Clinical Social Work Journal (2023) 51:211–245
https://doi.org/10.1007/s10615-023-00865-3

Best Practices for Technology in Clinical Social Work and Mental Health Professions to Promote Well-being and Prevent Fatigue

Donald M. Hilty[1] · Laura W. Groshong[2] · Mirean Coleman[3] · Marlene M. Maheu[4] · Christina M. Armstrong[5] · Shelby A. Smout[6] · Allison Crawford[7,8,9] · Kenneth P. Drude[10] · Elizabeth A. Krupinski[11]

Accepted: 16 April 2023 / Published online: 1 June 2023

Abstract

The shift to communication technologies during the pandemic has had positive and negative effects on clinical social worker practice. Best practices are identified for clinical social workers to maintain emotional well-being, prevent fatigue, and avoid burnout when using technology. A scoping review from 2000 to 21 of 15 databases focused on communication technologies for mental health care within four areas: (1) behavioral, cognitive, emotional, and physical impact; (2) individual, clinic, hospital, and system/organizational levels; (3) well-being, burnout, and stress; and (4) clinician technology perceptions. Out of 4795 potential literature references, full text review of 201 papers revealed 37 were related to technology impact on engagement, therapeutic alliance, fatigue and well-being. Studies assessed behavioral (67.5%), emotional (43.2%), cognitive (57.8%), and physical (10.8%) impact at the individual (78.4%), clinic (54.1%), hospital (37.8%) and system/organizational (45.9%) levels. Participants were clinicians, social workers, psychologists, and other providers. Clinicians can build a therapeutic alliance via video, but this requires additional skill, effort, and monitoring. Use of video and electronic health records were associated with clinician physical and emotional problems due to barriers, effort, cognitive demands, and additional workflow steps. Studies also found high user ratings on data quality, accuracy, and processing, but low satisfaction with clerical tasks, effort required and interruptions. Studies have overlooked the impact of justice, equity, diversity and inclusion related to technology, fatigue and well-being, for the populations served and the clinicians providing care. Clinical social workers and health care systems must evaluate the impact of technology in order to support well-being and prevent workload burden, fatigue, and burnout. Multi-level evaluation and clinical, human factor, training/professional development and administrative best practices are suggested.

Keywords Burnout · Fatigue · Social work · Stress · Technology · Virtual · Well-being · Videoconferencing

Most clinical social workers (CSWs) have learned how to use new technology and have used it to maintain continuity of care with clients (Berzin et al., 2015; Merrill et al., 2021; Ramsey & Montgomery, 2014). To ensure ongoing ethical and effective practice using telemental health (TMH), it is important for CSWs to assess and, as necessary, develop competencies in technology use for practice (Abramson et al., 1991; Merrill et al., 2021). The COVID-19 pandemic propelled telehealth and telemental health (TMH) into millions of workplaces and homes, sparking enduring consumer, client, and organizational interest (Alston et al., 2022; Hilty et al., 2020; McCoyd et al., 2023; Pew Research Center, 2021; Singh et al., 2021). Response to the pandemic was limited by lack of intra-agency guidance, communication and connecting with others, as well of inadequate technological infrastructure and blurred work and therapeutic boundaries related to remote workflow with technology (Ashcroft et al., 2022; Daley et al., 2023; McCoyd et al., 2023). CSW organizations have explored clinical, professional, regulatory, and legal challenges with TMH (Wodarski & Frimpong, 2013) to support person- and client/patient-centered care (deBronkart et al., 2015; McCarty & Clancy, 2002; National Association of Clinical Social Workers 2023; National Academy of Science, Engineering, and Medicine, 2020; Perron et al., 2010). At a time when clinicians and other employees have increasingly noted problems of fatigue and burnout related to technology (Gates et al., 2021; Golu et al., 2021; Hilty et al., 2022), there is work to be done to shift from the Triple Aim (enhancing patient experience, improving population health, and reducing costs) to the Quadruple Aim, which

Extended author information available on the last page of the article

adds a goal of improving the work life of health care providers (Bodenheimer et al., 2014).

Fatigue has many potential sources, but with intensive use of technology, it may be related to time on video, effort to ensure a good therapeutic engagement, and excessive workflow steps, particularly with electronic health records (EHRs) (Bender et al., 2021; Hilty et al., 2022; Montgomery et al., 2019; Nguyen et al., 2021; Shanafelt & Noseworthy, 2017). Fatigue is a complex and multidimensional construct and a review of research across cognitive science, exercise physiology and clinical practice suggests that its most promising common feature is the notion of perceived effort, accounting for inter-individual differences and situational variations, including both mental and physical constructs and integrates motivational and emotional dimensions (Pattyn et al., 2018). Subjective phrases like technology fatigue, Zoom fatigue or technostress suggest technology *causes* fatigue though it may not be that simple (Bullock et al., 2022; Ratan et al., 2021; Scaramuzzino et al., 2021). Business and occupational health studies have noted employees' emotional and physical concerns related to fatigue and burnout, related to computer displays and long work hours (Böös et al., 1985; Caldwell et al., 2019; Knave et al., 1985a, 1985b, 1985c; Mocci et al., 2001; Park et al., 2019; Travers et al., 2002).

Challenges for CSWs related to technology have existed in mental health, health and home settings, as well as for those providing mobile/virtual care. The COVID-19 pandemic accentuated the challenges with rapid uptake, substantial use and intensity of effort. Not surprisingly, technology has become a focus for complaints by CSWs (Bender et al., 2021; Berzin et al., 2015). These challenges have prompted an important discussion across mental health disciplines and other fields about sustainability for practice, education and professional development, largely related to well-being, fatigue and burnout (Shanafelt et al., 2017; Halupa, 2018; Wiederhold et al., 2020; Dima et al., 2021; Gates et al., 2021) – and prevention of errors for safety (Yusof & Sahroni, 2018). Further, there are specific competency sets for integrating video (2015, 2018), social media (2018), mobile health (2019, 2020) and asynchronous technologies (Hilty, Torous et al., 2020) into workflow.

More research is needed pre- and post-implementation of technology use to develop best practices to promote well-being and prevent fatigue and burnout in both mental health and health settings. There is a gap in understanding how health care clinicians typically use videoconferencing, EHR and other technologies, the amount of effort required and how this contributes to fatigue or burnout (Hilty et al., 2022). Health care is just starting to evaluate the longitudinal impact of work engagement and burnout, the development of burnout in relation with job demands/resources, and the role of psychosocial working conditions (Dima et al., 2021; Mäkikangas et al., 2017, 2021; Maricuțoiu et al., 2017; Seidler et al., 2014; Sonnentag et al., 2017). Another research gap is that systems have generally approached burnout as an individual's problem (e.g., depression) rather than an organization's shared problem as advocated by the World Health Association (WHO, 2019). Key stressors within an organization that put people at risk of burnout need to be identified—at a department or unit level—so that changes can be made to reduce their impact and create healthier workplaces.

The relationship between technology, fatigue and health care can be better understood by reviewing the broad literature across health, business, occupational health, technology, and well-being to:

a. Explore clinician experiences and perceptions of technology use in health care—specifically CSWs but also other mental health professionals—related to fatigue, workflow, and impact on therapeutic engagement.
b. Provide an overview of the business, occupational health, and well-being literature to contextualize technology-based fatigue, its components, and related processes.
c. Suggest best practices at the clinician, clinic, and system levels for assessing, monitoring, and preventing fatigue.

Methods

Approach

A literature search via MeSH of the key words spanned January 2000 to December 2021 according to the original six-stage scoping review process including input from experts (Arksey et al., 2005) with updated modifications (Levac et al., 2010) and the preferred reporting extension (Tricco et al., 2018).

Research Question

This scoping review explores the relationship between technology, fatigue, and health care to improve conditions for CSWs (clinicians not clients). It focuses on the overarching question: "What is technology-based fatigue and what are its consequences for clinicians including social workers?" Sub-questions are:

(1) What are the characteristics of technology-based fatigue and associated factors, including technologies?
(2) Does technology and associated fatigue have an impact on clinician health (burnout; compassion fatigue; well-being)?
(3) How does clinician burnout or well-being associated with technology affect the delivery of care, therapeutic

relationship, and quality of care offered in-person, by video and other technologies?

(4) What are strategies or interventions being used to prevent or ameliorate technology fatigue?

Identifying Relevant Studies

Fifteen databases were used via: Pubmed/Medline, APA PsycNET, Cochrane, EBSCO (including Social Work Abstracts), Embase, Google Scholar, PsycINFO, Web of Science, Scopus, Science Direct, Social Sciences Citation Index, Telemedicine Information Exchange database, Centre for Reviews and Dissemination, and The Cochrane Library Controlled Trial Registry.

The search focused on focused on technology, health care and fatigue via synchronous telepsychiatry, telebehavioral health (TBH) or TMH, though telephone, asynchronous, mobile health, tablet, and text were also searched. It included roles (i.e., clinician, provider, counselor, employee, medical, nurse, physician, psychiatrist, psychologist, social worker, therapist, worker), assessment (self-report and observed), screening, triage, prevention, interventions, and evaluation data.

The initial search targeted four concept areas that were consistent with published literature (i.e., physical, cognitive), clinicians' common descriptions of emotional fatigue and behaviors associated with fatigue that did not fit in the other areas. The specific terms used were:

(1) Behavioral, cognitive, emotional, and physical impact:

   a. Behavioral impact (anxious, barriers, boredom, complain(t;ing), concerns, depressed-, detach(ed;ment), distance, effort(ful), engage(d;ment), emotional-, enjoy(able), exhaustion, experience, factor, fatigue, insomnia, intimacy, isolation, mental, onerous, positive, readiness, reward(s;ing), social, substance, suicide, team, worry)
   b. Cognitive impact (attention, attitude(s), alertness, critical, cynicism, distraction, (self)-efficacy, effort, expectation, incompetence, indecision, motivation, multi-tasking, negative, steps, task(s), workflow, workload)
   c. Emotional impact (alone, anger, anxiety, compassion(ate), complex, confidence, empower, esteem, human, irritability, lonely, positive, quality of life, resilience, sadness, satisfaction, secondary, share(ing), trauma, satisfaction, stress, support, susceptible, therapeutic, wellness, well-being).
   d. Physical impact (ache, back, distress, exhaustion, eye, fatigue, headache, neck, pain, problems, strain, stress, tiredness, visual)

(2) Workplace at the individual, clinic, hospital, and system/organizational levels: accessories, alternative, burden, clerical, computer, control, dedicated, demand, display, distraction, disruptive, errors, flexibility, home, interruptions, intrusion, job, mishap, mistake, nap, organization, recognition, routine, relative value unit (RVU), safety, schedule, screen, separation, shift, telework, terminal, time, video, voice, workflow, and workload.

(3) Well-being, burnout, and stress: adaptable, (making) adjustment, burnout, confidence, coping strategies, esteem, fitness, happy, health, mindfulness, purposeful, relaxation, resilience, risk, safety, satisfaction, vitality, vulnerability, wellness, willingness.

(4) Clinician perceptions regarding technology: attitudes, diffusion, adaptor, and willingness, motivation, urgency, readiness to use technology, biases regarding tech use, and experience of using technology.

Study Selection

One author (DH) screened 4422 potential literature references, 203 were duplicates, and the title and abstract of 4018 did not meet criteria. Two authors (DH, CA or SS) reviewed the full text of 201and 37 met inclusion criteria based on consensus. An additional 2 studies were included via review of references (Fig. 1).

If there was disagreement, a third author made the decision. Thirteen studies focused on the impact of technology on clinical engagement and workflow, 14 directly evaluated the relationship of technology and fatigue, and 10 evaluated workflow and experiences related to technology that could contribute to fatigue.

Data Charting

A data-charting form was used to extract data, and notes were organized via descriptive analytical and qualitative methods. The reviewers compared and consolidated information using a qualitative content analysis approach (Crowe et al., 2015). The information was shared with selected experts, their input summarized, and themes extracted.

Analysis, Reporting and the Meaning of Findings

Results were organized into tables and figures, with key concepts and components of technology-based fatigue outlined and described, partially based on excerpts from published topics. Since this research area, though critical, is nascent, findings were reported individually.

Qualitative steps to analyze disparate populations, data and methods of studies were used (Crowe et al., 2015). Content, thematic, discourse, and framework qualitative

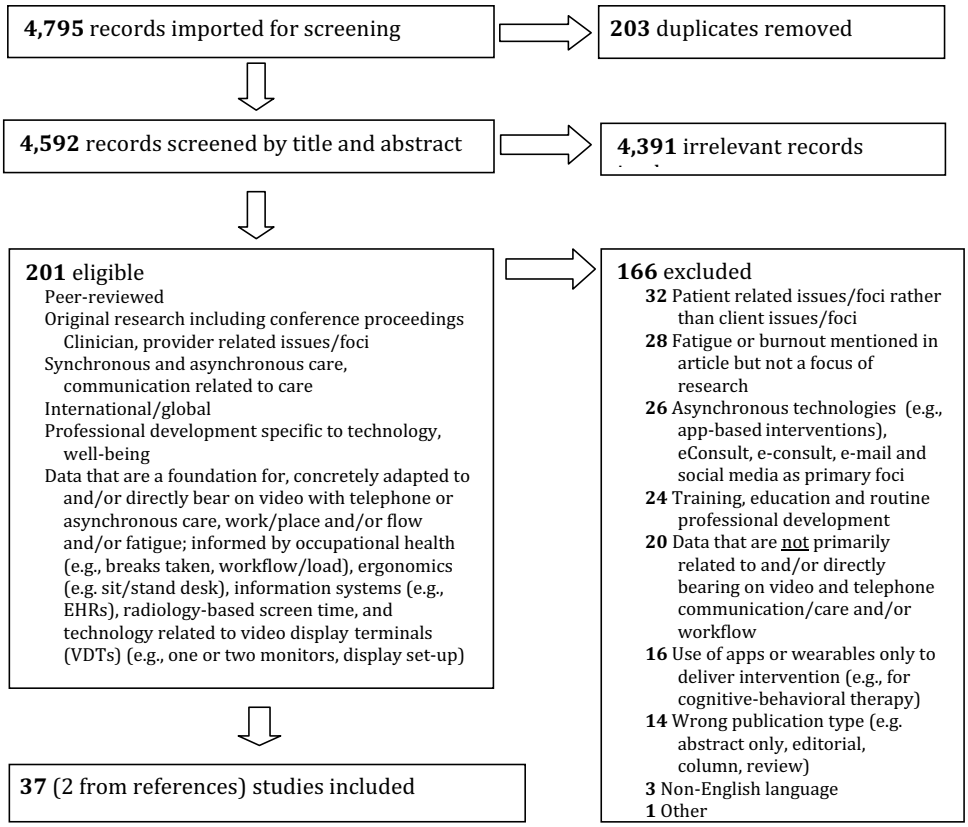

Fig. 1 Search flow chart: diagram of studies and other papers reviewed

analysis techniques were used to analyze findings to develop a spectrum of health/resilience to risk of fatigue to manifestations of burnout (Crowe et al., 2015; Nijrolder et al., 2008). Content analysis classified, summarized and tabulated the data. Thematic analysis was used when data were limited and interpretation was needed. Discourse analysis searched for themes and patterns; and framework analysis sifted through, chart and sorted data in accordance with key issues and themes (e.g., indexing; charting; mapping and interpretation). Three reviewers (DH, CA, SS) used preset schema (e.g., key words, emotives) trained on 5 articles individually, with Excel not journal entries to identify themes and emergent codes, then consolidated the data together with another author (LG). A formal software system was not used and inter-coder reliability calculations were not performed. If questions arose about data, an existing theme or potential new one, re-consolidation occurred with final work reviewed by all authors.

Expert Opinions

Expert opinions were solicited from: (1) behavioral health organizations internationally (e.g., psychiatry, psychology, social work, addictions); (2) technology-related special interest groups (e.g., American Telemedicine Association, Coalition for Technology in Behavioral Sciences; (3) health organizations related to quality improvement, human resources, occupational health, and Lean systems (e.g., Agency for Healthcare Research and Quality, American National Standards Institute, Healthcare Information and Management Systems Society, Joint Commission, World Health Organization); (4) federal (i.e., U.S. National Academy of Science, U.S. National Institute of Health, and U.S. Veterans Health Administration) and academic institutions; and (5) researchers, authors, and editors.

Experts were invited by e-mail from 7 countries (Australia, Canada, Germany, India, Italy, United Kingdom, U.S.) to attend a live videoconference expert feedback session and provide qualitative feedback. The lead author (DH) facilitated, a scribe was used and each of 3 sessions lasted 50 min. The abstract, objectives, methods, tables, and figures were sent 1 week in advance. Feedback was collated (Hilty et al., 2015; Maheu et al., 2019) using consensus and modified Delphi processes (De Villiers et al., 2005). Attendees completed a qualitative and quantitative 5-item Likert-scale survey (strongly disagree, disagree, neutral, agree, strongly

agree) or provided qualitative feedback via e-mail. The survey included 6 questions, 3 weighted positively (e.g., table X provides a systematic way to assess fatigue and well-being) and 3 negatively.

Results

Overview

The results are organized per objectives: clinician experiences and perceptions of technology use in health care, including impact on therapeutic engagement, problems with workflow and fatigue; a contextualization of technology-based fatigue, its components, and related processes, along a continuum from health to fatigue to burnout; and best practices for CSWs and systems to promote a culture of well-being and prevent fatigue. The data were organized to align with the 4 concept areas (behavioral, cognitive, emotional, and physical impact) and workplace setting at the individual, clinic, hospital, and system/organizational levels.

Expert Feedback

Twenty-four experts participated. Twenty completed the survey (83.3%); and 4 provided qualitative feedback (16.6%). Disciplines included 8 (33.4%) psychiatrists, 6 (25.0%) social workers, 5 (20.8%) psychologists, 2 (8.3%) marriage and family therapists, 1 non-psychiatrist physician (4.2%), 1 counselor and 1 (4.2%) system engineer. The majority agreed or strongly agreed that: 1) "The results provided in tables are organized, in the ballpark and relatively complete" (91.6%); 2) These are "a practical way to identify, analyze and begin to address technology problems for clinicians and systems" (70.8%); and 3) The figures "substantially help to compare/contrast the continuum of health/resilience versus fatigue versus burnout" (70.8%).

The Literature

Of 4795 references, 203 were duplicates, and title and abstract review resulted in further exclusion of 4,391. Full text review of 201 resulted in 35 meeting inclusion criteria, and 2 additional studies were included via references (Table 1). Studies varied from 1 week to 13 years in duration (median = 365 days, mean = 806 days. Approaches, methods, and measures varied, with more subjective than objective assessments, and 1–7 assessments per study (median 1, mean 2.0). Studies assessed behavioral (25; 67.5%), emotional (16; 43.2%), cognitive (21; 57.8%), and physical (4; 10.8%) impact of workflow at the individual (29; 78.4%), clinic (20; 54.1%), hospital (14; 37.8%) and system/organizational (17; 45.9%) levels; only 5 included all levels. (McAlearney et al., 2015, Mylod et al., 2017, Nakagawa et al., 2020, Shanafelt et al., 2017, Tutty et al., 2019). Participants were clinicians (varied) (8; 21.6%), social workers (2; 5.4%), psychologists (1; 2.7%), physicians (18; 48.6%), physician specialists ((psychiatrists (2; 5.4%) and radiologists (2; 5.4%)), nurses (1; 2.7%); pharmacists (1; 2.7%); other healthcare professionals (1; 2.7%) and interpreters (1; 2.7%). Unfortunately, the studies did not well-describe the clinician population in terms of years in the profession, time on the job, sociodemographics and other dimensions, aside from generational differences.

Technology Impact on Clinician Workflow and Engagement

Studies with qualitative methods (Brown-Johnson et al., 2019; Downing and Marriott 2020; Goldstein et al., 2016; Norwood et al., 2018; Osenbach et al., 2013) or mixed qualitative and quantitative methods (Greenhalgh et al., 2018) reported various impacts of video on patient care (Table 1, In "Methods" section). Findings included: (1) the working alliance in video clinical visits was inferior to in-person delivery; (2) clinicians' concerns about engagement that required additional effort compared to in-person care; and (3) rapport and therapeutic alliance were established during video sessions with patients similar to in-person (Goldstein et al., 2016; Osenbach et al., 2013; Schubert et al., 2019; Simpson et al., 2014). Presence was enhanced by listening without interrupting, focusing intentionally on the patient, taking brief re-centering breaks throughout a clinic day, and informing patients when attention must be redirected to administrative or technological demands (Brown et al., 2019). One cross-sectional study reported therapists experienced reduced interpersonal cues (24%), perception of client (9%), confidence (8%) and that clients seemed unsettled (8%), as well as more feelings of isolation and fatigue (10%), and technical issues (14%) (McBeath et al., 2020). Remote working more tiring (19%) due to intensity of concentration, safety/worry about potential unseen client distress, and lack of embodied sense of presence with the client (McBeath et al., 2020). Telephonic interpretation is satisfactory for information exchange, but less so for interpersonal aspects of communication; video display may offer improved communication (Price et al., 2012).

The most substantial therapist concerns when using video communications were about therapeutic engagement that resulted in therapists feeling less emotionally attuned and less able to use intuition (Downing and Marriott 2020). They felt a need to verbally check in more with patients to ensure they were correctly understanding them, and they had to use slightly exaggerated gestures or more words, as if physical gestures (e.g., nodding, open gestures, or encouraging facial expressions) did not communicate understanding

Table 1 Studies in health care for mental health clinicians: technology-related experiences, problems and fatigue

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
Technology impact on clinician workflow and engagement																	
1	Brown et al. (2019)	40	1 year	Physicians	US	Qualitative	In person recruitment and interviews explored presence and workflow	Within a clinic, presence was enhanced by listening without interrupting, focusing intentionally on the patient, taking brief re-centering breaks throughout a clinic day and informing patients when attention must be redirected to administrative or technological demands	EHR, video monitor, computer	1	0	0	0	0	0	0	0
2	Goldstein et al. (2016)			Clinicians	US	Qualitative	Analyzed videos to assess engagement	Providers build rapport and establish a therapeutic alliance during telemental health sessions with youth and families. Families may be more accepting of telemental health approaches than clinicians	Video monitor, computer, phone	1	1	0	0	1	1	0	0
3	Greenhalgh et al. (2018)	36		Physicians	UK	Mixed method	Multilevel, mixed method study of Skype video consultations versus in-person work in organizational case study	Compared with in-person consultations for similar conditions, video consultations were very slightly shorter, patients did slightly more talking, and both parties sometimes needed to make explicit things that typically remained implicit in a traditional encounter. Video worked better when the provider and patient already knew and trusted each other	Video monitor, computer	1	0	0	0	1	1	1	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
4	Downing and Marriott (2020)			Psychologists	Australia	Qualitative	A survey with 7 open-ended and 5 multiple choice questions explored comfort and engagement behavior	Clinicians needed to verbally "check in" more with patients to ensure that they were correctly understanding them, use slightly exaggerated gestures or had to use more words as if physical gestures (e.g. nodding, open gestures, or encouraging facial expressions) did not communicate understanding and/or empathy. In total, this reduced capacity for the therapist to use emotional attunement and intuition Almost all (98%) experienced 1 + challenge(s): difficulty reading body language; difficulty negotiating distraction and engagement; difficulty negotiating technology for care; increased fatigue and administration; increased intimacy with patients (therapist gaining glimpses into a patient's home life); and reduced cancellations, yet patients stating a preference for in-person meetings	Video monitor, computer, phone	0	0	1	0	1	0	0	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
5	McBeath et al. (2020)	335		Clinicians	UK	Cross-sectional survey	Purposeful online sampling via Linkedin and Facebook compared in-person with video engagement and impact	Reduced interpersonal cues (24%), perception of client (9%), confidence (8%) and client settled (8%); more feelings of isolation and fatigue (10%) and technical issues (14%) Remote working more tiring (19%) due to intensity of concentration, safety/worry about potential unseen client distress and lack of embodied sense of presence and of the client	Video monitor, computer, phone, email	1	1	1	0	1	0	0	0
6	Monthuy et al. (2013)	205		Clinicians	Canada	Cross-sectional descriptive	Survey of teleclinicians about whether to do telepsychotherapy	The key predictor of the intention to use telepsychotherapy was not provider attitude toward it or how complicated it is to use, but the anticipated degree of usefulness for patients	Video monitor, computer, phone	0	1	1	0	1	0	0	0
7	Norwood et al. (2018)			Clinicians	UK	Qualitative	Meta-analysis assessed working alliance	Working alliance in video clinical visits was inferior to in-person delivery	Video monitor, computer, phone	0	0	0	0	0	0	0	0
8	Olwill et al. (2021)	35		Psychiatrists	Ireland	Non-experimental	Survey about telephone consultations	Diagnostic challenges, the effect on the therapeutic alliance, technical challenges and ethical concerns outweighed work flexibility and convenience for patients	Video monitor, computer, phone	0	0	1	0	0	1	0	1

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
9	Osenbach et al. (2013)			Clinicians	US	Mixed methods	Compared synchronous telehealth versus in-person care for depression	Overall, no evidence to suggest that the delivery of psychotherapy via synchronous telehealth modalities is less effective than non-telehealth means in reducing depression symptoms	Video monitor, computer, phone	1	1	0	0	1	0	0	1
10	Price et al. (2012)	52		Medical interpreters	US	Cross-sectional descriptive analytical	Survey of interpreters across three medical centers	Telephonic interpretation is satisfactory for information exchange, but less so for interpersonal aspects of communication; video display may offer improved communication	Video monitor, computer, phone	0	0	0	0	0	1	1	1
11	Schubert et al. (2019)	120		Psychiatrists	Canada	Non-experimental	Explored satisfaction with telepsychiatric consultations from urban tertiary academic health center to patients located in rural primary care clinics	Patients and providers were both highly satisfied with telepsychiatry and both believed that telepsychiatry provided patients with better access to care. Paired patient and provider survey results demonstrated a high level of concordance between patients and provider responses	Video monitor, computer, phone	0	1	0	0	1	1	0	0
12	Simpson et al. (2014)			Clinicians	Australia	Cross-sectional descriptive analytic study	Explored therapeutic alliance via self-report questionnaires or qualitative methods either as a primary, secondary or tertiary outcome measure	The therapeutic alliance can be developed in psychotherapy by videoconference, with clients rating bond an presence at least equally as strongly as in-person settings across a range of diagnosis groups	Video monitor, computer, phone	0	0	0	0	0	0	0	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
13	Tachakra et al. (2002)	60		Physicians, nurses	UK	Retrospective cohort	Measured amount of time in telehealth versus in-person care in aspects of communication and social presence	Telehealth empowered patient to ask more questions of the doctor, and for the doctor to clarify more patient issues more frequently. Telehealth consultations resulted in higher rate of turn-taking between doctor and nurse than in-person consultation	Video monitor, computer, phone	1	0	0	0	1	0	0	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
Fatigue related to technology use for clinical care																	
14	Dima et al. (2021)	83		Social workers	Romania	Cross-sectional quantitative results with qualitative methods	Evaluated the risk for developing the burnout syndrome via two conceptual models: 1) the theoretical framework of VUCA (volatility, uncertainty, complexity, and ambiguity); 2) stress and burnout	Results show that 25,3% of respondents suffer from a high level of burnout and 44.6% scored in a range that indicate a medium level of burnout; 31.1% managed to handle stress factors in a healthy manner. Main stressors found are especially personal (family) and work-related factors (workload, new legislative rules and decisions, inconsistency, instability, ambiguity of managerial decisions, or even their absence or non-assumption, lack of clarity of working procedures, limited managerial and supervisory support, limited financial resources), less than client related factors (lack of direct contact, risk of contamination in two ways, managing beneficiaries fears, difficulties related to technology and digital skills) Study results point to the importance of organizational support and developing a self-care plan that help protect against occupational stress and burnout	Video monitor, computer, other	1	1	1	0	1	1	0	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
15	Galt et al. (2019)	2195		Pharmacists	US	Cross-sectional descriptive analytic	Survey	Integration of health technology into pharmacy practice introduced new error types and alert fatigue	Video monitor, computer	0	0	1	0	1	1	0	1
16	Holmgren et al. (2021)		10 months	Clinicians	US, Canada, Europe, Middle East, and Oceania	Cross-sectional descriptive analytic	Cross-sectional; controlled organizational characteristics, including structure, type, size, and daily patient volume on EHR workflow tasks	EHR work (mean time, 90.2 min versus 59.1 min; $P < .001$) included doing notes, orders, in-basket messages and clinical review. US clinicians composed more automated note text (77.5% versus 60.8% of note text; $P < .001$) and received significantly more messages per day (33.8 versus 12.8; $P < .001$). US clinicians used the EHR for a longer time after hours, logging in 26.5 min per day versus 19.5 min per day ($P = .01$)	EHR, video monitor, computer	1	0	0	0	1	0	0	1

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
17	Khairat et al. (2020)	25		Physicians	US	Cross-sectional descriptive analytic study	EHR simulation exercise involved 4 patient cases (mean [SD] completion time, 34:43 [11:41] min) recorded a total of 14 h and 27 min of EHR activity	Participants (80%) experienced physiological fatigue within the first 22 min of EHR use. Physicians who experienced EHR-related fatigue in 1 patient case were less efficient in the subsequent patient case, as demonstrated by longer task completion times ($r = -0.521$; $P = .007$), higher numbers of mouse clicks ($r = -0.562$; $P = .003$), and more EHR screen visits ($r = -0.486$; $P = .01$)	EHR, video monitor, computer	1	0	0	1	1	0	0	0
18	Krupinski et al. (2009)	6		Radiologists	US	Observational study	Used an autorefractor to measure eyestrain at various reading distances for participants reading CT or x-rays 5.73 h (sd = 1.24) in the late afternoon	Nearer user distance to video displays increased eyestrain as a function of target distance, as a function of time of day ($F = 316.10$, $p < 0.0001$) and in radiologists more than residents ($F = 271.47$, $p < 0.0001$)	Video monitor, computer, autorefractor	0	0	0	1	1	0	0	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
19	Krupinski et al. (2010)	40		Radiologists	US	Observational study	Reading time, visual accommodations, and symptoms of fatigue were measured after varied reading schedules (prior to work day and after work day)	After a day of clinical reading, radiologists have reduced ability to focus, increased symptoms of fatigue and oculomotor strain, and reduced ability to detect fractures. Lack of energy, physical discomfort and sleepiness were statistically significantly higher as a function of the length of session	Video monitor, computer	0	0	1	1	1	0	0	0
20	Lopez et al. (2018)			Nurses	US	Usability study	Assessed technology usability in 4 areas: inspection methods, usability testing, summative testing, and field studies	These technologies are highly usable to ensure high-quality and safe care delivery without unnecessary increases in workload	Technology (general)	1	0	1	0	1	1	1	0
21	Mylod et al. (2017)			Physicians	US	Intervention	Framework used to deconstruct the different sources of stress and rewards and guide strategies to improve balance	A two-pronged approach to clinician burnout is proposed to manage inherent stress of patient care is addressed separately from external stress (e.g., workflow, service delivery challenges) in clinical settings to reduce burnout	EHR, video monitor, computer	0	1	1	0	1	1	1	1

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
22	Nakagawa et al. (2020)			Physicians	US	Model intervention	Consensus explored burnout symptoms to technology-for digital natives versus those less familiar and comfortable with using technologies	Younger participants integrated technology faster than previous generations. Workflow, training and virtual assistants could improve efficiency, allow more flexibility with working arrangements and increase convenience for patients and physicians	EHR, video monitor, computer + (phone, email, tablet, virtual assistants)	1	1	1	0	1	1	1	1
23	National et al. (2019)			Clinicians	US	Consensus	Consensus study report	Health care technology is always evolving and that these developments are likely to be disruptive to the care delivery system as we know it today	EHR, video monitor, computer	1	1	1	0	0	1	1	1
24	Scaramuzzino et al. (2021)	523		Social workers	Sweden	Cross-sectional quantitative and qualitative methods	Explored whether or not social workers experience technostress	The binary logistic regression analysis showed that technostress is mostly a question of social workers already exposed to high workloads and high levels of general job stress. Also, the feeling of not being able to leave the job at the end of the day correlates positively with technostress. Malfunctioning technology, duplication of work, email 'bombs', information overload, and the fact that technology tends to set the terms of the social work	Video monitor, computer, other	1	1	1	0	1	1	0	0

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
25	Shanafelt et al. (2017)			Physicians, Healthcare Administrators	US	Assessment	Survey identified workload, burnout and efforts to reduce it	Deliberate, sustained, and comprehensive efforts by the organization to reduce burnout and promote engagement can make a difference. Many effective interventions are inexpensive, and small investments have large impact Approximately 45% of physicians work more than 60 h per week compared with less than 10% of US workers in other fields	Technology (general)	1	1	0	0	1	1	1	1
26	Tutty et al. (2019)			Physicians	US	Identification of intervention options	Explored implementation efforts with technology	Multiple opportunities for regulators, policymakers, EHR developers, payers, health system leadership, and users to make changes collectively to improve the use of efficacy of EHRs. Physicians spend 4–6 h on EHR and desk work during the day and 1–2 h after work, often for clerical and administrative tasks (e.g., documentation, order entry, billing, coding, and system security)	EHR, video monitor, computer	1	0	0	1	1	1	1	1

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
27	Zhang et al. (2013)	388		Physicians	US	Quasi-experimental	Measured cognitive workload via number of clicks for different order set combinations	Excessive cognitive workload on physicians imposed by technology impacts the cognitive behavior of users. The most important three factors that separate ideal order sets from the rest are patient safety, efficiency, and user satisfaction. Scientific evidence, workflow, ordering efficiency and user satisfaction reduces mouse clicks and unproductive thinking time	EHR, video monitor, computer	1	0	1	0	1	1	0	0
Technology impact on clinician workflow (not directly assessing fatigue)																	
28	Campbell et al. (2007)	95	3–4 days per site	Physicians	US	Qualitative	Qualitative surveys and interviews with physicians	Technology created chaos when there are insufficient backup systems in place and users had false expectations regarding data accuracy and processing, but some clinicians cannot work efficiently without computerized systems	EHR	1	0	1	0	1	1	1	0
29	McAlearney et al. (2005)	161	6 months	Physicians	US	Qualitative	Qualitative interviews and focus groups using standard, semi-structured guide with open-ended questions promoted discussion	Organizational strategies should include active support for broad-based and niche use, active support for niche use, and basic support for individual physicians	Smartphones, PDAs	1	1	1	0	1	0	0	1

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
30	McAlearney et al. (2015)	82		Physicians	US	Qualitative	Qualitative interviews and focus groups explored physician and administrative barriers to EHR: financial, technical, time, psychological, social, legal, organizational, and change process	Recommendations provided regarding how to facilitate physician adoption and use and address organizational concerns	EHR, video monitor, computer	1	1	1	0	1	1	1	1
31	Middleton et al. (2013)			Healthcare professionals	US	Consensus	2011 Health Care Technology Foundation Clinical Alarms Survey	Recommendations provided regarding human factors health information technology research, health IT policy, industry recommendations, and recommendations for the clinician end-user of EHR software	EHR, video monitor, computer	1	1	1	0	0	1	1	1
32	Nakagawa et al. (2019)			Physicians	US	Mixed methods	Semi-structured interviews with focus groups or individual physicians	Despite the increasing adoption of technology into medical practice, the problems and benefits that technology can offer to physician health and well-being have not been evaluated	EHR, video monitor, computer, phone, email	1	1	1	0	1	0	0	1
33	Nimjee et al. (2020)	11	1 month	Physicians	Canada	Qualitative	Semi-structured interviews explored problems	Common problems encountered included usability issues, downtimes and additional administrative tasks. Adaptability, perceived benefits and drawbacks vary based on generations involved	EHR, video monitor, computer	1	0	0	0	0	1	1	1

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
34	Paterick et al. (2018)			Physicians	US	Qualitative	Qualitative methods were used to gather and analyze data describing unintended adverse consequences of computerized provider order entry	Efficiency of medical care and time management via the EHR are undermined by unintended consequences like checkboxes, automatic filling of computer screens, pre-worded templates and automatic history and physical examination functions. Trainees and mentors are struggling to optimize medical education, develop clinical skills and provide high quality patient care	EHR, video monitor, computer	1	0	1	0	1	1	1	0
35	Shanafelt et al. (2016)	6375	3 months	Physicians across specialties	US	Non-experimental quantitative survey	Provided information regarding their use to EHR, electronic patient portals, and computerized physician order entry	Those using EHRs were less satisfied with the amount of time spent on clerical tasks and were at higher risk for professional burnout	EHR, video monitor, computer, electronic patient portal	0	1	0	0	1	0	0	0
36	Tai-Seale et al. (2017)	471	3 years	Physicians, healthcare administrators	US	Retrospective cohort s	Measured amount of time physician spent in EHR versus face to face care provided to patients	Noted increased computer related tasks and decreased in-person time with patients over time	EHR, video monitor, computer, phone, email	1	1	1	0	1	0	1	1
37	Westbrook et al. (2010)	40		Physicians	Australia	System redesign	Observational time and motion study conducted in the 400-bed emergency department of a teaching hospital explored workflow	Task completion times are shorter for interrupted tasks; tasks with high frequency of interruptions have lower accuracy; stress and frustration are higher during interrupted tasks	PDA	1	0	1	0	1	0	0	0
	Total # participant	11,378								25	16	21	4	29	20	14	17

Table 1 (continued)

Study #	Author year	N	Length (of study)	Population	Country	Design	Methods	Key findings	Technology (i.e. -hardware, software)	Area of focus* (1 = yes, 0 = no)				Level of focus** (1 = yes, 0 = no)			
										B	E	C	P	I	C	H	S
	Average # of participants	517.18															
									Sum (n = 37)	25	17	21	4	29	20	14	15
									Average (n = 37)	0.68	0.46	0.57	0.11	0.78	0.54	0.38	0.45

*Area of focus: *B* Behavioral, *E* Emotional, *C* Cognitive, *P* Physical.

**Level of focus: *I* Individual, *C* Clinic, *H* Hospital, *S* System. *EHR* electronic health record; *PCP* primary care provider; *PDA* personal digital assistant; *US* United States; *UK* United Kingdom; *VDT* video display monitor

and/or empathy. Almost all (98%) experienced multiple challenge(s): difficulty reading body language; difficulty negotiating distraction and engagement; difficulty negotiating technology for care; increased fatigue and administration; increased intimacy with patients (therapist gaining glimpses into a patient's home life); and reduced cancellations (although patients had preference for in-person meetings).

Telehealth empowered patients to ask more questions, and for clinicians to clarify issues more frequently. One study found the key predictor of the intention to use telepsychotherapy was not clinician attitude toward it or how complicated it is to use, but the anticipated degree of usefulness for patients (Monthuy et al., 2013). The diagnostic challenges, the effect on the therapeutic alliance, technical challenges and ethical concerns outweighed work flexibility and convenience for some (Olwill, et al., 2021). Overall, these findings appear to contradict non-inferiority research showing video as good as or better than in-person care (Morland et al., 2009).

Telehealth consultations resulted in higher rates of turn-taking between doctor and nurse than in-person consultation (Tachakra et al., 2002), similar to other telehealth media (e.g., telephone, e-mail) previously reported to have impact (Mohr et al., 2012; Walther, 2001). Both benefits and disadvantages about effectiveness pertain to specific cues or behaviors. In the context of a positive relationship, individuals are likely to make positive attributions in the absence of cues (e.g., perceiving a clinician being more like themselves and more sympathetic than the clinician actually is), whereas if difficulties, concerns or suspicions arise, attributions regarding missing cues can become overly negative (e.g., perceiving the clinician to be more uncaring) (Mohr 2012).

Use of Technology in Health Care and Associated Fatigue

Fourteen papers met the inclusion criteria (Table 1, in "Results" section). Video and electronic health record use were associated with behavioral, cognitive, emotional, and physical impact, with the latter usually reported as eye fatigue, neck pain, stress, and tiredness. Behavioral impact involved additional effort regarding barriers, trouble with engagement, emotional wear and tear, exhaustion, and fatigue. Cognitive impact focused on inattention, effort, expecting problems, multi-tasking, and workload. Emotional impact surfaced related to anger, irritability, stress, and concern about well-being.

Studies came from Romania, Sweden and the U.S., with one comparing multiple countries. Two studies discussed the physical environment, occupational health approaches, mobile care, telework, or Lean, human factor and user

design approaches to workflow. System on-boarding and training gets users oriented and informally sets expectations, but often there were no processes for ongoing self-, peer- and system-assessment of experience or skills. Workplace, workspace, ergonomic and technology implementation are gaining more attention in health care (Braithwaite et al., 2018; Keyworth et al., 2018) and other industries for those at work and home (Middleton et al., 2013). The studies were unidirectional in association, mediation, and causation (i.e., technology causing fatigue), and like other studies (Karwowski et al., 1994;; Mocci et al., 2001; Robelski et al., 2019; Travers et al., 2002) they lacked standard assessment, monitoring, and interventions.

Of the two studies of CSWs, one evaluated the risk for developing the burnout syndrome via two conceptual models: (1) the theoretical framework of VUCA (volatility, uncertainty, complexity, and ambiguity), and (2) stress and burnout (Dima et al., 2021). Results showed that 25.3% of respondents suffer from a high level of burnout and 44.6% at a medium level; with 31.1% handling stress in a healthy manner. Main stressors were personal (family) and work-related (workload, new legislative rules and decisions, inconsistency, instability, ambiguity of managerial decisions, or even their absence or non-assumption, lack of clarity of working procedures, limited managerial and supervisory support, limited financial resources), rather than client related (lack of direct contact, risk of contamination in two ways, managing beneficiaries fears, difficulties related to technology and digital skills). The other study explored whether social workers experienced technology-related stress (i.e., technostress) (Scaramuzzino et al., 2021). A binary logistic regression showed technostress was mostly a question of already being exposed to high workloads and high levels of general job stress. The feeling of not being able to leave the job at the end of the day correlated positively with technostress. Malfunctioning technology, duplication of work, email 'bombs', information overload, and the fact that technology tends to set the terms of the social work rather than the clinician contributed as well.

Studies focused on the use of technology (Khairat et al., 2020; Zhang et al., 2013), clinician perceptions (Galt et al., 2019; Shanafelt et al., 2017), visual strain or fatigue (Krupinski et al., 2009, 2010), implementation/usability and time spent on a variety of EHR tasks (Holmgren et al., 2021; Lopez et al., 2018; Tutty et al., 2019), and consensus reports (Aij et al., 2017; Maijala et al., 2018) (In "Results" section, Table 1). Approximately 45% of physicians work more than 60 h per week compared with less than 10% of US workers in other fields (Shanafelt et al., 2017). Time is often spent on video, e-mail, EHR and additional clerical and administrative tasks—at work and after work at home—contribute to fatigue. The most important three factors that separate ideal order sets from the rest are patient safety, efficiency, and user satisfaction. Scientific evidence shows that efficient workflow and ordering improves user satisfaction, reduces mouse clicks (i.e., cognitive click cost) and makes thinking time more productive (Zhang et al., 2013).

Clinician Health Care Technology Perceptions and Experiences not Specific to Fatigue

Ten studies explored clinician experiences or perceptions about technology that may apply to fatigue but did not directly investigate it. They focused on EHR and video (6), combinations of video display terminals, computers, and phones (6), smartphones or personal digital assistants (PDA) (1), or EHR alone (1) (Table 1, in "Discussion" section). Methods were heterogeneous with surveys, semi-structured interviews, qualitative methods, and comparison groups (e.g., video versus in-person or other).

Studies that focused on EHR time log data for physicians (Tai-Seale et al., 2017) found substantial time (e.g., 5.9 h per 11.4-h workday in a hospital) for documentation, order entry, billing, coding, inbox management, communicating with patients, refilling prescriptions or reviewing test results (Tai-Seale et al., 2017). User ratings were high on data quality, accuracy, and processing (Campbell et al., 2007), but low for satisfaction with clerical tasks. Interrupted tasks required more time and result in more errors, stress, and frustration (Westbrook et al., 2010) and qualitative interviews and focus groups suggested more focus on usability, usefulness, training, and support (McAlearney et al., 2015; Nimjee et al., 2020). There were differences between generations regarding adaptability, perceived benefits and drawbacks and perceptions of other generations' ability to adapt.

A Continuum From Health to Fatigue to Burnout

Qualitative analysis suggests a continuum from health to fatigue to burnout indicators (Fig. 2), which is stratified by technology/site, clinical care, routine/fitness, and attitude/outlook dimensions. Related to workflow, CSWs and organizations need to carefully select technology and accessories for user friendliness, may require help setting it up, and have timely help if problems develop. A key dimension for those with more than one site or context (e.g., work, mobile/virtual, home) is to make workflow as compatible as possible to align structure and function (Hill et al., 2003; McAllister et al., 2022; Robelski et al., 2019). Whether self-employed or an organization employee, having input in selection and implementation of technology in clinical workflow (e.g., pre-determined routines), workload, and remuneration is important. For those working in teams, there are ways to empower virtual team performance like fostering social interaction, acts of empathy, soliciting input, recognizing

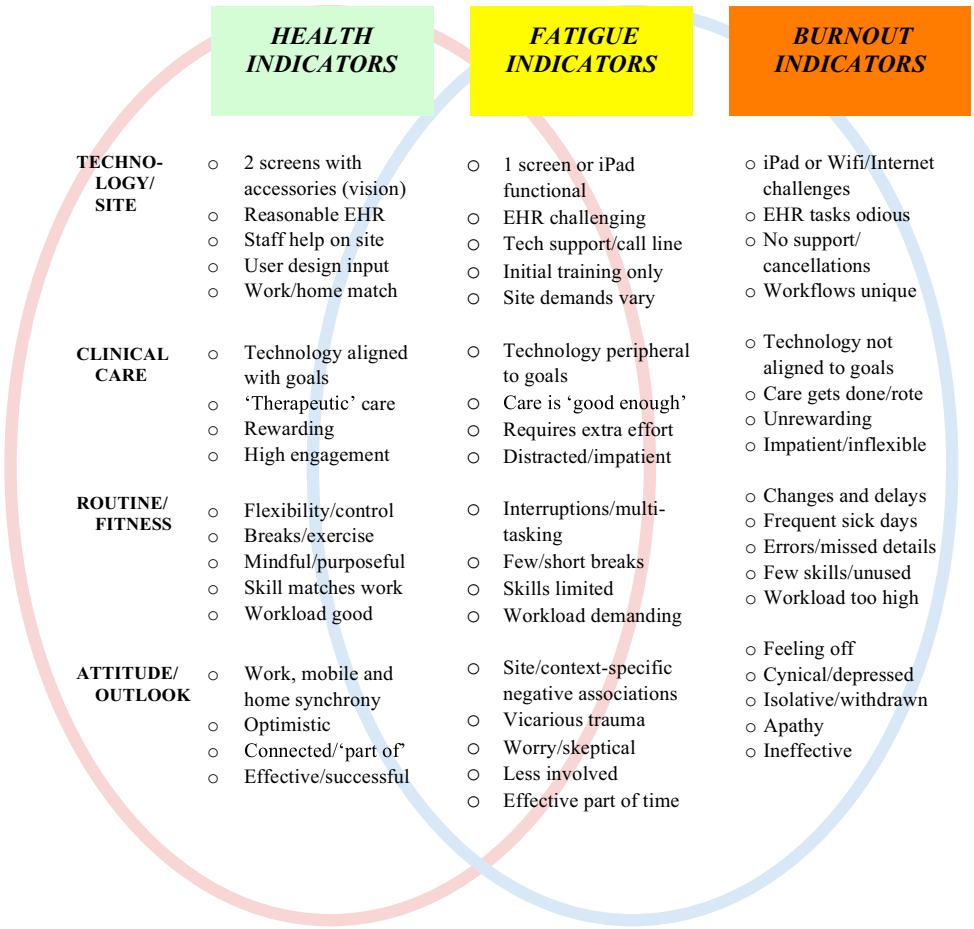

Fig. 2 A comparison of health, fatigue and burnout related to technology use

contributions, and in-person interactions or hybrid work (Hilty et al., 2020; Kirkman et al., 2004).

Clinicians vary in how aligned technology is with their goals, how therapeutic or enjoyable it is for them (and not just patients), and other rewards. Ways to help increase work-home segmentation, such as reducing workplace norms that encourage employees to be continuously accessible and provide flexibility, are suggested (Baer et al., 2016). Furthermore, introverts may selectively withdraw from the work domain to conserve resources when privacy at home is threatened. When CSWs or organizations employ user-centered design and/or Lean processes, user satisfaction and the fit of goals, methods and routines may be much higher (Aij et al., 2017; Maijala et al., 2018). These processes avoid gaps between system and clinician perspectives, as well as workflow problems that may arise. Fatigue often manifests in social/interpersonal contexts via changes in attitude/outlook with taxing fatigue overtaking effectiveness and engagement; this results in burnout with exhaustion, cynicism, and feelings of ineffectiveness (Shanafelt et al., 2016; Maslach et al., 2016, 2017).

Themes and Factors Relatively Unstudied

Since 2017, implementation science approaches have been more broadly used, at least in the U.S., but few systems have assessed how the addition of technological practices impact clinical workflow from Lean, human factor, product/user design or employee/human resource/occupational health approaches. Few studies discussed how to enhance the physical environment, considered the impact of work at home or mobile/virtual care, weighed professional versus personal well-being, considered how personality and boundaries impact fatigue, or stratified risk for fatigue or burnout (i.e., vulnerable to negative effects; anxiety, depression, other) in relation to well-being and resilience.

Other areas not well studied include culturally diverse populations, compassion fatigue and the impact of training and professional development on clinician skills, attitudes, and knowledge. Client–clinician dimensions of language (e.g., verbal dominance) and affective communication (e.g., rapport-building, tone, friendly, concerns) vary with clinician expectations (Lorié et al., 2017). If there is something intangible missing, it may explain increased risk of post-treatment deterioration in telephone-delivered treatment

relative to in-person treatment (Coughtrey et al., 2018; Kaplan et al., 1997; King et al., 2006). Compassion fatigue may be exacerbated by or contribute to technology fatigue (Cavanagh et al., 2020; Coetzee et al., 2018; Conversano et al., 2020; Fernando & Consedine, 2017; Rossi et al., 2013; Sorenson et al., 2017). Compassion fatigue and depersonalization from staff burnout may be insufficient to trigger current institutional procedures or cause immediate harm, yet can lead clients, family, and the public to wonder about care neglect or believe that staff are unconcerned about their emotional and physical well-being.

Other areas not evaluated included technology competencies. The assumption that clinicians—much less trainees—will have skills, attitudes, and knowledge to use video and other technologies was met with substantial problems during the pandemic (Hilty et al., 2022). There was also little information to compare between mental health professions and practice contexts in terms of experiences and positive/negative outcomes. Finally, the business, occupational health and well-being literature has not studied technology fatigue and burnout, yet research in occupational health, video display, burnout and other areas helped to contextualize technology-based fatigue, including best practices at clinician, clinic, and systems levels for health care.

Best Practices for Clinical Social Workers, Teams and Systems for Use of Technology and Well-being

Findings from Studies

The variety of human factors related to use of technology for mental health clinicians suggests best practices for clinicians and teams. These were organized in the following domains: technology and office adjustments; selection of technology, start-up considerations for a variety of setting (work office, mobile or home office); training and professional development; clinical care; and human factors (Table 2). For example, technology and office adjustments should be somewhat standardized and include the selection of primary and supportive technologies, office design for conducive workflow in space and with a good environment, a plan for technology assistance or failure, and information system components like EHR, Wi-Fi and virtual private network at a minimum.

Training and professional development findings suggest that adjustments for video may go well, but mobile health and other asynchronous technologies cause routine challenges to workflow. Data suggest that learning online may not be less effective, but teaching effectiveness and flow are disrupted, and administrative and committee work is less integrated. Furthermore, social and interpersonal relationships may be affected by being at a distance, and faculty acculturation and assimilation is better in-person. There is a substantial data on well-being and emotional connectedness (Bender et al., 2021; Gates et al., 2021; Sakuraya et al., 2020; Schneider et al., 2018), burnout (American Medical Association, 2015; Aronsson et al., 2017; Dima et al., 2021; Maslach et al., 2017; Scaramuzzino et al., 2021; Stehman et al., 2019; Swenson et al., 2017; West et al., 2016), burnout with EHRs (Downing and Marriott 2020; Shanafelt et al., 2017), risk factors (Gleichgerrcht &Decety, 2017; West et al., 2018), and interventions (Bender et al., 2021; Panagioti et al., 2017; Van Steenbergen et al., 2018; West et al., 2016) like mindfulness (Knox et al., 2021); with some specific to psychiatry/mental health clinicians (Eriksson et al., 2018; Rössler et al., 2012; Steel et al., 2015; O'Connor et al., 2018).

CSWs need to be practical about how to best integrate technologies into clinical practice, which requires reflection and purpose, discussion with patients, and keeping up with rapidly changing options. There are multiple opportunities for regulators, policymakers, and developers (mostly related to EHRs) (Lopez et al., 2018; Tutty et al., 2019), though, clinicians, managers, faculty, supervisors and leaders have to collectively plan, improve and monitor workflow with all technologies.

Perhaps the top priority is meeting the needs of the person/client and fitting the technology and training of the clinician to support the therapeutic relationship, which may require adapting technology for all users—the individual, families and groups. Depending on comfort, familiarity with technology and/or the clinician, the client may have varying degrees of receptiveness to technology. Willingness to engage, effective implementation and social support can assist them in navigating the new technology. Resource materials should summarize key concepts and outline procedures so the CSW does not have to. The technology must be appropriate and effective for the course of treatment of the client's illness, needs and ability to engage in-person or virtually. Digital care should be culturally safe – meaning that it aligns with the preferences and values of the recipient of care, as judged by that person rather than by the clinician.

Best Practices

Best practices for CSWs include creating a culture of well-being with technology use, and approaches to clinical care at individual, job or workplace levels, and evaluation or process improvement strategies (Table 3). A key part of this is to reflect on how technology contributes (and impedes) social good and assess if all social work populations (e.g., those who isolate, are impulsive or violent) can be engaged and whether help can be received if access to technology is a barrier. Care is needed so that technology does not inadvertently contribute to inequity and other injustices. A strong message of prioritization of well-being is sent by providing initial and longitudinal training and evaluation to promote

Table 2 Human factors related to use of technology for mental health care: how to identify, minimize and prevent fatigue

Evidence and findings	Manifestations	Analysis	Individual user adjustments
Technology and office adjustments			
Selection of primary technology	Solo desktop or laptop screen is challenging	Funding is needed for equipment (e.g., 2 screens, accessories)	Pre-plan basic needs and customize to individual needs
Planning for other technology needed	Using personal phone for work Mobile devices may not feed into EHR	Assess resources vs. needs, particularly for mobile health Use telework checklist	Administrative, clerical and technical support up front and ongoing
Work space, screen time and ease of work	Eye, wrist, neck, head and other complaints Substantial effort and late days	Ergonomic furniture, screen and issues – use occupational health and design studio principles	Adjust eyewear, furniture and length of day Pilot workflow and any changes
Workflow alignment across settings	Home office is not adequate Going mobile results in problems	New settings raise challenges Standardize as much as possible	Align settings in design (e.g., arrangement of furniture)
Space and efficiency issues	Delays, problems and fatigue Lack of back-up systems	Technology and task fit for workflow	Re-invest space $ to home setting Sound, décor and environment positive for patient and clinician
Technology failure(s)	Battery, hardware/software, other Wi-Fi availability and cost	Technology and task fit Help in time may be needed	Pilot, log and feed problem to IT staff and administration
EHR and IS complexity and workload	Time and effort requirements for inbox, checklists and mobile health	Wi-Fi, VPN and other needs Timeliness of response for help Completion of work during work or after	Assess workload, obtain skills and become efficient Discuss with supervisor, mentor and administration
Training and professional development			
Task-specific training and monitoring	Video okay but other technologies not	Skills, optimizing experience and flow	Attend training and have forum to share tips
Skills/competencies	Asynchronous less routine and challenges	Identify need (skill, knowledge) and triage	Schedule regular time (rather than free time)
Learning online may not be less effective	Limited discourse and less PD acculturation	Distractions, multi-tasking interruptions	Identify in-person: skills, attitudes and networking
Teaching effectiveness and flow	Virtual: need time to shift material/method	Virtual plan reduces errors and disruptions	Set learner expectation and create virtual culture
Social and interpersonal relationships	Less networking and venting	Evaluate teamwork and connection to others	Do little things before and after meeting; use rewards
Administration and committee challenge	In-person or virtual can be long and dry	Evaluate socialization and presence	Align in-person and virtual roles to task
Clinical care			
Engagement and communication problems	Different quality eye contact Missed non-verbals Feels less responsive	Video ≠ in-person Requires more concentration, fewer distractions	Use an "ice breaker" Adjust communication (e.g., verbal not tissue for tears) Fit equipment to task
Less rewarding and/or spontaneous	Less warm, deep and therapeutic for clinician	Less tangible, view limitations and virtual not preferred	Reflect on/implement rewarding aspects (e.g., meaning, joy)
Requires effort Cognitive Emotional Physical	Fatigue with workflow Less focus/attention Irritability, criticism Aches, strain	Individual (e.g., trait or state) versus work environment issues	Prepare and assist others Avoid multi-tasking Take breaks to refresh Attend to ergonomics
Excessive screen time	Eye, wrist, neck, head and other complaints Tired and finishing late	EHR retrieving, analyzing and entry Extra time needed	Adjust eyewear, furniture and length of day; take breaks Monitor for fatigue/burnout
Higher % time at bottom of license	EHR: fields, checklists and other	Demands outweigh rewards	Adjust workload and get team help
Interruptions	Texts, calls, and other alarms	Required, purposeful interruptions	Silence alarms and limit e-mail/text; notify patients
Quality of care outcomes	Compare in-person and video metrics	Valid questionnaires Identify root causes	Request feedback in-session and make adjustments
Care and workflow metrics needed	Adjustments for video, EHR and other	Detect if experience is good and effective	Identify data needed to assess issues and give input

Table 2 (continued)

Evidence and findings	Manifestations	Analysis	Individual user adjustments
Human factors			
Amplification (shift from seldom to frequent use)	Physical ailments Fatigue complaints	Minor issues become problems; fatigue turns into burnout	Identify tedious or problematic workflow context(s) and modify
Cumulative load of technology in work and life	Emotional, cognitive, physical fatigue Put off/delayed events	Recreation, social (media), training and care add up	Identify what needs to be/ in-person and triage/shift Diversify activity modes
Poor work engagement	Negative comments, schedule changes	Trait, state and other causes of fatigue	Align technology to goals and monitor attitude
Fitness (emotional, physical, spiritual) vs. fatigue	Concerns, worries, appearance and personal disclosures	Personal/professional, individual/team/ group evaluation	Localize problem and check-in with supervisor Add good habits
Isolation vs. social/interpersonal connection	Missing discussions, meetings and shifts Poor teamwork	Temporary or prolonged State vs. trait/chronic	Evaluate culture of care, training and faculty development
Errors and missed details	Poor outcomes and EHR alerts/alarms	Individual, group, team and IS factor(s)	Identify common errors via performance data
Myth of multi-tasking	Poor patient engagement and errors	Facilitate reflection, use peer observation	Engage/focus on task and rare purposeful multi-tasking
Effectiveness vs. negative perception	Lack of ideals and standards; frustration	Care, technology, workflow fit	Talk to supervisor, adjust workflow and get help

$ financial; *CME* continuing medical education; *EHR* electronic health record; *IS* information systems; *IT* information technology; *mhealth* mobile health; *N* population; *QI* quality improvement; *PI* process improvement; *PD* professional development; *WB* well-being

adaptive integration and attend to challenges. The impact of technology can be discussed in educational, professional development and administrative forums. Clinicians, teams, and services need to assess quality of care and if technology is working, as well as monitor the level of enjoyment of care, degree of contact with (or isolation from) others, and overall well-being (Hilty et al., 2022).

Human Factor Approaches

Human factor approaches at the level of CSWs should monitor the therapeutic engagement, evaluate clinical workflows, and promote competencies with technology and self-care (Merrill et al., 2021). One way to empower CSWs is to ensure training for skill, attitudinal and knowledge development related to technology (Merrill et al., 2021). Specific competency sets have been put forward for videoconferencing (2015, 2016, 2018) (Crawford et al., 2016; Hilty et al., 2015, 2018a, 2018b), social media (2018) (Hilty et al., 2018a, 2018b; Zalpuri et al., 2018), mobile health (2019, 2020) (Hilty et al., 2019, 2020) and asynchronous technologies (Hilty et al., 2020). These are formatted in the Accreditation Council on Graduate Medical Education domains of Patient Care, Medical Knowledge, System-Based Practice, Professionalism, Practice-Based Learning and Improvement, and Interpersonal and Communication Skills (2021). The Coalition for Technology in Behavioral Science (CTiBS) put forward a set of competencies in seven competency domains: (1) Clinical Evaluation and Care; (2) Virtual Environment and Telepresence; (3) Technology; (4) Legal and Regulatory Issues; (5) Evidence-Based and Ethical Practice (including Social Media); (6) Mobile Health and Apps; and (7) Telepractice Development (Merrill et al., 2021). Both frameworks provide entry for clinicians at any of three competency levels (Novice, Proficient and Expert/Authority) (Dreyfus & Dreyfus, 1980).

Ease of Workflow

It is important to assess how clinical, training and administrative sessions online affect flow of work—for example, to see if technology in sum, reduces wear and tear of travel to reach others or creates extra challenges. Ease of workflow is facilitated by site and workplace adjustments, which relate to institutional competencies for video (Hilty et al., 2019a, 2019b) and asynchronous technologies (Hilty, Torous et al., 2020). Institutional domains include: Patient-Centered Care; Evaluation and Outcomes; Training/Education and Development (e.g., trainees, faculty, teams, professions); Teams, Professions and Systems Within Institutions; and the Institutional or Organizational Culture. The interface of health care, technology and fatigue may also require Professional Development and Well-being. These have suggested for CSW professional development, research, and training, as well as applicability toward licensure, certification, and

Table 3 Best practices for clinical social workers and teams for technology use to promote well-being and prevent fatigue

General

- Create a culture of well-being with technology use
  - Provide initial and longitudinal training and evaluation to promote adaptive integration and attend to challenges
  - Enlist help from others and discuss impact of technology in clinical, educational and professional development forums
  - Reflect on how technology contributes (and impedes) social good
  - Foundation: assess, plan and monitor
- Create reasonable workflow at work office, mobile/virtual and home contexts
  - Consider alignment to standardize structure, process and workflow
  - Adapt technology for all users for individual, family and group formats; consider it if it helps reach additional populations despite some limitations
  - Identify benefits (e.g., facility, convenience) and challenges (e.g., boundaries)
  - Foundation: assess what is working and what things need adjustment
- Consider self-care, equity and inclusion, in general, and related to technology
  - Assess how clinical, training and administrative sessions online affect flow of work and create extra challenges
  - Monitor if technology inadvertently contributes to in inequity and other injustices, the opportunities for everyone to advance in society increase
  - Seek organizational assistance for self-care and use technology if he reduces wear and tear of travel to reach others
  - Monitor stress, unexpected events and challenges in workflow

Human factors

- Evaluate therapeutic alliance, quality care and access from clients' and clinicians' points-of-view
- Assess if all social work populations (e.g., those who isolate, are impulsive or violent) can be engaged and enlist help if access to technology is a barrier in order to reduce inequality
- Work toward and promote competencies for video (Hilty et al., 2015; Maheu et al., (2019), social media (Zalpuri et al., 2018), mobile health (Hilty et al., 2019, 2020) and asynchronous technologies (Torous et al., 2020)
- Adjust work schedule and routines to observed/experienced rather than theoretical plans (Maslach 2016; 2017)
  - Avoid interruption and multi-tasking, as interruption self-efficacy can help offset interruption-based stress (Tams et al., 2015)
  - Lower throughput and take breaks
  - Balance life-work
  - Manage time and resolve conflicts
  - Use mindfulness and fitness strategies
- For regular work on the computer, use 15-min work periods with micro breaks for better performance and fewer physical symptoms associated (Balci et al., 2003)
- For therapeutic work days, take 5–10 min breaks each hour
- Assess physical (e.g., eyewear, musculoskeletal, light) and professional environment needs
- Ergonomic intervention improved eye (e.g., fatigue, burning, red eyes and double/hazy vision) and physical pain (e.g., neck, shoulder, forearm, shoulder and back) symptoms (Aarås, 2005)
- Significant wrist/hand discomfort is seen more among women and working 7 + h at a computer with poor keyboard position (LaPointe et al., 2009)
- Age-related farsightedness was often over-corrected, so the alignment of vision with distance to the screen should be evaluated

Ease of workflow

- Consider usability attributes: simplicity; natural-ness; efficient interactions; effective information presentation; preserved context; and minimized cognitive load
- Get help with the selection and implementation of the technology for clinical workflow
  - Identify approach and responsible party for initial and ongoing help
  - Log accurate and meaningful data on successful and problematic events for analysis
- Align structure, process and workflow across settings and contexts (e.g., work, home, mobile/virtual)
- Redesign schedule and settings if significant problems arise

Table 3 (continued)

- Assess impact of video and mobile health, stress and workflow challenges, which are more common for those working across work and home settings compared to separators (Yeh et al., 2020)
- There is a possible relationship between eye discomfort and luminance ratios (in candela per square meter with ambient light 10–50:1 and recommended 100:1) and/or uncorrected acuity or refraction problems rather than a history of eye diseases (e.g., cataract) and eye discomfort

Site and workplace (e.g., home, clinic, hospital) factors and interventions
(Perlo et al., 2017; National Academies of Sciences, 2019; Nakagawa et al., 2020; Nguyen et al., 2021; Shanafelt et al., 2017; Torous et al., 2020)

- Promote self-care and evaluate/monitor well-being, health and resilience versus fatigue and burnout
- Facilitate individual/team coordination and collaboration
- Employ technology design and physical environment adjustments (e.g., ergonomics) based on business and occupational health principles
- Redesign job tasks for individuals and teams to optimize workflow at the top of license
- Apply technology competency domains used for organizations to individuals and teams (Hilty et al., 2019a, 2019b; Torous et al., 2020)
- The 40-degree video display terminal position showed significantly greater head tilt angles and higher muscle activity levels than the preferred the 15-degree position (Tan et al., 2006)

Evaluation and Process Improvement (Pelayo et al., 2018; Salzma et al., 2014; Torous et al., 2020) to promote: good device visuals; in time help options; ease of use and learning; and quality of support (Downing and Marriott 2020; Nguyen et al., 2021; Park et al., 2019; Shanafelt et al., 2016; Tutty et al., 2019)

- Use a 360-degree perspective to evaluate well-being related to technological integration
- Consider quantitative and qualitative analysis of each technology to see associated factors, types of fatigue and patterns to guide prevention and amelioration efforts
- Employ user design approaches/studios with focus groups, studies, surveys
- Apply Joy in Practice Framework principles to identify and address human needs/factors, develop leaders' participative management competency (Swensen et al., 2017)
- Incorporate technology, well-being and fatigue with regular, traditional outcomes like quality of care (e.g., engagement, improvement) and quality of life (e.g., enjoyment, facility/natural)

policy (Merrill et al., 2021). Some organizations employ human factors engineering and usability assessments (Szalma et al., 2014; Pelayo et al., 2018). Clinicians will find work easier with teamwork and if the structure and process are aligned across settings and contexts (e.g., work, home, mobile/virtual) (Yeh et al., 2020). Human resource oversight of variables such as eye discomfort and luminance ratios, physical environment (e.g., ergonomics) and video display terminal position is important (Tan et al., 2006).

Impact of Technology on Self-Care

The evaluation of health care, burnout, and use of technology (e.g., EHRs) needs to include objective measures to evaluate and enhance well-being and prevent fatigue. At a minimum, consideration is needed for the cognitive, behavioral, emotional, and physical impact of workflows at the individual, clinic, hospital levels and system/organizational levels. Human–computer interaction/graphical user interface (HCI/GUI) design, evaluation, and verification, as well as software user interface standards and guidelines, could be assessed with a wide array of qualitative, quantitative, or mixed methods commonly used in software intensive industries including healthcare. Adjustments in information systems and technology (IS, IT), use of Lean methods and emphasis on interprofessional education efforts with technology team-based care have been suggested by the Institute of Healthcare Improvement and Agency for Healthcare Research and Quality (Hilty, Torous et al., 2020). Deliberate, sustained, and comprehensive efforts by the organization, often inexpensive, reduce burnout and promote engagement (Maslach et al., 2016, 2017; Nakagawa et al., 2020; National Academies of Sciences, Engineering and Medicine, 2019; Shanafelt et al., 2017).

Discussion

The findings of this scoping review are a starting place for evaluation and adjustment of current practices using technology for CSWs (Merrill et al., 2021; Singh et al., 2021). Clinicians can build a therapeutic alliance via video, but this required additional skill, effort and monitoring to contend with challenges. Video and the EHR are associated with physical and emotional experiences related to barriers, effort, cognitive demands and additional workflow steps. In general, clinicians have low satisfaction with clerical tasks, the effort required in work and interruptions costing time, errors, and stress. Specifically, CSWs can help by creating a culture of well-being with technology use in clinical, educational and professional development contexts, and by reflecting on how technology contributes (and impedes) social good. Qualitative analysis of the literature suggests a

continuum from health to fatigue to burnout and best practices for using technology for health care and mental health care.

Health care is increasingly dependent on technology, creating challenges for individual clinicians and potential opportunities for systems of care to evaluate and intervene to have broad impact. For CSWs, reasonable workflow based on best practices is essential for all users – individual, families and groups formats – in order to reach additional populations without additional stress. Soon, practice in health and mental health settings will include in-time, continuous data collection and analytics to support clinical decision-making, including health, technology and cultural/language literacy for participants, particularly for mobile health (Pew Research Center 2021; Hilty et al., 2021a, 2021b, 2021c). A shift is beginning to occur, in which technology not only facilitates, but also organizes health care, education and research (Hilty et al., 2019a, 2019b). The business culture has expanded the tetrad—research, production, and marketing, and finance – to a pentad by integrating technology rather than appending it (Ray et al., 2007), and employing an IT architecture (Ross et al., 2003). Structural and functional redesign of workflow should include evaluation, process improvement, implementation and other human factor adjustments for clinical, training/professional development, and administrative practices (Hilty et al., 2022; Pelayo et al., 2018; Proctor et al., 2010; Szalma et al., 2014).

A final, major step toward this new culture is system integration of health care quality outcomes with those for technology and well-being (Hilty et al., 2022). Business, occupational health and well-being literature have employed human factor, Lean, process improvement, occupational health, design studios and implementation science approaches. Institutional strategies and a framework for champions, leaders and organizational resources are needed to promote resilience and self-care, flexibility, autonomy, camaraderie and teamwork (Shanafelt et al., 2017; Perlo et al., 2017). This system integration aligns with the Quadruple Aim (Bodenheimer et al., 2014) and may require a 360-degree perspective of functioning for client, employee/human resources, and training/education. Clinicians will find work easier if the structure and process are aligned across settings and contexts (e.g., work, home, mobile/virtual) (Hill et al., 2003; Kirkman et al., 2004; Baer et al., 2016; Robelski et al., 2019; Yeh et al., 2020; McAllister et al., 2022). Discussing the impact of technology in educational, professional development and administrative forums may lead to practical ways to redesign job tasks and workflow. Institutional strategies and a framework for champions, leaders and organizational resources are needed to integrate quality of care, well-being and resilience outcomes (Hilty et al., 2022).

A key area of research so far overlooked is the impact of justice, equity, diversity and inclusion – which has noted a digital divide for populations served, but for the clinicians providing the care – related to technology, fatigue and well-being. In health care, preliminary studies have evaluated the impact of generation (i.e., age) culturally safe care from a stance of humility and institutional competencies for academic health center for services via technology (Hilty et al., 2021a, 2021b, 2021c; McCoyd et al., 2023)**.** Support and involvement is needed from all levels of the organization for health care, evaluation, training, faculty and interprofessional teams and organizational structure, process and finance. Exemplary culture, diversity and leadership paradigms facilitate shared mental models, reduce uncertainties, enhance safety and include perspectives of program stakeholders via bidirectional learning and input (Hilty et al., 2021a, 2021b, 2021c. Any of the many dimensions of diversity or differences (e.g., culture, ethnicity, race, religion, sexual orientation, gender identity, language, nationality, immigration status, socioeconomic status, ability, spirituality, age, disability status, education, clinical diagnoses, geography, professional discipline or guild, career stage) could also affect evaluation, monitoring, reporting and intervention – as well as job satisfaction, role conflict and expectations (Hilty et al., 2022; Dickson, 2015).

There are several limitations to this scoping review. First, the review could only provide an overview of complex topics from a variety of fields in order to lay a foundation towards integrating them. Second, only one author reviewed the titles and abstracts. Third, given the small sample sizes, heterogeneous methods, and variable study duration, we were unable to apply a systematic quality evaluation system or draw conclusions using quantitative meta-analysis. Cross-sectional studies of associations with multiple factors in applied rather than controlled settings have limitations. Fourth, there are other pertinent databases that were not searched or data accessed effectively (e.g., Social Work Abstracts). Fifth, for qualitative analysis, a formal software system was not used and inter-coder reliability calculations were not performed. Sixth, our stratification of behavioral, cognitive, emotional, and physical domains of impact, while heuristically helpful, could be more rigorously operationalized. Similarly, workplace at the individual, clinic, hospital and system/organizational levels may need better definition. Lastly, methods did not search the terms justice, equity, diversity and inclusion – an oversight –and unfortunately the studies have not described the clinician populations in these dimensions and sociodemographics, aside from generational differences.

Conclusions

Health care is increasingly organized with technology, and organizations and health care systems need to evaluate the impact of technology in accordance with the Quadruple Aim

in order to support CSWs' well-being and prevent workload burden, fatigue and burnout. If done well, technology integration could further population-centered health and effectiveness of service delivery, though redesign financing, reimbursement, regulatory and other changes may be necessary – to integrate health care quality, technology and well-being outcomes – otherwise, advances in technology may not have substantial impact and may inadvertently worsen clinician workload burden, fatigue, and burnout. Future work could more systematically evaluate other relevant well-being, burnout, stress, organizational culture, and the physical, mobile or telework workflow environment. Broader input for consensus across organizations would also be helpful, particularly among more social workers, and a qualitative, small group interview approach with experts using via a semi-structured guide may be used to discover more information.

Acknowledgements American Telemedicine Association and the Telemental Health Interest Group; The Coalition for Technology in Behavioral Science; Department of Psychiatry and Behavioral Sciences, University of California, Davis School of Medicine; Veteran Affairs Northern California Health Care System and Office of Connected Care, Department of Veterans Affairs.

Declarations

Conflict of interest The authors have no financial or non-financial interests that are directly or indirectly related to the work submitted for publication.

References

Aarås, A., Horgen, G., Ro, O., Løken, E., Mathiasen, G., Bjørset, H.-H., Thoresen, M., et al. (2005). The effect of an ergonomic intervention on musculoskeletal, psychosocial and visual strain of VDT data entry work: The Norwegian part of the international study. Norwegian Part of the International Study. *International Journal of Occupational Safety and Ergonomics, 11*(1), 25–47. https://doi.org/10.1080/10803548.2005.11076627

Abramson, M. (1991). Ethics and technological advances. *Social Work Health Care, 15*(2), 5–17. https://doi.org/10.1300/J010v15n02_02

Accreditation Council on Graduate Medical Education. (2021). Common program requirements. Retrieved from: https://www.acgme.org/globalassets/PFAssets/ProgramRequirements/CPRResidency2021.pdf

Aij, K. H., & Rapsaniotis, S. (2017). Leadership requirements for Lean versus servant leadership in health care: A systematic review of the literature. *Journal of Healthcare Leadership, 9*, 1–14. https://doi.org/10.2147/JHL.S120166

Alston, A., Irons, K., Adamson, C., Boddy, J., Fronek, P., Briggs, L., & Foote, W. (2022). Australian and New Zealand social workers adjusting to the COVID-19 pandemic. *The British Journal of Social Work, 52*(4), 1859–1877. https://doi.org/10.1093/bjsw/bcab163

American Medical Association. (2015). 7 steps to prevent burnout in your practice [Internet]. AMA Wire, Aug 11, 2015. https://wire.ama-assn.org/practice-management/7-steps-prevent-burnout-your-practice.

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19–32. https://doi.org/10.1080/1364557032000119616

Aronsson, G., Theorell, T., Grape, T., Hammarström, A., Hogstedt, C., Marteinsdottir, I., Skoog, I., Träskman-Bendz, L., & Hall, C. (2017). A systematic review including meta-analysis of work environment and burnout symptoms. *BMC Public Health, 17*(1), 264. https://doi.org/10.1186/s12889-017-4153-7

Ashcroft, R., Sur, D., Greenblatt, A., & Donahue, P. (2022). The impact of the COVID-19 pandemic on social workers at the frontline: a survey of Canadian social workers. *The British Journal of Social Work, 52*(3), 1724–1746. https://doi.org/10.1093/bjsw/bcab158

Baer, S. M., Jenkins, J. S., & Barber, L. K. (2016). Home is private… do not enter! Introversion and sensitivity to work-home conflict. *Stress and Health, 32*(4), 441–445. https://doi.org/10.1002/smi.2628

Balci, R., & Aghazadeh, F. (2003). The effect of work-rest schedules and type of task on the discomfort and performance of VDT users. *Ergonomics, 46*(5), 455–465. https://doi.org/10.1080/0014013021000047557

Bender, A. E., Berg, K. A., Miller, E. K., Evans, K. E., & Holmes, M. R. (2021). "Making sure we are all okay": healthcare workers' strategies for emotional connectedness during the COVID-19 pandemic. *Clinical Social Work Journal*. https://doi.org/10.1007/s10615-020-00781-w

Berzin, S. C., Singer, J., & Chan, C. (2015). Practice innovation through technology in the digital age: A grand challenge for social work. *American Academy of Social Work & Social Welfare*. Working Paper 12, 1–21 https://grandchallengesforsocialwork.org/wp-content/uploads/2015/12/WP12-with-cover.pdf

Bodenheimer, T., & Sinsky, C. (2014). From triple to quadruple aim: Care of the patient requires care of the provider. *Annals of Family Medicine, 12*(6), 573–576. https://doi.org/10.1370/afm.1713

Böös, S. R., Calissendorff, B. M., Knave, B. G., Nyman, K. G., & Voss, M. (1985). Work with video display terminals among office employees. III. Ophthalmologic factors. *Scandinavian Journal of Work, Environment & Health, 11*(6), 475–481. https://doi.org/10.5271/sjweh.2207

Braithwaite, J., Churruca, K., Long, J. C., Ellis, L. A., & Herkes, J. (2018). When complexity science meets implementation science: A theoretical and empirical analysis of systems change. *BMC Medicine, 16*(1), 63. https://doi.org/10.1186/s12916-018-1057-z

Brown-Johnson, C., Schwartz, R., Maitra, A., Haverfield, M. C., Tierney, A., Shaw, J. G., Zionts, D. L., Zulman, D. M., et al. (2019). What is clinician presence? A qualitative interview study comparing physician and non-physician insights about practices of human connection. *BMJ Open, 9*(11), 30831. https://doi.org/10.1136/bmjopen-2019-030831

Bullock, A., Colvin, A., & Jackson, M. S. (2022). Zoom fatigue in the age of COVID-19. *Journal of Social Work in the Global Community*. https://doi.org/10.5590/JSWGC.2022.07.1.01

Caldwell, J. A., Caldwell, J. L., Thompson, L. A., & Lieberman, H. R. (2019). Fatigue and its management in the workplace. *Neuroscience and Biobehavioral Reviews, 96*, 272–289. https://doi.org/10.1016/j.neubiorev.2018.10.024

Campbell, E. M., Sittig, D. F., Guappone, K. P., Dykstra, R. H., & Ash, J. S. (2007). Overdependence on technology: An unintended adverse consequence of computerized provider order entry. *AMIA Annual Symposium Proceedings, 2007*, 94–98.

Cavanagh, N., Cockett, G., Heinrich, C., Doig, L., Fiest, K., Guichon, J. R., Page, S., Mitchell, I., & Doig, C. J. (2020). Compassion fatigue in healthcare providers: A systematic review and

meta-analysis. *Nursing Ethics, 27*(3), 639–665. https://doi.org/10.1177/0969733019889400

Coetzee, S. K., & Laschinger, H. (2018). Toward a comprehensive, theoretical model of compassion fatigue: An integrative literature review. *Nursing & Health Sciences, 20*(1), 4–15. https://doi.org/10.1111/nhs.12387

Conversano, C., Ciacchini, R., Orrù, G., Di Giuseppe, M., Gemignani, A., & Poli, A. (2020). Mindfulness, compassion, and self-compassion among health care professionals: What's new? *A Systematic Review. Frontiers in Psychology, 11*, 1683. https://doi.org/10.3389/fpsyg.2020.01683

Coughtrey, A. E., & Pistrang, N. (2018). The effectiveness of telephone-delivered psychological therapies for depression and anxiety: A systematic review. *Journal of Telemedicine and Telecare, 24*(2), 65–74. https://doi.org/10.1177/1357633X16686547

Crawford, A., Sunderji, N., López, J., & Soklaridis, S. (2016). Defining competencies for the practice of telepsychiatry through an assessment of resident learning needs. *BMC Medical Education, 16*, 28. https://doi.org/10.1186/s12909-016-0529-0

Crowe, M., Inder, M., & Porter, R. (2015). Conducting qualitative research in mental health: Thematic and content analyses. *The Australian and New Zealand Journal of Psychiatry, 49*(7), 616–623. https://doi.org/10.1177/0004867415582053

Daley, E. (2023). Hybrid working: Is it working… and at what cost? Exploring the experience of managers in child protection: Social Work. *The British Journal of Social Work*. https://doi.org/10.1093/bjsw/bcad080

De Villiers, M. R., De Villiers, P. J. T., & Kent, A. P. (2005). The Delphi technique in health science education. *Medical Teacher, 27*, 639–643.

deBronkart, D. (2015). From patient centred to people powered: autonomy on the rise. *BMJ (Clinical Research Ed.), 350*, h148. https://doi.org/10.1136/bmj.h148

Dickson, J. J. (2015). Supporting a generationally diverse workforce: Considerations for aging providers in the US healthcare system. *Journal of Best Practices in Health Professions Diversity, 8*(2), 1071–1086.

Dima, G., Meseșan Schmitz, L., & Șimon, M.-C. (2021). Job stress and burnout among social workers in the VUCA World of COVID-19 pandemic. *Sustainability, 13*, 7109. https://doi.org/10.3390/su13137109

Downing, N. L., Marriott, H. (2020). Mapping Australian psychologists' experiencesof telehealth during the Covid-19 pandemic. Telehealth and psychologyresources. https://www.affectmedia.com.au/wp-content/uploads/2020/06/Telehealthand-Psychology-WhitePaper_2020.pdf?fbclid=IwAR2kq2rxwL14UWzrNuQiJIBX7dx5O9RahvBy-JMUPPL0z7i_ETLXQt11bKM

Dreyfus, S. E., & Dreyfus, H. L. (1980). *A five-stage model of the mental activities involved in directed skill acquisition*. University of California Operations Research Center.

Eriksson, T., Germundsjö, L., Åström, E., & Rönnlund, M. (2018). Mindful self-compassion training reduces stress and burnout symptoms among practicing psychologists: A randomized controlled trial of a brief web-based intervention. *Frontiers in Psychology, 9*, 2340. https://doi.org/10.3389/fpsyg.2018.02340

Fernando, A. T., 3rd., & Consedine, N. S. (2017). Barriers to medical compassion as a function of experience and specialization: Psychiatry, pediatrics, internal medicine, surgery, and general practice. *Journal of Pain and Symptom Management, 53*(6), 979–987. https://doi.org/10.1016/j.jpainsymman.2016.12.324

Galt, K. A., Fuji, K. T., Kaufman, T. K., & Shah, S. R. (2019). Health information technology use and patient safety: Study of pharmacists in Nebraska. *Pharmacy (basel, Switzerland), 7*(1), 7. https://doi.org/10.3390/pharmacy7010007

Gates, T. G., Ross, D., Bennett, B., & Jonathan, K. (2021). Teaching mental health and well-being online in a crisis: fostering love and self-compassion in clinical social work education. *Clinical Social Work Journal*. https://doi.org/10.1007/s10615-021-00786-z

Gleichgerrcht, E., & Decety, J. (2017). Empathy in clinical practice: how individual dispositions, gender, and experience moderate empathic concern, burnout, and emotional distress in physicians. *PloS One, 8*(4), e61526. https://doi.org/10.1371/journal.pone.0061526

Goldstein, F., & Glueck, D. (2016). Developing rapport and therapeutic alliance during telemental health sessions with children and adolescents. *Journal of Child and Adolescent Psychopharmacology, 26*(3), 204–211. https://doi.org/10.1089/cap.2015.0022

Golu, F. (2021). Tech fatigue—a new pandemic. *Studia Doctoralia, 12*(2), 85–87.

Greenhalgh, T., Shaw, S., Wherton, J., Vijayaraghavan, S., Morris, J., Bhattacharya, S., Hodkinson, I., et al. (2018). Real-world implementation of video outpatient consultations at macro, meso, and micro levels: mixed-method study. *Journal of Medical Internet Research, 20*(4), e150. https://doi.org/10.2196/jmir.9897

Halupa, C. (2018). Technology fatigue in faculty. In *Proceedings of the International Conference of Education, Research and Innovation*. pp. 8623–8632.

Hill, J., Ferris, M., & Märtinson, V. (2003). Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life. *Journal of Vocational Behavior, 63*, 220–241.

Hilty, D. M., Armstrong, C. M., Luxton, D. D., Gentry, M. T., & Krupinski, E. (2021a). A scoping review of sensors, wearables and remote monitoring for behavioral health: Uses, outcomes, clinical competencies and research directions. *Journal of Technology in Behavioral Science, 6*, 278–313.

Hilty, D. M., Armstrong, C. M., Smout, S. S., Crawford, A., Drude, K. P., Maheu, M. M., Krupinski, E., et al. (2022). Findings and Guidelines on provider technology fatigue and well-being: a scoping review. *Journal of Medical Internet Research, 24*(5), e34451.

Hilty, D. M., Chan, S., Torous, J., Luo, J., & Boland, R. (2019). A telehealth framework for mobile health, smartphones and apps: Competencies, training and faculty development. *Journal of Technology in Behavioral Science, 4*(2), 106–123. https://doi.org/10.1007/s41347-019-00091-0

Hilty, D. M., Chan, S., Torous, J., Luo, J., & Boland, R. J. (2020). A framework for competencies for the use of mobile technologies in psychiatry and medicine. *Journal of Medical Internet Research, 8*(2), e12229.

Hilty, D. M., Crawford, A., Teshima, J., Chan, S., Sunderji, N., Yellowlees, P. M., & Li, S. T. (2015). A framework for telepsychiatric training and e-health: Competency-based education, evaluation and implications. *International Review of Psychiatry, 27*(6), 569–592.

Hilty, D. M., Crawford, A., Teshima, J., Nasatir-Hilty, S. E., Luo, J., Chisler, L. S. M., Lu, F. G., et al. (2021b). Mobile health and cultural competencies as a foundation for telehealth care: Scoping review. *Journal of Technology in Behavioral Sciences, 6*, 197–230.

Hilty, D. M., Maheu, M. M., Drude, K. P., & Hertlein, K. M. (2018a). The need to implement and evaluate telehealth competency frameworks to ensure quality care across behavioral health professions. *Academic Psychiatry, 42*(6), 818–824.

Hilty, D. M., Torous, J., Parish, M. B., Chan, S. R., Xiong, G., Scher, L., & Yellowlees, P. M. (2021c). A literature review comparing clinicians' approaches and skills to in-person, synchronous, and asynchronous care: Moving toward competencies to ensure quality care. *Telemedicine Journal and E-Health, 27*(4), 356–373. https://doi.org/10.1089/tmj.2020.0054

Hilty, D. M., Uno, J., Chan, S., Torous, J., & Boland, R. J. (2019a). Role of technology in professional development. *Psychiatric Clinics of North America, 42*, 493–512.

Hilty, D. M., Unutzer, J., Ko, D.-K., Luo, J., Worley, L. M., & Yager, J. (2019b). Approaches for departments, schools and health systems to better implement technologies used for clinical care and education. *Academic Psychiatry*. https://doi.org/10.1007/s40596-019-01074-2

Hilty, D. M., Zalpuri, I., Stubbe, D., Snowdy, C. E., Shoemaker, E. Z., Joshi, S. V., & Liu, H. Y. (2018b). Social media/networking as part of e-behavioral health and psychiatric education: Competencies, teaching methods, and implications. *Journal of Technology in Behavioral Science, 3*(4), 268–293.

Holmgren, A. J., Downing, N. L., Bates, D. W., Shanafelt, T. D., Milstein, A., Sharp, C. D., Cutler, D. M., Huckman, R. S., & Schulman, K. A. (2021). Assessment of electronic health record use between US and non-US health systems. *Journal of the American Medical Association Internal Medicine, 181*(2), 251–259. https://doi.org/10.1001/jamainternmed.2020.7071

Kaplan, E. H. (1997). Telepsychotherapy. Psychotherapy by telephone, videotelephone, and computer videoconferencing. *The Journal of Psychotherapy Practice and Research, 6*(3), 227–237.

Karwowski, W., Eberts, R., Salvendy, G., & Noland, S. (1994). The effects of computer interface design on human postural dynamics. *Ergonomics, 37*(4), 703–724. https://doi.org/10.1080/00140139408963684

Keyworth, C., Hart, J., Armitage, C. J., & Tully, M. P. (2018). What maximizes the effectiveness and implementation of technology-based interventions to support healthcare professional practice? A systematic literature review. *BMC Medical Informatics and Decision Making, 18*(1), 93. https://doi.org/10.1186/s12911-018-0661-3

Khairat, S., Coleman, C., Ottmar, P., Jayachander, D. I., Bice, T., & Carson, S. S. (2020). Association of electronic health record use with physician fatigue and efficiency. *JAMA, 3*(6), 07385. https://doi.org/10.1001/jamanetworkopen.2020.7385

King, R., Bambling, M., Reid, W., Thomas, I. (2006). Telephone and online counselling for young people: a naturalistic comparison of session outcome, session impact and therapeutic alliance. *Counselling and Psychotherapy Research, 6*(3), 175–181. https://doi.org/10.1080/14733140600874084

Kirkman, B. L., Rosen, B., Tesluk, P. E., & Gibson, C. B. (2004). The impact of team empowerment on virtual team performance: The moderating role of face-to-face interaction. *Academy of Management Journal, 47*, 175–192.

Knave, B. G., Wibom, R. I., Bergqvist, U. O., Carlsson, L. L., Levin, M. I., & Nylén, P. R. (1985). Work with video display terminals among office employees. II. Physical exposure factors. *Scandinavian Journal of Work, Environment and Health, 11*(6), 467–474. https://doi.org/10.5271/sjweh.2199

Knave, B. G., Wibom, R. I., Voss, M., Hedström, L. D., & Bergqvist, U. O. (1985). Work with video display terminals among office employees. I. Subjective symptoms and discomfort. *Scandinavian Journal of Work, Environment & Health, 11*(6), 457–466. https://doi.org/10.5271/sjweh.2200

Knave, B. G., Wibom, R. I., Voss, M., Hedström, L. D., & Bergqvist, U. O. (1985). Work with video display terminals among office employees. I. Subjective symptoms and discomfort. *Scandinavian Journal of Work, Environment and Health, 11*(6), 457–466. https://doi.org/10.5271/sjweh.2200

Knox, L. (2021). *Zoom mindfully: an investigation of the relationship between mindfulness and videoconferencing fatigue.* (Doctoral dissertation, California State University, Northridge).

Krupinski, E. A., & Berbaum, K. S. (2009). Measurement of visual strain in radiologists. *Academic Radiology, 16*(8), 947–950. https://doi.org/10.1016/j.acra.2009.02.008

Krupinski, E. A., Berbaum, K. S., Caldwell, R. T., Schartz, K. M., & Kim, J. (2010). Long radiology workdays reduce detection and accommodation accuracy. *Journal of the American College of Radiology, 7*(9), 698–704. https://doi.org/10.1016/j.jacr.2010.03.004

Lapointe, J., Dionne, C. E., Brisson, C., & Montreuil, S. (2009). Interaction between postural risk factors and job strain on self-reported musculoskeletal symptoms among users of video display units: A three-year prospective study. *Scandinavian Journal of Work and Environmental Health, 35*(2), 134–144. https://doi.org/10.5271/sjweh.1312

Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science: IS, 5*, 69. https://doi.org/10.1186/1748-5908-5-69

Lopez, K. D., & Fahey, L. (2018). Advocating for greater usability in clinical technologies: The role of the practicing nurse. *Critical Care Nursing Clinics of North America, 30*(2), 247–257. https://doi.org/10.1016/j.cnc.2018.02.007

Lorié, Á., Reinero, D. A., Phillips, M., Zhang, L., & Riess, H. (2017). Culture and nonverbal expressions of empathy in clinical settings: A systematic review. *Patient Education and Counseling, 100*(3), 411–424. https://doi.org/10.1016/j.pec.2016.09.018

Maheu, M., Drude, K., Hertlein, K., Lipschutz, R., Wall, K., Long, R., & Hilty, D. M. (2019). An interdisciplinary framework for telebehavioral health competencies. *Journal of Technology in Behavioral Science, 3*(2), 108–40. https://doi.org/10.1007/s41347-019-00113

Maijala, R., Eloranta, S., Reunanen, T., & Ikonen, T. S. (2018). Successful implementation of lean as a managerial principle in health care: A conceptual analysis from systematic literature review. *International Journal of Technology Assessment in Health Care, 34*(2), 134–146. https://doi.org/10.1017/S0266462318000193

Mäkikangas, A., Hyvönen, K., & Feldt, T. (2017). The energy and identification continua of burnout and work engagement: Developmental profiles over eight years. *Burnout Research, 5*, 44–54.

Mäkikangas, A., Leiter, M. P., Kinnunen, U., & Feldt, T. (2021). Profiling development of burnout over eight years: Relation with job demands and resources. *European Journal of Work and Organizational Psychology, 30*(5), 720–731. https://doi.org/10.1080/1359432X.2020.1790651

Maricuțoiu, L. P., Sulea, C., & Iancu, A. (2017). Work engagement or burnout: Which comes first? A meta-analysis of longitudinal evidence. *Burnout Research, 5*, 35–43. https://doi.org/10.1016/j.burn.2017.05.001

Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry, 15*(2), 103–111. https://doi.org/10.1002/wps.20311

Maslach, C., & Leiter, M. P. (2017). New insights into burnout and health care: Strategies for improving civility and alleviating burnout. *Medical Teacher, 39*(2), 160–163. https://doi.org/10.1080/0142159X.2016.1248918

McAlearney, A. S., Hefner, J. L., Sieck, C. J., & Huerta, T. R. (2015). The journey through grief: Insights from a qualitative study of electronic health record implementation. *Health Services Research, 50*(2), 462–488. https://doi.org/10.1111/1475-6773.12227

McAlearney, A. S., Schweikhart, S. B., & Medow, M. A. (2005). Organizational and physician perspectives about facilitating handheld computer use in clinical practice: Results of a cross-site qualitative study. *Journal of the American Medical Informatics Association, 12*(5), 568–575. https://doi.org/10.1197/jamia.M1816

McAllister, M. J., Costigan, P. A., Davies, J. P., & Diesbourg, T. L. (2022). The effect of training and workstation adjustability on teleworker discomfort during the COVID-19 pandemic. *Applied Ergonomics*. https://doi.org/10.1016/j.apergo.2022.103749

McBeath, A. G., du Plock, S., & Bager-Charleson, S. (2020). The challenges and experiences of psychotherapists working remotely during the coronavirus pandemic. *Counselling and Psychotherapy Research*. https://doi.org/10.1002/capr.12326

McCarty, D., & Clancy, C. (2002). Telehealth: Implications for social work practice. *Social Work, 47*(2), 153–161. https://doi.org/10.1093/sw/47.2.153

McCoyd, J. L. M., Curran, L., Candelario, E., Findley, P. A., & Hennessey, K. (2023). Social service providers under COVID-19 duress: Adaptation, burnout, and resilience. *Journal of Social Work, 23*(1), 85–102.

Merrill, C. A., Maheu, M. M., Drude, K. P., Groshong, L. W., Coleman, M., & Hilty, D. M. (2021). CTiBS and clinical social work: Telebehavioral health competencies for LCSWs in the age of COVID-19. *Clin Soc Work Journal*. https://doi.org/10.1007/s10615-021-00827-7

Middleton, B., Bloomrosen, M., Dente, M. A., Hashmat, B., Koppel, R., Overhage, J. M., & PayneRosenbloomWeaverZhang, T. H. T. C. J. (2013). Enhancing patient safety and quality of care by improving the usability of electronic health record systems: Recommendations from AMIA. *Journal of the American Medical Informatics Association, 20*(e1), e2–e8. https://doi.org/10.1136/amiajnl-2012-001458

Mocci, F., Serra, A., & Corrias, G. A. (2001). Psychological factors and visual fatigue in working with video display terminals. *Occupational and Environmental Medicine, 58*(4), 267–271. https://doi.org/10.1136/oem.58.4.267

Mohr, D. C., Ho, J., Duffecy, J., Reifler, D., Sokol, L., Burns, M. N., Jin, L., & Siddique, J. (2012). Effect of telephone-administered vs face-to-face cognitive behavioral therapy on adherence to therapy and depression outcomes among primary care patients: A randomized trial. *Journal of the American Medical Association, 307*(21), 2278–2285. https://doi.org/10.1001/jama.2012.5588

Montgomery, A., Panagopoulou, E., Esmail, A., Richards, T., & Maslach, C. (2019). Burnout in healthcare: the case for organisational change. *BMJ (Clinical Research Ed.), 366*, l4774. https://doi.org/10.1136/bmj.l4774

Monthuy-Blanc, J., Bouchard, S., Maïano, C., & Séguin, M. (2013). Factors influencing mental health providers' intention to use telepsychotherapy in First Nations communities. *Transcultural Psychiatry, 50*(2), 323–343. https://doi.org/10.1177/1363461513487665

Morland, L. A., Greene, C. J., Rosen, C., Mauldin, P. D., & Frueh, B. C. (2009). Issues in the design of a randomized noninferiority clinical trial of telemental health psychotherapy for rural combat veterans with PTSD. *Contemporary Clinical Trials, 30*(6), 513–522. https://doi.org/10.1016/j.cct.2009.06.006

Mylod, D. E. (2017; October 12). One Way to Prevent Clinician Burnout. *Harvard Business Review*. https://hbr.org/2017/10/one-way-to-prevent-clinician-burnout.

Nakagawa, K., & Yellowlees, P. M. (2019). University of California Technology Wellness Index: A physician-centered framework to assess technologies' impact on physician well-being. *The Psychiatric Clinics of North America, 42*(4), 669–681. https://doi.org/10.1016/j.psc.2019.08.005

Nakagawa, K., & Yellowlees, P. (2020). Inter-generational effects of technology: Why millennial physicians may be less at risk for burnout than baby boomers. *Current Psychiatry Reports, 22*(9), 45. https://doi.org/10.1007/s11920-020-01171-2

National Academies of Sciences, Engineering, and Medicine. (2019). Taking action against clinician burnout: a systems approach to professional well-being. National Academies Press. https://nam.edu/event/taking-action-against-clinician-burnout-a-systems-approach-to-professional-well-being-report-release-event/?gclid=Cj0KCQjw6J-SBhCrARIsAH0yMZgVVO3ImhlqgFXwDWsx_cHqF7IUHlO-arvv8-Q0hER134LDq9HXSgoaArJlEALw_wcB

National Academy of Sciences, Engineering, and Medicine. Health and Medicine Division. (2020). http://www.nationalacademies.org/hmd/Global/Meetings.aspx.

National Association of Clinical Social Workers. (2023). Standards for technology in social work practice. https://www.socialworkers.org/Practice/NASW-Practice-Standards-Guidelines/Standards-for-Technology-in-Social-Work-Practice

Nguyen, O. T., Jenkins, N. J., Khanna, N., Shah, S., Gartland, A. J., Turner, K., & Merlo, L. J. (2021). A systematic review of contributing factors of and solutions to electronic health record-related impacts on physician well-being. *Journal of the American Medical Informatics Association, 28*(5), 974–984. https://doi.org/10.1093/jamia/ocaa339

Nijrolder, I., van der Horst, H., & van der Windt, D. (2008). Prognosis of fatigue. A systematic review. *Journal of Psychosomatic Research, 64*(4), 335–349. https://doi.org/10.1016/j.jpsychores.2007.11.001

Nimjee, T., Miller, E., & Solomon, S. (2020). Exploring generational differences in physicians' perspectives on the proliferation of technology within the medical field: a narrative study. *Healthcare Quarterly Toronto, Ont., 23*(SP), 53–59. https://doi.org/10.12927/hcq.2020.26172

Norwood, C., Moghaddam, N. G., Malins, S., & Sabin-Farrell, R. (2018). Working alliance and outcome effectiveness in videoconferencing psychotherapy: A systematic review and noninferiority meta-analysis. *Clinical Psychology & Psychotherapy, 25*(6), 797–808. https://doi.org/10.1002/cpp.2315

O'Connor, K., Muller Neff, D., & Pitman, S. (2018). Burnout in mental health professionals: A systematic review and meta-analysis of prevalence and determinants. *European Psychiatry, 53*, 74–99. https://doi.org/10.1016/j.eurpsy.2018.06.003

Olwill, C., McNally, D., & Douglas, L. (2021). Psychiatrist experience of remote consultations by telephone in an outpatient psychiatric department during the COVID-19 pandemic. *Irish Journal of Psychological Medicine, 38*(2), 132–139. https://doi.org/10.1017/ipm.2020.51

Osenbach, J. E., O'Brien, K. M., Mishkind, M., & Smolenski, D. J. (2013). Synchronous telehealth technologies in psychotherapy for depression: A meta-analysis. *Depression and Anxiety, 30*(11), 1058–1067. https://doi.org/10.1002/da.22165

Panagioti, M., Panagopoulou, E., Bower, P., Lewith, G., Kontopantelis, E., Chew-Graham, C., Dawson, S., van Marwijk, H., Geraghty, K., & Esmail, A. (2017). Controlled interventions to reduce burnout in physicians: A systematic review and meta-analysis. *JAMA Internal Medicine, 177*(2), 195–205. https://doi.org/10.1001/jamainternmed.2016.7674

Park, S., Kyung, G., Choi, D., Yi, J., Lee, S., Choi, B., & Lee, S. (2019). Effects of display curvature and task duration on proofreading performance, visual discomfort, visual fatigue, mental workload, and user satisfaction. *Applied Ergonomics, 78*, 26–36. https://doi.org/10.1016/j.apergo.2019.01.014

Paterick, Z. R., Patel, N. J., & Paterick, T. E. (2018). Unintended consequences of the electronic medical record on physicians in training and their mentors. *Postgraduate Medical Journal, 94*(1117), 659–661. https://doi.org/10.1136/postgradmedj-2018-135849

Pattyn, N., Van Cutsem, J., Dessy, E., & Mairesse, O. (2018). Bridging exercise science, cognitive psychology, and medical practice: Is "cognitive fatigue" a remake of "the emperor's new clothes"? *Frontiers in Psychology, 9*, 1246. https://doi.org/10.3389/fpsyg.2018.01246

Pelayo, S., Kaipio, J., Section Editors for the IMIA Yearbook Section on Human Factors and Organizational Issues. (2018). Findings from the 2018 yearbook section on human factors and organizational issues. *Yearbook of Medical Informatics, 27*(1), 79–82.

Perlo, J., Balik, B., Swensen, S., Kabcenell, A., Landsman, J., Feeley, D. (2017). *IHI Framework for Improving Joy in Work*. IHI White Paper. Cambridge, Massachusetts: Institute for Healthcare Improvement. http://www.ihi.org

Perron, B. E., Taylor, H. O., Glass, J. E., & Margerum-Leys, J. (2010). Information and communication technologies in social work. *Advances in Social Work, 11*(2), 67–81.

Pew Research Center. (2021). Experts Say the 'New Normal' in 2025 Will Be Far More Tech-Driven, Presenting More Big Challenges: https://www.pewresearch.org/internet/2021/02/18/experts-say-the-new-normal-in-2025-will-be-far-more-tech-driven-presenting-more-big-challenges/

Price, E. L., Pérez-Stable, E. J., Nickleach, D., López, M., & Karliner, L. S. (2012). Interpreter perspectives of in-person, telephonic, and videoconferencing medical interpretation in clinical encounters. *Patient Education and Counseling, 87*(2), 226–232. https://doi.org/10.1016/j.pec.2011.08.006

Proctor, E., Silmere, H., Raghavan, R., Raghavan, R., Hovmand, P., Aarons, G., & Hensley, M. (2010). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administrative Policy in Mental Health, 38*(2), 65–76.

Ramsey, A. T., & Montgomery, K. (2014). Technology-based interventions in social work practice: A systematic review of mental health interventions. *Social Work Health Care, 53*(9), 883–899. https://doi.org/10.1080/00981389.2014.925531

Ratan, R., Miller, D. B., & Bailenson, J. N. (2021). Facial appearance dissatisfaction explains differences in zoom fatigue. *Cyberpsychology, Behavior, and Social Networking*. https://doi.org/10.1089/cyber.2021.0112

Ray, G., Muhanna, W. A., & Barney, J. B. (2007). Competing with IT: The role of shared IT-business understanding. *Communications of the ACM, 50*, 87–91.

Robelski, S., Keller, H., Harth, V., & Mache, S. (2019). Coworking spaces: The better home office? a psychosocial and health-related perspective on an emerging work environment. *International Journal of Environmental Research and Public Health, 16*(13), 2379. https://doi.org/10.3390/ijerph16132379

Ross, J. W. (2003). Creating a strategic IT architecture competency: Learning in stages. MIT Sloan School of Management Working Paper, 4314–03, Center for Information Systems Research Working Paper, No. 335. Website. http://dspace.mit.edu/handle/1721.1/3526.

Rossi, A., Cetrano, G., Pertile, R., Rabbi, L., Donisi, V., Grigoletti, L., Curtolo, C., Tansella, M., Thornicroft, G., & Amaddeo, F. (2012). Burnout, compassion fatigue, and compassion satisfaction among staff in community-based mental health services. *Psychiatry Research, 200*(2-3), 933–938. https://doi.org/10.1016/j.psychres.2012.07.029

Rössler, W. (2012). Stress, burnout, and job dissatisfaction in mental health workers. *European Archives of Psychiatry and Clinical Neuroscience, 262*(Suppl 2), S65–S69. https://doi.org/10.1007/s00406-012-0353-4

Sakuraya, A., Imamura, K., Watanabe, K., Asai, Y., Ando, E., Eguchi, H., & Kawakami, N. (2020). What kind of intervention is effective for improving subjective well-being among workers? A systematic review and meta-analysis of randomized controlled trials. *Frontiers in Psychology, 11*, 528656. https://doi.org/10.3389/fpsyg.2020.528656

Scaramuzzino, G., & Martinell Barfoed, E. (2021). Swedish social workers' experiences of technostress. *Nordic Social Work Research*. https://doi.org/10.1080/2156857X.2021.1951335

Schneider, A., & Weigl, M. (2018). Associations between psychosocial work factors and provider mental well-being in emergency departments: A systematic review. *PloS One, 13*(6), 0197375. https://doi.org/10.1371/journal.pone.0197375

Schubert, N. J., Backman, P. J., Bhatla, R., & Corace, K. M. (2019). Telepsychiatry and patient-provider concordance. *Canadian Journal of Rural Medicine, 24*(3), 75–82. https://doi.org/10.4103/CJRM.CJRM_9_18

Seidler, A., Thinschmidt, M., Deckert, S., Then, F., Hegewald, J., Nieuwenhuijsen, K., & Riedel-Heller, S. G. (2014). The role of psychosocial working conditions on burnout and its core component emotional exhaustion - a systematic review. *Journal of Occupational Medicine and Toxicology (london, England), 9*(1), 10. https://doi.org/10.1186/1745-6673-9-10

Shanafelt, T. D., Dyrbye, L. N., Sinsky, C., Hasan, O., Satele, D., Sloan, J., & West, C. P. (2016). Relationship between clerical burden and characteristics of the electronic environment with physician burnout and professional satisfaction. *Mayo Clinic Proceedings, 91*(7), 836–848. https://doi.org/10.1016/j.mayocp.2016.05.007

Shanafelt, T. D., Lightner, D. J., Conley, C. R., Petrou, S. P., Richardson, J. W., Schroeder, P. J., & Brown, W. A. (2017). An organization model to assist individual physicians, scientists, and senior health care administrators with personal and professional needs. *Mayo Clinic Proceedings, 92*(11), 1688–1696. https://doi.org/10.1016/j.mayocp.2017.08.020

Shanafelt, T. D., & Noseworthy, J. H. (2017). Executive leadership and physician well-being: Nine organizational strategies to promote engagement and reduce burnout. *Mayo Clinic Proceedings, 92*(1), 129–146. https://doi.org/10.1016/j.mayocp.2016.10.004

Simpson, S. G., & Reid, C. L. (2014). Therapeutic alliance in videoconferencing psychotherapy: A review. *The Australian Journal of Rural Health, 22*(6), 280–299. https://doi.org/10.1111/ajr.12149

Singh, M. I., Doyle, K., & Wobbe-Veit, L. (2021). Social work field education: harnessing technology to connect social work education and practice during COVID. *International Journal Digital Society, 12*(1), 1695–1699. https://doi.org/10.20533/ijds.2040.2570.2021.0211

Sonnentag, S. (2017). A task-level perspective on work engagement: A new approach that helps to differentiate the concepts of engagement and burnout. *Burnout Research, 5*, 12–20. https://doi.org/10.1016/j.burn.2017.04.001

Sorenson, C., Bolick, B., Wright, K., & Hamilton, R. (2017). An evolutionary concept analysis of compassion fatigue. *Journal of Nursing Scholarship, 49*(5), 557–563. https://doi.org/10.1111/jnu.12312

Steel, C., Macdonald, J., Schröder, T., & Mellor-Clark, J. (2015). Exhausted but not cynical: Burnout in therapists working within improving access to psychological therapy services. *Journal of Mental Health (Abingdon, England), 24*(1), 33–37. https://doi.org/10.3109/09638237.2014.971145

Stehman, C. R., Testo, Z., Gershaw, R. S., & Kellogg, A. R. (2019). Burnout, drop out, suicide: Physician loss in emergency medicine, Part I. *The Western Journal of Emergency Medicine, 20*(3), 485–494. https://doi.org/10.5811/westjem.2019.4.40970

Swensen, S. J., & Shanafelt, T. (2017). An organizational framework to reduce professional burnout and bring back joy in practice. *Joint Commission Journal on Quality and Patient Safety, 43*(6), 308–313. https://doi.org/10.1016/j.jcjq.2017.01.007

Szalma, J. L. (2014). On the application of motivation theory to human factors/ergonomics: Motivational design principles for human-technology interaction. *Human Factors, 56*(8), 1453–1471. https://doi.org/10.1177/0018720814553471

Tachakra, S., & Rajani, R. (2002). Social presence in telemedicine. *Journal of Telemedicine and Telecare, 8*(4), 226–230. https://doi.org/10.1258/135763302320272202

Tai-Seale, M., Olson, C. W., Li, J., Chan, A. S., Morikawa, C., Durbin, M., Wang, W., & Luft, H. S. (2017). Electronic health record logs indicate that physicians split time evenly between seeing patients and desktop medicine. *Health Affairs (Project Hope), 36*(4), 655–662. https://doi.org/10.1377/hlthaff.2016.0811

Tan, D. S., Gergle, D., Scupelli, P., & Pausch, R. (2006). Physically large displays improve performance on spatial tasks. *ACM Transactions on Computer-Human Interaction, 13*(1), 7–99

Torous, J., Jän Myrick, K., Rauseo-Ricupero, N., & Firth, J. (2020). Digital mental health and COVID-19: using technology today to accelerate the curve on access and quality tomorrow. *JMIR Mental Health, 7*(3), e18848. https://doi.org/10.2196/18848

Travers, P. H., & Stanton, B. A. (2002). Office workers and video display terminals: Physical, psychological and ergonomic factors. *Journal of the American Association of Occupational Health Nurses, 50*(11), 489–493.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine, 169*(7), 467–473. https://doi.org/10.7326/M18-0850

Tutty, M. A., Carlasare, L. E., Lloyd, S., & Sinsky, C. A. (2019). The complex case of EHRs: Examining the factors impacting the EHR user experience. *Journal of the American Medical Informatics Association, 26*(7), 673–677. https://doi.org/10.1093/jamia/ocz021

Van Steenbergen, E. F., van der Ven, C., Peeters, M., & Taris, T. W. (2018). Transitioning towards new ways of working: Do job demands, job resources, burnout, and engagement change? *Psychological Reports, 121*(4), 736–766. https://doi.org/10.1177/0033294117740134

Walther, J., & D'Addario, K. (2001). The impacts of emoticons on message interpretation in computer-mediated communication. *Social Science Computer Review, 19*(3), 324–347.

West, C. P., Dyrbye, L. N., Erwin, P. J., & Shanafelt, T. D. (2016). Interventions to prevent and reduce physician burnout: A systematic review and meta-analysis. *Lancet (london, England), 388*(10057), 2272–2281. https://doi.org/10.1016/S0140-6736(16)31279-X

West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: Contributors, consequences and solutions. *Journal of Internal Medicine, 283*(6), 516–529. https://doi.org/10.1111/joim.12752

Westbrook, J. I., Coiera, E., Dunsmuir, W. T., Brown, B. M., Kelk, N., Paoloni, R., & Tran, C. (2010). The impact of interruptions on clinical task completion. *Quality & Safety in Health Care, 19*(4), 284–289. https://doi.org/10.1136/qshc.2009.039255

Wiederhold, B. K. (2020). Connecting through technology during the coronavirus disease 2019 pandemic: Avoiding "zoom fatigue." *Cyberpsychology, Behavior and Social Networking, 23*(7), 437–438. https://doi.org/10.1089/cyber.2020.29188.bkw

Wodarski, J., & Frimpong, J. (2013). Application of e-therapy programs to social work practice. *Journal of Human Behavior in the Social Environment, 23*(1), 29. https://doi.org/10.1080/10911359.2013.737290

World Health Organization. (2019). Burn-out an "occupational phenomenon:" International Classification of Diseases. https://www.who.int/mental_health/evidence/burn-out/en/.

Yeh, Y. Y., Ma, T. N., Pan, S. Y., Chuang, P. J., & Jhuang, Y. H. (2020). Assessing potential effects of daily cross-domain usage of information and communication technologies. *The Journal of social psychology, 160*(4), 465–478. https://doi.org/10.1080/00224545.2019.1680943

Yusof, M., & Sahroni, M. N. (2018). Investigating health information systems-induced errors. *International Journal of Health Care Quality Assurance, 31*(8), 1014–1029. https://doi.org/10.1108/IJHCQA-07-2017-0125

Zalpuri, I., Liu, H., Stubbe, D., Wrzosek, M., Sadhu, J., & Hilty, D. (2018). A competency-based framework for social media for trainees, faculty and others. *Academic Psychiatry, 42*(6), 808–817.

Zhang, Y., Padman, R., & Levin, J. E. (2013). Reducing provider cognitive workload in CPOE use: Optimizing order sets. *Studies in Health Technology and Informatics, 192*, 734–738.

Donald M. Hilty, M.D., M.B.A. a researcher, clinician and administrator in psychiatric and medical education, health services, and telehealth. I work with the Veterans Health Administration, UC Davis School of Medicine and other hospitals to develop virtual care. I have worked with others on 20 grants and 7 contracts from the NIH, AHRQ and other agencies, with randomized trials for depression in primary care and a comparison of synchronous and asynchronous telepsychiatry. Our current research is in implementation and evaluation of video, social media, mobile health and asynchronous competencies for clinicians, trainees and institutions – with a focus on fatigue and well-being.

Authors and Affiliations

Donald M. Hilty[1] · Laura W. Groshong[2] · Mirean Coleman[3] · Marlene M. Maheu[4] · Christina M. Armstrong[5] · Shelby A. Smout[6] · Allison Crawford[7,8,9] · Kenneth P. Drude[10] · Elizabeth A. Krupinski[11]

✉ Donald M. Hilty
donh032612@gmail.com

Laura W. Groshong
lwgroshong@clinicalsocialworkassociation.org

Mirean Coleman
MColeman.nasw@socialworkers.org

Marlene M. Maheu
mmaheu@telehealth.org

Christina M. Armstrong
Christina.Armstrong@va.gov

Shelby A. Smout
smoutsa@vcu.edu

Allison Crawford
allison.crawford@utoronto.ca

Kenneth P. Drude
kdrude@yahoo.com

Elizabeth A. Krupinski
ekrupin@emory.edu

[1] Department of Psychiatry & Behavioral Sciences, UC Davis, 2230 Stockton Boulevard, Sacramento, CA 95817, USA

[2] Clinical Social Work Association, Seattle, WA, USA

[3] National Association of Social Workers, Washington, DC, USA

[4] Coalition for Technology in Behavioral Sciences, Telebehavioral Health Institute, Inc, 5173 Waring Road #124, San Diego, CA 92120, USA

[5] Department of Veterans Affairs, Connected Health Implementation Strategies, Office of Connected Care, Office of Health Informatics, U.S., 810 Vermont Avenue NW, Washington, DC 20420, USA

[6] Virginia Commonwealth University, 3110 Kensington Ave Apt 3, Richmond, VA 23221, USA

[7] Ontario Mental Health at CAMH, Toronto, Canada

[8] University of Toronto, Toronto, Canada

[9] Suicide Prevention Service, 1001 Queen St West, Toronto, ON M6J 1H4, Canada

[10] Coalition Technology in Behavioral Science, 680 E. Dayton Yellow Springs Rd, Fairborn, OH 45324, USA

[11] Department of Radiology & Imaging Sciences, Emory University, 1364 Clifton Rd NE, Atlanta, GA 30322, USA