In understanding the intricate workings of the mind and body together, researchers are encouraged to apply *multi-level approaches*. What this means is that specialists in biology, psychology, sociology, are encouraged to work together. Past are the days when researchers fumble in isolation in laboratories or in the field with their microscopes. Today, scientists increasingly work together by pooling all their information in combination to understand the interplay among the nature of things. For example, Dr. Cicchetti routinely publishes research articles that put together information at the levels of a child's genes, neurophysiology, personality factors, and behavioral observations to understand resilient functioning. In addition, Dr. Cicchetti's approach to measuring resilience is really quite spectacular in representing this multi-level approach based on a wealth of information from the summer camp such as: (a) peer nominations, for instance, of who is a leader and who is a bully; (b) counselor observations and evaluations of youths' behaviors; and (c) school

## Researcher's Prolife: Dr. Dante Cicchetti, Ph.D.

records and teachers' reports of academic performance, conduct, attendance, etc. For instance, it is well known that increased intellectual abilities are associated with increased resiliency. This wealth of information is combined to represent a "Resilience Index" that essentially summarizes the youths' competent behaviors in addition to the areas of positive/social behaviors, disruptive/aggressive behaviors, or withdrawal/avoidant behaviors. With this Index as a main outcome, Dr. Cicchetti and colleagues then see how multiple factors like genes, hormones, brain electrical activity, personality traits, and other factors are manifested together among children exposed and not exposed to maltreatment.

***Dr. Cicchetti's approach to measuring resilience is really quite spectacular in representing this multi-level approach based on a wealth of information from the summer camp such as: (a) peer nominations, for instance, of who is a leader and who is a bully; (b) counselor observations and evaluations of youths' behaviors; and (c) school records and teachers' reports of academic performance, conduct, attendance, etc.***

Thirdly and refreshingly, developmental psychopathology challenges conventional views of what constitutes as mental health and mental disease. Here, the emphasis is not on black or white views of mental health, but is rather all about the grey zones. Someone who suffers from depression can be very competent and resilient. This is an important point that is being slowly adopted into all mental health domains; namely, that psychological health and disease is a spectrum and not some "Yes or No" binary diagnosis.

Taken together, developmental psychopathologists emphasize the processes whereby multiple factors combine to contribute to the probability of someone developing, say, depressive disorder or substance abuse. But this is just a probability since numerous counter-regulatory factors can kick in and help protect against this probability; factors like a supportive adult, developing a strong sense of self, learning to gauge the environment, etc. This view of mental health as a continuum that is shaped by unique combinations of vulnerability and protective factors is by far the most advanced approach that is becoming the standard view adopted by the Bible of mental health: the Diagnostic and Statistical Manual of Mental Disorders or DSM-V that will be released soon.

### **From maltreatment and vulnerability to competence and resilience**

Dr. Cicchetti and his colleagues at the University of Minnesota have inherited a rich institutional tradition at the forefront of resilience theory, research, and practice. As a disciple of the late Norman Garmezy, Dr. Cicchetti and colleagues have effectively bridged views from psychology, sociology, and biology together to walk into new uncharted territory. Like other definitions, this view states that resilience is a dynamic developmental process encompassing the attainment of positive adaptation within the context of significant adversity. By definition then, two conditions must be met: (1) exposure to significant threat, severe adversity, or trauma and 2) the achievement of positive adaptation despite major assaults on the developmental process. Resilience is therefore not something an individual has forever since it is a process that is not fixed and that can be achieved at any point in life.

So what happens to the psychological functioning of youths that are exposed to dangerous early environments? In one landmark study by Drs. Dante Cicchetti and Fred Rogosch that followed children over three years, those that were maltreated had poorer functioning than non-maltreated children when measured with the Resilience Index described earlier. Interestingly, each group of youths displayed different resilient profiles. For the maltreated children, strong self-esteem and self-control of emotions made a positive difference. For the non-maltreated children, social and relationship factors mattered more. Taken together, maltreatment definitely has damaging effects; however, the development of self-related personality traits among maltreated youths and the other-related social skills among non-maltreated youths help to buffer against vulnerability and help bolster resilience.

***Someone who suffers from depression can be very competent and resilient. This is an important point that is being slowly adopted into all mental health domains; namely, that psychological health and disease is a spectrum and not some "Yes or No" binary diagnosis.***

What about brain functioning among youths exposed to maltreatment? In yet another pioneering study, Drs. Curtis and Cicchetti studied electrical brain waves via electroencephalogram or EEG. Participants must wear a cap with numerous electrodes that capture brain wave activities. Our brains have two hemispheres or sides working together to process the world around us. The



## Awards & Distinctions

**Dr. Cicchetti has won countless awards** and accolades for his outstanding achievements. He holds two prestigious endowed Chairs: (1) *McKnight Presidential Chair* and (2) *William Harris Chair*. For scientists, Chairs are the highest form of recognition university departments can bestow onto their best minds. They really should be called "Thrones" rather than "Chairs" because they signify the royalty and *crème de la crème* of academia.

Dr. Cicchetti is also the founder and current Editor of the prestigious journal *Development and Psychopathology*. This rigorous journal is considered one of the most important journals in the field.

In addition to these nominations and editorial responsibilities, here is a sampling of some recent distinctions:

- *Distinguished Scientific Contributions to Child Development Award from the Society for Research in Child Development (2011)*
- *American Academy for the Advancement of Science Fellow (2011)*
- *Klaus J. Jacobs Research Prize (2012)*



***If you are growing up in an environment that is harsh, it's a good thing that your stress hormones work in your favor to fine-tune how you interact with those around you and how much energy is mobilized and demobilized to help you react adaptively. That this would be manifested in such unique ways based on personality and hormones is ground-breaking and the focus of increasing resilience research.***

left hemisphere is related more to positive emotions and approach behaviors (e.g., things we do to get what we want) while the right hemisphere is related more to negative emotions and withdrawal behaviors (e.g., avoidance of things we do not want). The goal was to see if brain wave activities are different among different vulnerable and resilient children. In a study of 87 children, an analysis was applied to see differences among: (1) maltreated versus non-maltreated; (2) resilient versus not resilient; and (3) boys versus girls. What they found was that the non-maltreated children had more left hemisphere activity indicative of positive emotions. Interestingly, even among those who were maltreated, greater left hemisphere EEG activity corresponded to increased resilience. One step further in the multi-level analysis that looked at sex revealed that non-maltreated-resilient girls

whether the brain functions of resilient children are different in some way. Dr. Cicchetti and his colleagues are pursuing this line of research that now includes brain imaging techniques that add more sophistication through snapshots of the structure and workings of the brain.

In addition to brain activities, Drs. Cicchetti and Rogosch have also investigated interactions among personality and stress hormones in resilience among maltreated children. Based on previous findings of resilient personality traits, they wanted to see whether hormones related to stress biology would interact together in diverse ways. Throughout the day, they measured the stress hormone cortisol in addition to cortisol's helper dehydroepiandrosterone or DHEA that keeps cortisol in check by deactivating its potency. This study used a large sample of 677 children attending the research summer camp described earlier. While personality traits like self-control and the stress hormone cortisol and the anti-stress hormone DHEA were all related to resilience in unique ways, a totally different picture emerged when looked at together among sub-groups of children. For example, maltreated children that showed lower levels of cortisol in the morning were more resilient. This result was then broken down further to see how sub-types of maltreatment looked.

morning to afternoon. If you are growing up in an environment that is harsh, it's a good thing that your stress hormones work in your favor to fine-tune how you interact with those around you and how much energy is mobilized and demobilized to help you react adaptively. That this would be manifested in such unique ways based on personality and hormones is ground-breaking and the focus of increased resilience research.

## Conclusion

Armed with the powerful tactics and research strategies of developmental psychopathological perspective, Dr. Cicchetti and his colleagues continue to pave the way for resilience research. They have convincingly demonstrated in numerous studies the importance of interacting biological, genetic, and psychological processes that influence resilient functioning among maltreated children. Most importantly, they have developed approaches and interventions to help steer maltreated children towards more resilient paths. In summary, these innovations recognize that the pathways towards mental health are influenced by a complex matrix of risk and protective factors. *WAP*

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***Taken together, maltreatment definitely has damaging effects; however, the development of self-related personality traits among maltreated youths and the other-related social skills among non-maltreated youths help to buffer against vulnerability and help bolster resilience.***

had more left hemisphere activity than maltreated-resilient girls who had more right hemisphere activity. This suggests that maltreated-resilient-girls are scanning their environment and regulating their emotions in accordance. This study is the first of its kind to answer important questions like

Strikingly, physically abused resilient children showed high levels of cortisol suggesting that they mobilize the energy needed to adapt to a harsh environment. When looking at DHEA, again different profiles of resilience emerged, showing that maltreated children display atypical rises from

# Protective Factors and Our Resilience Toolbox

By **Alexandra Bisson Desrochers**, Summer Intern at the Centre for Studies on Human Stress  
Bachelor's Candidate in Psychology at the University of Quebec in Montreal

**A**s we have previously seen, bouncing back from life's adversities is called *resilience*. Imagine someone who develops allergies out of nowhere after years without them: they can be resilient during their childhood, but not so during adulthood or vice versa. In the same way that we can be allergic to hay and not to pollen, one can overcome a specific event and be vulnerable to another. That being said, a person who is not confronted and who avoids or prevents stressful situations cannot generally be called resilient. It is interesting to note that for any one adverse situation, physical and psychological health might be preserved, or one of the two can be negatively affected.

Although there is no consensus about what characteristics may help someone to become resilient, it seems like resilience is facilitated by *protective factors*. These factors can transform and improve a person's response to life's adversities and predict better physical and psychological adjustment.

***Although there is no consensus about what characteristics may help someone to become resilient, it seems like resilience is facilitated by protective factors. These factors can transform and improve a person's response to life's adversities and predict better physical and psychological adjustment.***

Sometimes, the protective factor may simply be an innate characteristic like one's sex or genes. For instance, girls are more affected than boys by depression once puberty hits. On the other, autism affects more boys than girls. This example highlights how being a man or a woman may influence resiliency to certain mental conditions.

Finally, in the field of psychological stress and resiliency, research shows that exposure to small doses of stress can improve resistance to a greater subsequent stressor. This phenomenon is called *stress inoculation*. A child who receives a vaccine for a specific disease will boost his/her immune system. In the same way, exposition to small adversities can boost our «stress system» resilience.

Pioneering resilience researchers have identified many factors that help overcome difficult situations like positive cognitive appraisals, opti-

mism, altruism, quality parental presence during childhood, life meaning when faced with adversity, proactive coping mechanisms, strong social support, efficient emotional regulation, and a positive self concept.

## What about you, are you resilient?

Let's take Jacynthe as an example. This 42 year old college teacher takes care of her husband who was diagnosed with depression a year ago not long after losing his job. She must also keep on taking care of her two teenagers and attend to housework. Even with this challenging life event and a tighter budget, she keeps a positive attitude towards life and maintains a good physical and mental health.

We will now take a look at some protective factors that helped her preserve good physical and psychological balance and show resilience in spite of this difficult event.

### • Positive reappraisal coping

Jacynthe had to reorganise the familial budget in order to pay the bills and live a normal life with one salary. She and her husband have decided to still take family vacations, but they switched their all-included vacation in Mexico for a week of camping in Quebec. She sees it as a chance for her teenagers to discover the beauty of their province. By changing her interpretation of this event from potentially negative to positive, Jacynthe has helped her psychological system cope with this adverse event.

### • Good parental care during childhood

Jacynthe is really close to her mother and always had a good relationship with her. She feels supported and cared for when she needs to talk about her thoughts and worries. She is thus using family support to maintain her resilience.

### • Optimism

Jacynthe is the kind of person who sees the glass half full. She is in good spirits even during rough times and comes up with new ideas to stay that way. For example, she keeps a journal where she notes three positive things that happened every day. Her optimism helps to keep her resilient at a high level.

### • The meaning given to adversity

Jacynthe believes this difficult period is an opportunity for her family to grow closer. She shows her teenagers how to support their father, which is a big challenge when we consider the stigma associated with depression. Here again, by deciding to see the positive side of things instead of the negative side, Jacynthe is helping her psychological system cope with the adverse event.

### • Proactive coping mechanisms

When her husband relapses, Jacynthe is able to find solutions fast by always having other options in mind (Plan B; see Mammoth Magazine Issue 1). For example, she can count on her teenagers' godfather to pick them at school when needed. As we have seen in previous issues of the Mammoth Magazine Issue 1, plan Bs are great ways to negotiate a stressor!

### • Good social support

Jacynthe opens up to her close ones when her husband relapses. She is happy with her best friend that has a good listening ear and who is not judgemental when she needs to express her feelings. By using social support instead of staying in isolation, Jacynthe is helping her stress system cope with the adverse event.

### • Effective emotional regulation

Obviously, this situation sometimes brings feelings of frustration and discouragement. Instead of denying these unpleasant emotions, she takes the time to feel them. Afterwards, she takes time for herself while taking a bath or reading her favourite novel. Jacynthe understands that it is normal to feel negative emotions in the face of adversity and she accepts this fact.

### • Altruism

Once a week, Jacynthe volunteers at the local elderly care center and is in charge of their choir. It makes her feel good. Also, singing helps diminish her stress because it allows diaphragm distension, which activates the parasympathetic system and regulates stress hormones (see Mammoth Magazine Issue 10). By combining altruism and breathing through singing, Jacynthe is using two major systems that are known to decrease the stress response.

### • Positive self concept

Jacynthe has the faculty to separate her different roles as a mother, a wife, a worker, a friend, a godmother, and as a daughter. Consequently, if she is faced with difficulties in a certain life area, she is still able to value herself and others. She also tries not to blame herself for her husband's depression. Jacynthe is using her self-esteem to delineate her different roles in life and this helps her contextualize the sources of adversity in her life.



This being said, one must not possess all of these characteristics in order to overcome a stressful event. Furthermore, we can improve our resistance to stress by regularly confronting stressful situations. Since protective factors can modify our ability to overcome difficult life events, we should try to improve the ones we have control over, like altruism or a good sense of humour. Everyone has his/her toolbox and it is up to you to pick the right tools during adversity. 🐘

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**In addition to those mentioned previously, here are a few more protective factors that have been identified by researchers and that can help you develop resilience in the face of adversity:**

- Good cognitive skills
- Auto-efficacy satisfaction
- Social skills
- Developed social intelligence
- Capable of empathy
- Internal locus of control
- Good sense of humour
- A nice, active and sweet temperament
- Charisma
- Warm, nurturing parents
- Successful experiences at school
- Spirituality
- Ability to face your fears
- Having a positive role model
- Goals in life and moral values



## Next Issue!

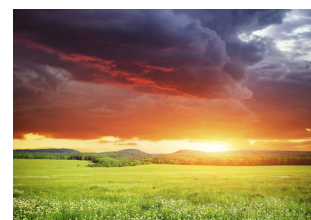
**A baby's on the way!  
Are you stressed?**

When we think of the events surrounding the arrival of a newborn, we often see only the magical side of things. And yet, we regularly forget to mention that this comes with its own load of stress. Is it taboo to admit that the various steps surrounding the conception of a baby, his/her arrival in the family, and the decisions influencing his/her well-being and health could be stressful? We often wrongly assume that it is abnormal to be stressed by such a wonderful event. After all, other parents seem to handle it so well, so I must not be normal to apprehend certain steps or to feel inadequate on certain occasions?!

And yet, it is totally normal for future or new parents to experience stress since most of these situations are often new, unpredictable, pose a certain threat on our ego and can decrease our sense of control. This will be the topic of our next issue of the *Mammoth Magazine*!

## MAMMOTH MAGAZINE

THE OFFICIAL  
PUBLICATION  
OF THE CENTRE  
FOR STUDIES ON  
TRAUMA  
MAMMOTH MAGAZINE, Issue 13, Summer 2013



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# Why did the situation affect me **this time?**

By **Stéphane Guay**, Ph.D., Director of the Centre for Studies on Trauma,  
Research Centre, University Mental Health Institute of Montreal  
Translated by **Anne-Laure Dubé**

**Psychological trauma** refers to events that can cause significant distress and potentially drive individuals towards disabilities and difficulties in their functioning. In such cases, can we say that these people lack resilience? This is actually really hard to assert. However, the majority of people naturally recover from serious events like sexual assault or a major car accident. Because only a small minority of traumatized individuals develop traumatic disorders, researchers have long been trying to figure out what makes some resilient and others less so. In fact, it is intriguing that people exposed several times to similar traumatic events (e.g., a violent act against a nurse) might only succumb to trauma on the tenth or twentieth occasion; sometimes even more.

***Because only a small minority of traumatized individuals develop traumatic disorders, researchers have long been trying to figure out what makes some resilient and others less so.***

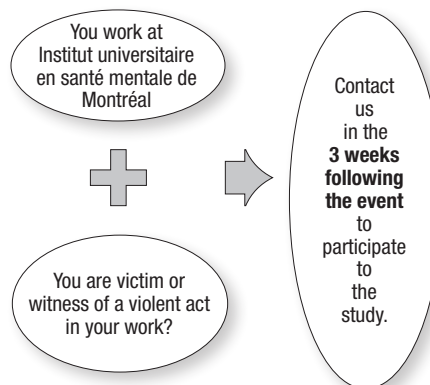
Researchers have tried to understand this phenomenon by identifying the risk factors as well as the psychological, social and biological protective factors involved among individuals exposed to traumatic experiences. All of these factors must be understood together and are evaluated according to a temporal perspective in order to understand which factors were present before, during and after the traumatic event. It turns out that only a few factors have been identified and proven to have relatively important effects on the victim's recovery process. Many questions remain and many research questions have not yet been answered.

Two identified risk factors are the severity of the event (e.g., whether the event caused injuries) and whether the person has « dissociated » (e.g., becomes less aware of what happens around them) during the event. An important protective factor (that becomes a risk factor when absent) is social support during the weeks and months after the event. Moreover, some recent studies suggest that the intensity and biological response during and immediately following the event (e.g., abnormalities in heart rate) could also predict the subsequent development of chronic post-traumatic stress. Cortisol, an important stress hormone, could also indicate the presence of an elevated biological response.

These are only a limited number of indicators representing the most solid knowledge base we have to date. Nevertheless, we can still use them to identify individuals who will experience greater difficulty recovering from a potentially traumatic event, and hopefully help find ways to support them before chronic difficulties settle in.

The Centre for Studies on Trauma is performing a study in collaboration with the Centre for Studies on Human Stress on workplace violence. Motivated by the great interest we received in our past study on workplace stress in 2012, we are now recruiting workers who have been victim of or who have witnessed a violent act.

***The Centre for Studies on Trauma is performing a study in collaboration with the Centre for Studies on Human Stress on workplace violence. Motivated by the great interest we received in our past study on workplace stress in 2012, we are now recruiting workers who have been victim of or who have witnessed a violent act.***



## **Share your experience**

**We need you!** The results of this study will contribute to development of a better support system for workers. All the data collected will remain anonymous and confidential.

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# CRACKING UP! IT HAS TO STOP!



## **Because workplace violence does exist!**

**Assaults, sexual abuses, robbery, threats...**

Workplace violence manifests itself in various ways and represents a neuralgic challenge in diverse environments.

**According to the General Social Inquiry by Statistics Canada, 33% of the violent incidents at work in 2004 were among workers from the social assistance and health care sectors.**

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Study program subsidized by the Canadian Institutes of Health Research Institute of Gender and Health