Facultad de Medicina
Carrera de Kinesiología
Magister en Terapia Física y Rehabilitación

EVIDENCE-BASED STRATEGIES AND INTERVENTIONS TO PROMOTE THE HEALTH OF WORKERS TELEWORKING FROM HOME: SCOPING REVIEW

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Actividad de grado presentada a la Facultad de Medicina de la Universidad del Desarrollo para optar al grado académico de Magister en Terapia Física y Rehabilitación-MAKI

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NOVIEMBRE 2022
SANTIAGO

ACKNOWLEDGMENTS

I would like to thank all the people who collaborated with this work, Sonia Roa and Sara Ramos for accompanying me in the different stages of this research, Marco Leppe for contributing his knowledge from the beginning of the master's degree and the project itself, the librarian Rossana Beggini and all the authors who kindly sent us their articles.

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BACKGROUND

In this "new era" numerous companies chose to continue in teleworking mode for non-COVID-19 reasons, since it proved to be a highly viable option, but that in turn, it could also provide more health risks. Evidence on interventions and strategies to promote health in teleworkers is limited and poorly understood.

Objective: To map the strategies and interventions that promote health during telework present in the literature.

Methods: Through an exploratory review, scientific databases were searched to find articles that presented a strategy or an intervention that could improve the health of teleworkers. Two review authors independently applied the selection criteria and extracted information systematically. Data were extracted and synthesized in a narrative format.

Results: The search produced 15 relevant articles. Interventions and strategies focused on promoting the physical and mental well-being and health security of teleworkers, mostly in the context of a pandemic. We found a large heterogeneity of types of interventions, strategies, and study designs, mainly were non-intervention studies. Deployment barriers and enablers include challenges in the respect workstation.

Conclusion: Companies should aim to improve the experience of teleworking, considering the environment and organizational aspects, and then establish health promotion activities. However, there is a lack of studies that focus on other health matters, multicomponent interventions that include organizational strategies.
Keywords: teleworking, well-being, working from home

Evidence-based strategies and interventions to promote the health of workers teleworking from home: Scoping review

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INTRODUCTION

Workplaces affect the physical, mental, economic, and social well-being of workers and, in turn, the health of their families, communities, and society. It offers an ideal environment and infrastructure to support the health promotion of a large audience. Workplaces have changed considerably in recent decades, not only with automation, but also with the increase of different forms of work, such as teleworking. This modality increased abruptly after the appearance of the COVID-19 pandemic worldwide In Chile, according to the report of the National Institute of Statistics (INE), until 2021, 17.5% of workers carried out remote work or under the modality of teleworking [1] and it is expected that also, after the pandemic, people will continue to work from home more frequently.[2]

To date, there is no standard definition for teleworking (TT), as illustrated by the range of different terms used, such as working from anywhere, telecommuting, working from home, mobile working, off-site work, remote working, etc. Telework or remote work can be defined as 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 employers premises, is carried out away from those premises on a regular basis [3]

Although many companies have switched to TT, this certainly does not mean that this switch was successful or that the conditions of working from home were conducive to good health [4]. Among the benefits of TT that have been reported in the literature are: increased productivity due to reduced travel time, greater flexibility of schedule, reduction of sick days, cost savings and job satisfaction. On the other hand, negative aspects of teleworking have been reported, which are associated with changes in lifestyles predisposing teleworkers to multiple health risk factors, such as increased sedentary behavior, poor eating habits, sleep problems, musculoskeletal disorders and mental disorders associated with the loss of boundaries between work and home, virtual presenteeism, social isolation. [5,6,7]. Therefore, to counteract the negative effects of TT that can put health at risk, it is necessary to increase the proportion of protective factors of this population by promoting health in the workplace. This encompasses all activities that enable workers and the company as a whole to reduce poor health and promote well-being. [8] These activities or actions in health can be identified within the empirical evidence as strategies and interventions. An “intervention” is defined as an intervention that comprises an action or program that aims to achieve identifiable results” [9] On the contrary, a strategy is a plan, a kind of consciously planned course of action, a guide (or a set of guidelines) to deal with a situation. [10]

Researchers have currently examined various interventions to promote health in workplaces in different settings and/or populations [11,12,13], but even the quality and quantity of research is lower in interventions related to TT. Health-related telework studies up to 2022 mainly focus on studying the impact, effects of telework on health and/or productivity [14,15,16,17]. On the other hand, there are manuals, good guides and practical recommendations for teleworking that provide guidelines from a multidimensional perspective, support for healthy teleworking. These mainly provide considerations for their implementation, together with guidelines and strategies that can help address health-related problems. To date, strategies and irruptions have not been deepened, nor have specialized guides or manuals been created on these topics.

Therefore, the evidence regarding strategies and interventions that can be applied in this context is poorly understood, likewise, the main barriers and facilitators at the time of their implementation have not been identified, taking into account the challenges that could present the implementation of an intervention outside a conventional workplace, such as the dispersion and remoteness of workers from their workplaces and that in many cases mixes environments that are shared from the family-domestic environment. The overall objective of this study is to map the strategies and interventions that promote health during teleworking present in the literature. To answer the general objective of this study, the following specific objectives are taken into account: a) Identify and describe interventions and

strategies to improve health in teleworkers b) Identify barriers and facilitators for the implementation of health interventions in teleworking

The result of this review is a synthesis of knowledge based on evidence, where a pool of considerations for the design of interventions in teleworking environments from home will be delivered, as well as the survey of strategies and/or interventions that can give an approximation of the solution to the problems found in the different workplaces. This will be useful to create work or action plans and the design and implementation of interventions by employers or employees, preventionists, human resources and those in charge of promoting health and also collaborate with the development of healthy telework programs in future studies.

METHOD

A scoping review will be carried out to identify the health interventions and strategies studied in teleworkers. We chose a scoping review method rather than a systematic review, as our aim will be to answer the research question in a comprehensive manner rather than assessing the quality of interventions. Arksey & O'Malley's five-stage scoping review framework was used [18].

Identify of research questions

RQ 1. What are the interventions and strategies to improve the health of teleworkers reported in the literature? RQ 2. What are the barriers and facilitators for the implementation of health interventions in telework?

Identify of relevant studies

A previous iterative process was carried out where different search strategies were developed with the purpose of to capture the studies sensitively and accurately. They were used terms related to teleworking, remote work, flexible working (Population) strategy, programme, policy, intervention, innovation (Intervention) health, well-being (Result). Complementary, ror the formulation of the strategy, He leaned similar studies in methodological terms (scoping reviews that explored strategies and interventions) and finally were reviewed and approved by a university librarian R.B of Universidad del Desarrollo, Concepcion, Chile.

Systematic searches were conducted in the databases Pubmed, Web of Science, CINAHL plus. These databases were chosen for their wide coverage in health areas from different perspectives. Which an iterative search was previously performed in each of the bases to determine the search strategy. Free and controlled vocabulary was used using MeSH terms (Supplemental material 1). Two manual searches were carried out in the publisher Multidisciplinary Digital

Publishing Institute (MDPI) and another article by snowball (Supplemental material 2).

Selection of studies: inclusion and exclusion criteria

The Rayyan web tool was used for the selection of studies and deduplication. The RF and SR researchers carried out three progressive filters to select the studies: Title, abstract and full text where the methodology of "include rather than exclude" will be used. Discrepancies will be resolved through a third investigator. For the full-text screening stage, 50% of the articles were peer-reviewed. This stage was reported using the PRISMA flowchart (Figure 1). It was filtered by English and Spanish language published from January 2000 onwards, since from that date it was the appearance of digital Internet and broadband facilitating teleworking. To ensure a broad capture of the literature, the study design was not restricted.

The following inclusion criteria based on the components of the PCC method shall be used.

Population: Workers over 18 years of age who work in teleworking mode (flexible work, remote work, remote work, flexible arrangement) from their places of residence (homes) belonging to any economic item. Concept: (intervention): Studies that involve any type of strategy and / or intervention to promote health, understood as a strategy any action that has been exercised or implemented and / or suggested by experts or researchers. Whether it is an intervention, and / or

application of a program and / or management / policy that aims to improve and / or promote general health during teleworking

For this study, the main difference between an intervention and a strategy is the performance of the measurement(s) of the variable(s) during the study.

Context: Since a scoping review is designed to cover a broad spectrum of literature, there will be no restrictions as to the type of studies to be included in this review.

We excluded articles that studied the effect or impact of teleworking alone without an aggregate exposure or intervention (telework is not the intervention of this study). Articles on telemedicine or remote health, population children (under 18 years) and older people (over 70 years) and special populations (with some specific condition) either chronic disability, pregnancy or lactation period.

In summary, to facilitate this process, the following questions were established to select the studies:

1. Does the article identify any strategy or intervention that promotes overall health and/or well-being by presenting an identifiable outcome(s)?
2. Is the article focused on the teleworking population?
3. Does the article partially describe and/or detail the strategy or intervention?

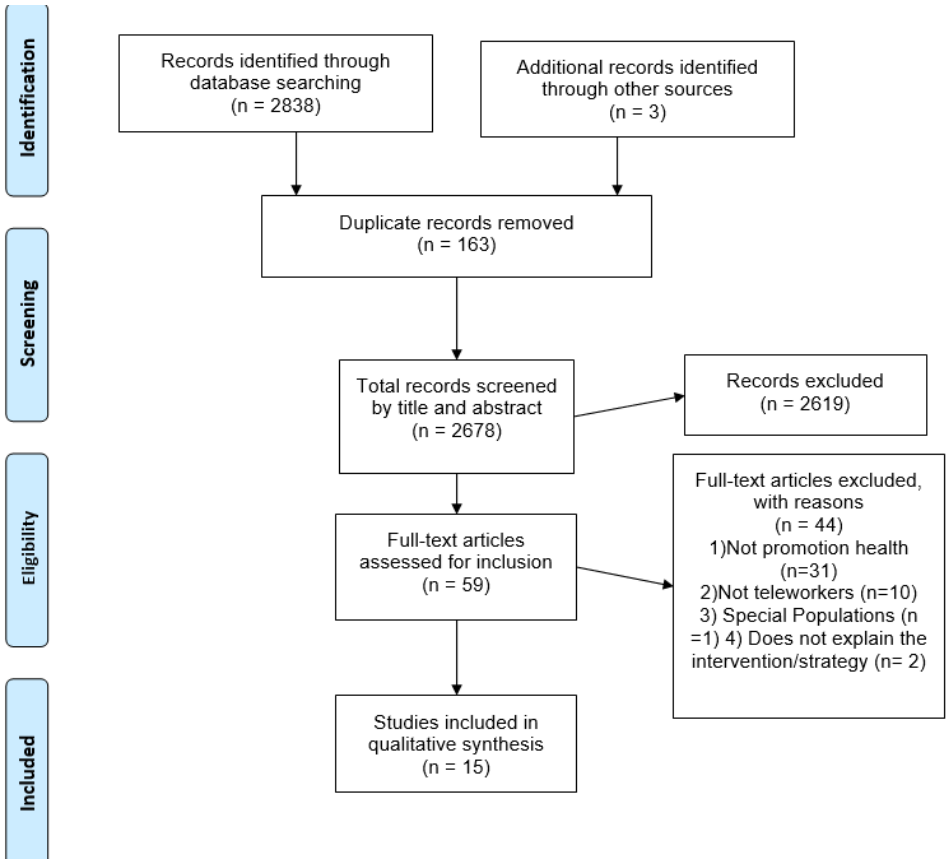

Figure 1. PRISMA 2009 flow diagram

DATA ANALYSIS

Graph data, collect, summarize, and report results

After reviewing the full text of the articles qualified for the study, in an Excel spreadsheet we extracted data on: bibliometric variables authors, source or journal, year, country study design, objective (s) and on the variables of interest: name of intervention or strategy, characteristics of the participants and sample size, action detail (intervention or strategy), mode of delivery, measures or

indicators, main results or relevant findings, facilitator/barrier of implementation of the action What facilitator or barrier was found during the implementation of the intervention (not of the study)?

Data collected from the selected studies were synthesized in a logical and descriptive order aligned with the study questions. According to the methodology described by Arksey and O'Malley. The extraction and synthesis of the data will be an iterative process that will depend on the literature found. [15] The results were presented in a descriptive abstract, using tables and narrative synthesis grouped by similar results and their main findings. As well as an analysis of the bibliometric variables with respect to the countries of origin and the study designs.

RESULTS

Study characteristics

Following a comprehensive review of 2678 titles, 15 articles were included in this review. Of the publications examined, a wide variability of research designs was found. 6 were experimental studies (RCT=3) [pilot RCTs=2) and 12 non-experimental articles in more review articles (n=4) and grey literature (n=4). 13 of the 15 articles were published between 2020 and 2022. Most of this research comes from the North American continent (n=6) and European countries (n=5)

such as England, Spain, Germany. 2 articles from Central America and 2 articles from Asia. All the publications included focused on improving the health of people who telework from home. The studies that presented intervention used a mixed gender sample, where 3 articles the predominant sample were women and the predominant labor sectors corresponded to office jobs, including administrative, employees of federal agencies, financial, ICT professionals. Except for 2 articles that included university professors (Table 1).

Of the 15 articles, 8 articles their interventions and/or strategies mentioned the mode of delivery. 6 articles used virtual media (zoom, Microsoft teams, web pages and online platforms) and less frequently mixed media, which includes virtual and modifications in the environment (n = 1) and a single group face-to-face activity for the development of coping strategies (n = 1).

We identified interventions and strategies focused on improving mental, physical, mixed health and health security (Table 2). We did not identify studies that addressed topics such as sleep hygiene, nutrition, alcohol, smoking and drug consumption and interventions that were multicomponent (more three different interventions) and 8 investigations mention within their titles "during the pandemic"

Mental well-being

Interventions and strategies focusing on mental well-being outcomes were the most frequent in the literature, described in 10 sources. These interventions and intervention proposals included Yoga [19,21], Mindfullness [32,25], behavioral interventions such as behavior change techniques, including goal settings, problem solving, self-control, social support and habit formation [23], education through RRSS modules on recognition of symptoms related to mental health [24] , leisure development [30], coping techniques through health circles [29] and teleworking collaborative [31]. The main results of these studies alluded to stress [19,23,24,29,32] and mood [21,23,24]

Physical well-being

For the promotion of physical well-being, it was clearly identified in 7 articles that included work gymnastics [33], A postural recommendation system [20], yoga (Vinyasa Yoga) [21] personalized exercise advice [28], collaborative telework [30], RRSS media for maintaining Good physical health were identified:, PA modelling and environmental restructuring such as sit–stand or active workstations, smartphone application-based cues and prompts for exercises [24]. Implementation of adjustable desk, behavioral intervention that incorporated behavioral changes based on cognitive theory to promote changes in sedentary behavior and physical activity [27]. Overall, overall results on physical health were presented and 2 studies presented results on musculoskeletal discomfort [24,21].

Health safety

A number of 4 articles presented topics on safety, health and well-being, 2 of them corresponded to ergonomics: ergonomics training programme [22], evaluation of the workstation at home and recommendations suggested for example through photographs [27], remote audits for the evaluation, control or monitoring of any strategy or intervention implemented [34], organizational strategies through safety leadership, boundary management such as the development of organizational policies to support work and family to manage role boundaries and finally integrate and strengthen personal interactions and interdependence [26].

Facilitators and Implementation Barriers

The barriers and facilitators of the implementation of the interventions were obtained exclusively from the 3 clinical trials and 1 experience report detailed below.

In a Zoom Intervention of Yoga, participants appreciated the convenience of the program being taught online: the benefits of not having to travel and practice from the comfort of their home; the online links are easily accessible and your surprise to be able to accommodate several classes each week as well as the flexibility of

the class schedule that was offered throughout the week, which made it easier to attend the recommended number of classes. Moreover, participants reported a variety of challenges, including personal challenges (difficulty keeping eyes closed), program-specific (slow and repetitive movements are frustrating), technology-related (internet and connection issues), and platform-specific challenges (limitation of not adjusting in pose or lack of a sense of social connection due to online delivery mode).

The three limitations of an online yoga intervention identified in this research were technology-related problems (connectivity), lack of social connection (only two participants), and absence of physical adjustment by the instructor, consistent with previous findings [19].

In a software ergonomics training, participants who completed an evaluation form said they would recommend the program to other telecommuters, that the program information interested them personally, and that the computers were easy to use for training. An 85% percent said they would like to use a computer for future training courses. In addition, participants made positive feedback in the course evaluation regarding the use of computer-based training, including the ability to advance through the materials at their own pace, the ability to complete the training at their convenience, and the ability to complete the training in their home offices. [22]

Among the barriers of a Virtual Yoga Intervention through a Web Platform, it was found that the recommendations to perform yoga exercises during work periods could not be controlled. Therefore, it is possible that some participants will wait until the end of the day to attend to the routine, which may have been less efficient than interruptions of ongoing work activities [21].

A social media-based intervention found poor end-user engagement with Facebook sessions despite weekly reminders from the lead researcher. This explained in this article may be due to the lack of functions, such as the low participation of colleagues in the challenges, the access support network, the lack of gamification, pushing and personalization [24].

An online work gymnastics intervention experience via microsoft teams reported that being remote, there was greater voluntary adherence by employees, thus contributing to the expansion of the scope of the actions and the number of participants. This method was positively valued by all involved. Delivering benefits in terms of viability, saving resources, extending the scope of actions and increasing the number of employees involved which improves the adherence of workers to health promotion programs. [33]

DISCUSSION

As far as we know, this is the first scoping review that seeks to identify strategies and interventions that could promote the health of teleworkers with a particular interest in describing them and identifying potential barriers and facilitators to their implementation. In general, there is still limited research targeting teleworkers. The first intervention was performed in 2004, after that no other intervention was found until the pandemic exploded and new studies began to be carried out. Most of the studies focused on improving mental health outcomes (n=10) and at the same time had under a pandemic approach (n=7) Mental health symptoms in teleworking, to date have been considerably higher studied over other outcomes, which have been demonstrated in 2 reviews [14,17], which may explain, the existence of a greater number of strategies or interventions in response to the need.

On the other hand, the interventions were heterogeneous in terms of type, the most frequent and similar to each other were the practices of disciplines, which correspond to Yoga and Mindfulness. These can be promising techniques to ensure the psychological well-being of teleworkers and even more so when facing crisis situations, such as the pandemic. [35,36]

Virtual media were the most frequent channels among studies with any intervention (n=7), but live on-streaming interventions were found in only 2 studies, which included yoga and work gymnastics sessions. The latter was an experience report, which did not report specific measures. In a recent quasi-experimental study of on-streaming work gymnastics for computer workers

evaluated the general state of health where effects were found in the domains pain, physical function, physical performance, and emotional performance. On the other hand, this same study revealed that, although this population did not perform teleworking mostly (which is not included in this study), it reported that good environmental working conditions directly influence the quality of life. The company had a good working environment: good lighting and low noise, adapted to the needs of each worker, two factors considered protective for the prevention of chronic diseases [37]. Therefore, the results in teleworking interventions may be influenced by environmental considerations specific to the place. This emphasizes the importance of considering beyond the workstation configuration, the environmental context that means work from home as well as gender differences [38,39]. The study by Mojtahedzadeh N et al. concludes that the important components of a health-promoting work design are temporary separation, spatial and mental work and private life [40].

The design of healthy jobs also includes the incorporation of organizational strategies, in the present investigation only 2 studies were found that included organizational aspects corresponding to collaborative teleworking and strategies in relation to leadership, limit management and work redesign that were studied in a literature review. Other dimensions that can contribute to the ability of the teleworker to maintain good health associated with challenges of reconciling personal and work life, is gender equity, and the right to disconnect, productivity management and the communication [41].

On the other hand, the intervention studies were considerably smaller than the non-intervention studies, so in a conference article, he explains that teleworking as a "promoter in itself" has not been sufficiently considered in the sense of comprehensive health promotion and has not been implemented accordingly. Implementation in this comprehensive sense depends largely on the health-promoting business structures, WHP norms/culture and the scope of action (convictions and possibilities of control) of internal decision-makers [41].

General considerations for the design and implementation of interventions in remote environments based on the characteristics of the studies analyzed

- Content delivery: Web platforms must modify or update the content weekly, and if it is online streaming they must adjust to as many schedules as possible (flexible schedules) and the instructions by the instructor must be very clear.
- Interaction between participants: Those virtual interventions are of a group nature does not guarantee interaction between workers. Teleworkers are under an isolated context (away from their co-workers physically) therefore interaction must be made between participants either chats or forums where they can interact between the team and those in charge of the interventions to achieve motivation also towards the other colleagues and share the achievements.

- User participation in the design: Adherence not only depends on the flexibility of time to participate, but also the active participation of co-design and co-adaptation is crucial, since it is essential to develop the autonomy and responsibility of the user with respect to their own state of health and develop solutions centered on the person (customization).

  ● Practical tools: The unique nature of the environment and the characteristics of employee groups must be taken into account [42]. To evaluate and collect information about the group of subjects, health circles, remote audits and ergonomic evaluations through photographs can be successful tools for gathering information and recognizing problems related to the health of the teleworker
- Ergonomic aspects of the teleworker: Although no related barriers were found in the included studies related to the environment, it is essential to recognize environmental challenges such as lighting, noise, distractions, presence of children and the workstation itself. It should be ensured that all teleworkers have the right furniture for a workstation, good internet connection, appropriate equipment with appropriate elements such as webcam, microphone. Basically, not having limitations about technologies, knowledge, and equipment

Limitations and future directions

Our exhaustive search only focused on finding articles that included a health intervention or strategy, without considering the policies, internal regulations and recommendations of telework and health of each country. While most of the studies belong to Europe and North America. It would be of great interest to include guides of recommendations and / or guides of good practices of the nations themselves and guidelines which could contribute in the design of interventions and strategies based on the national situation, since this review only provides general considerations, as well as considering existing studies on virtual interventions and / or through the use of ICTs to promote health, since they could be useful within this theme.

On the other hand, the experimental studies that were found were scarce, which limits identifying common characteristics in the detail of the interventions, for example to determine parameters such as dosage. More mixed studies are also needed if we are to identify barriers and facilitators more accurately in these settings.

The studies found were of short duration, small populations, although effectiveness was not the purpose of this study, but given this requirement, more interventions are needed with random allocation with larger samples and , that contemplate different outcomes, in addition to physical and mental health. Considering the impact of characteristics such as, for example, gender and family situation, specific characteristics of teleworking. Even the road is long and still needs to be explored

On the other hand, most of the studies emerged in times of pandemic, we do not know if the design was exclusive or suitable for teleworking thinking about confinement. Under this same premise, the results of these studies could not be extrapolated or generalizable, given that the course of the pandemic conditions are in a constant change.

Therefore, in future interventions in this "new era", they could use teleworking as a channel for the promotion of healthy activities outside home environments or implement semi-face-to-face (hybrid) interventions for example physical activities in the office and in teleworking mode from home and also interventions at the organizational level such as workshops on self-management and time management, virtual and hybrid cooperation or 'remote direction and leadership'.

CONCLUSION

Each workplace has its own needs in terms of health-related problems, the experience of teleworking is the first step to make improvements, which include addressing both environmental and organizational challenges, for example by establishing policies and formal agreements, and then establishing health promotion activities. This pool of activities can provide an approach to possible interventions and strategies to be implemented. Although, the main results were related to mental health in the first place and physical health, there is a lack of intervention studies where they focus on other health issues such as nutrition,

sleep hygiene, tobacco consumption, alcohol and multicomponent interventions and organizational strategies.

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Exhibit

Supplementary Material 1. Search strategy carried out in scientific databases

Data Base	Search terms	Results
Pubmed (13/01/22)	(teleworking [MeSH Terms] OR telework [Text Word] OR Working Remote OR Telecommuting OR Workplace Flexible) AND (intervention OR innovation OR strategies OR program OR policy AND Education OR Support OR Promote OR Health Education [Mesh] OR Health Promotion [Mesh] OR Health Policy [Mesh] Wellness Program OR interventions wellness OR Campaigns OR Health OR well-being OR Promotional Items)	2,461
CINHAL Plus Full text (13/01/22)	(telework OR Working Remote OR Telecommuting OR Workplace Flexible work from home) AND (intervention OR policy OR program OR education OR promote)	302
Web of Science (13/01/22)	TOPIC=(telework OR Telecommute) AND ALL=(intervention OR innovation OR strategies OR program) AND ALL=(health or well-being)	86

Supplementary Material 2. Articles from other sources

Source	Title
MDPI (19/06/22)	Healthy Teleworking: Towards Personalized Exercise Recommendations
MDPI (19/06/22)	A Deep-Learning Based Posture Detection System for Preventing Telework-Related Musculoskeletal Disorders
International Journal of Environmental Research and Public Health (01/07/22)	Effects of Sedentary Behavior Interventions on Mental Well-Being and Work Performance While Working from Home during the COVID-19 Pandemic: A Pilot Randomized Controlled Trial

Table 1. Sumammary of study

Reference	Author	Source	Country	Design	Aim	Type	Sample characteristics	Outcomes/Indicator
19	Wadhen et al (2021)	Work	England	RCT (pilot)	To investigate the feasibility and outcome of an online-transmitted yoga intervention on the stress and well-being of people working from home during COVID-19.	Yoga	52 in total. (26 yoga, 26 control) The mean age was 42.5 years, 91% were women. Among the professions were teaching, corporate, administrative and the rest worked in other areas.	Perceived stress (elements of the Perceived Stress Scale-14; PSS-14), Mental Wellbeing (Warwick-Edinburgh Mental Wellbeing Scale; WEMWBS), Coping Self-Efficacy (Coping Self-Efficacy Scale; CSES-26).
20	Piñero et al (2021)	Sensors	Spain	Pilot	The objective is to design, develop, evaluate and test a skeletal detection system using CNNs (convolutional neural networks) that subsequently estimates the user's posture and makes postural recommendations for the neck, shoulders and arms. This system is tested in real time, using various embedded systems, to measure both its detection efficiency and its response in real time and its energy consumption.	Skeletal detection system "postural detector"	12 in total. between 20 and 50 years, of both sexes and with both dominant hands. It was tested in the laboratory	Not outcome health.
21	Garcia et al (2021)	Human factors	Ecuador	RCT	The purpose of the present study was to assess whether or not a yoga program has a physical and emotional effect on office workers, forced to work from home due to the COVID-19 pandemic.	Yoga	40 participants (26 women and 14 men) with an average age of 39.4 ± 11.2 years. Office workers working from home	discomfort and pain (Cornell (CMDQ) Mood (anger, fatigue, vigor, kindness, tension and depressed mood) Profile of Mood States (POMS).
22	Harrington et al (2004)	Journal of Safety Research	EE.UU	RCT	The purpose of this research was to assess the short-term effects of an ergonomics training programme on the knowledge, attitudes and practices of a group of teleworkers.	Ergomony Training	50 in total. They included telecommuters from 10 federal agencies (north =42), and 4 private companies (north =8). Participants consisted of 28 (56%) men and 22 (44%) women.	knowledge, attitudes and practices of ergonomic safety (instrument was created by the researchers together with the experts) and also opinions of the participants on the

23	Falk et al (2022)	International Journal of Environmental Research and Public Health	EE.UU	RCT Pilot	determine whether a behavioural intervention programme and/or environmental intervention is associated with improvements in the mental well-being of sedentary employees, including mood, stress levels and fatigue, without adversely affecting job performance, including the performance of employees. irritability, concentration, job satisfaction, non-job satisfaction and productivity, while working from home during the COVID-19 pandemic.	Behavioral and environmental intervention	95 in total. were university employees working from home at least 80% of the time, 70 were women	Mood (Positive and Negative Affect Program (PANAS), Stress (the Perceived Stress Scale (PSS) to assess stress, the Fatigue Symptom (Health and Work Inventory (FSI) and the Health and Work Questionnaire (HWQ) to mainly evaluate work performance: and also irritability, concentration, job satisfaction, non-work satisfaction and productivity.
24	Muniswamy et al (2022)	Appl Psychol Health Well-Being	India	RCT	(1) to identify software professionals working in IT firms who are low in physical and mental health during remote working and (2) to explore the effects of social media-based intervention on SB and active time during work- and non-workday's estimated aerobic capacity and mental health variables in IT professionals who had poor physical and mental health scores.	Social media-based intervention	48 in total., 22 in the FIIT group, 26 control group. The majority of respondents (52%) in this study were men and young adults (26.25 ± 3.49 years) were all IT professionals (Information Technology;) who worked from home	The physical health of workers was assessed through a modified Workers Living Activity Time Questionnaire (WLAT-Q) (Matsuo et al., 2020). . Mental health was assessed through the Depression, Anxiety and Stress Scale (DASS 21).
25	Toniolo-Barrios et al (2021)	Kelley School of Business, Indiana University	Canada	Literary review	This article explains how mindfulness can improve mental health and productivity and presents a list of mindfulness techniques and suggestions to perform.	Mindfulness (Mindfullness-bases) (Proposal)	NA	Mental health and productivity.

25	Toniolo-Barrios et al (2021)	Kelley School of Business, Indiana University	Canada	Literary review	This article explains how mindfulness can improve mental health and productivity and presents a list of mindfulness techniques and suggestions to perform.	Mindfulness (Mindfullness-bases) (Proposal)	NA	Mental health and productivity.

26	Schall et al (2021)	Human factors	USA	Literary review	Review practical evidence-based strategies that can be implemented to promote safety, health and the well-being of telecommuters during and after the 2019 coronavirus (COVID-19) pandemic	Safe and healthy strategies (Proposal)	NA	Safety, health and well-being.
27	Emerson et al (2021)	Journal of Hand Therapy	USA	Literary review	(1) describe the components of the evaluation of a computer workstation; (2) identify problems related to the computer interface that may contribute to the pain and symptoms of the client's MSK; (3) provide suggestions well reasoned to improve the safety, posture, and comfort of the computer workstation, and (4) suggest a method for completing the workstation analysis using virtuaL technology.	Identification of ergonomic risk factors, Evaluation of the work station and Recommendations - suggestions that can improve security and comfort on the computer workstation	NA	Safety and comfort at the workstation.
28	Almarcha et al (2021)	Sustainability	Spain	Literary Review	Propose, under the focus of Network Physiology of Exercise, some personalized recommendations of exercise medicine to maintain a healthy lifestyle in conditions of teleworking at home.	Personalized exercise advice (Proposal)	NA	Healthy lifestyle.

29	Konradt (2000)	Health Education Research	Germany	Mixed	Explore the stressors and stresses typical of telecommuting, as well as appropriate coping strategies 2. We examine the perceived usefulness and efficacy of our concept of "Health Circles" following a three-stage procedure. .	"Health circles in telework"	17 in total (14 women and three men) came from different companies and branches (e.g. data processing, financial services, public administration, paper industry, consultancy, education) of different sizes. Fourteen participants had to care for one or more children during teleworking.	Stressors factors, stresses typical and coping strategies
30	Abdel et al (2021)	Anxiety Stress Coping .	Germany	Observational*	1. We examine the day-level relationships between demanding work, household demands, and emotional exhaustion during telecommuting. 2)we test whether leisure development (i.e. proactive pursuit and enactment of goal-directed leisure activities environment, socialization, growth and development) is negatively related to emotional exhaustion.	Elaboration of leisure	From 178 participants who worked from home. The mean age was 35.34 years and 72% were women. 54 people reported having at least one person living in their home that they had to care for (e.g., children). Participants had diverse occupational backgrounds.	Daily demands of work and home, related to COVID-19 rumination, leisure development, emotional exhaustion and work performance.
31	Hori & Ohashi (2004)	37th Annual Hawaii International Conference on System Sciences	Japan	Conference Proceedings	In this article, I would like to discuss why you cause the stress that occurs in the teleworker and the stress in women when teleworking. In addition, in presenting the solution, I originally proposed a "Collaborative Work System" for working and living with mental and physical health for telecommuters.	Proposal "Collaborative teleworking"	NA	Physical and mental health.
32	Vione et al (2021)	Journal of Mental Health and Addiction	England	Commentary	The mental health difficulties that working from home can cause non-key workers* are discussed, based on research on New Ways of Working (NWW) and teleworking. In addition, it proposes the use of mindfulness-based approaches to protect the workforce from the potential negative impacts of working from home during the Covid 19 Pandemic.	Mindfulness (Mindfullness-bases) (Proposal)	NA	
33	Fonte et atl (2021)	Revista Brasileira de Medicina do Trabalho	Brazil	Corporative experience report	Discuss our experience of implementing an on-site exercise program of remote work for working bank employees from home during the COVID-19 pandemic.	Work gymnastics (compensatory exercises)	employees of different departments of a bank, with branches located in different states of Brazil, who worked from home.	
34	Delahoussaye & Shankar (2020)	Journal Of Ahima	USA	Journal article*	The article discusses some issues for home workers to consider when it comes to remote compliance auditing.	Remote auditing	NA	

Table 2. Sumammary of study interventions and strategies

Reference	Author	Topic	Type	Intervention or strategy	Delivery	Relevant findings
19	Wadhen et al (2021)	Mental well-being	Yoga	The Yoga program was based on the tradition of Hatha Yoga and consisted of simplified and modified versions of various components such as poses, breathing techniques, and relaxation/meditation techniques to meet the needs of the participants. The components of poses, breathing and relaxation. The inherent spiritual element of yoga was an important part of the intervention design.	Zoom meeting	The yoga group reported significant improvements in perceived stress, mental well-being, depression, and coping self-efficacy, but not stress and anxiety. Participants experienced physical and mental health benefits and reported high acceptability and enjoyment of the intervention.
20	Piñero et al (2021)	Physical well-being	Skeletal detection system "postural detector" "	The system was designed to be placed on the computer screen or on a stand above it. The imaging device, a webcam or other type of camera, had to be pointing at the person in order to capture them from head to arm. This device is connected to an embedded system where the video is processed in two steps: first, the positions of the user's joints are estimated, using a neural network classifier, and then the user's entire posture is processed and validated to provide recommendations.	real-time posture estimation software called TRT_Pose + Webcam	A postural recommendation system is more than feasible using the resources presented. The system can operate completely autonomously and without the intervention of a computer, providing information in real time. Therefore the system is able to correctly recognize most of the inputs it feeds.
21	Garcia et al (2021)	Physical and mental well-being	Yoga	The yoga program consisted of daily routines (Monday through Friday) of 10 minutes that focused on (1) mindfulness (repetition of positive affirmations), (2) regulation of breathing (pranayama), (3) postures (asanas) and (4) relaxation. (concentrating	Web platform (software)	A 1-month yoga intervention program significantly reduced CMDQ discomfort scores in eyes, head, neck, upper and
22	Harrington et al (2004)	Health safety:Ergonomics	Ergomony Training	"Ergonomics for Teleworkers" is a 45-minute computer-based training on home office ergonomics. The main topics were: Introduction to Ergonomics, Understanding Musculoskeletal Disorders, Principles of Ergonomics, Assessing Your Home Office, and Ergonomic Stretching Exercises. The program combines text, graphics, color illustrations, animation and sound to provide a fully interactive media-rich learning environment.	Computer software "Ergonomics for Teleworkers"	Participants who completed the training significantly improved their scores on the knowledge, attitude, and practice subtests. In a follow-up survey, participants indicated that they had made ergonomic changes in their offices based on training. Several participants indicated that the pain or discomfort they had been experiencing was eliminated or reduced as a result of the training.
23	Falk et al (2022)	Physical and mental well-being	Behavioral and environmental intervention	The desks distributed for this study were the Varidesk ProPlus 36 model, which is placed on an existing desk surface, provides a large work surface to accommodate several monitors and can be manually adjusted between sitting and standing postures quickly and easily by lifting two levers. They were also given a Varidesk anti-fatigue foot mat. The behavioral intervention program: Each week consisted of a short video featuring the week's theme, behavioral content aimed at social cognitive constructs, and opportunities for participants to interact with each other through an online discussion forum. (example: motivational constructions to create intentions to reduce sedentary behavior during the workday, promoted increased physical activity	Adjustable Desktop and Online Program (website)	The results indicate that the use of a combination of environmental and behavioral program interventions generate moderate to large improvements in mental well-being and job performance, such as mood, fatigue, focus, job satisfaction, non-job satisfaction, and productivity.

24	Muniswamy et al (2022)	Physical and mental well-being	Social media-based intervention	The necessary modules to publish on social networks to maintain good physical and mental health were identified. These include: ergonomic considerations, recognition of symptoms of depression, stress and anxiety, Af modelling and environmental restructuring, such as active or standing workstations, smartphone app-based signals and exercise directions. These were combined and provided in weekly Facebook messages (infographics and videos) allowed for quick maintenance of social chats between participants and questions to and questions to administrators. Participants could post their achievements	Facebook and website "FIIT"	N/A
25	Toniolo-Barrios et al (2021)	Mental well-being	Mindfulness (Mindfullness-bases) (Proposal)	Mindfulness is usually described as being aware of and paying attention to what is happening in the present moment (e.g., thoughts, bodily sensations, environment). can be practiced through a variety of mindfulness techniques (e.g., Minfullness), you do not need to engage in a specific technique to cultivate mindfulness.	N/A	1) help employees mentally disconnect from work when they need it; (2) improve people's attention to work tasks and thus improve their performance; and (3) allow workers to better manage screen fatigue.
26	Schall et al (2021)	Health & Safety	Safe and healthy strategies (Proposal)	Strategies discussed include 1. increase motivation to engage in OSH behaviors through increased safety leadership, 2. manage function boundaries to promote OSH behaviors in the home 3. integrate and strengthen interpersonal interactions, interdependence, as well as worker initiation while redesigning work for the benefit of teleworkers	N/A	Our review indicates that organizations invest in resources to prevent exposure to physical and psychosocial stressors while motivating telecommuters to engage in safe and healthy behaviors by providing active educational opportunities can lead to better OSH outcomes.
27	Emerson et al (2021)	Health safety:Ergonomics	Identification of ergonomic risk factors, Evaluation of the work station and Recommendations - suggestions that can improve security and comfort on the computer workstation	Attention should be paid to - Ergonomic considerations - Physical components of the workstation - Considerations for training Moreover, training is critical to achieving these benefits, noting that untrained subjects were more likely to develop MSK symptoms and develop them earlier than subjects who had received training. Thus coo the need to make a consultation to the ergonomics professional,	N/A	Prior to 2020, these assessments were conducted in person at the office workstation. Modifications in data collection were necessary to transition the analysis to a reliable virtual format. The remote method described provides a consistent approach that involves the customer in the process.
28	Almarcha et al (2021)	Physical well-being	Personalized exercise advice (Proposal)	Personalized exercise counseling should pay special attention to (a) educating professionals and users about the redefined concepts and objectives of health and fitness, (b) designing interventions focused on developing the potential for functional diversity of users, (c) promoting the creation of compensatory synergies in multiple dimensions to evade the states of reduced possibilities of users, (d) co-design and co-adapt exercise interventions together with users, (e) contribute to developing users' somatic awareness and exercise self-regulation competencies, (f) create environmental contexts that offer possibilities for movement variation and motivate effort.	N/A	The active participation of users in the co-design and co-adaptation of exercise programmes. Personalized is key to exercise adherence and health prevention. The computer technologies can support co-designed programs, but not can replace user decisions and monitoring skills of users Users based on somatic consciousness. It is crucial that health professionals and the exercise take into account that one of the main objectives of the intervention process is to develop the autonomy and responsibility of the user with respect to his own state physical and health.

29	Konradt (2000)	Mental well-being	"Health circles in telework"	The 'health circle' seeks to encourage participants to discuss their subjective experiences of stress. In addition to focusing on workplace-related stresses, appropriate coping strategies are developed together. (Work-related health problems are raised and solutions are sought together. The topics addressed were chosen according to the preferences of the participants. Three main themes emerged that were addressed by all three HCs at once: (1) the workplace at home, (2) contact with supervisors, colleagues, and clients, and (3) addressing computer issues.	Face-to-face (hotel)	not only did the circles made had positive effects on health promotion in the short term, but teleworkers could transfer the developed coping strategies to daily working conditions producing considerable long-term effects. the results also suggest potentials for preventive health promotion strategies, such as better time management, greater autonomy for decisions and activity planning, and interventions that increase feelings of responsibility and self-efficacy.
30	Abdel et al (2021)	Mental well-being	Elaboration of leisure	It is proposed that the creation of leisure is a powerful way to (re)create meaningful leisure experiences during teleworking in confinement due to the COVID-19 pandemic. Leisure development is defined as a proactive behavior during free time aimed at goal setting, connection, learning and personal development (Petrou & Bakker, 2016)	N/A	The daily development of leisure during the COVID-19 pandemic is a promoter of subjectivity. well-being, as we found good support for our assumption that daily leisure processing is negatively related to the emotional exhaustion of teleworkers. Leisure development can serve as an effective strategy to counteract emotional exhaustion. This study suggests that organizations can benefit from it, as it keeps employees healthy and performing well.
31	Hori & Ohashi (2004)	Physical and mental well-being	Proposal "Collaborative teleworking"	- Collaborative teleworking has implications for two or more teleworkers in a group to work collaboratively communicating through their networked computers and collaborate in their work and management process. - On the network, a shared virtual area is provided where workers share various materials and use various tools for collaboration. - It has been found that it is more effective to use the combination of Business Process, Collaborative Work Strategy and Information Technology as means of encouraging logical and structural thinking rather than using a	N/A	Collaborative teleworking suggests the structure that teleworkers maintain in a work group to maintain working conditions with good mental and physical health for both the internal and external teleworker, in addition to achieving good results in their work. . Through collaborative teleworking, it will also be possible to offer a higher level of human resources and promote the maintenance of the mental and physical health of the teleworker.
32	Vione et al (2021)	Mental well-being	Mindfulness (Mindfullness-bases) (Proposal)	Psychological interventions to help workers during this period should focus on stress, worry, and loneliness. Mindfulness-based programs generally focus on the development of self-compassion. Examples of applications are: -Compassion-Focused Therapy (Gilbert, 2009), -Mindfulness for Health (Penman & Burch, 2013) and -Conscious Self-Compassion (MSC; Neff & Germer, 2013).	N/A	A Mindfulness-Based intervention:1)can address the blurred work-home limit: another COVID-19 labor issue 2) Decreases rumination about work when at home and greater satisfaction with work and sleep quality.3)Mindfulness-based stress reduction intervention has been shown to increase self-compassion. Consequently, an increase in self-compassion has positive effects on well-being because it makes the person feel connected, cared for and calm.
33	Fonte et atl (2021)	Physical well-being	Work gymnastics (compensatory exercises)	Compensatory exercises aim to prevent the usual bad postures of workers and achieve an active antagonistic muscle balance by exercising the less used muscles during the workday and relaxing the muscles most used during routine tasks, thus reducing fatigue. the proposed exercises involved the following aspects: a) active kinesiotherapy; (b) static and dynamic stretching; (c) muscle strengthening; yd) muscle relaxation.	Microsoft Teams®	This method of intervention was positively valued by all those involved. It also provided benefits in terms of feasibility, saving resources, extending the scope of actions and increasing the number of employees involved, improving workers' adherence to health promotion programs, and improving their awareness of postural habits beyond the work environment.
34	Delahoussaye & Shankar (2020)	Safe and healthy	Remote auditing	Their purpose of remote auditing is to protect patient information while keeping employees healthy and productive. Employees are requested to turn on their cameras and take a tour of their workspace. In addition to "touring" their home offices, managers must also make sure employees keep the data on their laptops safe. Once audits are complete, use that data to identify high-risk areas that could pose a security threat, this can be used for policy compliance monitoring.	N/A	Audits can help increase that awareness and activate management and human resources (HR) to intervene with education and supportive assistance.