

Technostress in the Workplace Enhanced by the SARS-CoV-2 Pandemic: Innovative and Multidisciplinary Tools for Risk Assessment and Prevention of the Effects of Technology on Workers' Health. A Multicenter Study on the Healthcare, Legal, and Education Sector. A Project.

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Abstract IT: *Il progetto analizza gli effetti del tecnostress sulla salute dell'individuo attraverso un rivoluzionario approccio multidimensionale basato su un gruppo di ricerca interdisciplinare composto da medici, psicologi e giuristi. La varietà delle discipline coinvolte e dei settori analizzati (sanitario, giuridico ed educativo) consentirà di produrre documenti sostenibili per la società e universalmente applicabili nelle aziende e nelle pubbliche amministrazioni per la valutazione dei rischi, la stima dei danni e la prevenzione delle tecnopatie sul lavoro.*

Abstract EN: *The project analyzes the effects of technostress on the health of the individual through a revolutionary multidimensional approach based on an interdisciplinary research group made up of physicians, psychologists and jurists. The variety of disciplines involved and of the sectors analyzed (health, law and educational) will make it possible to produce documents sustainable for society and universally applicable in companies and public administrations for risk assessment, damage estimation and prevention of technopathies in the workplace.*

Sommario: 1. Introduction. – 2. State of art. – 3. Objectives and Results. – 4. Possible application potentialities and scientific and/or technological and/or social and/or economic impact, with indications of the possible use of research infrastructures.

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1. Introduction.

Digitalisation, including information and communication technology enabled technologies (ICT-ETs) is likely to have major impacts on the nature and location of work. Although new work situations bring opportunities, they can also create new risks and challenges for workers and employers, which in turn demand political, administrative, technical and regulatory intervention to ensure good standards of safety and health at work are maintained (EU-OSHA 2018). Numerous studies have shown how the increasing use of ICTs in the workplace has negative consequences on the psychophysical health of individuals (Bondanini 2020, La Torre 2019, Gabriele Berg-Beckhoff 2017, Dragano, 2020). Main innovations of our project will be an interdisciplinary research group and the tools that will be used for the evaluation of the multidimensional aspects of technostress. The team will be composed of health personnel (doctors and occupational psychologists) and jurists expert in labor law in order to offer a new multidimensional assessment of occupational risk and prevention of technostress in the workplace. The technostress assessment will include: an innovative psychometric tool consisting of 15 dimensions specific for ICT-related stress in the workplace, clinical-laboratory evaluation and instrumental tests (EEG, actigraphy) carried out directly in the workplace. The participation of experienced jurists provides sustainability and social impact to the project. The team of lawyers will analyze the lack of legal regulations regarding technostress. Furthermore, jurists will estimate the compensation for damages and will identify an ideal legal protection for emerging technopathies due to the highly digitized work environment.

2. State of art.

The spread of technologies has drastically changed the environments and working conditions. Information and communication technology (ICT) is defined as “technology that provides access to information through telecommunications, such as the Internet, wireless networks, cell phones, and other communication media” (Berg-Beckhoff, 2017). In Europe the proportion of workers who reported a frequent use of digital technologies increased from 36 to 57% between 2005 and 2015. The data showed that the digitization of work is greatest in Scandinavian countries, with a percentage standing at 38% in Denmark and 33% in Sweden. Other European countries with a large use of ICT were: the Netherlands (31%), Luxembourg (29%), the United Kingdom (27%), France (26%) and Estonia (25%). In the EWCS 2017 report, Italy was instead the country with the lowest share of workers who used ICT (8%) (European Working Conditions Survey, 2017). This scenario was significantly reversed by the health emergency of Covid-19 which "forced" the use of remote work as a tool to safeguard both health and the economy. In April 2020 Eurofound launched an online survey entitled "Living, working and Covid 2019" to analyze these specific changes. Respondents were asked about their work situation, how they managed to reconcile family work and the use of

remote work during the pandemic. According to the results, Italy was one of the countries that made the most massive use of agile work in order to stop the spread of the Coronavirus infection in Europe (Living, working and COVID-19, 2020). In Italy, therefore, the massive use of ICT in the workplace has spread in emergency mode. The introduction of ICT in the various work environments initially seemed to bring significant benefits to human society in terms of facilitating working tasks and greater global interconnection thus technology allows constant access to resources and continuous flow of data. However, recent evidence demonstrates the "dark side" of ICT for the well-being of the individual and the development of companies (Bondanini, 2020). The use of digital technologies is associated with new forms of work-related stress, the so-called technostress. The concept of technostress regards a modern disease of adaptation caused by an inability to cope with new computer technologies, affecting mental health in a manner which may manifest as a struggle to accept computer technology, or as over-identification with computer technology. Massive use of ICT in work environment (cell phones, instant messaging, e-mail) can cause stress for the worker resulting in overload, role ambiguity, job insecurity and work-life conflicts (Dragano, 2020). The definition of technostress has been addressed by numerous authors and is currently the subject of numerous studies. Ragu-Nathan et al. explained technostress using two dimensions: technostress creators and technostress inhibitors. Technostress creators refer to: techno-overload (technology forces workers to work more and faster), techno-complexity (intrinsic complexity of new technologies and consequent feeling of incompetence), techno-invasion (constant connectivity that invades private life), techno-insecurity (fear about losing their jobs because of new technologies) and techno-uncertainty (constant updates and innovations of ICT that need to be learned). Inhibitors include factors that can moderate technostress outcomes such as: knowledge sharing, team-work, end-user training, user guidelines, technical support, and facilitating engagement (Ragu-Nathan, 2008). Salanova et al. instead focused studies on the anxiety, fatigue, skepticism (technostress) that an excessive use of ICTs can affect the worker (techno-addiction) (Salanova, 2014). Technostress influences organizational commitment, job satisfaction and employee outcomes (eg absenteeism, turnover) (Tarafdar, 2011). Although several categories of workers have already been studied, ICTs are so widespread that even more studies are needed. Healthcare professionals, education staff and lawyers are among the most affected categories. A recent study showed that healthcare managers frequently exhibit negative aspects of digital communication, poor user experience of ICT systems and lack of organizational resources as potential technostressors creators (Stadin, 2020). The field of education has undergone a notable change with the COVID-19 pandemic forcing teachers to use online learning. The lack of training, the inadequate infrastructure and the lack of technological support generated by mandatory online teaching can increase teachers' anxiety and tension, which lead to mental and physical stress related to the use of technology (Panisoara, 2020). The development of technostress

was favored by the lack of a clear regulatory framework for remote working. Recently the art. 263 of the legislative decree n. 34/2020 provided that the Public Administrations must identify the necessary organizational and verification means through the Organizational Plan of Remote Work, also involving citizens. This provision was followed by the decree of the Ministry of Public Administration no. 5/2020, whose art. 5 specifies that teleworking can be organized for specific ranges of contacts and, in the absence of such ranges, rest and disconnection times from work tools must be guaranteed. Furthermore, art. 6 of the decree specifies that performance measurement systems must be adapted to the specificities of remote work. The guarantee of the right to disconnect is also linked to significant safety obligations, in particular as regards the assessment of work-related stress. The main innovations of our project concern the longitudinal design of the studio (in the literature we mainly have cross-sectional studies), the definition of new stressors that can better define technostress and at the same time the identification of coping strategies to manage it in the workplace.

3. Objectives and Results.

Our project will analyze the effects of technostress on the health of the individual through a revolutionary multidimensional approach based on an interdisciplinary research group made up of physicians, psychologists and jurists. The variety of disciplines involved and of the sectors analyzed (health, law and education) will make it possible to produce documents sustainable for society and universally applicable in companies and public administrations for risk assessment, damage estimation and prevention of technopathies in the workplace. Work-related stress that may result from the digitization of work environment (in the three selected sectors) is the main focus of the research. The medical research unit has a long experience in the field of work-related stress and is currently publishing a special issue on how technological innovation will shape the health and productivity of individuals and organizations (Mucci 2020). The general objective is to analyze compensation for damages and to identify an ideal primary prevention for emerging technopathies due to highly digitized work environment. The INAIL system (public insurance for injuries to workers) aims both to prevent injuries and to provide compensation and rehabilitation to work. In cases covered by public insurance, employers who have the duty to pay premium, are not held liable for injuries to employees but for cases of criminal responsibility. In this system, employers ought to respect two kinds of duties: duties to assure a safe work environment (see TU INAIL, d. 81 and art. 2087 civil code) and duties to implement process and procedures useful to assess risks and prevent injuries (d. 81 mainly). Violations of both kinds of duties can be a basis for litigation and for asking employers at least compensation for damages in civil liability (or recourse action for social or private insurance who has already paid), in cases in which employers can be held liable in criminal law. Nonetheless, in most cases

it is uncertain when a work environment can be considered and is correctly assessed as safe, or instead when employers should further investigate on possible “sentinel-events” or “near misses”, or even on possible environmental or technological solutions and mitigation measures. Therefore, in order to implement the project as far as the main object is concerned, some specific objectives should be detailed and autonomously pursued. In order to identify risk factors or signs of diseases, specific for “technostress” and used to assess also employers responsibilities, and to map the assessment of damages, we will conduct an analysis of courts decisions (and, when possible, of transactions or INAIL assessments) [Scuola Superiore Sant'Anna hereinafter SSSA unit]. We will conclude formal agreements or use existing ones with representative tribunals. Several past and present agreements between SSSA and Italian tribunals will facilitate the availability and the collection of decisions.. The Project deals with possible strategies that enable management and prevention of psycho-physiological effects that may result from the digitization of work environments. It ensures a strong interdisciplinary innovative perspective also from the methodological point of view. Our main goal is to transform the critical issues related to the COVID-19 pandemic into new opportunities to improve the health of the entire population. The need for an urgent resolution of the psycho-physical and social problems linked to the new scenarios of technological work offers us a unique opportunity to face and solve the problem. Any critical issues related to the limited data available are seen by our interdisciplinary research group as an exciting challenge to propose new and concrete tools for solving the problems of technostress. The idea is revolutionary in terms of the composition of the research group, methodology and tools presented. Our project proposes concrete and innovative solutions to important problems of the current global COVID-19 pandemic.

4. Possible application potentialities and scientific and/or technological and/or social and/or economic impact, with indications of the possible use of research infrastructures.

The project will have an impact on improving the well-being of workers in the current context of digitalisation of the workplace.

Therefore, the important expected impacts of the projects are:

- to provide a high level of scientific underpinning on the quantification, qualification and valuation of the risks of digitalization of workplace;
- to implement risk management and reduction;
- developing new public and private sector insurance in the perspective of building a resilient society;
- enhancing human capital;
- supporting the objectives of the EU Digital Workplace Strategy. New digital workplace tools support a concept in which the workplace is becoming more and more location independent and at the same time safe thanks to the deploy a 'Secure-By-Design' infrastructure.

- identification of the possible and best solutions for linking compensation systems, use of the results of the mapping of jurisprudential cases to identify specific areas of organizational and environmental risk in work contexts, consequent identification of the application strategies of the procedures established by law for risk prevention.

With the increasing prevalence of technostress and its associated health effects, including anxiety, fatigue, and mental strain, occupational health professionals will require innovative approaches to assess and manage these risks effectively. By integrating advanced psychometric tools, clinical-laboratory evaluations, and instrumental tests directly into workplace assessments, occupational health practitioners can gain deeper insights into the multifaceted nature of technostress and tailor interventions to individual worker needs. Moreover, the longitudinal design of the study will enable researchers to track trends over time and identify emerging risk factors, facilitating proactive interventions to mitigate adverse health outcomes. Through collaboration with interdisciplinary teams comprising physicians, psychologists, and jurists, the project aims to develop evidence-based guidelines and protocols for the prevention and management of technostress-related conditions, thereby advancing the field of occupational medicine. Furthermore, by leveraging existing research infrastructures and forging partnerships with industry stakeholders, the project can contribute to the development of comprehensive occupational health strategies that promote employee well-being, enhance productivity, and reduce healthcare costs.

Technology is no longer the means to bring innovation and facilitate work but has become a new job to go with the traditional one. It has created the so-called digital job. This was the case before, but even more so today due to the health emergency caused by the covid-19 virus that has forced people to work from home, giving more space to the use of the internet, digital platforms and new technologies. In spite of the advancement of technology, however, it is difficult to find guidelines or rules for the traditional subordinate public work, invested with the contribution of new technologies, i.e. for the worker operating within public administrations whose work is the set of his traditional tasks, for which he was hired, with the addition of the increasingly important technological contribution that, over time, has created a so to speak 'complex' performance.

The issue has been addressed both from a justificatory perspective more aimed at the citizen and his desire to achieve a higher level of efficiency and effectiveness in the work of the public administration, so in this regard, it has been talked about digital administration and the reference is the CAD , Legislative Decree 7 March 2005 n.82, amended by Legislative Decree 13 December 2017 n, 217, in which it deals with digital citizenship or the right to the use of technology in relations between citizens and public entities, and from a perspective related to the individual worker and therefore the relationship between the individual, traditional work and technological work. The problems have concerned the repercussions on the worker who, not having legal instruments to protect himself and to manage all these digital/technological/informatics innovations in his work, and in order to find

relief has also embraced issues such as the so-called right to disconnection. The right to disconnection would be born, in fact, for smart working with the purposes that are precisely the protection: of working time, health, safety of workers, limits to the duty of care, work-life balance. Law 81 of 2017 contains a reference to the technical and organisational measures necessary to ensure that workers are disconnected from technological and work equipment. However, this guideline has not been extended to traditional workers in public employment, leaving questions for this category. In France, this issue is addressed by Article 17 of Law 2242 of the French Labour Code; in Spain, workers have been recognised as having the right to digital disconnection in the labour sphere; in Italy, there is no law or regulation regulating the digital aspect of traditional subordinate public work, and reference is made to collective agreements, which, however, have done little in this respect. A step has been made, in collective bargaining, with the agreement reached in the public education sector, where art. 22 "Levels, subjects and matters of trade union relations for the School Section", paragraph 4, c9), indicates that the effects on the quality of work and professionalism of technological innovations and computerisation processes inherent to administrative services and in support of school activities are subject to collective bargaining, while nothing has been provided for the health and justice sectors. An interesting study on these sectors was carried out by the Chamber of Deputies, 17th Legislature, 'Deloitte, the digital transformation of the Public Administration', in which the benefits for citizens of receiving services in digital mode were reaffirmed, but it was also highlighted that in our country the technological approach is a complicated reality. Focusing on the work of the doctor employed in the public hospital, we recall the theme of the so-called IT strike. An apparently simple argument but which in reality, as well as questioning the difficulty of these figures in reconciling their traditional work with the bureaucratic work of the hospital, which is now digitalised, is of great help because it allows us to understand the importance of tasks and duties. The technology used in traditional medical work does not seem to have a place in the employment contract, or even if it did, it should be relocated in the light of the complexity of medical services and the pandemic presence that has forced people to work from home.

Recently, art. 263 of Legislative Decree no. 34/2020 has also come to our aid, providing that Public Administrations must identify the necessary organisational and verification means through the Organisational Plan of Distance Working. However, it remains necessary to find a regulatory/protocol/contractual and insurance solution to reconcile the old and the new and to avoid that digitisation leads to the creation of damage or risks for the public administration that could be summarised univocally as: damage and at the same time a risk from "technological abuse in the public service".

