Original Article

Technostress: The Other Face Of Technology

Alaa A.Ismail*, Elsayed H. Abdelhamid, Ghada M. Khalil, and Noha M. Abdelsalam

Department of Public Health and Community Medicine, Faculty of Medicine, Zagazig University, Zagazig, Egypt.
Corresponding author: Alaa A.Ismail
Email : a.637494@gmail.com
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Abstract

Background
Technology is used in every aspect of life. It made our lives easier and more convenient. On the other hand, it negatively impacted our lives in many ways. One of its disadvantages is called technostress. Technostress is an important phenomenon that has many adverse outcomes on individual and professional lives. Its effect differs greatly among individuals and it has many associated factors. Fortunately, it isn't uncontrolled. There are many preventive and interventive strategies to prevent and control it.

Keywords: Technostress, technostress types, technostress associated factors, techno-strains, technostress impact, technostress prevention.

INTRODUCTION

The first personal computer was invented in the mid-1970s **(1).** then it was only a few years for the psychologist Craig Brod to become aware of its bad effect so he introduced this expression (Technostress) for the very first time in his book in the early 1980s and clearly defined and explained it as: "Technostress is a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner. It manifests itself in two distinct but related ways: in the struggle to accept computer technology and in the more specialized form of over-identification with computer technology." **(2)**.
Here we are in the 20th century and of course, this concept still concerns the scientists who develop the definition to make it more with the new era and so Tarafdar et al. termed technostress (Tech.S) as "stress experienced by end users as a result of their use of information and communication technology (ICT)" **(3).**
A more recent and informative definition is "Technostress is the outcome of improved practices of work and relationship that are being brought about because of the usage of up-to-date information technologies at the workplace and home circumstances" **(4)**.
The process of Tech.S can be illustrated by the transactional-based model of stress. The stress process is not a static and unidirectional (antecedent-consequent) process. Otherwise, it is a dynamic, bidirectional, and mutually reciprocal process. In other words, what was an antecedent in time 1 could become a consequence in time 2 and vice versa. They also discussed that the cause of stress can be either in the environment or in the person himself **(5).**
The transactional-based model (Figure 1) illustrated that it all starts when the individual is first exposed to challenging ICTs (information and communication technologies) then the individual's mental processes start to experience these ICTs as stressors (primary cognitive appraisals). When the individual is continuously exposed to the ICTs, he will totally believe that they are undesirable stressful conditions. So, he will try to cope with these stressful conditions and once he fails to cope with them, he will suffer from the main effect of Tech.S which is strain **(5-6).**

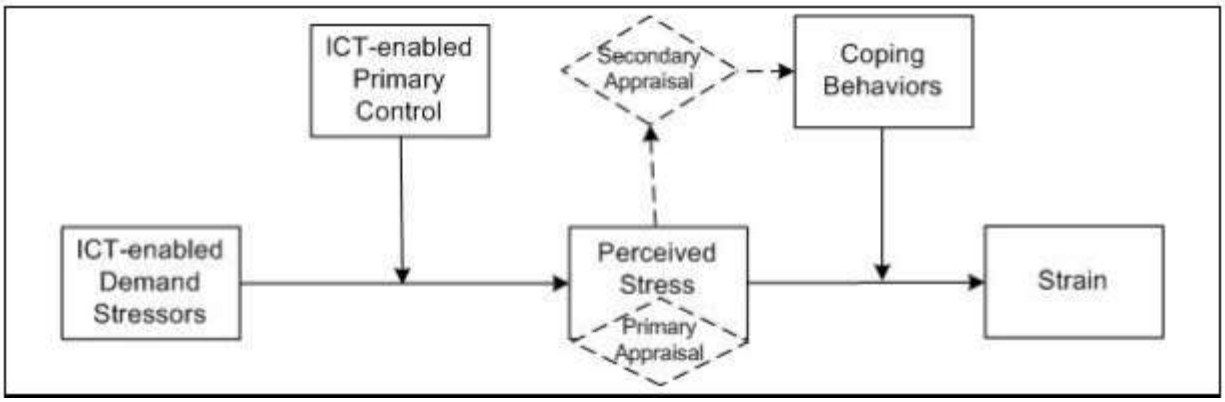

Figure 1 Transactional-based model

This study aimed to overview Tech.S in relation to its types, associated factors, manifestations, impacts, as well as coping and prevention-intervention strategies.

Types of technostress

Weil & Rosen found that seven types of Tech.S result from the different ways humans interact with technology. They are (Learning technostress, boundary technostress, communication technostress, time technostress, family technostress, workplace technostress, and societal technostress) **(7).**

Learning technostress is the type of Tech.S that is experienced by individuals when they interact with new technology, trying to understand and learn it. There is no doubt that technological advancement is extremely rapid making this type of Tech.S obvious and serious **(7-9).**

Boundary technostress is a form of Tech.S occurs when the individual can't determine a clear time limit while using the technology. As a result, there is a diffusion of boundaries between self and technology, so it is also known as technosis. This form of Tech.S can be seen when the technology user feels that he had to answer all messages or do any given task whatever the circumstances are **(7-9).**

Communication technostress is the kind of Tech.S that occurs on using any communication technology (ICT). When individuals want to convey or send a message or try to communicate with others, they often try to use appropriate communication channels, and although nowadays there are advanced and fast communication technologies, they themselves could be a hindrance for communication when they malfunction leading to stress **(7-9).**

The main goal of technology is to save time and effort but actually many times they waste time rather than saving it leading to what is called **time technostress**. It could occur when people depend on technology on doing tasks in a short time, so they commit themselves to a lot of tasks at the same time resulting in the feeling that they always lack time and also feel that they are in a rush and become distracted and impatient **(7-9).**

Family technostress occurs when technology becomes the leading cause of the family breakup. It is so obvious nowadays in a lot of families that every family member begins to isolate himself from other family members and spends a very long time using his own electrical device for hours doing his own activities alone and eventually he creates his own technological cocoon. So, each family member stays in his technological cocoon which would damage the family system **(7-9).**

Workplace technostress is a common type of Tech.S that occurs in the workplace. There are a lot of forms of stressful situations that occur at work due to technology usage. Some examples are when technological devices are complex, when employers ask employees to do a lot of work believing that technology will aid them in doing it fast, when individuals have to continue work at home, and even when colleagues pretend to have more technology-related knowledge and skills so, frustrate other coworkers. All these workplace stressors and more lead to a phenomenon called paradox productivity as the use of technology unexpectedly reduces productivity **(7-9).**

Societal technostress is a form of Tech.S that occurs in society. As a result of rapid technological development. Some people become obsessed with obtaining every new technology even if they don't need it or can't afford it. Societal technostress can also be obvious in stigmatizing individuals with relatively old technology. Some forms of Societal technostress are the lack of privacy as personal information is widely distributed throughout social media, the lack of real-world social interactions which are being replaced by virtual relationships, and eventually, there is infodemic phenomenon as a result of information overflow and overupendant information, especially wrong ones. **(7-9).**

Technostress associated factors

According to **Tarafdar et al.(10)** there are five main variables that were found to be the most influential factors that cause Tech.S and they are usually called technostress creators or techno-stressors. they are:

- Techno-overload: the work with digital technologies is demanding because of prolonged working hours, the high pace, multitasking, frequent interruptions, and also high expectations regarding response times in digital communication, so the employees will have to work longer and harder **(10-11).**
- Techno complexity: certain digital technologies tend to be overly complex and challenge the workers' qualifications, concentration, and feeling of control. As a result, these technologies deserve additional time to handle the complexity **(10-11)**

- Techno-invasion: a major effect of mobile devices is the high flexibility, making individuals easily reachable, and so blur boundaries between work and other life domains, causing work-life conflicts and impairing recovery from work **(10-11)**
- Techno-insecurity: some individuals tend to believe that more qualified personnel or even digital technologies will partly or fully replace their own positions/jobs **(10-11).**
- Techno-uncertainty: a stressor occurs when technology users have to be constantly updated to keep up with the rapid digital transformation processes, so they feel **(10-11)**

These five variables are affected by a lot of other variables that can be classified into three categories: individual variables, organizational/environmental variables as well as technology-related variables **(12).**

Individual variables:

The "4 Cs" model (competence, confidence, concentration, and attentional capture) which is introduced by **Tams et al.** explained why older people suffer more from Tech.S in comparison to younger people which is due to their low technological experience and self-efficacy as well as their low concentration and attention during using technology **(13)**.

The gender variable has a significant relationship with Tech.S as seen in the literature of **Erdoğan & Akbaba (14)** who found that gender can explain the change of Tech.S in up to 10% of cases. Also, according to **Marchiori et al. (15)** males experience some types of techno-stressors more than females while females experience other different types.

Organizational/ environmental variables:

The surrounding environment or the organization in which one uses technology has an outstanding role in igniting the Tech.S **(12).** Some environmental conditions that could be important causes of Tech.S are poor working conditions, poor lighting, and lack of funding **(16).**

An obvious example of this variable is power centralization **(17)** which was so clear a while ago due to the Covid-19 pandemic. As a result of this pandemic, there was a vast lockdown and so authorities oblige employees to work online using technology, and almost all of them were not prepared for this big change resulting in the adverse impacts of Tech.S **(18).**

Technology-related variables:

Having good modern devices is important in decreasing Tech.S in comparison to old ones. Also, the lack of access to a fast network is an important factor in developing Tech.S **(19).**

One more IT feature that can boost Tech.S is privacy and security concerns. Lately, when teachers started online teaching using the Zoom application, a big privacy breakdown occurred which was called "Zoom-bombing" or "Zoom raiding" which can be described as a disruptive intrusion into the video conference call. As a consequence of this privacy breakdown, the ministry of education in Taiwan prevented online Zoom teaching **(20)**.

Techno-strain

Tech.S is manifested in individuals as strains. Those strains can be classified into psychological, physical/physiological, and behavioral manifestations **(21).**

Psychological manifestations:

Tech.S has some psychological manifestations such as loss of temper, irritability feelings, feeling of indifference, fear that led to technology avoidance, and lastly negative attitudes towards technology usage **(16)**.

Some other manifestations were detected by Igwe & Chukwu **(22)** such as distorted ideas, momentary confusion, impatience, and distractibility. In addition to anxiety and depression **(23)**.

Physical/physiological manifestations:

Tech.S almost affects all body systems; the central nervous system (Headache and sleep-waking rhythm disorders), cardiovascular system (coronary artery disorders, tachycardia, and hypertension), gastrointestinal tract (gastritis, reflux, and irritable bowel syndrome), musculoskeletal system (myalgia, cervicalgia, and limb numbness) as well as general symptoms like sweating, chronic fatigue, hormonal disorders, menstrual disorders in females and also Stress-related dermal disorders (dermatitis and psoriasis) **(24)**.

Hormones have a strong relationship with Tech.S. As due to Tech.S, stress hormones (cortisol, adrenaline, and alpha-amylase) are released, and they also affect the performance of the individuals during human-computer interaction situations. These hormones can be used as useful biological markers of Tech.S **(25)**.

Behavioral manifestations:

Discontinuous usage intention is stopping technology usage as a result of the stress experienced by the technology user. According to users' *responses* to Tech.S, this behavior differs. Some users just give themselves a short break from technology, others control their technology usage, and some stop using it the technology totally **(26).**

Those three types were studied among Instagram users. Those users were affected and stressed by Instagram usage, they didn't delete their accounts and completely stopped their usage. Otherwise, users with low social influence chose to control their activities on Instagram by decreasing the time spent on it. On the other hand, users with high social influence chose to take short breaks whenever they felt stressed from its usage **(27)**.

Impact of technostress

There are several adverse outcomes of Tech.S either on the individual level, on the social level, or on the organizational level. Long-term Tech.S has several impacts as role stress. Role stress is not only a consequence of technostress, but it also plays a mediating role between Tech.S creators and job performance. So, Tech.S could aggravate role stress, which negatively affects job performance **(28).**

Excessive mobile usage (techno-addiction) affects social, professional, and personal life. Actually, this pervasive

technology usage led to three types of conflicts (technology-family conflict, technology-work conflict, and technology-personal conflict). If the individual fails to self-control or self-regulate their excessive technology usage, they will enter into the dilemma of those three conflicts which are more obvious in teenagers. So, schools and parents should detect those conflicts. For instance, technology-family conflict can be obvious in the form of ignoring the offline world and feeling that they can't live without their mobile phones even during picnics. On the other hand, school performance deterioration is a form of technology-school conflict, but sleep disturbance and eye strains can reflect the technology-personal conflict **(29).**

Some works of literature believed that Tech.S negatively influences job satisfaction. Some examples are human resources employees of the US (united states) and Canadian firms **(30)** and secretaries **(22).**

Coping and prevention-intervention strategies of technostress

Coping strategies are the ways the individual uses to deal with Tech.S. There are three styles of coping strategies: problem-focused coping, emotion-focused coping, and avoidance coping. Problem-focused coping is referred to as trying to solve the problem, people face the problem and take action to handle the stressor. Emotion-focused coping occurs when individuals regulate their emotional responses and feelings as regards the stressors. Avoidance coping responses are simply avoiding technological stressors. Some examples of those three types are planning, seeking social support, and disengagement respectively **(31)**.

In order to deal with Tech.S, three levels of strategies are available. Primary intervention strategies target healthy technology users who didn't develop any symptoms of Tech.S such as technostress workshops which aim to become familiar with Tech.S diagnostic measures so the end users will be capable of their own self-diagnosis. Secondary intervention strategies target individuals who start to suffer from Tech.S symptoms or outcomes such as replacement technologies strategy which aims at changing the unfriendly, useless, obsolete, or ergonomically stressful technologies. Tertiary intervention strategies target technology users who have the full range of Tech.S symptoms such as counseling and psychotherapy strategy **(32)**.

Technostress inhibitor is the term used in the literature to describe any prevention-intervention strategy. Some of the most famous technostress inhibitors are literacy facilitation, involvement facilitation, and support **(33)**.

Conclusion

Tech.S is an important phenomenon. Although it isn't a new phenomenon, its effect is increasing dramatically due to rapid and continuous technological advancement. It is a complex process so its effect differs greatly among different individuals. People could suffer from psychological symptoms, physical symptoms, or even behavioral symptoms. It doesn't only affect individuals, but it could also affect organizations by decreasing productivity and increasing job stress and dissatisfaction. It is also responsible for many types of conflicts on the personal as well as on work and family levels. Tech.S isn't specific to definite occasions or circumstances. It may affect people at work or at home and at any time. Some factors are believed to be associated factors with Tech.S. Whereas individual factors have significant effects, but they can't be changed or controlled unfortunately. On the other hand, we can control and decrease Tech.S by controlling environmental and technological factors.

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