

Effectiveness of occupational e-mental health interventions: a systematic review and meta-analysis of randomized controlled trials ¹

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1. *Appendix A. Full electronic search strategies*
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Search strategy: MEDLINE

(((((stress [Title/Abstract] OR distress [Title/Abstract] OR mental [Title/Abstract] OR depress* [Title/Abstract] OR anxiety [Title/Abstract] OR sleep [Title/Abstract] or substance [Title/Abstract] OR fatigue [Title/Abstract] OR alcohol* [Title/Abstract] or workaholism [Title/Abstract] or fatigue [Title/Abstract] or mental[Title/Abstract] OR burnout[Title/Abstract] OR well-being[Title/Abstract] OR well-being[Title/Abstract] OR drinking[Title/Abstract] OR absenteeism[Title/Abstract] OR presenteeism[Title/Abstract] OR "Stress, Psychological"[MeSH]) OR "Fatigue"[MeSH] or "Burnout, Professional"[MeSH] OR "Depression"[MeSH] OR "Depressive Disorder"[MeSH] OR "Sleep Initiation and Maintenance Disorders"[MeSH] OR "Alcohol-Related Disorders"[MeSH] OR "Absenteeism"[MeSH] OR "Presenteeism"[MeSH] OR "Mental Health"[MeSH] OR "Anxiety"[MeSH] or "Substance-Related Disorders"[MeSH])) AND ((internet[Title/Abstract] OR "Internet"[MeSH] OR "Telemedicine"[MeSH] OR "Therapy, Computer-Assisted" [MeSH] or web[Title/Abstract] OR online[Title/Abstract] OR computerized[Title/Abstract] OR computer[Title/Abstract] OR e-health[Title/Abstract] OR e-health[Title/Abstract] OR digital[Title/Abstract] OR tele-health[Title/Abstract] OR mhealth[Title/Abstract] OR program[Title/Abstract] OR application[Title/Abstract] or "e-mental health"[Title/Abstract])))

AND ((occupation*[Title/Abstract] OR worker* [Title/Abstract] or working [Title/Abstract]
OR workplace [Title/Abstract] or “at work” [Title/Abstract] or [Title/Abstract] or workforce
[Title/Abstract] or work-related [Title/Abstract] OR employee*[Title/Abstract] or
"Occupational Health"[MeSH] or workplace [MeSH]))

AND ((randomized control trial [MeSH Terms] or randomized controlled trial [Publication
Type]) or (random*[Title/Abstract] AND control*[Title/Abstract]))))

Search strategy: PsycINFO

(stress/ or exp occupational stress/ or exp psychological stress/ or exp social stress/ or major
depression/ or well being/ or mental health/ or insomnia/ or sleep disorders/ or alcoholism/ or
addiction/ or alcohol abuse/ or fatigue/ or anxiety/ or anxiety disorders/ or employee
absenteeism/ or distress/ or workaholism/ or work related illnesses/ or "substance abuse and
addiction measures"/ or (stress or distress or mental or depress* or anxiety or sleep or
insomnia or fatigue or workaholism or burnout or well-being or well-being or alcohol* or
substance or drinking or absenteeism or presenteeism).ab. or (stress or distress or mental or
depress* or anxiety or sleep or insomnia or fatigue or workaholism or burnout or well-being
or well-being or alcohol* or substance or drinking or absenteeism or presenteeism).ti.)

and (internet/ or telemedicine/ or computer assisted therapy/ or online therapy/ or computer
mediated communication/ or (Internet or web or online or computerized or computer or e-
health or e-health or digital or tele-health or mhealth or program or application or e-mental
health).ab. or (Internet or web or online or computerized or computer or e-health or e-health
or digital or tele-health or mhealth or program or application or e-mental health).ti.)

and (employee assistance programs/ or workplace intervention/ or occupational health/ or
(occupation* or at work or working or worker* or work-related or employee* or worksite or

workplace or workforce).ab. or (occupation* or at work or working or worker* or work-related or employee* or worksite or workplace or workforce).ti.)
and ((random* and control*).ab. or (random* and control*).ti. or Clinical trial/)

Search strategy: Cochrane Central Register of Controlled Trials (CENTRAL)

#1 randomized controlled trial;pt 438361
#2 MeSH descriptor: [Randomized Controlled Trials as Topic] explode all trees 22823
#3 random*.ti,ab and control*.ti,ab 336646
#4 #1 or #2 or #3 603600
#5 occupation*.ti,ab 4471
#6 employee*.ti,ab 1756
#7 working.ti,ab 9529
#8 work-related.ti,ab 697
#9 workplace.ti,ab 1399
#10 workforce.ti,ab 285
#11 "at work".ti,ab 697
#12 worksite.ti,ab 587
#13 worker*.ti,ab 5615
#14 MeSH descriptor: [Workplace] explode all trees 776
#15 MeSH descriptor: [Occupational Health] explode all trees 637
#16 #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 20812
#17 web.ti,ab or online.ti,ab or computer.ti,ab or computerized.ti,ab or e-health.ti,ab or e-health.ti,ab or digital.ti,ab or tele-health.ti,ab or mhealth.ti,ab or program.ti,ab or application.ti,ab or "e-mental health".ti,ab or internet.ti,ab 100554
#18 MeSH descriptor: [Internet] this term only 3145
#19 MeSH descriptor: [Telemedicine] explode all trees 2064

- #20 MeSH descriptor: [Therapy, Computer-Assisted] explode all trees 2987
- #21 #17 or #18 or #19 or #20 103369
- #22 MeSH descriptor: [Stress, Psychological] explode all trees 4960
- #23 MeSH descriptor: [Fatigue] explode all trees 2486
- #24 MeSH descriptor: [Burnout, Professional] explode all trees 178
- #25 MeSH descriptor: [Depression] explode all trees 7487
- #26 MeSH descriptor: [Depressive Disorder] explode all trees 9121
- #27 MeSH descriptor: [Sleep Initiation and Maintenance Disorders] explode all trees 1596
- #28 MeSH descriptor: [Alcohol-Related Disorders] explode all trees 4197
- #29 MeSH descriptor: [Absenteeism] explode all trees 528
- #30 MeSH descriptor: [Presenteeism] explode all trees 12
- #31 MeSH descriptor: [Mental Health] explode all trees 1140
- #32 MeSH descriptor: [Anxiety] explode all trees 6741
- #33 MeSH descriptor: [Substance-Related Disorders] explode all trees 11525
- #34 stress:ti,ab or distress:ti,ab or mental:ti,ab or depress*:ti,ab or anxiety:ti,ab or
sleep:ti,ab or substance:ti,ab or fatigue:ti,ab or alcohol*:ti,ab or workaholism:ti,ab or
burnout:ti,ab or well-being:ti,ab or well-being:ti,ab or drinking:ti,ab or absenteeism:ti,ab or
presenteeism:ti,ab or fatigue:ti,ab or mental:ti,ab 150157
- #35 #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or
#34 158298
- #36 #4 and #16 and #21 and #35 1027

Search strategy: CINAHL

((MH "Internet") or (MH "Telemedicine+") or (MH "Tele-health+") or (ti internet or ab internet) or (ti web or ab web) or (ti computerized or ab computerized) or (ti computer or ab computer) or (ti e-health or ab e-health) or (ti e-health or ab e-health) or (ti digital or ab

digital) or (ti tele-health or ab tele-health) or (ti mhealth or ab mhealth) or (ti program or ab program) or (ti application or ab application) or (ti “e-mental health” or ab “e-mental health”))

and ((ti occupation* or ab occupation*) or (ti at work or ab at work) or (ti working or ab working) or (ti worker* or ab worker*) or (ti work-related or ab work-related) or (ti worksite or ab worksite) or (ti workplace or ab workplace) or

(ti workforce or ab workforce) or (ti work-related or ab work-related) or (ti employee* or ab employee*) or (MH "Workforce") or (MH "Occupational Health Services+"))

and

((MH "Stress+") or (ti stress or ab stress) or (ti mental or ab mental) or (MH "Mental Health") or (ti depress* or ab depress) or (MH "Depression") or (MH "Anxiety") or (MH "Anxiety Disorders+") or (ti anxiety or ab anxiety) or (MH "Fatigue") or (ti fatigue or ab fatigue) or (ti alcohol* or ab alcohol*) or (MH "Alcoholism") or (ti workaholism or ab workaholism) or (MH "Burnout, Professional") or (ti burnout or ab burnout) or (ti well-being or ab well-being) or (ti well-being or ab well-being) or (ti drinking or ab drinking) or (ti absenteeism or ab absenteeism) or (MH "Absenteeism") or (MH "Presenteeism") or (ti sleep or ab sleep) or (ti insomnia or ab insomnia) or (MH "Insomnia") or (ti substance or ab substance) or (MH "Substance Use Disorders+"))

and

((TI random* AND TI control*) or (AB random* AND AB control*) or (MM "Randomized Controlled Trials") or PT clinical trial)

Search strategy: US National Institutes of Health Ongoing Trials Register

ClinicalTrials.gov www.clinicaltrials.gov

Condition/disease: Stress OR distress OR depression OR anxiety OR sleep OR fatigue OR substance OR alcohol OR workaholism OR burnout OR well-being OR well-being OR insomnia OR sleep OR absenteeism OR presenteeism OR burnout OR "mental health"

Other terms: employee OR worker OR workplace OR occupation OR working OR worksite OR workforce OR work-related OR "at work"
employee OR occupation OR working OR worksite OR work-related OR "at work"

Intervention/treatment:

Internet OR web OR online OR computer OR e-health OR e-health OR digital OR tele-health OR mhealth OR application OR "e-mental health"

Filters: Completed

Interventional (or Clinical Trial)

Search strategy: WHO International Clinical Trials Registry Platform (ICTRP)

<http://apps.who.int/trialsearch/>

Title: employee* OR work* OR occupation*

Condition: Stress OR distress OR depression OR anxiety OR sleep OR fatigue OR substance OR alcohol OR workaholism OR burnout OR well-being OR insomnia OR well-being OR absenteeism OR presenteeism OR burnout

Intervention: Internet OR web* OR computer* OR online OR e-health OR e-health OR mhealth OR tele-health OR application OR program OR digital.

Table S1: Characteristics of the studies

Author Year Country	Study design/ setting	Participants	Recruitment	Intervention (IG) Control condition (CC)	Personal guidance	Out- comes	Key findings, effects compared with the control group	Attrition rate
Stress								
Alexandre et al. 2016 (84) USA	4 arms ¹ Duration: 8 weeks Follow up: 16 weeks, 1 year only for IG Study setting: employees in a corporate call center	Randomization of 161 ² Male rate: 16.8% Mean age: 40.0 Education: -	workplace	I1: Web-based mindfulness stress management program I2: I1 plus group support I3: I1 plus group and expert clinical support CC: Waitlist	Yes, in IG3	PSS-10 (104) § MBI-EE (105) MAAS ³ (106) SF-36 ⁴ (107)	The IG demonstrated significant moderate effects on perceived stress and emotional well-being and small effects on burnout and mindfulness at postassessment and at follow up. Group support improved the outcomes. No significant difference was observed when providing expert onsite support in addition to group support alone.	38.0% T1 52.0% T2
Billings et al. 2008 (61) USA # \$\$	2 arms Duration: access for 3 months Study setting: employees from a major technology company in the mid-Atlantic region	Randomization of 309 Male rate: 29.4% Mean age 30-39: 51.1% Education: 43.4% college degree	workplace	I: Web-based multimedia stress and mood management program with CBT elements CC: Waitlist	No	CES-D (108) BAI ⁵ (109) SDS ⁶ (110)	The IG showed significant improvements with small effects on stress and binge drinking.	21.0%

¹ Only 2 arms included in the meta-analysis intervention group (IG) versus the control group (CG).

² N=91 in the 2 arms considered.

³ Mindfulness Attention Awareness Scale (MAAS).

⁴ Short Form Health Survey (SF-36).

⁵ Beck Anxiety Inventory (BAI).

⁶ Symptom Distress Scale (SDS).

Carolan et al. 2017 (27) UK ~ °°	3 arms Duration: 8 weeks Follow up: 16 weeks Study setting: employees from six organizations (two local authorities, two universities, one third- sector organization, and a telecommunications organization) with an elevated level of stress, score ≥ 20 on the PSS- 10	Randomization of 84 Male rate: 15% Mean age: 41 Education: 39% master's, doctorate or equivalent	workplace	I1: Guided CBT-based stress management intervention with a discussion group I2: Guided CBT-based stress management intervention without a discussion group ⁷ CC: Waitlist	Yes, e- coach and discussion group	DASS-21 (111)	Small to medium effect size differences were found at posttreatment in favor of the active conditions compared with the control on the depression, anxiety and stress DASS subscales and the enthusiasm and comfort IWP subscales. This result was largely maintained at follow up.	26.19% T1
Cook et al. 2007 (62) USA # °° @ ⁸	2 arms Duration: access for 3 months Follow up: - Study setting: employees of a human resources company	Randomization of 419 Male rate: 27.4% Mean age: 42.0 Education: 60.9% university-level education	workplace	I: Web-based health promotion program rooted in accepted models of health behavior change, designed to improve dietary practices, reduce stress, and increase physical activity CC: Print materials on the same topics	No	PSS-5 (104) SDS (110)	The web-based program was more effective than print materials in the areas of diet and nutrition but was not more effective in stress reduction.	14.5% T1
Cook et al. 2015 (64)USA # °° \$\$	2 arms Duration: access for 3 months Follow up: - Study setting: employees aged 50 to 68 from multiple US offices of a large	Randomization of 278 Male rate: 67.3% Mean age: 55.4 Education: 54.0% university education	workplace	I: Web-based health promotion program containing information on the major health promotion topics of healthy aging, diet, physical activity, stress management, and tobacco	No	SD ⁹ (146)	The intervention showed significant contributions to short-term dietary and exercise practices, but no significant differences between the two groups in measures of stress were found.	12.6% T1

⁷ The arm without a discussion group compared to the waitlist was used for the meta-analysis because of better comparability to other interventions.

⁸ Not included in the meta-analysis because of an active control condition.

⁹ Symptoms of Distress (147)

global information technology company			use based on social cognitive theory CC: Waitlist					
Ebert et al. 2016a (79) Germany ~	2 arms Duration: 7 weeks Follow up: 6 months Study setting: general working population with PSS-10 $\geq$ 22	Randomization of 264 Male rate: 14.1% Age: 42.9 Education: 71.9% high level	community	I: Internet-based adherence-focused guided stress management intervention CC: Waitlist	Yes, participan ts received adherence -focused guidance from an e- coach	PSS-10 (104) § ISI (113) CES-D (108) HADS-A (113) MBI-EE (105)	The IG participants showed a significantly higher reduction in perceived stress at postassessment (g=0.79) and at the 6-month follow up (g=0.84) compared with the controls. Significant moderate to large short-and long-term effect sizes were also found for other mental health outcomes.	9.1% T1 17.0% T2
Ebert et al. 2016b (73) Germany ~	2 arms Duration: 7 weeks Follow up: 6 months Study setting: general working population with PSS-10 $\geq$ 22	Randomization of 264 Male rate: 28.0% Mean age: 42.0 Education: 67.0% high level	community	I: Internet- and mobile- based intervention based on the Lazarus and Folkman transactional model of stress and its distinction between problem-focused and emotion-focused coping CC: Waitlist with treatment as usual (TAU) access	No	PSS-10 (104) § ISI (112) CES-D (108) HADS-A (113) MBI-EE (105)	Individuals in the IG experienced significantly higher reductions in perceived stress at postassessment (g=0.95) and at the 6-month follow up (g=0.64) compared with the controls. Significant moderate short-and long-term effects were also found for other mental health outcomes.	5.7% T1 9.8% T2
Eisen et al. 2008 (39) USA @ ¹⁰	3 arms Duration: 2 weeks Follow up: 1 month Study setting: employees from three	Randomization of 288 Male rate: 64.7% Mean age: 44.4	workplace	I1: Computerized CBT- based stress management intervention with multiple two-minute mini- relaxations	No	SUDS ¹¹ (114)§	Individuals in both intervention groups experienced significant reductions in stress immediately following the	52.0% T1 - T2

¹⁰ Not included in the meta-analysis because of the lack of data.

¹¹ Subjective Units of Distress Scale (SUDS).

	manufacturing sites within a single corporation	Education: 74.1% college degree		I2: CBT-based stress management intervention with multiple two-minute mini-relaxations via instructor CC: Waitlist			2-minute mini-relaxations, but there were no significant improvements at the end of the intervention or at the follow up.	
Heber et al. 2016 (72) Germany ~	2 arms (intervention, waitlist with access TAU) Duration: 7 weeks Follow up: 6 months, 12 months for IG Study setting: general working population with PSS-10 $\geq$ 22	Randomization of 264 Male rate: 26.9% Mean age: 43.3 Education: 76.9% highly educated	community	I: Internet- and mobile-based intervention based on the Lazarus and Folkman transactional model of stress and its distinction between problem-focused and emotion-focused coping CC: Waitlist with TAU access	Yes, participants received written feedback on every completed session from an e-coach	PSS-10 (104) § ISI (113) CES-D (108) HADS-A (113) MBI-EE (105)	Individuals in the IG experienced significantly higher reductions in perceived stress at postassessment (g=0.83) and at the 6-month follow up (g=1.01) compared with the controls. The within-group effect was g=1.83 after 1 year. Significant large to moderate short- and long-term effects were also found for other mental health outcomes.	5.7% T1 10.6% T2 30.3% T3
Ketelaar et al. 2013 (85) Netherlands	2 arms Duration: 3 months Follow up: 6 months Study setting: nurses and allied health professionals employed at an academic hospital	Randomization of 1140 Male rate: 20.2% Mean age: 40.0 Education: -	workplace	I: Personalized feedback on mental health and a matched offer of an online self-help mental health intervention CC: Waitlist	No	NWFQ ¹² (115) § 4DSQ ¹³ (116)	The study was faced with substantial dropouts and could not demonstrate the effectiveness of the intervention on any outcomes compared to the control group.	64.6% T1 81.7% T2
Ly et al. 2014 (58) Sweden	2 arms Duration: 6 weeks Follow up: - Study setting: middle managers at medium-	Randomization of 74 Male rate: 42% Mean age: 41.5	workplace	I: Smartphone stress intervention based on acceptance and commitment therapy (ACT)	Yes, the therapist sent encouraging	GHQ-12 ¹⁴ (117)§ PSS-14 (104)	The IG participants scored lower than the control group on the PSS-14 at 6 weeks with a small effect.	6.7% T1

¹² Nurses Work Functioning Questionnaire.

¹³ Four-Dimensional Symptom Questionnaire (4DSQ).

¹⁴ General Health Questionnaire (GHQ-12).

	and large-sized companies (N>50 employees)	Education: 47.0% university education		CC: Waitlist	personal messages every other day to the participants				
Mori et al. 2014 (87) Japan	2 arms Duration: 150 min class + 1 month Follow up: 6 months Study setting: employees at an information technology company in Tokyo, Japan	Randomization of 187 Male rate: 78.0% Mean age: 38.4 Education: -	workplace	I: 150-minute group class presented by a qualified CBT expert on CBT and 1 month of homework via a web-based CBT program CC: Waitlist	Yes	K6 (118)§	Although the IG exhibited lower K6 scores, the difference from the control group was not significant.	15.5% T1 17.2% T2	
Persson et al. 2017 (90) Sweden @ ^{15~}	2 arms Duration: 8 weeks Follow up: 6 months Study setting: distressed managers mainly employed in the healthcare, information technology, communications and education sectors	Randomization of 117 Male rate: 33.0% Mean age: 46.9 Education: 91% university-level education	community	I: Internet-based stress management intervention including cognitive behavioral stress management and positive management techniques CC: Attention control (AC) condition, weekly mail contact, homework assignment	Yes, participants received weekly guidance from a psychologist focusing on feedback and adherence	PSS-14 ¹⁶ (104) § MADRS-S ¹⁷ (119) SMBQ ¹⁸ (120) ISI (112)	Participants in the IG reported significantly fewer symptoms of perceived stress, depression, insomnia, and burnout with moderate to large effects at postassessment. Significant medium to large effect sizes on the mental health outcomes were also found at the 6-month follow up.	20.5% T1 29.9% T2	

¹⁵ Not included in the meta-analysis because of an active control condition.

¹⁶ Perceived stress (PSS-14).

¹⁷ Montgomery-Åsberg Depression Rating Scale (MADRS).

¹⁸ Shirom-Melamed Burnout Questionnaire (SMBQ).

Ruwaard et al. 2007 (94) Netherlands ~	2 arms Duration: 7 weeks Follow up: 3 years for IG Study setting: general working population with PSS-10 $\geq$ 22	Randomization of 239 Male rate: 40.0% Mean age: 44.0 Education: 84.0% highly educated	community	I: E-mail-based cognitive behavioral treatment including practical exercises CC: Waitlist	Yes, communication between clients and therapists took place through regular e-mails	Stress, § anxiety and depression subscales from the DASS-42 ¹⁹ (111) MBI-EE (105)	The IG showed statistically significant moderate improvements in stress and small significant effects for other mental health outcomes at the end of treatment. At the 3-year follow up, the positive developments were maintained with large within-group effects for all outcomes.	20.9% T1 64.4% T2
Smith 1987 (50) USA #	2 arms Duration: 5 weeks Follow up: - Study setting: adult male juvenile counselors from the Juvenile Services Administration, Baltimore City, Maryland	Randomization of 30 Male rate: 100% Age: 31-40 67.0% Education: 53.0% master's degree	workplace	I: Computerized self-help stress coping program based on cognitive learning theory CC: Waitlist	No	PStQ ²⁰ (121) SA ²¹ (122)	The IG demonstrated statistically significant decreases in state anxiety with small effect.	-
Umanodan et al. 2014 (100) Japan	2 arms Duration: 7 weeks Follow up: 12 weeks Study setting: 12 work units from the research and development divisions and support staff in a manufacturing company	Randomization of 263 Male rate: 92.6% Mean age: 38.9 Education: -	workplace	I: Computerized CBT-based stress management program CC: Waitlist	No	BJSQ ²² (124) §	A small significant effect of the intervention was found only for “knowledge of stress management” at T1 but not for any other primary or secondary outcomes.	3.4% T1 5.7% T2

¹⁹ Depression, Anxiety and Stress Scales (DASS-42).

²⁰ Personal Strain Questionnaire (PStQ).

²¹ State anxiety from the State-Trait Anxiety Inventory.

²² Brief Job Stress Questionnaire (BJSQ).

Wolever et al. 2012 (38) USA \$\$ @ ²³	3 arms Duration: 12 weeks Follow up: - Study setting: employees of a national insurance company	Randomization of 239 Male rate: 23.4% Mean age: 42.9 Education: 72.4% college, graduate, or professional degree	workplace	I1: Therapeutic yoga I2: Stress management program based on the practices of mindfulness meditation provided through an online virtual classroom by a meditation teacher CC: List of resources available to all employees of the national insurance carrier	Yes, mediation teacher	PSS-10 (104)§ PSQI (120) CES-D (108)	Compared with the control group, the mind- body interventions yielded significantly greater improvements in perceived stress with a moderate effect and in sleep quality with a small effect.	14.2% T1
Yamagishi et al. 2008 (36) Japan # @ ²⁴	2 arms Duration: 3 weeks Follow up: 4 weeks Study setting: shift- work nurses from two urban hospitals	Randomization of 60 Male rate: - Mean age: - Education: -	workplace	I: Web-based career identity training CC: Waitlist	No	JSBQ ²⁵ (125)- mental workload BJSQ (126)- anxiety, depression	The IG showed significant improvements in two career identity subscales, but there was no evidence of significant improvements in mental health or stress-related outcomes.	40.0% T1 56.7% T2

Depression

Ebert et al. 2014 (78) Germany	2 arms Duration: 7 weeks Follow up: 6 and 12 months	Randomization of 150 Male rate: 16.7% Mean age: 47.1	community	I: Internet-based problem- solving training CC: Waitlist	No	CES-D ²⁶ (108) § PSQ ²⁷ (126)	IG participants displayed a significantly greater reduction in depressive symptoms and stress after	11.3% T1 19.0% T2 15.5% T3
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²³ Not included in the meta-analysis because of the lack of data.

²⁴ Not included in the meta-analysis because the validity of the measures used was not reported.

²⁵ Job Stress Brief Questionnaire.

²⁶ Center for Epidemiologic Studies Depression Scale (CES-D).

²⁷ Perceived Stress Questionnaire (PSQ).

	Study setting: employed teachers	Education: 100% university degree					the intervention with moderate and small effects at postassessment and follow up compared with the control group.		
Birney et al. 2016 (47) USA ~ °° \$\$ @ ²⁸	2 arms Duration: 6 weeks Follow up: 10 weeks Study setting: general working population with mild to moderate depression (PHQ-9>9)	Randomization of 300 Male rate: 23.0% Mean age: 40.7 Education: 90% college, university or graduate school educated	community	I: CBT-based depression self-management mobile app MoodHacker CC: E-mail with links to vetted online information about depression	No	PHQ-9 ²⁹ (127) §	At the end of treatment, depression symptoms had significantly decreased with a small effect compared with the control group; at 10 weeks, the small treatment effect was no longer significant.	4.7% T1 5.0% T2	
Geraedts et al. 2014a/2014b (98) (128) ~	2 arms Duration: max 7 weeks Follow up: 6 and 12 months Study setting: Employees from 6 different companies with depressive symptoms >16 on the CES-D	Randomization of 231 Male rate: 37.7% Mean age: 43.4 Education: 63.3% highly educated	workplace	I: Problem-solving and cognitive therapy CC: Care as usual	No	CES-D (108) § HADS ³⁰ (147) MBI-EE (105)	The IG had decreased anxiety with a small significant effect at posttreatment. There were no other significant differences between the groups in any other outcomes posttreatment or long-term.	26.4% T1 32.0% T2 46.0% T3	
Grime et al. 2004 (59) UK ~ #	2 arms Duration: 8 weeks Follow up: 1, 3, and 6 months after treatment Study setting: public sector employees with 10 or more cumulative days of stress-related	Randomization of 48 Male rate: 42.0% Mean age: 39.0 Education: -	workplace	I: Computerized CBT program plus conventional care CC: Conventional care	No	HADS (113) MBI-EE ³¹ (105)	The IG had statistically significantly lower depression and negative attributional style scores at the end of treatment and 1 month later and lower anxiety scores 1 month posttreatment.	18.8% T1 29.1% T2 33.3% T3 31.3% T4	

²⁸ Not included in the meta-analysis because of an active control condition.

²⁹ Patient Health Questionnaire (PHQ-9).

³⁰ Hospital Anxiety and Depression Scale (HADS) (148).

³¹ Maslach Burnout Inventory-Emotional Exhaustion (MBI-EE).

	absenteeism in the last 6 months							
Hirsch et al. 2017 (101) USA ³²	2 arms Duration: 26 weeks Study setting: employees of a mid-sized financial software firm	Randomization of 165 Male rate: 65.0% Mean age: 68.3% 41-60 years Education: -	workplace	I: Web- and mobile-based CBT and 12 informational e-mails CC: Informational e-mails about depression	No	DASS ³³ -21 (111)§	myStrength users demonstrated significantly steeper reductions in depressive symptoms over time than the active control group with a small effect.	67.0% T1
Imamura et al. 2014 (102) Japan	2 arms Duration: max 10 weeks Follow up: 3 and 6 months Study setting: employees at two companies developing information systems	Randomization of 762 Male rate: 83.8% Mean age: 37.6 Education: 89.9% college, university or graduate school educated	workplace	I: Web-based CBT program CC: E-mails with stress management tips	No, but voluntary homework with feedback from clinical psychologists	BDI-II ³⁴ (113) § K6 ³⁵ (118)	The iCBT program showed small statistically significant effects on BDI-II at the 3- and 6-month follow ups.	20.5% T1 22.3% T2
Imamura et al. 2016 (65) Japan ~	2 arms Duration: access for 4 months Follow up: 1 and 4 months Study setting: currently employed workers in the high-risk group (visited mental health specialist in the past month), moderate risk	Randomization of 1236 Male rate: 70.0% Mean age: 39.4 Education: 47.7% university degree	community	I: Psychoeducational website “UTSMed” CC: Waitlist	No	BDI-II ³⁶ (113) § K6 (118)	The intervention was effective at a significant level in reducing depression and stress with moderate effects only among participants in the high-risk subgroup.	11.8% T1 17.5% T2

³² Not included in the meta-analysis because of an active control condition.

³³ Depression Anxiety Stress Scales (DASS).

³⁴ Beck Depression Inventory-II (BDI-II).

³⁵ Kessler Psychological Distress Scale (K6).

	K6≥5 and low-risk group K6≤4 distress scores							
Lappalainen et al. 2013 (86) Finland ~	2 arms Duration: - Follow up: 6 months Study setting: full-time employed males aged 25 to 45 years with exhaustion, stress symptoms, or sleeping problems	Randomization of 24 Male rate: 100% Mean age: 43.3 Education: -	community	I: CBT- and ACT-based program delivered via multiple channels, including group meetings, web portal, mobile phone applications, and personal monitoring devices CC: Waitlist	Yes, 3 psychologist-assisted group meeting	BDI-II (113)§	There were no significant changes in depressive scores between the groups after the treatment. A significant within-group effect in the IG was found at the follow up.	4.1% T1
Phillips et al. 2014 (67) UK ~ @ ³⁷	2 arms Duration: 5 weeks Follow up: 6 and 12 weeks Study setting: employees with PHQ-9≥10 at three companies in the transport, health and communication sectors	Randomization of 637 Male rate: 46.4% Mean age: 42.4 Education: -	workplace	I: Computerized CBT intervention CC: Weekly e-mails and five websites containing general information on mental health	Yes, weekly calls by clinical study officer, 10 min on average	WSAS (129)§ PHQ-9 (127) CORE10 ³⁸ (130) GAD ³⁹ (131)	There was no evidence of a difference in the treatment effect of the intervention on any of the outcomes.	43.6% T1 63.7% T2
Shirotsuki et al. 2017 (95) Japan # °°	3 arms Duration: 6 weeks Follow up: - Study setting: office workers from beverage, alcoholic beverage, and food manufacturing/sales companies in Tokyo	Randomization of 87 Male rate: 68.0% Mean age: 37.2 Education:-	workplace	I1: CBT program I2: I1 with L-carnosine drink CC: Waitlist	No	POMS ⁴⁰ (132) (Japanese version)	The intervention significantly changed the subjective experience of tension-anxiety with a moderate effect. The addition of a supplement drink enhanced the treatment effect only for fatigue.	17.2% T1
Insomnia								

³⁷ Not included in the meta-analysis because of an active control condition.

³⁸ Clinical Outcomes in Routine Evaluation.

³⁹ Generalized Anxiety Disorder (GAD) Assessment.

⁴⁰ Profile of Mood State (POMS).

Bostock et al. 2016 (60) USA ~	2 arms Duration: 8 weeks Follow up: 3 months Study setting: “Fortune 500” company, mainly office workers self- identified as having poor sleep	Randomization of 270 Male rate: 90.0% Mean age: 33.6 Education: -	workplace	I: Digital CBT with e- mail/SMS prompts and access to a moderated online community CC: Waitlist	No	SCI (133) ⁴¹ PHQ-2 ⁴² (127) GAD-2 (131) ⁴³	The IG showed a significant large effect on sleep quality. The small improvements in anxiety and depression were not significant. The large within-group effect on sleep was maintained after 3 months.	20.5% T1 38.5% T2
Hasson et al. 2005 (49) Sweden #@ ⁴⁴	2 arms Duration: 6 months Study setting: employees from four information technology and two media companies	Randomization of 303 Male rate: 61.7% Mean age: 74.5% >30 Education: 51.4% academic degree	workplace	I: Web-based tool for health promotion and stress management with real-time monitoring of stress status. In addition, participants in the IG were offered web-based cognitive exercises CC: Intervention without the possibility of web- based cognitive exercises	No	Sleep quality on VAS ⁴⁵ Biological markers	The IG improved significantly compared with the control group with small effects on sleep quality, perceived ability to manage stress and other mental outcomes. Furthermore, the IG showed significant decreases in the hormone neuropeptide Y (NPY), which has been found to promote sleep.	8.6% T1
Querstret et al. 2017 (91) UK # \$\$	2 arms Duration: 4 weeks Follow up: 3 and 6 months Study setting: general working population with affective rumination score ≥15	Randomization of 127 Male rate: 19.5% Mean age: 40.6 Education: 68.6% university educated	community	I: Online mindfulness- based stress reduction and cognitive therapy CC: Waitlist	No	PSQI (120) ⁴⁶ FFMQ-4 (123) ⁴⁷	The IG significantly improved sleep quality and mindfulness with large effects after the treatment. The significant within-group effect was	24.4% T1 25.9% T2 27.6% T3

⁴¹ Sleep Condition Indicator (SCI).

⁴² Patient Health Questionnaire (PHQ-2) (2 items).

⁴³ Generalized Anxiety Disorder questionnaire (GAD-2) (2-items).

⁴⁴ Not included in the meta-analysis because of an active control condition.

⁴⁵ Visual Analogue Scale (VAS).

⁴⁶ Pittsburgh Sleep Quality Assessment (PSQI).

⁴⁷ FFMQ-4 (describing, acting with awareness, nonjudging, nonreacting).

							maintained after 3 and 6 months with medium to large effect sizes.	
Suzuki et al. 2008 (99) Japan #	2 arms Duration: 2 weeks Follow up: 3 weeks Study setting: employees from companies in Okayama and Shizuoka and at Okayama University	Randomization of 43 Male rate: 61.0% Mean age: 39.6 Education: -	community	I: CBT via PC and mobile phone CC: Waitlist	No	PSQI (120) K6 (118), Japanese version	No significant effects were observed for sleep quality and mental health measured by the PSQI and K6.	9.3% T1 30.2% T2
Taylor et al. 2017 USA (96) @ ⁴⁸	3 arms Duration: 6 weeks Follow up: 6 months Study setting: 100 active duty US Army personnel at Fort Hood, Texas	Randomization of 100 Male rate: 83% Mean age: 32.73 Education: 62% some college degree	-	I: Internet CBT I2: in-person CBT CC: Weekly phone call assessments	No	ISI (112) ⁴⁹	Both intervention groups reported significantly greater improvements than the control group across the majority of assessed sleep parameters. The effect sizes for in-person CBT were consistently higher than those for Internet CBT.	14% T1 66% T2
Thiart et al. 2015 (70) Germany ~	2 arms Duration: 8 weeks Follow up: 6 months Study setting: teachers at primary, secondary, and vocational schools with ≥15 on the ISI	Randomization of 128 Male rate: 25.8% Mean age: 48.0 Education: 100% university degree	community	I: Digital CBT supported by trained coaches CC: Waitlist	Yes	ISI (112)	Insomnia severity decreased significantly in the IG group with a large effect after treatment, and the large effect was maintained at the follow up.	7.8% T1 11.7% T2
Van Drongelen et al. 2014 (92)	2 arms Duration: - Follow up: 3 and 6 months	Randomization of 502 Male rate: 93.2% Mean age: 40.9 Education: -	workplace	I: Mobile intervention providing personalized advice to reduce fatigue and improve sleep	No	JSEQ (133) ⁵⁰	The IG showed significant improvements in sleep quality after 3 and 6 months with small	19.3% T1 22.4% T2

⁴⁸ Not included in the meta-analysis because of an active control condition.

⁴⁹ Insomnia Severity Index (ISI).

⁵⁰ Jenkins Sleep Evaluation Questionnaire (JSEQ).

Netherlands	Study setting: pilots from an internationally operating airline company			CC: Website with standard information on fatigue			effects compared with the control group.	
Abbott et al. 2009 (81) USA #	2 arms Duration: - Follow up: 10 weeks Study setting: sales managers from an Australian industrial organization based in home offices	Randomization of 53 Male rate: 86.8% Mean age: 43.3 Education: 49.2% postgraduate-level educated	workplace	I: Online resilience training based on cognitive therapy CC: Waitlist	No	DASS-21 (111) QOL psychological of WHOQOL-BREF (134) ⁵¹	There were no significant differences between the groups for the depression, anxiety, stress or quality of life measures.	41.5% T1
Bolier et al. 2014 (63) Netherlands	2 arms Duration: 3 months Follow up: 6 months Study setting: nurses and allied health professionals employed at one academic hospital	Randomization of 1140 Male rate: 20.2% Mean age: 40.0 Education: -	workplace	I: Personalized feedback on mental health and a matched offer of an online self-help mental health intervention CC: Waitlist	No	MHC-SF (135) ⁵² § depression and anxiety subscales - BSI (136) ⁵³	The intervention significantly enhanced positive mental health compared with the control group with small effects at posttest and at follow up. No significant or relevant differences between groups were found for the secondary outcomes.	64.6% T1 81.7% T2
Borness et al. 2013 (37) Australia @ ⁵⁴	2 arms Duration: 16 weeks Follow up: 6 months Study setting: white collar employees of a large Australian public sector organization	Randomization of 135 Male rate: 36.4% Mean age: 41.6 Education: 13.7 years of education	workplace	I: Online cognitive training CC: Documentaries about the natural world	No	QOLS (137) ⁵⁵ DASS-42 (111)	There were no significant effects on well-being immediately after the training. At the 6-month follow up, the control group experienced a significant increase in	25.9% T1 34.8% T2

⁵¹ The World Health Organization Quality of Life-BREF (WHOQOL-BREF).

⁵² The Mental Health Continuum-Short Form (MHC-SF).

⁵³ Brief Symptom Inventory (BSI).

⁵⁴ Not included in the meta-analysis because of the lack of data.

⁵⁵ Quality of Life Scale (QOLS).

							self-reported QOLS, a decrease in stress levels, and overall improvement in psychological well-being with small effects.		
Feicht et al. 2013 (97) Germany °°	2 arms Duration: 7 weeks Follow up: 11 weeks Study setting: 2 departments of a local insurance company	Randomization of 147 Male rate: 31.2% Mean age: 37.2 Education: -	workplace	I: Web-based happiness training CC: Waitlist	No	WHO-5 (138) SWS (139) ⁵⁶ FMI (140) ⁵⁷	-	12.2% T1 19.0% T2	
Myers et al. 2017 (88) USA °° \$\$ @ ⁵⁸	2 arms Duration: 4 weeks Follow up: 8.5 weeks Study setting: employees at a major research university in southeastern USA	Randomization of 479 Male rate: 24% Mean age: 41.8 Education: 47.7% had a graduate degree	workplace	I: Online intervention that uses interactive and scenario-based learning to promote growth in subjective well-being CC: CAU with 30 days of 24-hour access to a webpage that provided links to several well-established websites	No	I COPPE (141) ⁵⁹	The IG showed no significant differences from the control group. Considering actual participation in the intervention, significant improvements in interpersonal well-being at follow up, community well-being at posttreatment and follow up, psychological well-being at follow up, and economic well-being at posttreatment and follow up were found.	36.7% T1 40% T2	
Neumeier et al. 2017 (89)	3 arms, first and WL were included in the meta-analysis	Randomization of 431 Male rate: 32.7%	community	I1: Online positive psychology intervention based on	No	GSWB (142) ⁶⁰	Participants in both IGs reported significant increases in well-being after the intervention with	29.7% T1	

⁵⁶ Stress Warning Signal Scale (SWS).

⁵⁷ Freiburg Mindfulness Inventory (FMI).

⁵⁸ Not included in the meta-analysis because of an active control condition.

⁵⁹ I COPPE Scale, a scale developed by the authors that incorporates overall as well as Interpersonal, Community, Occupational, Physical, Psychological, and Economic well-being.

⁶⁰ General subjective well-being (GSWB).

Germany \$\$	Duration: 2 weeks Follow up: - Study setting: general working population	Mean age: 41.2 Education: 73.3% postgraduate-level educated		Seligman's well-being theory I2: Online gratitude intervention CC: Waitlist			small effects compared with the control group. The significant increases had small effect sizes for general subjective well- being and moderate effect sizes for work-related subjective well-being.	
Yuan et al. 2015 (103) Hong Kong \$\$	2 arms Duration: 4 weeks Follow up: 1 and 3 months Study setting: employees of medium and large companies in Hong Kong	Randomization of 321 Male rate: 23.7% Mean age: 34.99 Education: 78.82% highly educated, bachelor's degree or above	community	I: Online cognitive training CC: Waitlist	No	WEMWBS (143) ⁶¹ CES-D (108)	The intervention was effective for mental well- being and work engagement with small effect sizes at posttreatment and follow up; however, it did not show significant effects for any other outcomes.	48.5% T1 51.7% T2 55.8% T3
Mindfulness & Burnout								
Aikens et al. 2014 (82) USA	2 arms Duration: 7 weeks Follow up: 6 months Study setting: employees of Dow Chemical Company in Midland, Michigan	Randomization of 90 Male rate: - Mean age: - Education:-	workplace	I: The mindfulness intervention consisted of a program combining live, weekly, hour-long virtual class meetings with accompanying online applied training CC: Waitlist	Yes, virtual class meetings	FFMQ (123) ⁶² § PSS-14 (104)	The IG had significant decreases in perceived stress and increases in mindfulness with moderate effects. At the follow up, the IG maintained significant improvements in mindfulness (within- group effect).	13.3% T1 31.1% T2
Jonas et al. 2017 (83) Germany ~ ∞	2 arms Duration: 4 weeks Follow up: 3, 6 and 12 months	Randomization of 39 Male rate: 51.3% Mean age: 46.5	community	I: CBT-based intervention for burnout CC: Waitlist	Yes	MBI-GS (105) ⁶³ § DASS-21 (111) German version	After three months, intervention users had significantly lower values for depression and	7.7% T1 12.8% T2 23% T3

⁶¹ Warwick-Edinburgh Mental Well-being Scale (WEMWBS).

⁶² Five Facets of Mindfulness Questionnaire (FFMQ).

⁶³ Maslach Burnout Inventory-General Survey (MBI-GS).

	Study setting: general working population with a relevant level of work-related emotional exhaustion or cynicism (scoring 3.5 or higher on the related MBI-EE or MBI-cynicism scales)	Education: 78.82% highly educated, bachelor's degree or above					cynicism and significantly higher values for professional efficacy with medium to large effects. Those effects were sustained after 12 months and yielded a moderate within-group effect size for cynicism and a large within-group effect for depression.	
Rexroth et al. 2017 (93) Germany #	2 arms Duration: 3 weeks Follow up: 5 weeks Study setting: general working population	Randomization of 412 Male rate: 28.9% Mean age: 41.41 Education: -	community	I: Online mindfulness-based intervention (boundary management) CC: Waitlist	No	CAMS-R (144) OLBI (145) ⁶⁴	The IG significantly improved boundary management and emotional exhaustion, negative affect, and overall life satisfaction with small effects. The IG maintained the enhancement at follow up for boundary management and emotional exhaustion.	45.7% T1 63.5% T2
Alcohol								
Boß et al. 2017 (76) Germany ~ 2 arm included in the analysis (unguided)	3 arms Duration: 5 weeks Follow up: 6 months Study setting: general working population consuming at least 21/14 weekly SUA and scoring ≥8/6 on the Alcohol Use Disorders Identification Test	Randomization of 434 Male rate: 59.4% Mean age: 47.0 Education: 67.6% high educational level	community	I1: Web-based modules including personalized normative feedback, motivational interviewing, goal setting, problem-solving and emotion regulation. I2: Intervention with an individually assigned psychologist who	Yes, 2 arm	Total weekly alcohol consumption in SUA ⁶⁵	Both IGs showed small, significant improvements in reducing alcohol consumption after treatment and at the follow up compared with the controls. There was no significant difference between the unguided and guided interventions.	21.9% T1 37.6% T2

⁶⁴ Oldenburg Burnout Inventory (OLBI)

⁶⁵ SUA (standard alcohol unit). One SUA contains 10–12 grams of pure alcohol.

				provided adherence-focused guidance. CC: Waitlist				
Brendryen et al. 2017 (48) Norway ~ °° @ ⁶⁶	2 arms Duration: up to 6 months Follow up: 2 and 6 months Study setting: at risk drinkers with ≥3 FAST score employed at public hospitals, municipal departments, consulting company	Randomization of 85 Male rate: 51.7% Mean age: 43.0 Education: people with higher education were overrepresented in the sample	workplace	I: Personalized feedback followed by 62 web-based sessions with CBT elements with reminder e-mails and mobile phone text messages CC: Personalized feedback and e-booklet about the effects of alcohol	No	Total weekly alcohol consumption with SUA§	At the two-month follow up, a small, significant treatment effect was found for the IG, but this effect was not replicated with an intent-to-treat approach to the analysis.	34.0% T1 40.0% T2
Doumas et al. 2008 (35) USA # \$\$ @ ⁶⁷	3 arms Duration: 15 min/30 min Follow up: 30 days Study setting: young (18-24) adults in the workplace at five local companies	Randomization of 196 Male rate: 27.0% Mean age: - Education: 75.0% attending school	workplace	I1: Web-based program with personalized feedback I2: Web-based program plus a 15-minute motivational interview with a counselor CC: Waitlist	No	Weekend drinking, peak consumption, binge drinking	Participants in both IGs reported significantly lower levels of drinking with small to moderate effects than the control group. The effect was enhanced for participants classified as high-risk drinkers at the baseline assessment. No significant differences between the two interventions types were found.	36.7% T1
Khadjesari et al. 2014 (68) UK ~ @ ⁶⁸	2 arms Duration: - Follow up: 3 months Study setting: employees of a UK-	Randomization of 1330 Male rate: 75.5% Mean age: 48.0 Education: -	workplace	I: Online personalized feedback on alcohol intake in the context of a health check with the	No	Total weekly alcohol consumption with UK units	Alcohol consumption was 5.6% higher in the IG than in the CG, although this was not statistically significant.	19.8% T1

⁶⁶ Not included in the meta-analysis because of an active control condition.

⁶⁷ Not included in the meta-analysis because the validity of the outcomes was not reported.

⁶⁸ Not included in the meta-analysis because of an active control condition.

	based private sector organization with ≥ 5 on the AUDIT-C ⁶⁹			option of a more extensive intervention CC: Waitlist with general online health check		(1 UK unit=8 g of ethanol) §		
Matano et al. 2007 (34) USA # ~ \$\$ @ ⁷⁰	2 arms Duration: 90 days (access to the website) Follow up: 3 months Study setting: employees with low and moderate risk for alcohol at a worksite in Silicon Valley, California	Randomization of 173 Male rate: 22.1% Mean age: 39.94 Education: 84% college or university educated	workplace	I: Website with full individualized feedback, recommendations, mini-workshops, a drinking journal, and links to online resources CC: Website with limited individualized feedback	No	Ten items assessing alcohol consumption	The intervention showed significant effectiveness in reduction of hard liquor and beer binges in the low-risk group and beer binges in the moderate-risk group with moderate effects.	16.2% T1
# - no primary outcomes defined; ~ - at risk population; °° - conflict of interest declared; \$\$ - incentives offered; @ - not included in meta-analysis; § - primary outcome; g - Hedges' g between groups; T1 - posttreatment; TX - follow up X.								

⁶⁸ AUDIT-C is a 3-item alcohol screen; ²Fast Alcohol Screening Test (FAST).

⁷⁰ Not included in the meta-analysis because the validity of the outcomes was not reported.