An investigation into the smart working in the COVID-19 era: proposal of an electronic survey to examine the critical issues

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Background: The COVID-19 pandemic is proposing new models of work. Among these new models we find the smart working which allows remote work through workstations configured from home.
Methods: We focused on the figure of the smart-worker and we had the idea of preparing a survey to investigate on the smart workers their relationship with this new model of working. To do this we have prepared a survey dedicated to the purpose for this figure. The survey has been submitted electronically on a preliminary sample.
Results: The submission is still active and a properly tuned datamining will follow, however the study is showing preliminary interesting results: (I) some emerging problems needing attention; (II) a high degree of acceptance of the methodology, as confirmed using a dedicated feedback form. Certainly some initial indications relating to the need of a greater training on the subject; the need of inclusion of surveys capable of also giving a measure of the psychological impact and the need of platforms for remote neuromusculoskeletal monitoring could already be important steps to be taken immediately.
Conclusions: A study on smart workers was conducted through an electronic survey (eS). This study, albeit preliminary, suggests important insights and initiatives

Keywords: Smart working; COVID-19; ehealth

Introduction

The pandemic, as is well known, has spread through fluctuating phases in which in the various nations' restrictions have been spreading that have provided for social distancing in particular. To comply with the restrictions, for example to avoid crowds in public transport and to maintain the distance in the workplace between the various solutions envisaged, that of working from home was envisaged through the so-called smart working. Smart Working is an organizational model capable of bringing significant benefits to the organizations that adopt it: in terms of productivity, achievement of objectives, but also in terms of welfare and quality of life of the worker. In the

last year, Smart Working has been at the center of extensive debates and has allowed us to guarantee work continuity and co-commerce activities and at the same time safeguard public health. During phase 1 of the pandemic in Italy, ie in the period between 8 March and 4 May 2020, Smart Working was adopted by numerous organizations. The Italian government itself, through regulatory interventions, has significantly pushed its application, simplifying the procedure for accessing the tool and discouraging face-to-face work. In the second phase of the emergency, there was a better integration from remote and office workstations to improve work processes. Smart working is an "agile" mode that can be exploited in various circumstances. Working in smart working in fact allows the worker to better reconcile

work duties with the needs of his life. Furthermore, the cardinal principle of "agile work"—which is also the reason for its name—is "mobility", so those who work in this mode can choose the location and change it according to their needs (home, library, co-working, in the hotel, and so on). The concept of agile work mobility, in light of this, finds it difficult to correlate with ergonomics, a multifactorial concept, which from time to time must be reviewed and re-evaluated in a different environment (home, library, working, in the hotel, and so on) and without the direct supervision of an expert/labor manager.

The concept of mobility is also linked to mobile technology which plays and is playing a triple key role during the pandemic (1).

The *first role* is the traditional one played in the field of digital health (2-6) by connecting citizens to the health system and providing them with highly innovative technological solutions not only by electronic health (eHealth) but also based on mobile Health (mHealth) the use of smartphone and/or tablet and/or Wireless Connection to provide health care.

The *second role* is specific to this pandemic and consists in providing *mHealth* solutions for controlling and monitoring the spread of the pandemic, such as through App-based solutions for the *digital contact tracing* (7,8).

The *third role* is to support teaching, work and relational activities in an exceptional way, allowing social distancing between subjects, such as through messaging and/or video conferencing and/or social network tools (9,10).

It is therefore the third role that allowed the introduction and the diffusion of the *smart working* in Italy and in the world as a measure to combat the pandemic.

In Italy the *smart working* had a great diffusion (https://www.lavoro.gov.it/strumenti-e-servizi/smart-working/Pagine/default.aspx) (11) as part of the measures adopted by the Government for the containment and management of the epidemiological emergency from COVID-19 (coronavirus). In fact the President of the Council of Ministers issued on 1 March 2020 the Italian Decree that intervenes on the methods of access to smart working, then confirmed by the subsequent provisions issued to deal with the emergency (12), and many other Italian decrees followed to increment this modality of work (13). Agile work (or smart working) is a modality of execution of the subordinate employment relationship characterized by the absence of time or spatial constraints and an organization by phases, cycles and objectives, established by agreement between employee and employer; a modality that helps the worker to reconcile the times of life and work and, at the same time, favor the growth of his productivity.

The definition of smart working, contained in the Italian Law no. 81/2017 (14), emphasizes organizational flexibility, the voluntary nature of the parties signing the individual agreement and the use of tools that allow you to work remotely (such as: laptops, tablets, and smartphones).

Agile workers are guaranteed equal treatment - economic and regulatory - with respect to their colleagues who perform the service in ordinary ways. Therefore, their protection in the event of accidents and occupational diseases is envisaged, according to the methods illustrated by INAIL in Circular no. 48/2017 (15). We present the following article in accordance with the SURGE reporting checklist (available at https://dx.doi.org/10.21037/jphe-21-26).

Purpose

We did a search on PubMed with a smart working key and we found only 5 jobs in which smart working is however treated in a secondary and accompanying way but never as a main aspect (16-20). In particular, smart working has never been thoroughly analyzed in the important health implications related to the related health risk. There are very important aspects on this issue ranging from (a) the well-established ones related to the so-called VDT risk (21) to (b) new psychological types of anxiety, depression and stress that presumably the new working condition can determine.

While in the traditional workplace it is possible to directly and continuously monitor the aspects in (a) through the company systems for monitoring the health of workers, we have no guarantees regarding remote monitoring.

We therefore set ourselves the goal of addressing the problem of monitoring the worker in smart working through a survey that would allow us to highlight any critical issues.

The consequent sub-objectives of the study are therefore:

❖ Develop an electronic survey (eS) to address any critical issues of smart working in its various facets;
❖ Assess the acceptance of the methodology on the same sample;
❖ Submit it to a first sample of subjects and analyze a first group of results;
❖ Propose any solutions for any critical issues highlighted.

Methods

The design of the survey

The survey undoubtedly represents a powerful tool for investigating many scientific problems, and, as such, is a valuable, if not fundamental apparatus for addressing the issues mentioned in this study, in which remotely gathering information/opinion from the actors involved in this field is essential.

Among the various administration techniques that can be used we have preferred the electronic one through the so-called eSs which:

❖ In a pandemic period they allow to maintain social distancing by avoiding paper transmission in presence;

❖ They reach the agile worker through the same remote tools that he has at his disposal and with which he must have a minimum familiarity to interact remotely (see also below);

❖ They allow an easy administration: It is possible to send an Internet link through the most common web communication tools (e-mail, messenger);

❖ They allow an Automatic data storing in the cloud: the recipients, once the link has been selected, can access the survey online, fill it in, and complete it by means of an automatic entry of data into the appropriate databases (without manual operation). Once the interested parties complete the questionnaire, the data entered are automatically loaded into a database.

It is possible to insert different types of simple question forms in the eSs such as graded evaluation, simple/multiple choice answer, Likert, open answers etc.

We decided to use *Microsoft Forms*, it is a commercial tool provided by the Microsoft Corporation (USA), as we have yet used it and tested with success as we have yet used it with success in many other applications (22,23).

We decided to submit the survey (available in the supplement material) anonymously) using a *peer to peer* submission based on the multimedia and social tools. It respected the declaration of Helsinki (as revised in 2013). The study was not an experimental study conducted on humans or animals (furthermore anonymous); for this reason it was not necessary a formal consent during the involvement; however, even if not necessary, we have provided for the first question (see in the supplement material) a form of electronic informed consent with the possibility of leaving the survey.

Statistical analysis

The tools available within Microsoft forms allow the creation of automatic reports including statistical analysis. Further statistical analyses were added in our study.

In particular, our study envisaged:

❖ A statistical analysis of the failure rate relating to the operation of the survey before the sub-division;

❖ An integration about the output of the questionnaire administration with some targeted statistical analyses;

❖ A statistical analysis of acceptance of the methodology.

Results

The first result is represented by the environment with the core element eS.

Figure 1 shows the Quick Response code related to the eS with the following link: https://forms.office.com/Pages/ResponsePage.aspx?id=_ccwzxZmYkutg7V0sn1ZEvPNtNci4kVMpoVUounzQ3tURFhWQTFVU1dMNTdLOFJVUEM1SlY5NEtaTy4u.

The printout of the survey is shown in supplemental file (https://cdn.amegroups.cn/static/public/JPHE-21-26-1.pdf).

Before the official submission we tested the survey among our-self assuring the trial of all the ramifications. We tested it 200 times with 0% of failures.

We organized the survey with all obligatory questions, with the exception of the final facultative question ("final comment/observation"). This avoided:

❖ Partial completions;

❖ The need of handling item missing data provided.

We assessed the rate of participation on the basis of

❖ The first question (The data will be used anonymously for a study on this issue. Agree to participate?). A negative response forced to stop and exit the survey;

❖ The second question giving the requirement with the question "Have you done at least 100 hours of work in the last 3 months in smart working mode?".

It is clear that, as we have illustrated above, this type of survey reaches the worker through the same tools for working remotely with which he has been equipped and with which he must be familiar. In fact, at least the home worker must be able to use the email tool through which it is possible to travel the eS.

However, to minimize any but unlikely bias due to the digital divide, we also invited receivers to spread it and to support the less capable with digital technology, clearly adding a warning in this direction during the spread. We

Figure 1 The Quick Response code of the eS.
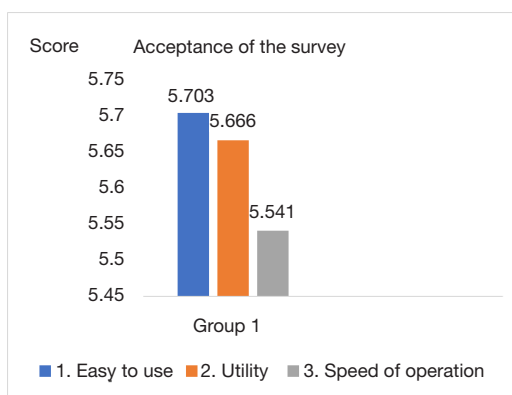
Figure 2 Acceptance of the survey.

have seen in (24) through a survey directed at the entire population (and therefore not only at workers equipped with electronic devices but also elderly people alone and other non-technological subjects) that through these solutions it is possible to minimize the technological bias due to the Digital Divide.

The eS is currently on the submission process. We are disseminating it both through websites, facebook, email and other multimedia tools (messenger and twitter). To minimize any but unlikely bias due to the digital divide, it was however necessary to spread it and to support the less capable with digital technology.

We do not and cannot have the objective of showing a significance (submission is still active and we aim to reach thousands of participants) of the study but its ability to

highlight through an innovative mHealth tool (23) of bring problems to the stakeholder. In this sense, we have an innovative telemedical approach as a remote telemonitoring investigation tool to bring out any critical issues.

Here with the objective of the dissemination of the methodology highlight a first submission on a small sample of 111 smart workers (58 males, average age 43.5; 53 females, average age 44.3) of the private sectors (111 who accepted among 123 submission where 12 invited refused or did not have the requirements for participating); an important homogeneous slice of employment in a subordinate form.

Figure 2 highlight the high acceptance on the survey (assessed by means of a feedback form sent after the submission of the survey).

Each interviewee could give a grade from 1 (minimum) to 6 (maximum) on the three aspects listed in the figure. An average grade of less than 3.5 indicates a more negative than positive evaluation. While an average grade above 3.5 indicates a more positive than negative evaluation. All parameters, with a rating higher than 5.5, had an extremely positive rating.

The pie chart shows the type of tool used by the interviewees. The most used tool is the PC (both fixed and portable) even if someone uses tablets and smartphones.

The pie chart (*Figure 3*) shows the type of tool used by the interviewees. The most used tool is the PC (both fixed and portable) even if someone uses tablets and smartphones.

Figure 4 shows the responses received relating to the question "Have you been trained on the configuration of the workstation for smart working?". These responses show a lack of training received.

Figure 5 shows the results relating to the question on the received training "Do you feel more or less stressed since operating in this mode?" which highlights an increase in stress in relation to the new working condition.

Regarding the question on musculoskeletal problems "Have musculoskeletal problems arisen or worsened since you started working in this modality?" The 58% said yes indicating that most of workers declare to perceive health problems.

Discussion

We are witnessing the spread of tools of a *pocket type* for remote investigation of health aspects of (23) that is within the reach of a click on the smartphone. In this sense we are witnessing a revolution of *mHealth* which together with eHealth represents one of the basic components of telemedicine.
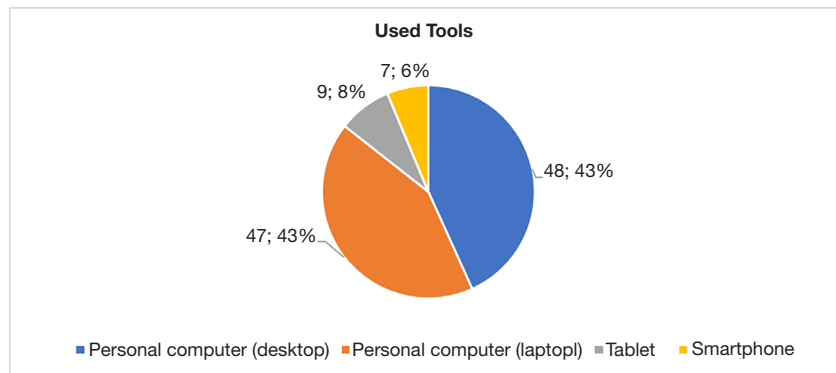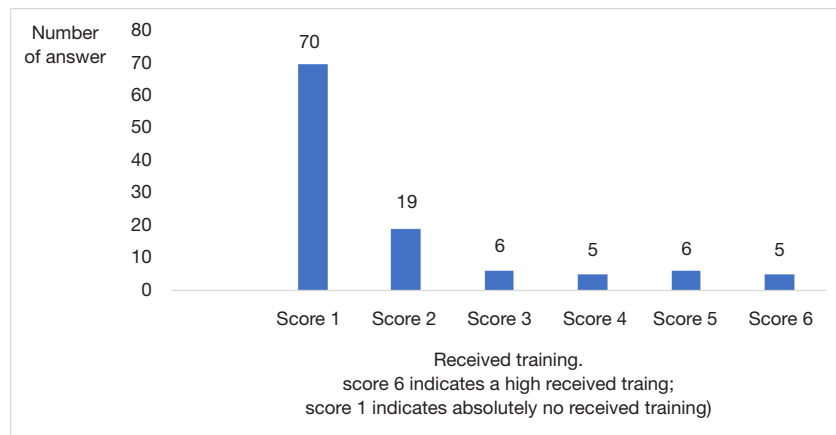
Figure 3 Used tools.

Figure 4 Answers to the question on the received training.
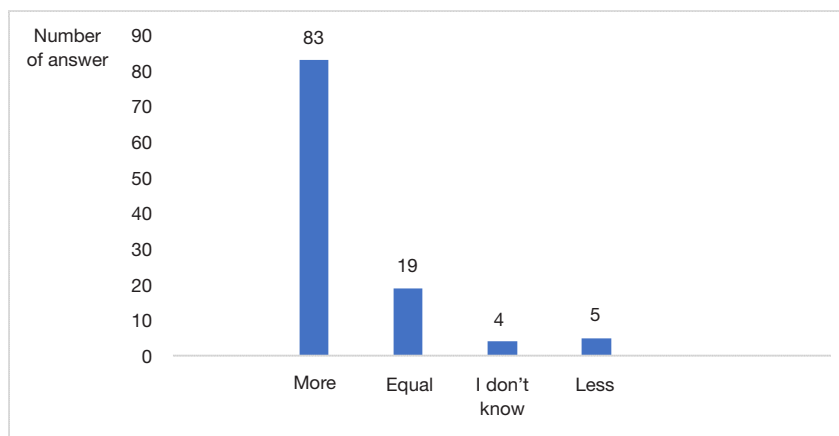

Figure 5 Answers to the question on the perceived stress.

We relied on one of these tools to develop a methodology to collect any health criticalities of the use of smart working in the COVID-19 era.

A survey dedicated to this purpose has therefore been developed and is currently being submitted, targeted datamining will follow. The electronic submission, the design of the study and some described solutions allowed a strong minimization of the bias and the elimination of the phenomenon of partial/incomplete answers.

In line with the objective of the Special series, we presented the useful mHealth tool and its first use in the field to show its potential to bring any critical issues to the attention of stakeholders.

With this tool we expect to collect the criticalities in the practice of smart working, it is desirable that other scholars deal with the advantages of smart working from a psychological point of view, for example, and/or other parameters related to quality of life.

It was used on a first sample of workers on the private sectors (111 who accepted among 123 submissions); an important homogeneous slice of employment in a subordinate form.

Even if the data are preliminary and even if they will require the foreseen in-depth analyzes through appropriate datamining, the potentiality of the tool in bringing out some possible criticalities such as (I) poor training; (II) the presence of stress (we are not talking about psychological problems) and (III) neuromuscular pain.

Certainly, some initial indications relating to greater training on the subject; the inclusion of surveys capable of also giving a measure of the psychological impact and of platforms for remote neuromusculoskeletal monitoring could already be important steps to be taken immediately.

A short electronic feedback form was also submitted to the same sample, which made it possible to verify a high acceptance of the survey methodology.

Conclusions

The COVID-19 pandemic is proposing new models of work not in presence. Among these new models we find the smart working. We focused on the figure of the smart-worker and we had the idea of preparing a survey to investigate on the smart workers their relationship with this new model of working.

The survey was submitted electronically.

The study showed:

(I)   No malfunction of the electronic procedure;
(II)   A high acceptance of the methodology;

(III)   Although preliminary, a series of evident problems to keep under control.

From a general point of view, these first general results show the need to raise awareness among stakeholders on the problems that have emerged and to move forward with these initiatives.

Acknowledgments

Footnote

See: https://creativecommons.org/licenses/by-nc-nd/4.0/.

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