

The influence of eHealth stress
management interventions on
psychological health parameters in
patients with cardiovascular disease:
A systematic review and meta-
analysis

SUPPLEMENTARY
MATERIAL

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Methods

Search strategy

Table S1. Overview of the databases searched and the search terms used

#	Source and date	Search term	Hits
1	Pubmed 15.11.2023	(eHealth[tiab] OR e-Health[tiab] OR mHealth[tiab] OR telehealth[tiab] OR "digital health intervention"[tiab] OR mobile[tiab] OR app[tiab] OR web[tiab] OR web-based[tiab] OR online[tiab] OR phone[tiab] OR internet[tiab] OR Telemedicine[Mesh] OR "Mobile Applications"[Mesh] OR Internet[Mesh] OR Computers[Mesh] OR "Cell Phone"[Mesh] OR "internet-based cognitive behavioral therapy"[tiab] OR "web-based cognitive behavioral therapy"[tiab] OR "online cognitive behavioral therapy"[tiab] OR "digital cognitive behavioral therapy"[tiab] OR "Cognitive Behavioral Therapy"[Mesh]) AND ("cardiovascular disease"[tiab] OR "heart disease"[tiab] OR "coronary heart disease"[tiab] OR "coronary artery disease"[tiab] OR "ischemic heart disease"[tiab] OR "heart attack"[tiab] OR "heart failure"[tiab] OR "cardiac failure"[tiab] OR "acute coronary syndrome"[tiab] OR "myocardial infarction"[tiab] OR "peripheral arterial disease"[tiab] OR "peripheral occlusive disease"[tiab] OR Cardiology[Mesh] OR "Cardiovascular Diseases"[Mesh]) AND ("cardiac rehabilitation"[tiab] OR "secondary prevention"[tiab] OR "stress management"[tiab] OR "stress reduction"[tiab] OR distress[tiab] OR stress[tiab] OR self-management[tiab] OR self-efficacy[tiab] OR "quality of life"[tiab] OR "risk factor modification"[tiab] OR "risk factor reduction"[tiab] OR Depression[Mesh] OR Anxiety[Mesh]) AND ("randomized controlled study"[tiab] OR "randomized controlled trial"[tiab])	565
2	Embase 15.11.2023	(eHealth:ti,ab OR e-Health:ti,ab OR mHealth:ti,ab OR telehealth:ti,ab OR 'digital health intervention':ti,ab OR	771

		<p>mobile:ti,ab OR app:ti,ab OR web:ti,ab OR web-based:ti,ab OR online:ti,ab OR phone:ti,ab OR internet:ti,ab OR 'internet-based cognitive behavioral therapy':ti,ab OR 'web-based cognitive behavioral therapy':ti,ab OR 'online cognitive behavioral therapy':ti,ab OR 'digital cognitive behavioral therapy':ti,ab OR telemedicine/exp OR 'mobile application'/exp OR Internet/exp OR computer/exp OR 'cognitive behavioral therapy'/exp) AND ('cardiovascular disease':ti,ab OR 'heart disease':ti,ab OR 'coronary heart disease':ti,ab OR 'coronary artery disease':ti,ab OR 'ischemic heart disease':ti,ab OR 'heart attack':ti,ab OR 'heart failure':ti,ab OR 'cardiac failure':ti,ab OR 'acute coronary syndrome':ti,ab OR 'myocardial infarction':ti,ab OR 'peripheral arterial disease':ti,ab OR 'peripheral occlusive disease':ti,ab OR cardiology/exp OR 'cardiovascular disease'/exp) AND ('cardiac rehabilitation':ti,ab OR 'secondary prevention':ti,ab OR 'stress management':ti,ab OR 'stress reduction':ti,ab OR distress:ti,ab OR stress:ti,ab OR self-management:ti,ab OR self-efficacy:ti,ab OR 'quality of life':ti,ab OR 'risk factor modification':ti,ab OR 'risk factor reduction':ti,ab OR depression/exp OR anxiety/exp) AND ('randomized controlled study':ti,ab OR 'randomized controlled trial':ti,ab)</p> <p><i>(Polyglot [1] was used to convert the search term and this search term contained terms from Emtree)</i></p>	
3	<p>Cochrane Library 15.11.2023</p>	<p>(eHealth:ti,ab OR e-Health:ti,ab OR mHealth:ti,ab OR telehealth:ti,ab OR "digital health intervention":ti,ab OR mobile:ti,ab OR app:ti,ab OR web:ti,ab OR web-based:ti,ab OR online:ti,ab OR phone:ti,ab OR internet:ti,ab OR "internet-based cognitive behavioral therapy":ti,ab OR "web-based cognitive behavioral therapy":ti,ab OR "online cognitive behavioral therapy":ti,ab OR "digital cognitive behavioral therapy":ti,ab) AND ("cardiovascular disease":ti,ab OR "heart disease":ti,ab OR "coronary heart disease":ti,ab OR "coronary artery disease":ti,ab OR "ischemic heart disease":ti,ab OR "heart attack":ti,ab OR</p>	1624

		<p>"heart failure":ti,ab OR "cardiac failure":ti,ab OR "acute coronary syndrome":ti,ab OR "myocardial infarction":ti,ab OR "peripheral arterial disease":ti,ab OR "peripheral occlusive disease":ti,ab) AND ("cardiac rehabilitation":ti,ab OR "secondary prevention":ti,ab OR "stress management":ti,ab OR "stress reduction":ti,ab OR distress:ti,ab OR stress:ti,ab OR self-management:ti,ab OR self-efficacy:ti,ab OR "quality of life":ti,ab OR "risk factor modification":ti,ab OR "risk factor reduction":ti,ab)</p> <p><i>(Polyglot [1] was used to convert the search term)</i></p>	
4	APA PsycInfo 15.11.2023	<p>(eHealth.ti,ab. OR e-Health.ti,ab. OR mHealth.ti,ab. OR telehealth.ti,ab. OR "digital health intervention".ti,ab. OR mobile.ti,ab. OR app.ti,ab. OR web.ti,ab. OR web-based.ti,ab. OR online.ti,ab. OR phone.ti,ab. OR internet.ti,ab. OR "internet-based cognitive behavioral therapy".ti,ab. OR "web-based cognitive behavioral therapy".ti,ab. OR "online cognitive behavioral therapy".ti,ab. OR "digital cognitive behavioral therapy".ti,ab.) AND ("cardiovascular disease".ti,ab. OR "heart disease".ti,ab. OR "coronary heart disease".ti,ab. OR "coronary artery disease".ti,ab. OR "ischemic heart disease".ti,ab. OR "heart attack".ti,ab. OR "heart failure".ti,ab. OR "cardiac failure".ti,ab. OR "acute coronary syndrome".ti,ab. OR "myocardial infarction".ti,ab. OR "peripheral arterial disease".ti,ab. OR "peripheral occlusive disease".ti,ab.) AND ("cardiac rehabilitation".ti,ab. OR "secondary prevention".ti,ab. OR "stress management".ti,ab. OR "stress reduction".ti,ab. OR distress.ti,ab. OR stress.ti,ab. OR self-management.ti,ab. OR self-efficacy.ti,ab. OR "quality of life".ti,ab. OR "risk factor modification".ti,ab. OR "risk factor reduction".ti,ab.) AND ("randomized controlled study".ti,ab. OR "randomized controlled trial".ti,ab.)</p> <p><i>(Polyglot [1] was used to convert the search term)</i></p>	41

5	Web of Science 15.11.2023	<p><u>Suchfeld "topic" für title, abstract und keyword:</u></p> <p>(eHealth OR e-Health OR mHealth OR telehealth OR "digital health intervention" OR mobile OR app OR web OR web-based OR online OR phone OR internet OR "internet-based cognitive behavioral therapy" OR "web-based cognitive behavioral therapy" OR "online cognitive behavioral therapy" OR "digital cognitive behavioral therapy") AND ("cardiovascular disease" OR "heart disease" OR "coronary heart disease" OR "coronary artery disease" OR "ischemic heart disease" OR "heart attack" OR "heart failure" OR "cardiac failure" OR "acute coronary syndrome" OR "myocardial infarction" OR "peripheral arterial disease" OR "peripheral occlusive disease") AND ("cardiac rehabilitation" OR "secondary prevention" OR "stress management" OR "stress reduction" OR distress OR stress OR self-management OR self-efficacy OR "quality of life" OR "risk factor modification" OR "risk factor reduction") AND ("randomized controlled study" OR "randomized controlled trial")</p> <p><i>(Polyglot [1] was used to convert the search term)</i></p>	540
6	ClinicalTrials.gov 15.11.2023	<p><u>Search field "Condition or disease":</u></p> <p>("cardiovascular disease" OR "heart disease" OR "coronary heart disease" OR "coronary artery disease" OR "ischemic heart disease" OR "heart attack" OR "heart failure" OR "cardiac failure" OR "acute coronary syndrome" OR "myocardial infarction" OR "peripheral arterial disease" OR "peripheral occlusive disease")</p> <p><u>Search field "Intervention/Treatment":</u></p> <p>(eHealth OR e-Health OR mHealth OR telehealth OR "digital health intervention" OR mobile OR app OR web OR web-based OR online OR phone OR internet OR "internet-based cognitive behavioral therapy" OR "web-based cognitive behavioral therapy" OR "online cognitive</p>	280

		behavioral therapy" OR "digital cognitive behavioral therapy") <i>Search field "Other terms":</i> ("cardiac rehabilitation" OR "secondary prevention" OR "stress management" OR "stress reduction" OR distress OR stress OR self-management OR self-efficacy OR "quality of life" OR "risk factor modification" OR "risk factor reduction") AND ("randomized controlled study" OR "randomized controlled trial")	
7	German Clinical Trials Register (GermanCTR) 15.11.2023	(eHealth OR e-Health OR mHealth OR telehealth OR "digital health intervention" OR mobile OR app OR web OR web-based OR online OR phone OR internet OR "internet-based cognitive behavioral therapy" OR "web-based cognitive behavioral therapy" OR "online cognitive behavioral therapy" OR "digital cognitive behavioral therapy") AND ("cardiovascular disease" OR "heart disease" OR "coronary heart disease" OR "coronary artery disease" OR "ischemic heart disease" OR "heart attack" OR "heart failure" OR "cardiac failure" OR "acute coronary syndrome" OR "myocardial infarction" OR "peripheral arterial disease" OR "peripheral occlusive disease") AND ("cardiac rehabilitation" OR "secondary prevention" OR "stress management" OR "stress reduction" OR distress OR stress OR self-management OR self-efficacy OR "quality of life" OR "risk factor modification" OR "risk factor reduction") AND ("randomized controlled study" OR "randomized controlled trial")	25
8	International Clinical Trials Registry Platform (ICTRP) 15.11.2023	(eHealth OR e-Health OR mHealth OR telehealth OR "digital health intervention" OR mobile OR app OR web OR web-based OR online OR phone OR internet OR "internet-based cognitive behavioral therapy" OR "web-based cognitive behavioral therapy" OR "online cognitive behavioral therapy" OR "digital cognitive behavioral therapy") AND ("cardiovascular disease" OR "heart disease" OR "coronary heart disease" OR "coronary artery disease" OR "ischemic heart disease" OR "heart attack" OR	28

		"heart failure" OR "cardiac failure" OR "acute coronary syndrome" OR "myocardial infarction" OR "peripheral arterial disease" OR "peripheral occlusive disease") AND ("cardiac rehabilitation" OR "secondary prevention" OR "stress management" OR "stress reduction" OR distress OR stress OR self-management OR self-efficacy OR "quality of life" OR "risk factor modification" OR "risk factor reduction") AND ("randomized controlled study" OR "randomized controlled trial")	
9	(International Standard Randomised Controlled Trial Number Registry (ISRCTN registry) 15.11.2023	(eHealth OR e-Health OR mHealth OR telehealth OR "digital health intervention" OR mobile OR app OR web OR web-based OR online OR phone OR internet OR "internet-based cognitive behavioral therapy" OR "web-based cognitive behavioral therapy" OR "online cognitive behavioral therapy" OR "digital cognitive behavioral therapy") AND ("cardiovascular disease" OR "heart disease" OR "coronary heart disease" OR "coronary artery disease" OR "ischemic heart disease" OR "heart attack" OR "heart failure" OR "cardiac failure" OR "acute coronary syndrome" OR "myocardial infarction" OR "peripheral arterial disease" OR "peripheral occlusive disease") AND ("cardiac rehabilitation" OR "secondary prevention" OR "stress management" OR "stress reduction" OR distress OR stress OR self-management OR self-efficacy OR "quality of life" OR "risk factor modification" OR "risk factor reduction") AND ("randomized controlled study" OR "randomized controlled trial")	204
Total hits			4.078
Total hits without duplicates			2.990

Results

Meta-analysis

The meta-analyses were carried out for the different outcome parameters on the basis of a total of seven study reports [2-8].

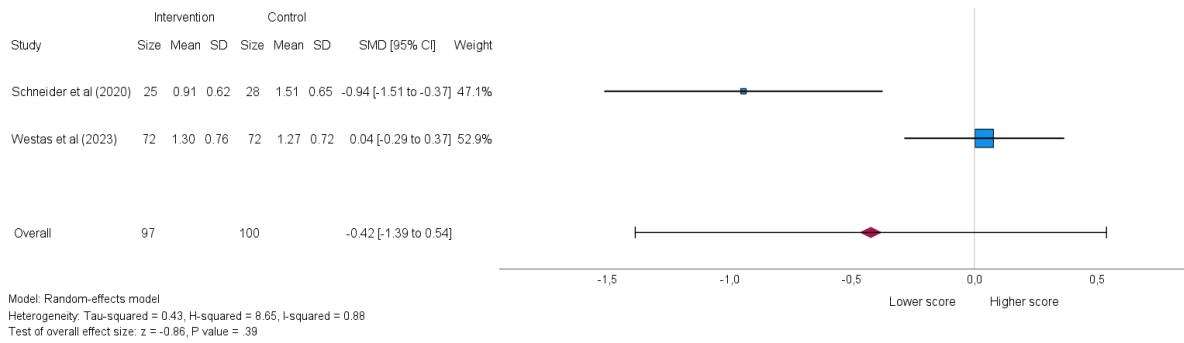


Figure S1. Forest plot showing the effect of eHealth stress management interventions on the CAQ-Attention score among patients with cardiovascular diseases. CAQ = Cardiac Anxiety Questionnaire; SD = standard deviation, SMD = standard mean difference, CI = confidence interval

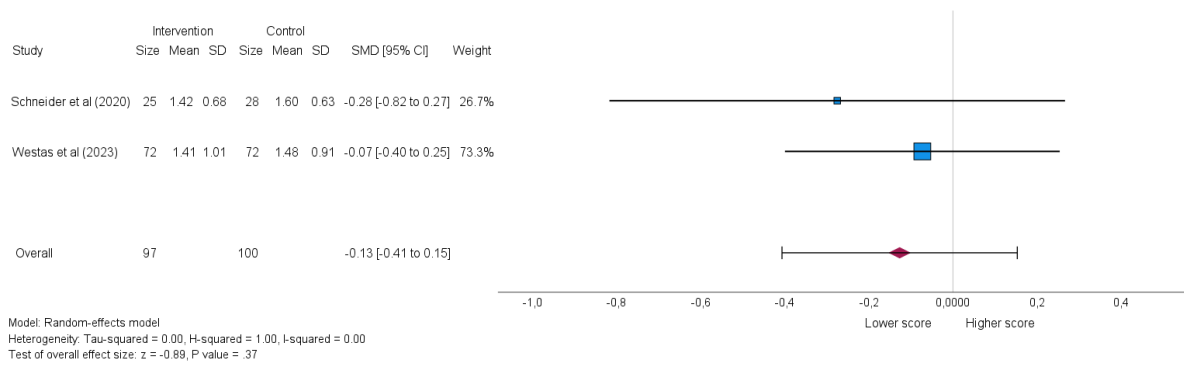


Figure S2. Forest plot presenting the impact of eHealth stress management interventions on the CAQ-Avoidance score among patients with cardiovascular diseases. CAQ = Cardiac Anxiety Questionnaire; SD = standard deviation, SMD = standard mean difference, CI = confidence interval

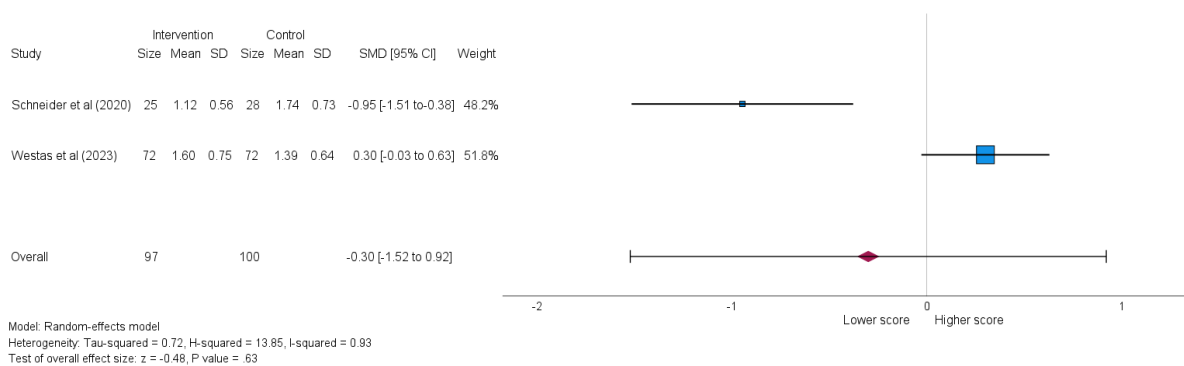


Figure S3. Forest plot showing the effect of eHealth stress management interventions on the CAQ-Fear score among patients with cardiovascular diseases. CAQ = Cardiac Anxiety Questionnaire; SD = standard deviation, SMD = standard mean difference, CI = confidence interval

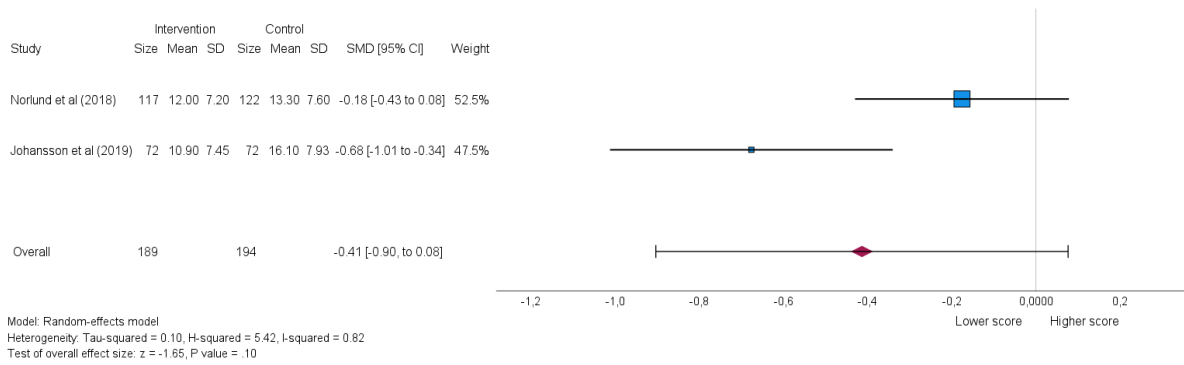


Figure S4. Forest plot showing the effect of eHealth stress management interventions on MADRS-S score in patients with cardiovascular diseases. MADRS-S =; Montgomery–Åsberg Depression Rating Scale-Self Assessment SD = standard deviation, SMD = standard mean difference, CI = confidence interval

Sensitivity analysis

Table S2. Findings of the conducted sensitivity analysis

Outcome	Mean Difference [95% CI]	Standard Error	P Value	I ²
CAQ-Total	-0.20 [-0.77 to 0.37]	0.29	.49	0.90
CAQ-Attention	-0.27 [-0.89 to 0.34]	0.31	.39	0.88
CAQ-Avoidance	-0.12 [-0.35 to 0.12]	0.12	.32	0.00
CAQ-Fear	-0.19 [-1.01 to 0.62]	0.41	.64	0.93
GAD-7	-2.64 [-5.96 to 0.67]	1.69	.12	0.86
MADRS-S	-3.16 [0.11 to -6.98]	1.95	.11	0.83
PHQ-9	-2.33 [-3.35 to -1.31]	0.52	<.001	0.12
SF-12 Physical Health	1.72 [-1.20 to 4.64]	1.49	.25	0.47
SF-12 Mental Health	3.89 [1.60 to 6.18]	1.17	<.001	0.00

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