

Long-term stress impact on health and well-being from diabetes to psychosis

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Abstract. This research aimed to examine the impact of traumatic experience and long-term stress exposure for the development of Diabetes and psychopathological symptomatology, with a sample of 312 individuals from Portuguese nationality, with PTSD or PTSD Secondary diagnosis, traumatic experience or prolonged stress exposure, aged between 29 and 93 years old, 67% males and 33% females, previously to the stress/trauma occurred were healthy individuals and without physiological and/or psychological family pathology history. We find evidence that individuals with PTSD diagnosis can be more susceptible to develop Diabetes, finding in accordance with systematic scientific review about stress impacts, and individuals exposed to long-term stress or traumatic experience with Diabetes or deregulation of cortisol and glucose metabolism systems are more susceptible to Psychosis and/or Paranoid Ideation development.

Key words: stress, PTSD, diabetes, psychosis, paranoid ideation, psychotic disorder

IMPATTO DELLO STRESS A LUNGO TERMINE SU SALUTE E BENESSERE: DAL DIABETE ALLA PSICOSI

Riassunto. Questa ricerca mira a esaminare l'impatto dell'esperienza traumatica e l'esposizione allo stress a lungo termine per lo sviluppo del diabete e sintomi psicopatologici, con un campione di 312 individui di nazionalità portoghese, affetti da disturbo da stress post-traumatico o PTSD, esperienza traumatica o stress prolungato, di età tra i 29 e 93 anni, di cui il 67% degli uomini e il 33% donne che prima dello stress/trauma prodotto erano sani e senza storia di patologia familiare. Abbiamo trovato che le persone con diagnosi di PTSD possono avere più probabilità di sviluppare il diabete, dato confermato da una revisione sistematica scientifica sugli effetti dello stress. Gli individui esposti a stress a lungo termine o a una esperienza traumatica con diabete o deregolamentazione del cortisolo e i sistemi di metabolismo del glucosio sono più suscettibili allo sviluppo di psicosi e/o ideazione paranoide.

Parole chiave: stress, PTSD, diabete, psicosi, ideazione paranoide, disturbo psicotico

IMPACTO DEL ESTRÉS A LARGO PLAZO EN LA SALUD Y EL BIENESTAR: DE LA DIABETES A LA PSICOSIS

Resumen. Esta investigación tuvo como objetivo examinar el impacto de la experiencia traumática y la exposición al estrés a largo plazo para el desarrollo de Diabetes y la sintomatología psicopatológica, con una muestra de 312 individuos de nacionalidad portuguesa, con trastorno de estrés postraumático o trastorno de estrés postraumático, experiencia traumática o exposición prolongada al estrés, edad entre los 29 y 93 años de edad, el 67% de los hombres y el 33% de las mujeres, antes del estrés/trauma producido eran individuos sanos y sin antecedentes de patología familiar fisiológica y/o psicológica. Encontramos evidencia de que las personas con diagnóstico de PTSD pueden ser más susceptibles de desarrollar diabetes, encontrando de acuerdo con una revisión científica sistemática sobre los impactos del estrés, y las personas expuestas a estrés a largo plazo o experiencia traumática con diabetes o desregulación del cortisol y los sistemas de metabolismo de la glucosa son más susceptible de desarrollo de Psicosis y/o Ideación Paranoide

Palabras clave: estrés, PTSD, diabetes, psicosis, ideación paranoica, trastorno psicótico

Stress BIG Fives

About Stress

1 - Stress is a normal feeling and it affects everyone.

Everyone feels stressed from time to time. Stress is a feeling of emotional or physical tension. It can come from any event or thought that makes one feel frustrated, angry, or nervous. Stress is a body's reaction to a challenge or demand, is how the brain and body respond to any demand. Every type of demand, such as exercise, work, school, major life changes, or traumatic events, can be stressful.

2 - Stress can provide energy and protection, therefore not all stress is bad.

All animals have a stress response. Stress can even be life-saving in some situations. In response to danger, your body prepares to face a threat or flee to safety. In these situations, the body reacts to stress by releasing hormones. These hormones make one's brain more alert, cause muscles to tense, increases the pulse and breathe faster, the brain uses more oxygen and increases activity – all functions aimed at survival. Stress can motivate people to prepare or perform, like when they need to take a test or interview for a new job. In the short term, these reactions are positive because they can help handle the situation that is causing stress. This is the body's way of protecting itself. In short bursts, stress can be positive, providing energy, such as when it helps avoiding danger or meet a deadline or doing something exciting. It's when stress lasts for a long time that it may harm health.

3 - There are different types of stress, all of which carry physical and mental health risks.

A stressor may be a one time or short-term occurrence, or it can be an occurrence that keeps happening over a long period of time.

Health problems can occur if the stress response goes on for too long, such as when the source of stress is constant, or if the response continues after the danger has subsided.

There are two main types of stress:

a) Acute stress.

Everyone has acute stress at one time or another. This is short-term stress that goes away quickly. One can feel it when slam on the brakes, have a fight with a partner, or ski down a steep slope. It helps managing dangerous situations. It also occurs when doing something new or exciting.

b) Chronic stress lasts for a longer period of time.

Any type of stress that goes on for weeks or months is chronic stress. Chronic stress can cause both physical and mental harm. With chronic stress, those same life-saving responses in your body can suppress immune, digestive, sleep, and reproductive systems, which may cause them to stop working normally.

Examples include:

- i) Routine stress related to the pressures of work, family, and other daily responsibilities – may be the hardest type of stress to notice at first, because the source of stress tends to be more constant than in cases of acute or traumatic stress, the body gets no clear signal to return to normal functioning. There's a risk to become so used to chronic stress that one can't realize it is a real problem and so not managing stress would increase health risk. Over time, continued strain on the body from routine stress may contribute to serious health problems, such as heart disease, high blood pressure, diabetes, and other illnesses, as well as mental disorders like depression or anxiety;
- ii) Stress brought about by a sudden negative change, such as losing a loved one, divorce, illness or losing a job;
- iii) Traumatic stress, examples include a major accident, war, assault, or a natural disaster. This type of stress can cause Post-Traumatic Stress Disorder (PTSD). The body stays alert, even though there is no danger.

Over time, it puts health at risk, including: High blood pressure; Heart disease; Diabetes; Obesity; Depression or anxiety; Skin problems, such as acne or eczema; Menstrual problems; and if already having a health condition, chronic stress can make it worse. People under chronic stress are prone to more frequent and severe viral infections, such as the flu or common cold. Vaccines, such as the flu shot, are less effective for them.

4 - Different people, different feelings, different effects, different coping.

Different people may feel stress in different ways. Some people may cope with stress more effectively or recover from stressful events more quickly than others. It's important to know self-limits when it comes to stress, so more serious health effects can be avoided.

5 - Stress symptomatology

Stress can cause many types of physical and emotional symptoms. Stress symptoms can affect body, thoughts and feelings, and behavior:

a) body - frequent aches and pains as headache, muscle tension, chest pain, stiff jaw or neck, diarrhea or constipation, upset stomach, sleep problems, forgetfulness, fatigue, change in sex drive, weight loss or gain,

b) mood - anxiety, restlessness, lack of energy, motivation or focus, feeling overwhelmed, irritability or anger, sadness or depression,

c) behavior - overeating or undereating, angry outbursts, drug or alcohol abuse, tobacco use, social withdrawal, exercising less often (1-5).

Managing Stress

The effects of stress tend to build up over time. Taking practical steps to manage stress can reduce or prevent these effects. Exploring stress management strategies can have numerous health benefits, as sleeping and eating healthy, avoiding tobacco use, excess caffeine and alcohol intake, and the use of illicit substances, regular physical activity, relaxation techniques, such as deep breathing, meditation, yoga, tai chi or getting a massage, keeping a sense of humor, socializing with family and friends, setting aside time for hobbies and pleasant activities, as aiming to find other active ways to manage your stress.

Inactive ways to manage stress, such as watching television, surfing the Internet or playing video games may seem relaxing, but they may increase stress over the long term.

1 - Learn to recognize oneself signs of stress and identify the stressors.

Everyone feels stress in a different way (get angry or irritable, lose sleep, or have headaches or stomach

upset) and situations that cause stress, called stressors, can be identifiable. The stressors could be family, work, relationships, money or health vulnerabilities. Once known what signals to look for and once identified where stress is coming from, the individual can come up with ways to deal with stressors and can start to manage it.

2 - Learn to say no.

If the stress comes from taking on too much at home or work, learn to set limits.

3 - Acceptation.

Accept that some things can't be changed allows to let go and not get upset. For instance, the impossibility to change the fact to have to drive during rush hour (if impossible to find a new route or to leave home early enough to miss the traffic jams), an individual can look for ways to relax, such as listening to a podcast, news, or music or a book.

4 - Focus in health and pleasure, replacing bad thoughts with good ones, finding healthy stress busters and ways to relax and be happy.

Each time a bad thought is noticed, purposefully think of happily or proudly events, or memorize a poem, prayer, quote or music and use it to replace the bad thought.

Find something enjoyable and doing at least one thing a day that's just for oneself, whether it is reading a book, listening to music, watching a movie, take up a new hobby or class, or volunteer at a hospital or charity, or getting physical activity, as walking, cycling, softball, swimming or dancing, doing it for at least 30 minutes on most days. is one of the easiest and best ways to cope with stress. When an individual exercise, the brain releases neurochemicals that make the body feel good and allows to release frustration.

Practicing relaxation techniques allows to handle daily stress, it helps slow heart rate and lower blood pressure. There are many types, from deep breathing and meditation to yoga and tai chi.

Focus on get enough sleep and eat healthy diet (vegetables, fruits, whole grains, low-fat or nonfat dairy, and lean proteins), is a nutrition for body and mind.

5 - Connect with life.

Connect with loved ones, family and friends can help to cope with stress, to feel better, to forget stress, and confiding in them may also help working out problems, or asking others for help when needed, or join a support group, talk with a health care provider, or a therapist or counselor who can help finding other ways to deal with stress (5, 6).

Stress: major risk factor

When stress occurs, it's like something causes our body to behave as if it were under attack and the body prepares to take action. This preparation is called the fight-or-flight response. In the fight-or-flight response, levels of many hormones shoot up. Their net effect is to make a lot of stored energy – glucose and fat – available to cells. These cells are then primed to help the body get away from danger.

In people who have diabetes, the fight-or-flight response does not work well. Insulin is not always able to let the extra energy into the cells, so glucose (sugar) piles up in the blood (6).

Thus, it's plausible to think that if an individual is exposed to stress for a long period or endure a traumatic event that prolonged its effects long-term, his glucose level would be naturally higher than ordinary people, and therefore it's understandable why chronic stress can cause Diabetes, as explained above.

What is Diabetes

Also called: Diabetes mellitus (DM) is a disease in which blood glucose, or blood sugar, levels are too high.

Glucose comes from the foods we eat, and Insulin is a hormone that helps the glucose get into the cells to give them energy, but when the body fails making or using insulin, the glucose stays in the blood. Over time, without enough insulin and consequently having too much glucose in the blood could cause serious problems.

Diabetes can be managed through healthy eating, physical activity, and blood glucose level should also be supervised and medicine taken if prescribed.

There's different types of Diabetes:

- Type 1 diabetes (also called: Insulin-dependent diabetes, Juvenile diabetes), the pancreas does not make insulin. It happens most often in children and young adults but can appear at any age. It occurs when the immune system, the body's system for fighting infection, attacks and destroys the insulin-producing beta cells of the pancreas. Scientists think type 1 diabetes is caused by genes and environmental factors, such as viruses, that might trigger the disease. Studies such as TrialNet are working to pinpoint causes of type 1 diabetes and possible ways to prevent or slow the disease.

- Type 2 diabetes, the more common type, the body does not make or use insulin well. Usually begins with insulin resistance, a condition in which muscle, liver, and fat cells do not use insulin well. As a result, your body needs more insulin to help glucose enter cells. At first, the pancreas makes more insulin to keep up with the added demand. Over time, the pancreas can't make enough insulin, and blood glucose levels rise.

Is caused by several factors, including lifestyle factors and genes, its higher risk is correlated with age (being older is positively correlated with this type of Diabetes), obesity, family history of diabetes, or do not exercise. The location of body fat also makes a difference: extra belly fat is linked to insulin resistance, type 2 diabetes, as with heart and blood vessel disease.

As in type 1 diabetes, certain genes may make an individual more likely to develop type 2 diabetes. The disease tends to run in families and occurs more often in these racial/ethnic groups: African Americans, Alaska Natives, American Indians, Asian Americans, Hispanics/Latinos, Native Hawaiians, Pacific Islanders. Genes also can increase the risk of type 2 diabetes by increasing a person's tendency to become overweight or obese.

Type 2 diabetes can be delayed or preventable of developing it by making some lifestyle changes. The symptoms of type 2 diabetes appear slowly. Some people do not notice symptoms at all. Having prediabetes also increases the risk of getting type 2 diabetes.

- Prediabetes means that blood sugar is higher than normal but not high enough to be called diabetes.

- Pregnant women can also get diabetes, called Gestational diabetes. Scientists believe Gestational diabetes, a type of diabetes that develops during pregnancy, is caused by the hormonal changes of pregnancy along with genetic and lifestyle factors. Hormones produced by the placenta contribute to insulin resistance, which occurs in all women during late pregnancy. Most pregnant women can produce enough insulin to overcome insulin resistance, but some cannot.

Gestational diabetes occurs when the pancreas can't make enough insulin, as with type 2 diabetes, extra weight is linked to gestational diabetes. Women who are overweight or obese may already have insulin resistance when they become pregnant. Gaining too much weight during pregnancy may also be a factor.

Having a family history of diabetes makes it more likely that a woman will develop gestational diabetes, which suggests that genes play a role. Genes may also explain why the disorder occurs more often in African Americans, American Indians, Asians, and Hispanics/Latinas

- Monogenic diabetes is caused by mutations, or changes in a single gene. These changes are usually passed through families, but sometimes the gene mutation happens on its own. Most of these gene mutations cause diabetes by making the pancreas less able to make insulin. The most common types of monogenic diabetes are neonatal diabetes and maturity-onset diabetes of the young (MODY). Neonatal diabetes occurs in the first 6 months of life. Doctors usually diagnose MODY during adolescence or early adulthood, but sometimes the disease is not diagnosed until later in life.

Genes and Environment: Stress, Cortisol and Glucose

Rebecca Hasson (7) found increasing evidence that the environment we live in plays a bigger role than the genes we're born with. The everyday stresses people face, such as poverty and discrimination – factors that some people live with more than others – may be taking a physical toll. "Type 2 diabetes is a modern epidemic, but an enduring puzzle is why it's spreading faster in some groups than in others. In the United States, 1 in 2 African Americans and Latinos will develop type 2 diabetes in their lifetimes; the risk for

whites is 1 in 3. Researchers once thought genes might account for the dramatic differences. Studies trying to tease out the reasons for disparities in type 2 diabetes risk have also examined factors such as physical activity, nutrition, and family history of diabetes. One reason is a hormone called cortisol. Cortisol puts gas in the body's tank: It tells the body to increase blood glucose, directs cells to resist insulin's signals to absorb and store blood glucose in favor of keeping it available for muscles to burn, and prompts cravings for high-calorie foods. It's released in times of stress to help supply the body with as much energy as possible, as part of the "fight or flight" response to immediate threats. "Cortisol is a biomarker of stress". That's all good, if you're being attacked by a lion and need energy to escape. But other things can trigger cortisol, too. "Those energy substrates are mobilized so you can run away", "But if you don't, or can't run away – you're late for school, someone's pointing a gun at you, you can't pay your bills – you're always in this high-alert situation, whether or not you're conscious of it". When cortisol levels are consistently high but there's no physical activity to buffer the effects of chronic stress, the consequences may contribute to type 2 diabetes. Higher cortisol results in higher insulin resistance, for example, forcing the pancreas to produce more insulin to get a response. With ongoing insulin resistance, the insulin-producing beta cells wear out, causing type 2 diabetes. If we know chronic stress makes people sick, is it possible blacks and Latinos are sicker than whites because they're more stressed? They're more likely to be poor or live in poor neighborhoods, so they're more likely to be exposed to the chronic stressors of poverty—and to cortisol, with all of its negative effects. Exposure to discrimination, too, can be a stressful experience. Overall, ethnic minorities have much higher cortisol levels and exposure than whites" (7, 8, 9, 10).

We must question seriously the impact amplitude of a stressful environment, as discrimination and poverty, as Rebeca Hasson explained above, in the development of Diabetes.

Accordingly, it's understandable that some individuals who endure war theatres or disasters could develop type 2 Diabetes, as some of those individual under those adverse conditions, would have to deal with inadequate levels of cortisol, as also explained above about

chronic stress. Though, some of those would develop stress related Disorders like PTSD, and some of those have high resilience and would completely recover.

Post-traumatic stress disorder (PTSD) and Diabetes

The NIH - National Institute of Mental Health (3) defines “Post-traumatic Stress Disorder (PTSD) as a stress related Disorder and enlighten that anyone, even children, can get PTSD after living through or seeing a traumatic event, such as war, a hurricane, sexual assault, physical abuse, or a bad accident. PTSD makes someone feel stressed and afraid after the danger is over. It affects the person’s life and the people around. PTSD can cause problems like: Flashbacks or feeling like the event is happening again; Trouble sleeping or nightmares; Feeling alone; Angry outbursts; Feeling worried, guilty or sad. PTSD starts at different times for different people. Signs of PTSD may start soon after a frightening event and then continue. Other people develop new or more severe signs months or even years later. Treatment may include talk therapy, medicines or both.”

For instance, Hariri et al (11) declared that not all, but some studies, showed that individuals diagnosed with PTSD have lower (12, 13) cortisol levels than individuals without PTSD.

Wittleveen et al (14) observed PTSD symptom-clusters of intrusion and hyperarousal (in particular sleep disturbances) were associated with lower and higher cortisol levels, respectively.

In accordance, Nowotny et al (15) explained that after acute stress exposition, cortisol and heart rate tend to increase, and are observed high levels of glucose and insulin and a decrease of immune and inflammatory systems that are related with type 2 Diabetes, pointing that psychological stress affects glucose metabolism and inflammatory process.

Comorbidity between diagnoses: a preliminary study

Methodology

We proceeded to the examination of 401 clinical files gathered in therapeutic setting, by the researchers, with personal data codified, guaranteeing the confi-

dentiality of the individuals. From the 401 files, we excluded 89, resulting 312 validated files to examine the impact of traumatic experience and long-term stress exposure for the development of Diabetes and psychopathological symptomatology.

Sample

312 individuals from Portuguese nationality, with PTSD or PTSD Secondary diagnosis, traumatic event experience or prolonged stress exposure, aged between 29 and 93 years old, 67% males and 33% females.

Inclusion Criteria

War veterans, military and safety forces individuals with PTSD diagnosis, traumatic experience or long-term stress exposure, and their wives with PTSD Secondary diagnosis, traumatic experience or long-term stress exposure.

Clinical files had individuals’ statements of being healthy before traumatic event(s) occurred and had not physiological and/or psychological family pathology history.

Exclusion Criteria

44 individuals expressed normal psychophysiological reaction face stress/trauma, having recovering within a month, followed up during 1 year.

15 individuals with psychopathological diagnosis and history of alcohol and illicit drugs abuse, previous stress/trauma exposure.

9 with diabetes family history

21 with absence of traumatic experience or long-term stress exposure

Assessment Protocol

- Specific semi-structured interview with sociodemographic data, health risk behaviors and coping strategies.
- PTSD and Secondary PTSD have been assessed by DSMIV-R PTSD symptomatology
- Psychopathological symptoms of the male individuals have been assessed (it was not possible to

gather significant number of assessments from females) by the Symptom Checklist-90-R (trad. for Portuguese population by Galhardo, Castilho e Pinto-Gouveia, 1999). The SCL-90-R is a self-report instrument containing 90 items, each of them with five response categories from 0 = Not at all, 1 = little, 2 = some, 3 = very to 4 = severe and measures nine dimensions: Somatization, Obsessive Compulsive Disorder, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism.

Results and Discussion: can diabetes cause psychosis?

Our study revealed that 35% of male individuals (ages between 31 and 88 years old) developed type 2 Diabetes, and 42% of female individuals (ages between 33 and 86) developed type 2 diabetes and one developed Gestational Diabetes in her second gestation (first normal, military individual, not an overweight individual).

In addition, we find that 47% of the male individuals that developed type 2 Diabetes, concomitantly expressed higher number of psychopathological symptoms for Psychoticism and/or Paranoid Ideation compared to the other dimensions, and we want to underline that this sample of individuals with Diabetes didn't have alcohol or illicit drugs abuse history (7% of the general sample admitted alcohol and illicit drug abuse, after stress/trauma occurred). Yet, they remained under psychopharmacological medication for more than 10 years, as a treatment to relieve PTSD symptomatology and that could have been the explanation.

Accordingly, NIH (1) explained that sometimes certain medicines can harm beta cells or disrupt the way insulin works. These include: niacin (a type of vitamin B3), certain types of diuretics (also called water pills anti-seizure drugs), psychiatric drugs, drugs to treat human immunodeficiency virus (HIV), pentamidine (a drug used to treat a type of pneumonia), glucocorticoids – medicines used to treat inflammatory illnesses such as rheumatoid arthritis, asthma, lupus, ulcerative colitis and Post-traumatic stress disorder (16), anti-

rejection medicines and Statins (which are medicines to reduce “bad” cholesterol levels) can slightly increase the chance that you'll develop diabetes.

Nonetheless, we can contribute to enlighten if Diabetes could have been due to glucocorticoids treatment, even if we couldn't verify if the participants were under glucocorticoids treatment, as our sample manifested later treatment, because the majority become aware of the opportunity and necessity of PTSD treatment decades after the traumatic exposure, and so initiated treatments later in life, and after Diabetes awareness and treatment. Therefore, is mostly unlikely that glucocorticoids could have cause Diabetes.

This finding is particularly insightful and led us to ask if Diabetes could be at the origin of psychotic disorders. Meaning that our study puts on evidence the same doubt: what come first, Psychotic Disorder or irregular glucose metabolism?

Since XIX century, science had evidence that individuals with psychotic disorders, particularly schizophrenia had higher risk to develop type 2 diabetes mellitus, so it could have been the Psychoticism or Paranoid Ideation that had led to Diabetes development.

Though, Chouinard et al (17) pointed that there is increasing evidence that patients display glucose metabolism abnormalities before significant antipsychotic medication exposure, and the findings suggest that familial abnormal glucose metabolism or a primary insulin signaling pathway abnormality is related to risk for psychosis, independent of disease expression and treatment effects.

Therefore, even if medication could have been the explanation for Psychotic Disorders development, 71% under psychiatric medication over 10 years didn't develop it, suggesting that it is conceivable that deregulation of cortisol and glucose metabolism systems could be at the foundation of Psychotic emergence, in accordance with Chouinard et al (17).

So, it's conceivable that Diabetes can boost Psychoticism and Paranoid Ideation, due to glucose metabolism system deregulation.

Even though, 6% of the sample without Diabetes expressed also higher number of psychopathological symptoms for Psychoticism and Paranoid Ideation, that can be explained by the severity of trauma experience, or lack of knowledge of Diabetes condition.

In fact, we must add that from our sample assessment reports, it seems that Diabetes come first, previously psychotic symptomatology, and after devastating stress or PTSD (even if participants weren't aware of their stress damages or PTSD condition), as participants only had acknowledged, of psychotic symptomatology later on life (like PTSD), after Diabetes installed. But it could also nothing to do with Diabetes and be explained by the hormonal system and natural transformation of aging, as an additional risk factor of psychopathology development, though, it would just be a great coincidence in a quite significant number of trauma/stress exposed individuals with the same health condition of Diabetes.

Final considerations

Brief movie: stress attacks, the hormone of stress, cortisol, orders the body to produce more glucose, no activity of "fight or flight", the body remains vigilant, stressed, dangerously alert though inactive, with high cortisol and blood glucose levels, after a long period of higher cortisol levels, and inaction, cortisol becomes discredited, and get lower, but glucose still wants to remain alert, and protect its store of energy, in case of need, because stress remains, even if cortisol don't seems to realize it, and that's another factor to enforce the champ battle, as it could be resting or injured, and in need of help, so more sugar, more energy stored, and so this battle fallen champ translates a good scenario for Diabetes development.

But why high blood sugar levels or increased stored energy can cause Psychotic Disorders remains unclear to us. Though, this study points that Diabetes for itself it's improbable to cause Psychotic Disorders, but long-term Stress seems to be the great trigger and master.

Individuals with PTSD, we had learned that their cortisol levels are usually lower than in healthy individuals, though, paradoxically, a good percentage, as our sample suggests, would develop Diabetes, perhaps the above scenario, could be not a fantasy but an equation that could be written by long-term stress galvanizing the emergence of Diabetes and their function the emergence of Psychotic Disorders.

In a romantic or philosophical perspective – as science has not yet enlighten us, calling for romantic and philosophical wisdom is one of the best formulae to unlock the chain of science and make pertinent questions, the primordial key of science – as in our designed scenario, it seems the attempt of the body to recover homeostasis, diabetic individuals can be trying to save sugar in their bodies as the world had stolen the sweetness of life from them. If the bitterness of prolonged stress or traumatic experience can cause the development of PTSD, it could be due to the efforts of the individual, by means of inadequate coping strategy, trying to reach oblivion and emotional distance from the adverse event(s) and, at the same time, trying to save the essential endogenous sweetness to survive and recover. But as an inadequate strategy, the sugar transforms in bitter Diabetes and then it becomes essential greater measure for oblivion and distance, that could enthusiastically be provided by the dissociative or fracturing "skills" of a psychotic disorder. Resuming: Stress/trauma can cause PTSD that can cause Diabetes that provide inadequate and additional tools to reach oblivion and distance from the hurtful reality and can cause Psychotic Disorders. That could be a scenario that our study does not guarantee but point it.

Limitations and suggestions

Even if we can't confirm, we can point a causality effect, and we vehement hope further research address it, as it could unveil new therapeutic models for psychotic and stress related disorders, as well the development of new psychopharmacological treatments. Also, further studies on this subject are needed to confirm that Stress is a major risk factor among other risk factors, as high blood pressure, cholesterol, LDL (Low Density Lipoprotein, "bad cholesterol"), triglycerides or smoking, drugs or alcohol abuse, overweight and lack of exercise, to develop severe diseases as Diabetes or cardiovascular diseases, as it is also postulated by science that Stress itself is the source of those risk factors.

Therefore, preventing Stress should result more efficient rather than working on preventing all the other factors. Meaning, preventing the source, the odds of achieving success increases exponentially.

So, it urges to seriously create policies programs of Stress management and resilience's categories training, as advised Lopez, A. (18).

We firmly suggest the creation of Resilience training programs, aiming to prevent related Stress Disorders, PTSD and Psychotic Disorders.

At this purpose, Roberts et al (19), with the objective to examine the efficacy of multiple session early psychological interventions commenced within three months of a traumatic event, aimed at preventing PTSD, they tested a diverse range of psychological interventions, with a sample of 941 participants, and did not find any evidence to support the use of an intervention offered to everyone and concluded that no psychological intervention can be recommended for routine use following traumatic events and that multiple session interventions, like single session interventions, may have an adverse effect on some individuals. The clear practice implication of this is that, at present, multiple session interventions aimed at all individuals exposed to traumatic events should not be used. Further, better designed studies that explore new approaches to early intervention are now required.

Reason why we suggest a Resilience interventional model, considering idiosyncratic differences, to better adequate the necessary resilience skills to face stressful or traumatic events, focusing on inclusive models, recognizing the importance of adequate integration of any individual in a community (7, 19), and essentially focusing on individuals more susceptible to face adversity, like safety and military forces, caregivers and also minority communities, more vulnerable to stress exposure, due to factors as poverty or discrimination based on sexual orientation, ethnicity, age or gender.. Resilience training models are still being mostly directed to empowerment training programs and personal development or coaching, not quite applicable in the domains to prevent stress or stress related disorders treatment as pointed by Lopez (18) as a major contribute.

And with the objective to assess whether the combination of psychological therapy and pharmacotherapy provides a more efficacious treatment for PTSD than either of these interventions delivered separately, Hetrick et al (20) concluded there is not enough evidence available to support or refute the effectiveness of

combined psychological therapy and pharmacotherapy compared to either of these interventions alone. Further large randomised controlled trials are urgently required.

Amos et al (21) considering previous reviews had shown that talking therapy (cognitive behavioural therapy CBT) is effective in preventing PTSD, they intended to be the first reviewing medication as a preventative treatment for PTSD, thus, with a total of 345 adults who had experienced traumatic events but did not have a diagnosis of PTSD at the time of starting medication and with the objective to assess the effects of pharmacological interventions for the prevention of PTSD in adults following exposure to a traumatic event, they concluded that there is moderate quality evidence for the efficacy of hydrocortisone for the prevention of PTSD development in adults, and they found no evidence to support the efficacy of propranolol, escitalopram, temazepam and gabapentin in preventing PTSD onset. Thus, there is no sufficient evidence yet to recommend any medication as a preventative treatment for PTSD. Further research is necessary in order to determine the efficacy of pharmacotherapy in preventing PTSD and to identify potential moderators of treatment effect.

And with the objective to assess the effects of psychological therapies in preventing PTSD and associated negative emotional, behavioural and mental health outcomes in children and adolescents who have undergone a traumatic event, Gillies et al (22), with a total of 6201 participants, considered cognitive behavioral therapy (CBT), family therapy, eye movement desensitisation and reprocessing (EMDR), narrative therapy, psychoeducation, supportive therapy, psychodynamic therapy, exposure therapy, practiced alone or in association or in comparison or both (in association and comparison), delivered individually or group therapy. There were no studies which compared psychological therapies to drug treatments. They conclude, that the meta analyses in this review provided some evidence for the effectiveness of psychological therapies in prevention of PTSD and reduction of symptoms in children and adolescents exposed to trauma for up to a month, as well, there was moderate quality evidence that cognitive behavioral therapy (CBT) might be more effective in reducing symptoms of PTSD compared to other

psychological therapies for up to a month, however there was no evidence for the effectiveness of psychological therapies beyond one month (23).

With this knowledge, we propose that Resilience interventional model follow the constructionist approach, integrating the different contributes of psychological therapies in order to promote and work the different categories that contribute to the development or strengthening of the resilience of an individual, considering all the categories, in any form of therapeutic delivery: self-esteem and self-confidence, empathy, altruism, faith, internal locus of control, creativity, initiative and dynamism, planification and realistic objectives, sense of humor, optimism, patience, sense of commitment, proud, tenacity, autonomy and independence, frustration and negative emotions tolerance, ability to establish affective and secure relationships, ability to recognize opportunities and alternatives and adaptability to change (24).

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