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Telework and health effects review, and a research framework proposal

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Abstract

Telework is an increasingly popular flexible working arrangement. The features that characterize telework are presented in this work. The advantages and disadvantages of teleworking are described, as well as its effect on the health of the worker. In general, empirical evidence seems to show a positive association between telework and worker health. However, it can also have negative impacts on health such as stress and depression. We propose a framework of analysis of the effect of telework on health that draws on contributions from health economics and from occupational psychology.

Keywords: telecommuting, teleworking, workers, health

* The author certifies that she has the right to deposit the contribution with MPRA.

1. Introduction

Teleworking was originally attributed to the oil crisis of the 70's when it was realized that if one out of 7 urban commuters would work from home, then the US would have no need to import oil and then it became evident that work flexibility could result in benefits for the organization and for the employee. The term itself, telecommuting, was introduced by Nilles (1975).

While in US, the term for "home-working", is *telecommuting*; in Europe, it is termed *telework*. But the terms to express telework are varied and include work-at-distance, off-site work or even remote work. The idea behind all these terms is the same; it is the work to be done somewhere and not a place to go (Baruch, 2000).

The European Framework Agreement on Telework¹ of 2002 defines Telework in article 2: "Telework is a form of organizing and/or performing work, using information technology, in the context of an employment contract/ relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis". Although this definition is broad, it captures the main idea behind telework which is work flexibility in space and time.

Working flexibility has become an opportunity for workers to improve work, family and social life by decreasing work constraints, and gaining autonomy over one's own affairs. The borders between working and non-working time have become flexible and adjustable to the needs of people in different stages in life: study time, family, aging or simple individual preferences. Telework is therefore the tool for decision making about working hours and adapting them to the needs and preferences of worker (and demands of the employer).

¹ The European Framework Agreement on Telework was signed by the social partners in July of 2002. The framework agreement regulates issues such as employment and working conditions, health and safety, training, and the collective rights of teleworkers. The unique aspect of this agreement is that it is not implemented through a European directive. Instead, it is transposed through the autonomous route, in accordance with the procedures and practices specific to management and labor in each Member State.

Telework, as a form of flexible work arrangement, has become more and more significant in late 90's as the use of home computers, laptops, mobile phones and other sophisticated telecommunication software become an every day life tool of work.

In the last decade, the number of workers teleworking was still increasing. In the US, the increase is around 80% between 2005 and 2012 and in this last year teleworkers represented 2.6% of total employee workforce (about 3.3 million of people, excluding self-employed or unpaid volunteers) considering home as their primary place of work (Global Workplace Analytics, 2012), as shown in table 1.

Table 1: Teleworkers in the US

	2005	2012	% total workforce
employee teleworkers	1 819 355	3 268 525	2.6

Source: Global Workplace Analytics, American Community Survey data, 2012

In Europe, telework is less often used in the labour market than in the US. Most recent statistics come from the 3rd EU Survey on Working Conditions of 2000². Teleworking on a full-time basis is carried out by just over 1% of the working population (around 1.5 million people). Occasional teleworking is more widespread (5% of workers). But this work arrangement is not found homogeneously in European countries. While UK has around 10% of employees teleworking at least 25% of the working time, in Portugal and Italy that number is only of 2%, as it can be observed in table 2 (Paolli and Merllié, 2001). In 2005, the overall proportion of teleworkers in EU was about 7% of the employees (European Foundation for the Improvement of Living and Working Conditions, 2015)³.

² The European Working Conditions Survey measures only telework “from home”, while the European Framework Agreement covers workplaces away from the employer’s premises other than home as well. However, this slight difference in definition can be considered negligible, since evidence from other national or sectorial statistics shows that home is a workplace for the large majority of teleworkers.

³ For the cross-country comparison, the definition provided by European Foundation for the Improvement of Living and Working Conditions for teleworker is an employee working “with a personal computer (PC)” away from the employer’s premises at least a quarter of the time. This definition fulfills the criteria set out in the European

Table 2: Percentage of teleworkers in Europe

% work force	UK	L	FIN	NL	A	B	DK	S	E	F	IRL	D	EL	P	I	EU15
At least 25% time	10	9	8	7	6	6	6	5	4	4	4	4	2	2	2	5
All the time	2	3	1	1	3	2	1	1	3	2	1	0	1	1	0	1

Source: Paolli and Merllié, 2001

Teleworking is naturally more often found in some professions and usually associated with high qualified white collar jobs. In Europe, 15% of telework is done by managers and 12 % by professionals or specialists (for instances, statisticians or financial intermediates) at least in one quarter of their working time (Paolli and Merllié, 2001) as it is shown in table 3.

Table 3: Telework by profession in Europe

Percentage	At least 25% time	All the time
Managers	15	4
Professionals	12	3
Technicians	8	2
Clerks	4	1

Source: Paolli and Merllié, 2001

Nowadays it can be observed that working hours have extended into the evening and night and also to weekend days. So, working hours have become more flexible in a “24h Society”. The 3rd EU Survey on Working Condition showed that what is termed as normal working hours (meaning from 9h-18h on week days) have become the exception rather than the rule. Employed people on this traditional and rigid pattern of working hours represented only 27% of all the employed people in the survey. The analysis of the survey data shows a positive correlation between flexibility (under individual discretions and control) and better health

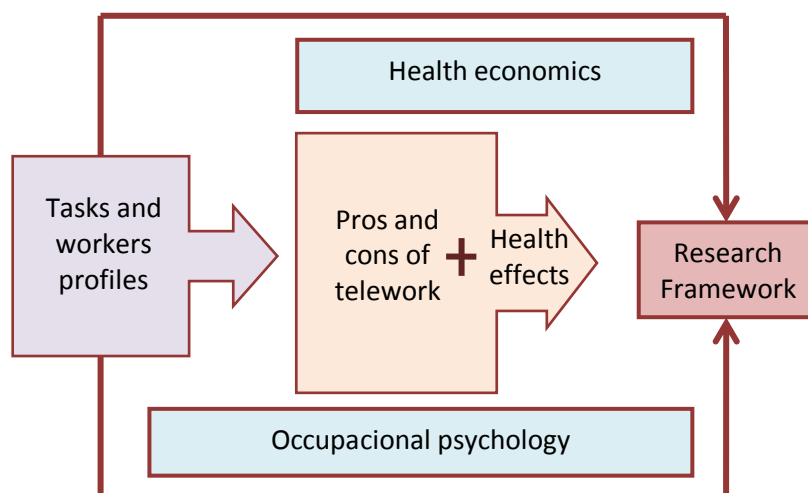
Framework Agreement’s definition, as it includes telework that is done slightly more than one day a week, on average (Available in Eurofound web page <http://www.eurofound.europa.eu/>).

outcomes. However, results also show that increasing working hours are associated with stress, fatigue, sleeping problems, and anxiety (Paolli and Merllié, 2001).

Therefore, telework generates a trade-off between the individual improvement of quality of life and the depreciation of the individual health. The analysis of this trade-off, in particular, of the health effects generated by telework, has been mainly a concern in psychology arena. But the health economics field also contributes to the explanation of the individual choices about work and its effect on health. So the next obvious step is to propose a framework of analysis that gathers contributions from the economics and psychology scientific arenas.

For this end, the main features of telework are revised and its associated trade-offs are described, in particular, the health effects on the worker. The telework tasks and jobs require a certain individual profile to be performed successfully. These individual characteristics are relevant as inputs in the research framework which sustains the study of the effect of telework on worker's health. Additionally, the characteristics of telework tasks and workers profiles contribute to the explanation of the advantages and disadvantages of telework to the worker, as well as to the particular effects of health. So the research framework proposed later on is based on the knowledge about the tasks and workers profiles, on the pros and cons of telework and also on the contributions coming from health economics and occupational psychology as shown in figure 1. This figure may be also viewed as the summary of this work.

Figure 1: The scheme of contributions



2. Telework features and teleworkers

Professions that rely on telephones, computers and other communication technology devices are strongly related with the potential performance by telework. Some professions have intrinsic features that make them more adapted to be performed by telework such as managing and specialized professionals. The tasks performed under a telework contract are usually described as follows (Doherty et al, 2000; Van Horn & Storen, 2000):

- information based and portable,
- require high level of concentration to be performed,
- offer a high degree of autonomy to be performed,
- can be planned in advance and performed at varying times of the day,
- creating, manipulating and disseminating information,
- result in measurable output such as written reports, statistical figures, software, etc.

This last characteristic plays an important role when contracts are designed between the firm and the worker. The sustaining theory that models the relationship between employee and employer is the well known “agency theory” which states that the alignment of interest between the two parts may be done by optimal contracts, which mostly depend on the performance of the employees (Gray, 1995; Eisenhardt, 1989)

The demanding characteristics of the tasks, which may be performed under telework, implies that not everyone is suitable to telework. Empirical evidence profiles the successful teleworker as someone who shows the following personal characteristics (Pyoria, 2011; Bailey & Kurland, 2002; Shilling, 1999):

- *Self-motivation*: skilled at setting routines and meeting deadlines.
- *High level of job knowledge and skills*: enough knowledge of their position to facilitate working and solving problems independently.

- *High performance*: solid performers, although it is important for some top performers to remain in the office at least part of the time to serve as mentors to co-workers.

- *Independence and confidence*: because of less exposition to supervision and feedback, individuals should have the ability to make independent decisions.

- *Comfort with solitude*: because of isolation feelings, individuals with lower need for social interaction are well suited for telecommuting arrangements.

- *Time management and organizational skills*: because of limited daily demands or check-ups, individuals should possess the ability to schedule and organize their work to meet deadlines.

- *Concentration*: highly focused and able to handle potential home distractions.

- *Strong communication skills*: greater efforts to stay in touch with managers and coworkers, providing them with necessary information and updates while working away from the office setting.

- *Trustworthiness and reliability*: individuals are accountable for getting the job done to the same extent as if they were being supervised in the office setting; mutual trust is an essential element of a telework arrangement.

These personal characteristics play a relevant role in the way people design strategies to deal with the obstacles of teleworking and perform the tasks, especially without damaging one's health.

3. Pros and cons of telework

The *advantages* and *disadvantages* of telework, from the teleworker perspective, have been identified by several authors (Sardeshmukh et al., 2012; Pyoria, 2011; Jones, 2010; McNall, 2010; Mann and Holdsworth, 2003; Hill et al., 2003; Montreuil and Lippel, 2003;

Baruch and Nicholson, 1997) and others have reviewed or listed them (Crawford et al.,2011; Butler et al., 2009; Bailey and Kurland, 2002; Baruch, 2000). These are summarized in table 4.

Table 4: Advantages and disadvantages of telework

Advantages	Disadvantages
Better balance of home and work life	Blurring of boundaries between work and home time and overwork
Increased flexibility and autonomy	<i>Presenteeism</i>
Reduction in commuting time	Social isolation
Increased productivity	Lack of support, inadequate equipment
Higher morale and job satisfaction	Career progression or promotions
Avoidance of office politics	Resentment from colleagues

Teleworkers spend less time travelling, commuting and away from home. For this reason they may use this time to be with the family and enjoy a better balance of home and work life. However, the blurring of boundaries between work and home time may create family conflict or prevent time to rest.

Homeworking increases flexibility and autonomy of people. Teleworkers can often choose the hours of work, enabling them to take advantage of off-peak hours in the supermarket, in the gym, in the administrative offices, to take advantage to work in their most productive time of the day, or even to accept another work. Nevertheless, homeworking is right next to the breakfast table and so teleworkers tend to work long and continuous hours and even when they are sick, this is called *presenteeism*. Working under an unhealthy state impacts in the speed and quality of the recovery and well-being of the worker but also in the quality of the work.

Teleworkers tend to be more productive than their counterparts in traditional offices because of fewer interruptions and distractions, longer working hours, better use of the high productive moments, flexibility when planning work schedules. Despite this potential for higher productivity, often teleworkers face lack of technical support and also inadequate equipment which prevents them to achieve the desired productivity. Nevertheless, this

disadvantage may be mitigated nowadays because internet runs in optical cables ensuring high speed and reliability. Additionally, the use of computer anti-virus prevents problems of work loss and the use of cloud computing system allows the share and use of software and files.

Higher morale and job satisfaction are common among teleworkers who tend to be highly motivated to prove that this choice is better and more successful. However, being away from the central office may have a negative impact on the career progression because they tend to be overcome by other workers who are better positioned for lobbying activities. However, the lobbying activities from some of the work colleagues happen no matter what, they are focused on their goals and lobbying is part of their tasks in the office.

Another advantage of homeworking is the avoidance of office politics. This politics is mainly about relationships for power, influence and careers; it is time and effort consuming activity. Some people may prefer to focus on performance and care less about office politics. The other side of this may be the social isolation that workers may feel because they spend long hours alone without social interaction and the resentment from the colleagues, who cannot or are not able to be home-workers.

The today communication technology based on high connectivity, easy and trustworthy information sharing, easy and cheap communication and on sophisticated computers and mobile phones makes social interaction and work outputs presentation easy, no matter where people are located (Pearce II, 2009). Therefore, from our perspective, the disadvantage of being absent of the main office is not really relevant nowadays.

4. Health issues associated with telework

Telework has recognized effects on health. The overall effect on health is neither well known nor consensual (Crawford et al., 2011; Steward, 2001). Most of empirical work shows positive and negative effects but it is scarce the analysis of the trade-offs associated with telework and its net benefits or net costs.

The methodological difficulty on measuring trade-offs makes it hard to deduce if telework benefits out-weigh the costs in workers' health. Nonetheless and apparently, there is sufficient evidence to infer that benefits are larger than the health problems. Observing the historical and statistical evolution of telework, which exists now for more than 40 years and continues to expand, it seems that telework generates a net benefit for individuals (and organizations). If telework was mainly resulting in negative impact on the health (and job satisfaction) of workers, then eventually they would lose the willingness to work remotely (Weinert et al, 2015) and telework would have tended to disappear.

As Michael Marmot (2013, p.1090) stated: "depriving people of control over their lives... is indeed damaging to their health", so it is likely that telework benefits health more than it damages because it contributes to peoples' ability to control life. In fact some evidence seems to favor the net benefits of telework in employees (Grant et al, 2013; Butler et al 2009; Casey and Grzywacz, 2008), in other words, "telecommuting is likely more good than bad for individual" (Gajendran and Harrison, 2007).

4.1 Identified health problems

The health problems associated with telework may be grouped into four categories: the musculoskeletal problems, isolation and depression, stress and overwork and others. These are next described in more detail.

Musculoskeletal problems

Working long hours with a computer, usually at home, is associated not only with a static and constraining posture, repetitive movements, extreme positions of the forearm and wrist but also with long periods of continuous work. These are risky behaviours that contribute to the development of musculoskeletal problems in the neck, shoulders, wrist, hand and lumbar regions (Skov et al 1996; Montreuil and Lippel, 2003; Crawford et al, 2011). Moreover, teleworkers do not socialize with colleagues and so they over-look health breaks important for

musculoskeletal relaxation and sit long hours without appropriate breaks (Sang et al., 2010; Budworth, 1999).

Isolation and depression

The nature of telework implies that teleworkers do not establish a social-work relationship with the colleagues, special those in the office. The condition of being far from the workplace joint with the long continuous working hours can induce feelings of solitude and isolation. (Crawford et al, 2011; Gajendranand Harrison, 2007; Mann and Holdsworth, 2003; Montreuil and Lippel, 2003; Bailey and Kurland, 2002; Borg and Kristensen, 1999). It has even been suggested that teleworkers should spend at least 20% of working time in the office to prevent feelings of isolation (Fairweather, 1999).

Stress and overwork

Today stress is strongly correlated with cardiovascular diseases, diabetes type 2 and poor mental health (particular depression), for this reason it captures full attention nowadays (Cohen et al., 2007).

Stress is an emotional response to pressure suffered from the context a person is living or working and for which she has no control. While the immediate effects of stress hormones may be beneficial, long term exposure to stress accommodates definitely the high level of hormones and so it generates a negative effect for the human body. Stress is caused by stressors and it is revealed by changes of physiological and psychological behavior. Stressors are triggers of stress and these include all influences (job related and non job related) that affect someone at work such as work tasks, deadlines, equipment, organizational and procedural regulations, spatio-temporal and physical conditions (Konradt et al., 2003).

Stress-response theory provides theoretical framework for the linkages between work flexibility (as in telework) and health (Rice, 2000). This flexibility includes the schedule and the location, which are the main characteristics of telework. The linkages between work flexibility

and health are mainly of twofold. On the one hand, flexibility reduces exposure to some stressors since workers are better able to control their lives, reduce family conflict and improve family-work balance. Moreover, telework flexibility provides resources to enable workers to respond to stressors and so to prevent negative impacts of stress in health (Casey and Grzywacz, 2008).

On the other hand, flexibility creates more stress due to family responsibilities, blurred frontier work-home life and family conflict (Standen et al 1999; Huws and Podro, 1995). Additionally, telework creates job stress related to factors such as overwork, short deadlines, intense long hours of work, inability of switch off and reduced time to rest (Hartig et al, 2007; Dmitrova, 2003; Mann and Holdsworth, 2003; Huws and Podro, 1995) and it is related to poor mental health, exhaustion and worst health status (Weinert et al., 2015; Sardeshmukh et al, 2012; Butler et al., 2009; Borg and Kristensen, 1999).

Other health problems

There are other health problems which may be identified and associated with flexible work conditions. These health problems include metabolic, cardiovascular, and gastrointestinal disorders. Metabolic disorders include hypertension, high cholesterol and fasting increasing glucose (Costa, 2010; Thomas and Ganster, 1995). Moreover, cancer is likely to be a negative effect of certain health unbalances created by work flexibility and women's reproduction function is also potentially affected (Costa, 2010).

4.2 Health benefits

Several health benefits are generated with telework for people choosing this alternative work arrangement.

Several empirical works have found positive and beneficial effects on tele-workers health. Benefits come from the lower stress (Konradt et al., 2003) of daily commuting home-work (Steward, 2001; Kurland and Bailey, 1999; Stephens and Szajna, 1998), greater schedule

flexibility and work-life balance (Bloom et al., 2015; Butler et al., 2009; Casey and Grzywacz, 2008; Mann and Holdsworth, 2003; Guimaraes and Dallow, 1999), higher life control and job satisfaction (Sardeshmukh et al., 2012; Wheatley, 2012; Madsen, 2011; Golden and Wiens-Tuers, 2006; Wilkes et al., 1994).

The effects on health outcomes as sickness and impairment seem to happen less with the choice of teleworking (Casey and Grzywacz, 2008). Moreover, working home provides an environment for higher concentration, less noise, less interruptions, more privacy (which often open-spaces destroy), better air quality (which may be dubious in the traditional office) which have contributes to the workers health (Montreuil and Lippel, 2003).

5. Frameworks of analysis of the effects of telework

The analyses of the effects of telework in health have been based mainly on occupational psychology frameworks. However, there is a well known economics framework which may also contribute to the studies in this area. In what follows, these frameworks are briefly described.

5.1 Health economics framework – Model of Grossman

Grossman model states that individuals have a certain stock of health, which is due to deteriorate overtime, but which can also be restored. For this aim, each person may invest in themselves and in their health, in order to rebuilt their health capital stock. So each individual decides the time allocation between leisure and work; the income allocation between health inputs and consumption goods; and the amount of investment in health. The payoff of the health investment is the healthy time that the individual can use to work and earn money, or to enjoy leisure (Grossman, 1972). The sustaining framework of the model is presented in figure 1 of the appendix.

Despite the contribution of Grossman model explaining the demand for health and the amount of time each person may choose to work, the model is highly formalized and it is not

able to provide information about the optimal time allocation of, for instances, 8 hour-work/day along the 24 hour day.

The empirical approach to Grossman model is usually done by econometrics methods. There are many studies estimating the Grossman demand for health. Gerdtham et al. (1999) provide a review on this empirical work and they present three possible estimation approaches. All of them share identical health inputs, such as age, gender, income, education and lifestyle.

Assuming that the choice of teleworking is freely done by the worker and that it brings him net benefits, then clearly the choice of the teleworker influences his health capital stock and so also the health status, as described previously.

5.2 Occupational psychology frameworks

In this section, some frameworks proposed in the occupational psychology arena are described to understand what are the links and relationships between health and teleworking.

The frameworks presented here were chosen because all of them are concerned with the effects of telework in health in different moments in time, allowing for some assessment of the historical evolution of the analysis. All the proposed frameworks place emphasis on a different aspect of the relationship between telework and health. While Standen et al. (1999) focus the environment and boundaries between home and work to explain the impact on the psychological well-being, De Croon et al. (2005) choose to focus the attention on the determinant factors related with the job conditions. Both Gajendran and Harrison (2007) and Maier et al. (2015) centre their attention on the stress factors that impact on health. However, only the work-home conflict is a common stressor between them two.

Despite the diversity of frameworks, all share some determinant factors that impact on the workers health. In particular, the work autonomy and isolation/work relationships are found in

all frameworks; the home/family-work conflict is in all frameworks, except in the proposal by De Croon et al..

5.2.1 Home-Work Environment framework

Warr model is based on studies of healthy psychosocial environments at home and in work context. It considers nine variables which create the links between well-being/health and work. These variables are: opportunity for control, opportunity for skill use, external generated goals, variety (tasks, location, skills use, roles, responsibilities), environmental clarity, availability of money, physical security, opportunity for interpersonal contact and valued social position (Warr, 1987).

Although this framework provides useful tool to study home-telework relationship, it is silent with respect to the relative weighting of each variable, the form of the relationship of each variable with one another and, finally, it does not account for individual differences and preferences (Standen et al., 1999).

Based on the proposal by Warr, Standen and his colleagues propose a conceptual framework for the analysis of the relationship between health and telework, which accounts for job and individual characteristics. The framework structure is presented in figure 2 in the appendix and it has been named Home-Work Environment framework. Despite trying to answer the criticism to Warr model, Standen et al framework omits the physiological and other general health effects that may emerge with telework.

5.2.2 Job Centred framework

De Croon et al. (2005) propose a conceptual model to analyse the effect of office-work in health and performance in a systematic review. This framework defines that there are two basic foundations for the effects of the telework, which are the office concepts and the work conditions. The office concepts accounts for the office location, lay-out and office use. The work conditions include workload, working hours, work autonomy, privacy and interpersonal

relations and also it is influenced by the office conditions. Thus, in general, the impacts on health come from the job conditions and for this reason this framework is referred as Job Centred.

The short term effects of the job conditions (office and work) are physiological and psychological such as job satisfaction and stress. It is within the long term reactions that the health effect is considered (in particular, chronic fatigue, burnout and musculoskeletal disorders). The proposed framework is presented in figure 3 in the appendix.

Despite considering the health effects on the framework, De Croon and colleagues excluded the individual characteristics as a relevant component in the analysis. This additional

5.2.3 Psychological Mediators Centred framework

Gajendran and Harrison (2007) try to solve what they called *telecommuting paradox* by doing a meta-analysis. This paradox emerges because telework is supposed to enhance perceived autonomy and lower work-family conflict which in turn would improve performance, job related attitudes and reduce stress; on the other hand, telework damages work relationships and career and so telework reduces job satisfaction and performance. In order to solve this paradox, the authors present a framework of analysis which is based on three pillars: structural moderator and psychological mediators are determinants of the third pillar, the individual outcomes. Because the determinants factors influencing health are on the psychological pillar this framework is named Psychological Mediators Centred framework. It is presented in figure 4 in the appendix.

The main criticism here is that individual health outcomes are not considered. The framework only accounts for stress outcome, when in fact the health outcomes are several, and they deserve their own component in the individual outcomes. (This is included in figure 4).

5.2.4 Stressor Centred framework

The work presented by Maier et al (2015) sustains that individuals and their environment are in balance, and this balance happens when values and abilities meet the supplies and demands of the environment, otherwise the balance is disrupted. This framework of analysis is based on three layer sequential components: characteristics, stressors and strains. The characteristics are situational factors, such as context, task or role-related, which act independently as a source of stress. The characteristics lead to stressors, which are stimuli or actions encountered by the individual. The stressors, on their turn, may produce strains, that is, reactions towards the stressors. Strains may be psychological, as exhaustion, or behavioral, such as turnover intention.

In order to apply this framework, the authors created a set of constructs which are measured using reflective indicators as presented in figure 5 in the appendix. The set of constructs enable to capture and measure each of the three components as it follows:

- i) Characteristics which includes information undersupply, autonomy, isolation;
- ii) Stressors which accounts for work overload, work-home conflict, role ambiguity; and
- iii) Strains which are exhaustion and turnover intention (intention to continue telework).

Despite the detailed analysis of the factors account for the balance between individuals and their environment, does not capture the fundamental aspect of the effects of telework in health since the only health aspect which is taken into account is exhaustion.

5.3 A research framework proposal

Occupational psychology has provided relevant insights about the relationship between telework and health. In particular, it finds links between the job/work conditions, the family life and the stress which may impact on workers' health. On the other hand, health economics

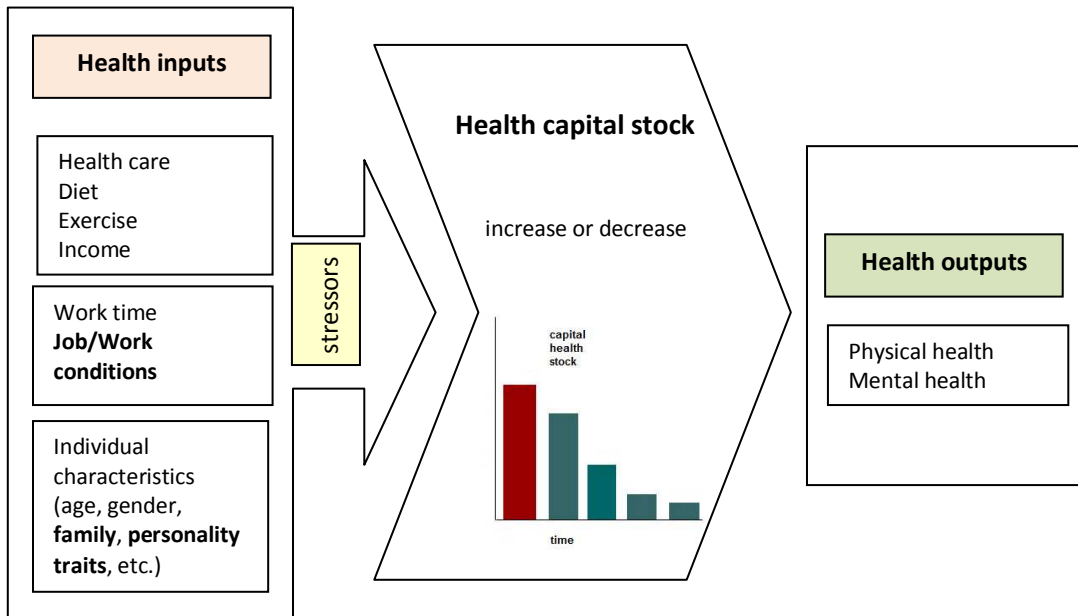
provides the Grossman model of health demand which explains the individual decisions about working time which impact in his health status and capital.

Bringing together the contributions from the psychology and economics arena, it is proposed a more general framework which is represented in figure 4. The extension of the Grossman model begins with the inclusion of more health inputs such as factors of work conditions (where, when and how) and family conditions (type of family, balance of work-family life). In this way the key determinant factors of telework, described before and which impact on health, can be formally captured. These additional health inputs trigger the stressors which necessarily get to be reflected in the health capital stock and so in the health outputs. The health outputs now may include musculoskeletal problems, depression, stress and other.

The novelty of this extended Grossman framework comes from the joint efforts from different scientific areas to explain an observable socio-economic phenomenon. The main contribution comes from the strong theoretical background that supports the potential empirical analysis.

This empirical work has to be based on micro-data, or individual related data, obtained by questionnaires or surveys. The aggregated data does not allow capturing the key determinant factors of telework that impact health. This type of empirical analysis admits the estimation of the variation (and the elasticity) of determinant factors, such as work autonomy, isolation and family influence, on the individuals' health. Hence, it may be possible to identify the stronger and weaker influencing factor and then deduce policy suggestions to human resources management.

Figure 4: Extended Grossman Framework



The work presented by Butler et al (2009) adopts an empirical approach close to the proposed model here but Grossman work is not cited, most likely because of its nature. They use a simple linear framework for the analysis of the effects of job flexibility in health (output) captured by self-reported stress, physical health and strain. The health inputs considered are age, race, family and the work flexibility. The sample is obtained from the Health Risk Appraisals forms filled by workers in a large multinational pharmaceutical company in the US. The most important result of this work points at that the lack of work control is linked to poorer health status while flexibility enhances individual self-reported health and this may contribute to a human resource policy suggestion.

6) Conclusion and future research

Telework is a flexible work arrangement which has been increasingly more adopted worldwide. Workers seem to be willing to choose this form of work since it improves working and social life by decreasing work constraints and allowing for gains in autonomy over one's own affairs. Telework has become a working solution for the needs of people in different

moments in life such as study time, family, aging or simple matching their individual preferences because it allows for decision when and where to work.

Telework tasks have particular features which demand certain traits of personality, so that the job is done successfully. Moreover, these features contribute to the definition of the advantages and disadvantages, in particular of the health effects, of doing a job under telework conditions. Workers face a trade-off between the benefits and the costs of doing telework. There is a general view that the telework results in a net benefit for the worker and in a positive effect on his health. This is so mainly because of less stress and a more balanced work-family life. This trend in the empirical evidence may be more significant nowadays. The reason for this trend may arise due to some of the potential disadvantages of telework, mainly related with the absence of workers from main office. These disadvantages are strongly mitigated with the sophisticated technology of communication which exists nowadays.

There are two main strands researching the effects of telework in health: health economics and occupational psychology. To reconcile these two perspectives is the main aim of this work. It is proposed an extension the Grossman model of demand for health. This is a theoretical proposal which has implications on the empirical work. The health inputs provided by psychology analysis such as the job conditions and family conditions are additionally included in the framework. The health outputs now account for the health issues arising with telework, such as depression.

The contribution of this extended Grossman model comes from the strong theoretical background that supports the empirical analysis about an observable socio-economic phenomenon and the possibility to draw policy suggestions to health resource managers.

Future research may continue the analysis of the effects of telework on and on health utilization. Again based on the Grossman model, it is expected that teleworkers will use more health services than the workers in the fixed office.

Another line of future research may focus, firstly, on the relationship between the worker personality traits and the health outcomes and, secondly, between the workers performance and health outcomes, particularly, those associated with depression and stress.

Finally, future research is needed to re-assess the relevance of some telework disadvantages and health effects associated with isolation and lack of social interaction because nowadays communication technology is based on high connectivity, easy and trustworthy information sharing, easy and cheap communication and on sophisticated computers and mobile phones.

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APPENDIX

Figure 1: Grossman Model

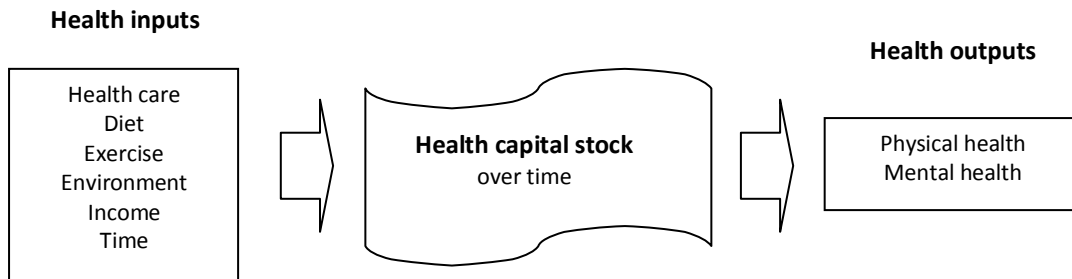


Figure 2: Home-Work Environment framework

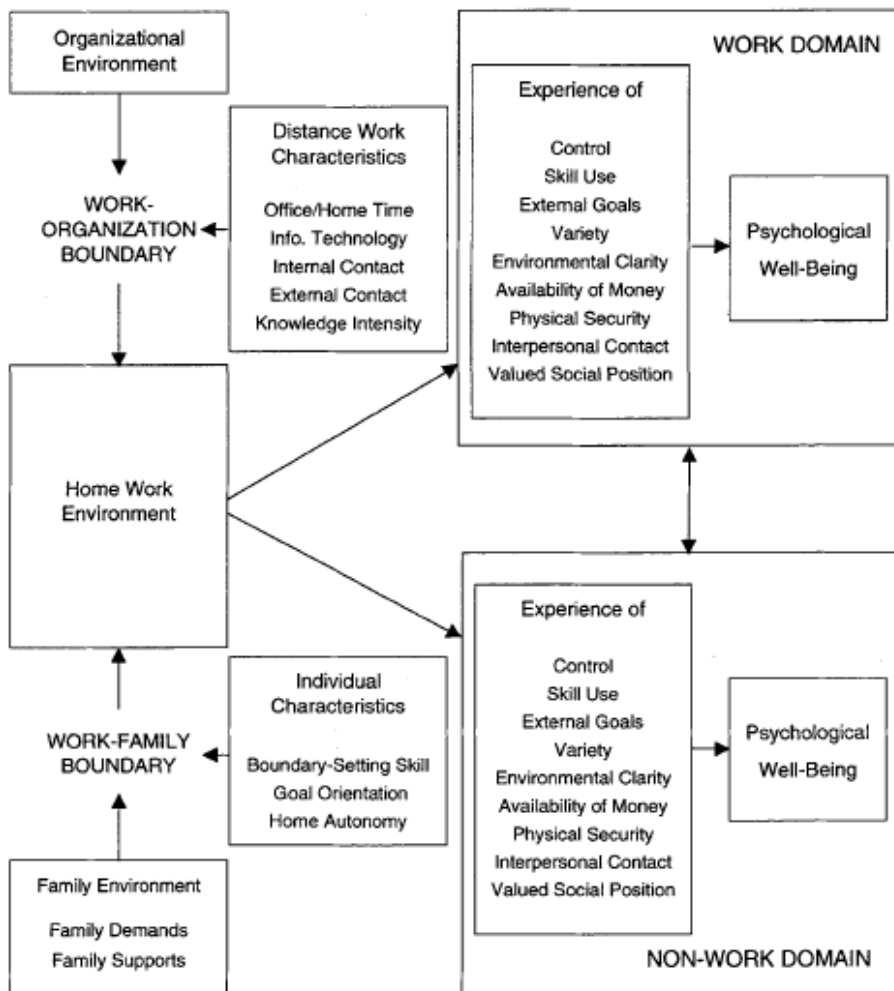


Figure 3 : Job Centred framework

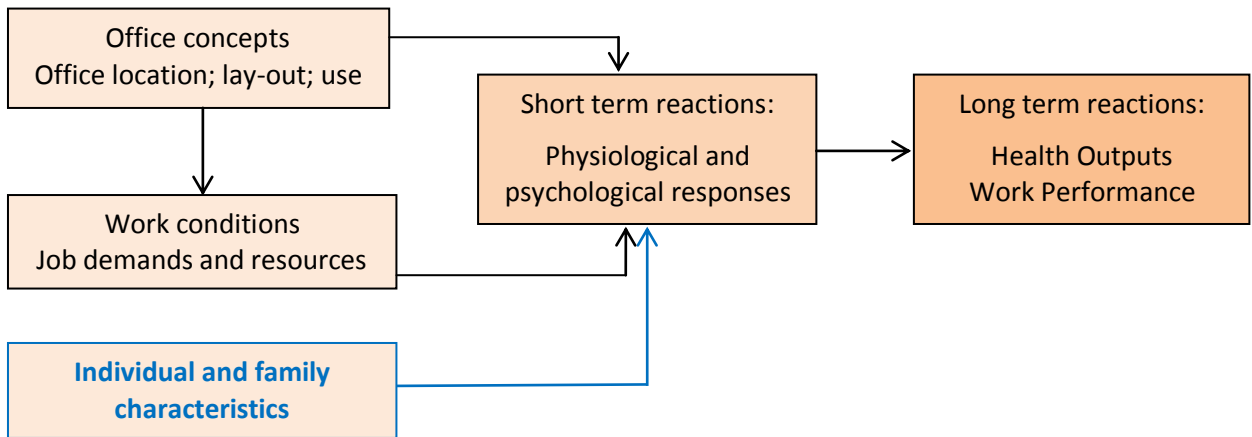


Figure 4: Psychological Mediators Centred framework

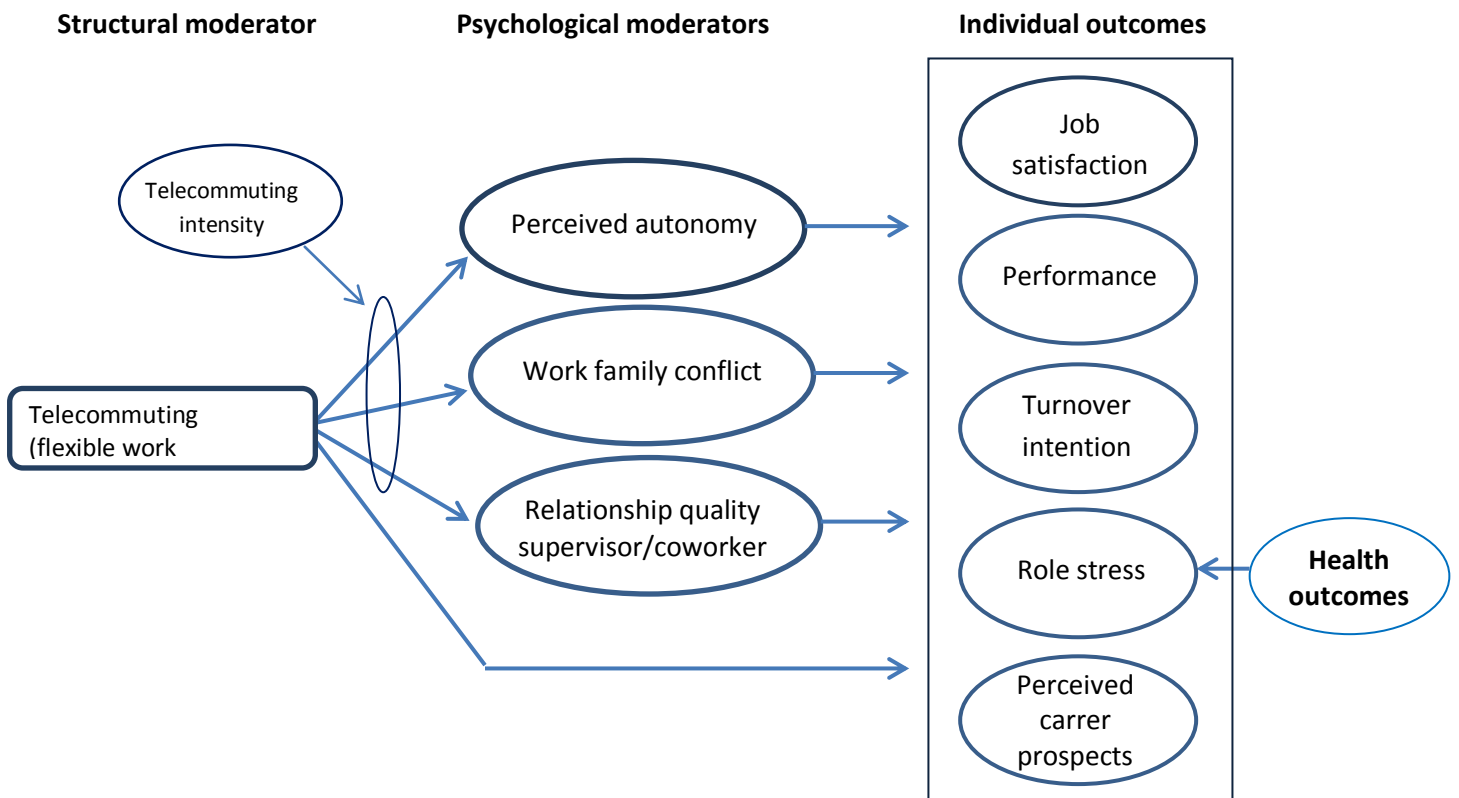


Figure 5: Stressor Centred framework

