

S2 Table - Characteristics Table for the 28 Included Intervention Studies

Characteristics of the 28 included intervention studies (from 26 intervention articles)									
Study Details			Intervention Details						
Authors (Year); Country; Contact centre details*	Population	Design**	Duration	Data collection time point(s)	Intervention delivery (setting)***	Theoretical underpinning	Intervention aim(s)	Primary outcome(s)	Other outcome(s)
Allexandre et al (2016); USA; Corporate call centre [1]	- Contact centre advisors - N=161; 83.2% female - Mean age: 40 years (SD 13) - 77% C/W	RCT	8 weeks	Baseline, 8 and 16 weeks, and 1-year	I1 (hybrid): Ed/T/P (weekly mindfulness themes and meditation techniques taught through written and audio formats; educational articles (e.g., mindfulness in everyday eating) and x2 email reminders). I2 (office for meetings; hybrid for I1): Ed/T/P (as I1) and En (followed by face-to-face group meetings, 1h x1 per week x 8 weeks; discussion and sharing positive experiences). - <i>Delivered by selected company employees who participated in the web-based programme before the start of the study.</i> I3 (office for meetings; hybrid for I1): Ed/T/P (as I1) and En (Face-to-face group meeting, discussion facilitated by clinical support on week 3, 6 and 8.) - <i>Delivered by a clinical counsellor or licensed social worker.</i> C (office): Waitlist control filling in outcome questionnaires only.	Based on mindfulness meditation principles	Increase mindfulness to reduce workplace stress	Perceived psychosocial stress	- Mindfulness - Burnout - Psychological and emotional wellbeing - Productivity - Acceptability and feasibility of the intervention
Bond, Flaxman & Blunck (2008); UK; Two contact centres of a large financial services organization [2]	- Contact centre advisors - N=181; 67% female - Mean age: 33 years (SD 10) - Ethnicity NA	cRCT	14 months	2 months pre-intervention and 14 months	I (office): En/ER (steering group formed x12 team members; identified work organization problem areas and implemented change; including increased job control and meetings with team leaders to solve problems and develop training needs). - <i>Delivered as a collaborative relationship between the researchers and organization members.</i> C (office): Work as usual.	Based upon the principles of participative action research	Increase job control	Job control (moderated by psychological flexibility)	- Psychological distress - Absence levels - Intrinsic job motivation
Chau et al (2015); Australia; Large telecommunication company [3]	- Contact centre advisors - N=31; 45% female	Q-E	19 weeks	Baseline, 1, 4, and 19 weeks. Measurements conducted across the whole week	I (office): ER/T/P (sit-stand desk; brief training; daily e-mail reminders to stand for the first 2 weeks post installation). - <i>Deliverer unclear.</i> C (office): Work as usual with regular desks.	-	Reduce sitting time and increase physical activity	- Work and non-work sitting - Work and non-work physical activity	- Productivity

	- Mean age: 33 years (SD 10.8) - Ethnicity NA			(Monday-Saturday).					
Chi & Lin (2009); Taiwan, China; Established under the Employment and Vocational Training Administration [4]	- Contact centre advisors (with disability) - N=22; 50% female - Mean age: 25.6 years (range 24-55) - Ethnicity NA	PP	12 months	2.5, 5 and 12 months	I (office): ER (screen filter fitted). - <i>Deliverer unclear.</i>	-	Reduce visual fatigue	Visual fatigue	-
Cook et al (2004); Australia; Newspaper contact centre [5]	- Contact centre advisors - N=59; 91.5% female - Mean age: 39 years (range 21-68) - Ethnicity NA	RCT	6 weeks	1, 6 and 12 weeks	I (office): ER/T (workstations adjusted to provide forearm support; prompt sheet given on how to maintain forearm support). - <i>Delivered by researchers.</i> C (office): Desks as usual, then given the intervention at 6 weeks.	-	Decrease neck/shoulder and wrist/hand musculoskeletal discomfort	Musculoskeletal discomfort	- Workstation setup - Working posture - Comfort
Garrett (2016); USA; Provide telephonic health and clinical advising [6]	- Contact centre advisors - N=167; 70.7% female - Mean age NA - Ethnicity NA	Q-E	6 months	Continuously over 6 months	I (office): T/ER (training, stand-capable workstations, dual monitor set up, footrests and anti-fatigue mats installed). - <i>Deliverer unclear.</i> C (office): Seated at a traditional desk with dual monitor set up.	-	Reduce sitting time and increase standing time at work, and increase productivity	- Sitting time at work - Standing time at work - Productivity	-
Holman et al (2009); UK; Department in a large UK company providing health insurance and health care [7]	- Contact centre advisors, administrative employees and support section employees - N=119; 55% female - Mean age NA - Ethnicity NA	Q-E	6 months (to fully implement)	1-month pre intervention and 1-month after full implementation	I (office): En/ER/T (assessment and redesign (<i>phase one</i>) to identify obstacles; one day off site x3. Implementation (<i>phase two</i>) occurred over the next few months, with progress monitored by the team's representatives who attend progress meetings over 3 months. Design changes involved training to increase skills). - <i>Delivered by the research team (facilitated phase one) and employees (led proposed initiatives).</i> C (office): Serendipitous event created an inert-treatment control group (outsourcing	Job demands – resources theories of job design	Enhance job design characteristics	Job-related wellbeing	- Job control - Decision making - Feedback - Skill utilisation - Task obstacles

					initiative, announced and introduced by management just before the assessment and redesign phase. This meant the key active ingredient of the job redesign did not occur).				
Holman & Axtell (2016); UK; Department in the UK civil service dealing with transport-related issues [8]	- Contact centre advisors - N=62; 56% female - Mean age NA - Ethnicity NA	Q-E	6 months (to fully implement)	1-month pre intervention and 2 months after full implementation	I (office): ER/ER/T (assessment and redesign (<i>phase one</i>) to identify obstacles; two-day workshop then 2 weeks to develop proposals for a meeting with the managers and researchers. Implementation (<i>phase two</i>) occurred over the next few months, with the effectiveness monitored by the teams. Design changes involved training to increase job control). - <i>Delivered by the research team (facilitated phase one) and employees (led proposed initiatives).</i> C (office): Active control – completed initial survey.	Multiple mediator/multiple outcome model of job redesign intervention	Change job characteristics	Job-related wellbeing	- Job control and feedback - Job performance - Psychological contract fulfilment
Kennedy & Pretorius (2008); South Africa; Assists external company's staff with mental health/behavioural problems [9]	- Contact centre advisors - N=19; 78.9% female - Mean age NA - Ethnicity NA	PP	NA	Baseline and end of the intervention	I (office): ER/Ed/P (portable heart rate variability biofeedback device; guides users by finding their unique breathing pattern so that respiration and heart rate are synchronised; points awarded for smooth waves). - <i>Deliverer unclear.</i>	-	Reduce work-related stress symptoms	Stress-related symptoms	Environmental stressors (supportive work environment and resource management).
Kirk et al (2013); Australia; Major metropolitan contact centre [10] (Study 1)	- Contact centre advisors - N=214; Female NA - Mean age NA - Ethnicity NA	Q-E	NA	1-month pre and post-intervention	I (office): ER/T (paper-based ergonomic checklist delivered in-situ to each team member). - <i>Designed by the in-house occupational health and safety officer and team leaders delivered the checklist.</i> C (office): Work as usual.	-	Reduce work-related musculoskeletal disorders	Physical discomfort	-
Kirk et al (2013); Australia; Major metropolitan contact centre [10] (Study 2)	- Contact centre advisors - N=NA; Female NA - Mean age NA - Ethnicity NA	Q-E	NA	1-month pre and post-intervention	I (office): T/Ed (based on a paper-based ergonomic checklist; one-on-one skill-based training session included demonstration on adjustments and positions, followed by rehearsal; training followed by an explanation of the positive effects of the training and the health consequences of common errors). - <i>Delivered in-situ by the researcher.</i> C (office): Work as usual.	-	Reduce work-related musculoskeletal disorders	Physical discomfort	-

Krajewski, Wieland & Sauerland (2010); Germany; Inbound contact centre [11]	- Contact centre advisors - N=14; 57% female - Mean age: 38 years - Ethnicity NA	RCT	6 months	1 week pre-intervention (baseline) and 2, 4, and 6 months. Measurements conducted at 12:00, 13:00, 16:00, and 20:00 on assessment days.	I (office): ER/T (lunch break with progressive muscle relaxation; snack served, then progressive muscle relaxation in the 'silent room', wear eye masks, lie on medical daybed, instructions through headphones with calming music). - <i>Delivered by researchers.</i> C (office): lunch break involving small talk in company staff room with self-chosen colleagues.	Systematic relaxation techniques	Reduce stress levels	Strain states (emotional, mental, motivational and physical)	-
Krajewski, Sauerland & Rainer (2011); Germany; Contact centre details not available [12]	- Contact centre advisors - N=14; 57.1% female - Mean age: 38.4 years - 100% C/W	RCT	6 months	1-day per month at five time points (awakening, awakening +30 min, start of lunch break, end of lunch break, and bedtime)	I (office): ER/T (lunch break with progressive muscle relaxation; snack served, then progressive muscle relaxation in the 'silent room', wear eye masks, lie on medical daybed, instructions through headphones with calming music). - <i>Delivered by researchers.</i> C (office): lunch break involving small talk in company staff room with self-chosen colleagues.	Cognitive-behavioural model of relaxation	Reduce stress levels	Cortisol levels (through saliva samples) to indicate stress levels	-
Lehto et al (2003); Finland; The largest Finnish telecommunication operator [13]	- Contact centre advisors (without severe voice problems) - N=48; 79% female - Mean age: 27.5 years (range 21-40) - Ethnicity NA	PP	2 days	Baseline and 3 weeks	I (office): T/Ed (vocal training on 2 days including vocal hygiene, activities and practice). - <i>Delivered by a speech language therapist and speech teacher.</i>	-	Reduce voice failures	Perceived vocal symptoms	- Acceptability and feasibility of the intervention
Mishra et al (2010); India; Four different business process outsourcing companies [14]	- 23.1% managers/admin staff, 74.2% advisors and 2.8% researchers/analysts who smoked N= 646; 19.7% female	cRCT	12 months	Across 18 months: regular follow up visits every 2-3 months	I1 (unclear): Ed/En/P (educational health awareness sessions followed by focus group discussion to reflect on barriers to smoking cessation and to identify strengths to overcome these (7-10 employees)). I2 (unclear): Ed/En/P (I1 above plus one-to-one counselling was provided to address rationalizations for continuing tobacco use at an individual level) I3 (unclear): Ed/En/P (I2 above plus bupropion was offered based on individual need assessment)	-	Increase tobacco cessation	Tobacco cessation	Knowledge, attitude and practice regarding tobacco use

	- Mean age: 23.1 years (SD 3.7) - Ethnicity NA				- <i>Delivered by researchers (sessions) and expert tobacco counsellor (focus groups and one-to-one counselling).</i> C (unclear): Distribution of pamphlets (information on hazards of tobacco).				
Morris et al (2021); UK; Inbound contact centre [15]	- Contact centre advisors - N=59 ; 68% female - Mean age: 30.6 years (SD 11.5) - Ethnicity NA	RCT	10 months	Baseline, 3 and 10 months	I1 (office): En/T/M/P/Ed (x4 30-min education and training sessions; stand-up champions and team leader support; self-monitoring and health check feedback provided). I2 (office): ER/En/T/M/P/Ed (multicomponent intervention with height-adjustable workstations; instructions provided and reminders to stand via emails; x4 30-min education and training sessions; stand-up champions and team leader support; self-monitoring and health check feedback provided). - <i>Delivered by researchers.</i>	Socioecological model, the COM-B model and Behaviour Change Wheel	Reduce sitting time and increase standing and movement time at work	Sitting time at work	- Feasibility and acceptability of the intervention Various outcomes for: - Anthropometric - Behavioural - Cardiometabolic - Musculoskeletal - Psychosocial (wellbeing) - Work
Morris et al (2019); UK; Inbound contact centre [16]	- Contact centre advisors and team leaders - N=19 ; 78% female - Mean age: 39.3 years (SD 11.9) - 78% C/W	PP	8 weeks	Baseline and 8 weeks	I (office): ER/En/T/P/Ed (multicomponent intervention with height adjustable workstation; team leaders provided daily verbal support in one-to-one meetings; 1-hour education and training session week 1 and 5; weekly emails). - <i>Delivered by researchers.</i>	Socioecological model, the COM-B model and Behaviour Change Wheel	Reduce sitting time and increase standing and movement time at work	Acceptability and feasibility outcomes	Various outcomes for: - Behavioural - Cardiometabolic - Anthropometric
Pickens et al (2016); USA; Provided telephonic health and clinical advising [17]	- Contact centre advisors - N=138 ; 66.7% female - Mean age: 32.9 years - 22.5% AA , 70.3% C/W	Q-E	6 months	A 2-day collection period at baseline, 3 and 6 months	I1 (office): T/ER (training; sit-to-stand workstation, dual monitor set up, anti-fatigue mats and chair with adjustable seat height - purchased by the company after consultation with the research team). I2 (office): T/ER (training/ stand-biased workstation, mesh back stool and footrest - purchased by company). - <i>Delivered by managers (assigned and purchased desks to install).</i> C (office): Seated at a traditional desk.	-	Reduce sitting time and increase standing time at work	- Sitting time at work - Standing time at work	- Physical activity levels - Workstation usage - Acceptability and feasibility of the intervention
Rempel et al (2006); USA; Large healthcare company [18]	- Contact centre advisors - N=182 ; 94% female	RCT	52 weeks	Weekly for 52 weeks	I1 (office): T/ER (ergonomic training; trackball installed). I2 (office): T/ER (ergonomic training; armband provided). I3 (office): T/ER (ergonomic training; trackball + armband). - <i>Interventions delivered by researchers.</i>	-	Prevent upper body musculoskeletal disorders	Pain intensity (neck/shoulders, right elbow/forearm/wrist/hand, and left elbow/forearm)	- Work schedule - Medication uses for pain - Acute injury events during the week

	<ul style="list-style-type: none"> - Mean age: 40 years (SD 11.6) - 47.8% C/W, 20.9% AA, 17.6% A/P, 1.1% N-A 				C (office): Ergonomic training only.			m/ wrist/hand)	
Schneider et al (2012); Austria; One of the largest Austrian telecommunication companies [19]	<ul style="list-style-type: none"> - Contact centre advisors - N=76; 49% female - Mean age: 29.3 years - Ethnicity NA 	Q-E	4 weeks	Baseline and 4 weeks	<p>I1 (office): ER/Ed (biofeedback programme installed; providing real time feedback). - <i>Delivered by researchers.</i></p> <p>C (office): The control group used the biofeedback programme similarly, but the results were blinded and made visible only to the examiners.</p>	-	Improve vocal health	<ul style="list-style-type: none"> - Vocal self-assessment -Vocal performance 	<ul style="list-style-type: none"> - Vocal constitution - Vocal risk factors
Sharifi, Denesh and Gholamnia (2022); Iran; Private telecommunication company [20]	<ul style="list-style-type: none"> - Contact centre advisors - N=84; 76% female - Mean age: 28.1 years (SD 3.69) - Ethnicity NA 	PP	6 months	Baseline and 6 months	<p>I (office): ER/T/Ed/E (Modifications to the physical workstation, and adjustable chairs with arm rests, footrests and screen stands added to the environment; given an additional 10-minute rest break to perform an exercise program; Ergonomic skills training; visual pamphlet on ergonomic skills training; educated on the etiology of MSD; snapshots of inappropriate exercises taken to discuss potential solutions; Log to track daily exercises; researchers monitored ergonomic behaviours and tracked exercise program participation). - <i>Delivered by researchers.</i></p>	-	Reduce work-related musculoskeletal symptoms	<ul style="list-style-type: none"> - Musculoskeletal symptoms 	<ul style="list-style-type: none"> - Fatigue - Mental workload
Tham (2004); Singapore; Telecommunication company [21]	<ul style="list-style-type: none"> - Contact centre advisors - N=56, 100% female - Mean age: 28 years (range 25-36) - Ethnicity NA 	PP	9 weeks	Weekly (morning and afternoon)	<p>I1 (office): ER (temperature 22.5C and 51 set points (level of outdoor air supply rates)).</p> <p>I2 (office): ER (temperature 24.5C and 51 set points (level of outdoor air supply rates)).</p> <p>I2 (office): ER (temperature 22.5C and 101 set points (level of outdoor air supply rates)).</p> <p>I2 (office): ER (temperature 24.5C and 101 set points (level of outdoor air supply rates)). - <i>Deliverer unclear.</i></p>	-	Reduce sick building syndrome symptoms	Sick building syndrome symptoms	<ul style="list-style-type: none"> - Perceptions of the indoor environmental conditions - Self-assessed productivity
Thatcher et al (2020); South Africa; Large IT company (clients in Africa, Europe, and the Middle East) [22] (Study 1)	<ul style="list-style-type: none"> - Contact centre advisors - N=32; 56% female - Mean age: 31.6 years (SD 10.8) 	PP	6 weeks	Baseline and 6 weeks	<p>I (office): ER (plant provision into the office). - <i>Delivered by researchers.</i></p>	Attention Restoration Theory and Stress Reduction Theory	Improve wellbeing	Perceived psychological and physical wellbeing	<ul style="list-style-type: none"> - Perceived productivity - Perceived work engagement - Evaluations of the work environment - Connectedness to nature

	- Ethnicity NA								
Thatcher et al (2020); South Africa; Small medical insurance company [22] (Study 2)	- Contact centre advisors - N=34; 56% female - Mean age: 28.9 years (SD 4.7) - Ethnicity NA	PP	14 weeks	Baseline and 14 weeks	I (office): ER (plant provision into the office). - <i>Delivered by researchers.</i>	Attention Restoration Theory and Stress Reduction Theory	Improve performance and wellbeing	Perceived psychological and physical wellbeing	- Perceived productivity - Absenteeism - Perceived work engagement - Job satisfaction. - Evaluations of the work environment - Perceived attractiveness of the plants
Wargocki, Wyon and Fanger (2004); Denmark; Addressed national directory enquiries [23]	- Contact centre advisors - N=26; Female NA - Mean age: NA - Ethnicity NA	PP	Each intervention alternated weekly; each implemented twice across 8 weeks	1-week	I1 (office): ER (new filter with low outdoor air supply rate). I2 (office): ER (new filter with high outdoor air supply rate). I2 (office): ER (used filter with high outdoor air supply rate). I2 (office): ER (used filter with low outdoor air supply rate). - <i>Deliverer unclear.</i>	-	Reduce sick building syndrome symptom intensity	Sick building syndrome symptom intensity	- Perceived air quality (including acceptability measures) - Environmental perceptions - Self-estimated productivity
Workman (2003); USA; Large international computer company [24]	- Contact centre advisors - N=149; 44% female - Mean age: NA - Ethnicity NA	RCT	NA	Baseline and post-intervention	I1 (office): ER/En/In/P (alignment job redesign; employee structure and reward system aligned to organizational goals e.g. management approval and raises). I2 (office): ER/En/T/Ed/P (high-involvement work processes; raises individual discretion and involvement in organizational development; team problem solving; mentors assigned; 1-week training programme for advisors and managers; lunch and learn participation workshops to expand knowledge of the larger work system). I3 (office): ER/En/T/In/P (autonomous work teams; entirely group focused redistributing control and creating written contracts for roles; team measures own performance; 1-week training seminar; team-based measurements and rewards). - <i>Deliverer unclear.</i> C (office): Work as usual.	Alignment theory and Cooptimized systems theory	Improve employee job attitudes	Job satisfaction	- Task relationship orientation
Workman & Bommer (2004); USA; Large	- Contact centre advisors	RCT	6 months	Baseline and 6 months post-intervention	I1 (office): ER/En/In/P (alignment job redesign; employee structure and reward	Alignment theory and	Improve employee job attitudes	Job satisfaction	- Organizational commitment

international computer company [25]	- N=149; 44% female - Mean age: 31 years (range 21-56) - Ethnicity NA				system aligned to organizational goals e.g. management approval and raises). I2 (office): ER/En/T/Ed/P (high-involvement work processes; raises individual discretion and involvement in organizational development; team problem solving; mentors assigned; 1-week training programme for advisors and managers; lunch and learn participation workshops to expand knowledge of the larger work system). I3 (office): ER/En/T/In/P (autonomous work teams; entirely group focused redistributing control and creating written contracts for roles; team measures own performance; 1-week training seminar; team-based measurements and rewards). - <i>Delivered by external consultants (organizational developers).</i> C (office): Work as usual.	Cooptimized systems theory			- Degree of group orientation
Yesilyurt & Yelken (2020); Turkey; Contact centre details not available [26]	- Contact centre advisors with voice problems - N=13; 100% female - Mean age: NA - Ethnicity NA	PP	4 weeks	Baseline and 4 weeks	I (unclear): Ed/T (voice therapy, vocal hygiene and diaphragm breathing training given in groups; voice exercises and laryngeal massage delivered individually; all performed x1 per week lasting 35-40 minutes). - <i>Deliverer unclear.</i>	-	Improve vocal health	Vocal health	-
<p>Footnotes: NA: Not available; I: intervention; C: control; SD: Standard deviation; C/W: Caucasian/White; AA: African American; A/P: Asian or Pacific Islander; N-A: Native American. * See online supplementary 7 for intervention study reference list. ** Study designs: RCT: Randomised controlled trial, cRCT: Clustered randomised controlled trial, Q-E: Quasi-experimental, PP: Pre-post study (within-subjects). *** Intervention function: T: Training, En: Enablement, P: Persuasion, Ed: Education, ER: Environmental restructuring, In: Incentivisation, M: Modelling.</p>									