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REVIEW ARTICLE

Psychological distress and quality of life in asymptomatic adults following provision of imaging results for prevention of cardiovascular disease events: a scoping review

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Aims Psychological distress and changes in health-related quality of life (HRQoL) may occur after screening for disease. Reporting outcomes related to potential benefits and harms of screening is a key recommendation in the guidelines for reporting high-quality trials or interventions. However, no reviews have directly investigated outcomes related to psychological distress and/or changes in HRQoL following imaging assessment of cardiovascular risk and communication of cardiovascular findings to asymptomatic adults. A scoping review was conducted to map research on psychological distress and/or HRQoL following screening.

Methods and results Six electronic databases (MEDLINE, PsychINFO, Social Work Abstracts, Psychology and Behavioural Sciences Collection, CINAHL, and EMBASE) were searched for articles that assessed psychological distress and/or HRQoL following screening. Two investigators independently screened titles and abstracts for all records retrieved using predefined criteria. Studies were conducted among active smokers, military personnel, athletes, post-menopausal women, and high-risk individuals. Seven constructs related to psychological distress and HRQoL appeared across 11 articles (randomized controlled trials, $n = 4$ and non-randomized studies, $n = 7$). Worry, depression, perceived stress, anxiety, and quality of life were most prominent. Multiple-item measures of psychological distress (e.g. Taylor Anxiety Score and Beck Depression Inventory) were used in 5/9 (56%) studies. Key findings on psychological distress and/or changes in HRQoL following screening were mixed.

Conclusions Findings support the need for multiple-item measures with better psychometric properties to examine the psychological responses to screening results in future studies. Strategies to support individuals during and following vascular screening to maximise potential benefits of screening and minimize harms are discussed.

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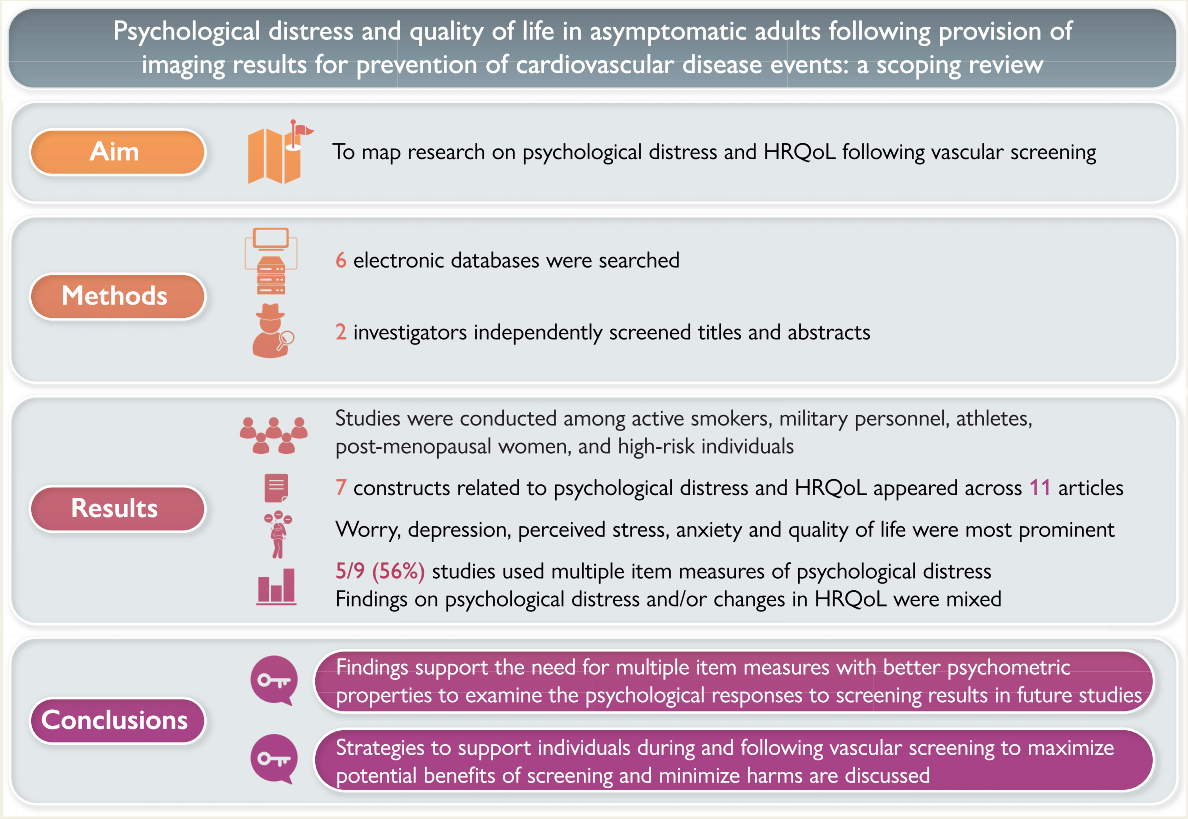
Graphical Abstract



Keywords Health-related quality of life • Psychological distress • Cardiovascular imaging • Cardiovascular disease • Scoping review

Novelty

- Seven constructs related to psychological distress and health-related quality of life were identified.
- Effects of imaging results on psychological distress varied and were most often associated with the communication of cardiovascular findings to participants.
- Multiple-item measures of psychological distress were used in most of the studies that assessed psychological responses to vascular screening results.
- Strategies to support individuals during and following vascular screening to maximise potential benefits of screening and minimize harms are reported.

Introduction

Cardiovascular disease (CVD) refers to a class of diseases involving the blood vessels or heart.[1] The World Health Organization estimated that 17.9 million people died from CVD in 2019, representing almost one-third of all global deaths.[2] Coronary and cerebrovascular events, such as a heart attack or stroke, constitute 85% of all CVD-related deaths.[2] Atherosclerosis is the main pathological process responsible for most acute coronary and cerebrovascular events.[3] Non-invasive vascular imaging of the carotid and coronary arteries are commonly used to screen for the presence of atherosclerotic plaques or asymptomatic CVD.[4–8] Screening for asymptomatic CVD provides an opportunity to initiate risk factor management to prevent the progression of disease before the occurrence of adverse cardiac or cerebrovascular events.[9,10] Screening for asymptomatic CVD can also inform risk classification and the design and implementation of tailored prevention strategies.[11] Carotid and coronary atherosclerosis screening by non-invasive imaging are important for (i) increasing awareness and understanding of the personal risk of cardiac events, (ii) gaining greater control over

decisions and actions affecting one's health, and (iii) the prevention of clinical disease.[12]

Screening findings suggesting abnormalities in the coronary or carotid arteries and standard information about risk (i.e. abnormalities or plaques in the coronary and carotid arteries increase one's risk of stroke, heart attack, and death) are communicated to individuals in different forms (e.g. verbal, written, detailed discussions or conversations).[13–16] Information suggesting susceptibility to a condition, particularly if the condition is perceived as potentially having serious consequences, can be considered a severe life stressor or threat.[17–20] Several factors such as self-efficacy, coping resources, cognitive regulation and individual traits may modulate the type of response to a perceived threat.[17,18,21,22] Defensive or adaptive behaviours (e.g. higher smoking cessation rates and dietary changes) can be evoked by threatening stimuli and may improve health outcomes.[5–7,17,18,21,23–25] However, not all individuals will engage in adaptive behaviours or experience positive health outcomes when exposed to a perceived threat.[18–20,26–37] Individuals who do not have the emotional and/or mental capacity to process a stressful situation may be susceptible to psychological harm when exposed to a perceived threat.[18–20,28–38] Receiving positive screening test results related to a major medical condition can lead to elevated fear, concerns related to personal health, psychological distress (e.g. high rates of anxiety and depression), and changes in health-related quality of life (HRQoL).[28,38–41] It is therefore important to examine both the potential benefits and harms of screening.[42]

Examining psychological distress and changes in HRQoL following screening to detect disease is necessary and important for identifying individuals who are at an increased risk of experiencing psychological distress and/or impaired HRQoL immediately or over time.[43] Information from this scoping review will guide researchers and clinicians to design interventions that best support asymptomatic adults who may undergo vascular screening to prevent any negative psychosocial outcomes. This paper reports a scoping review with the key aim to (i) identify, map, and organise the evidence on psychological distress and HRQoL following the provision of vascular imaging results and (ii) identify knowledge gaps in the existing studies.

Methods

This scoping review is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR) reporting criteria.[44] We used the framework initially designed by Arksey and O'Malley[45] and updated by Levac *et al.*[46] and Peters *et al.*[47–49] to identify, select, collate, summarise, and report the evidence. A scoping review was the most appropriate due to the nature of the evidence and the lack of comprehensive reviews on this topic.[50] A protocol was published to describe the methods and conduct of this review.[51]

Information sources and search strategy

Articles were identified via EBSCOhost [MEDLINE, PsychINFO, Social Work Abstracts, Psychology and Behavioural Sciences Collection, and Cumulative Index to Nursing and Allied Health Literature (CINAHL)] and EMBASE databases without the year of publication or language restrictions. The complete electronic search strategy for EBSCO and EMBASE databases is included in Supplementary material online, *File S1*. Additional records were identified through reference lists searches (e.g. manual screening of individual studies retrieved) and grey sources (e.g. Open Grey and Open Access Theses and Dissertations). We used this diverse array of sources to capture a complete picture of the state of the literature on the topic.

Eligibility criteria

Studies that were conducted among adults (≥18 years) who were asymptomatic or had no symptoms of atherosclerosis (not diagnosed with angina or screened due to clinical symptoms of angina or chest pain, or intermittent claudication), and without a known history of CVD (e.g. myocardial infarction or heart attack, transient ischaemic attack, stroke, and/or peripheral arterial disease) were included in this review (see Supplementary material online, *File S2*). Participants were screened using non-invasive vascular imaging modalities [e.g. Electron Beam Computed Tomography (EBCT), Double-Helical Computed Tomography, and B-mode ultrasound] to detect atherosclerotic plaques in the coronary and carotid arteries. Participants were also examined for outcomes related to psychological distress (e.g. anxiety, depression, worry, and perceived stress) and/or HRQoL (e.g. appraisals of wellness, physical and mental health functional status) following screening.

Selection of evidence

Two investigators (R.A. and J.R.L.) independently screened titles and abstracts for all records retrieved from the selected databases and manual search of reference lists to agree on inclusion and exclusions. Articles that met inclusion criteria were retained for full-text review (*Figure 1*). Two investigators (R.A. and J.R.L.) independently screened full-text articles to determine the eligibility of articles for inclusion and agreed on the exclusions. Data from included studies were extracted. No risk of bias assessment was included as it is not relevant to the objectives of this scoping review.

Data charting

A tabular form of charting was used to chart information including the name of the first author, year of publication, study purpose, design and setting, study population, intervention, data collection instruments and outcomes. Data on how results were provided, details of results, follow-up period after baseline screening and any additional support (e.g. counselling/lifestyle recommendations) were also extracted.

Synthesis and reporting of the results

We grouped and synthesized results based on outcomes. Outcomes fell into two broad categories related to HRQoL and psychological distress. We also described study characteristics including study type/purpose, sample characteristics, imaging techniques, outcome assessment instruments, follow-up period after screening, and gaps in existing knowledge.

We compared and reported outcomes differently based on the type of study designs employed by the included studies. For the prospective non-randomized studies, we compared outcomes between groups [e.g. coronary artery calcium (CAC) present group vs. CAC absent group or low-risk group vs. moderate-risk group vs. high-risk group]. We reported outcomes on psychological distress and HRQoL before and after the interventions (provision of imaging results) in studies that used pre–post study designs. Outcomes reported for the randomized controlled trials (RCTs) are based on groups that were screened and received imaging results compared to groups that

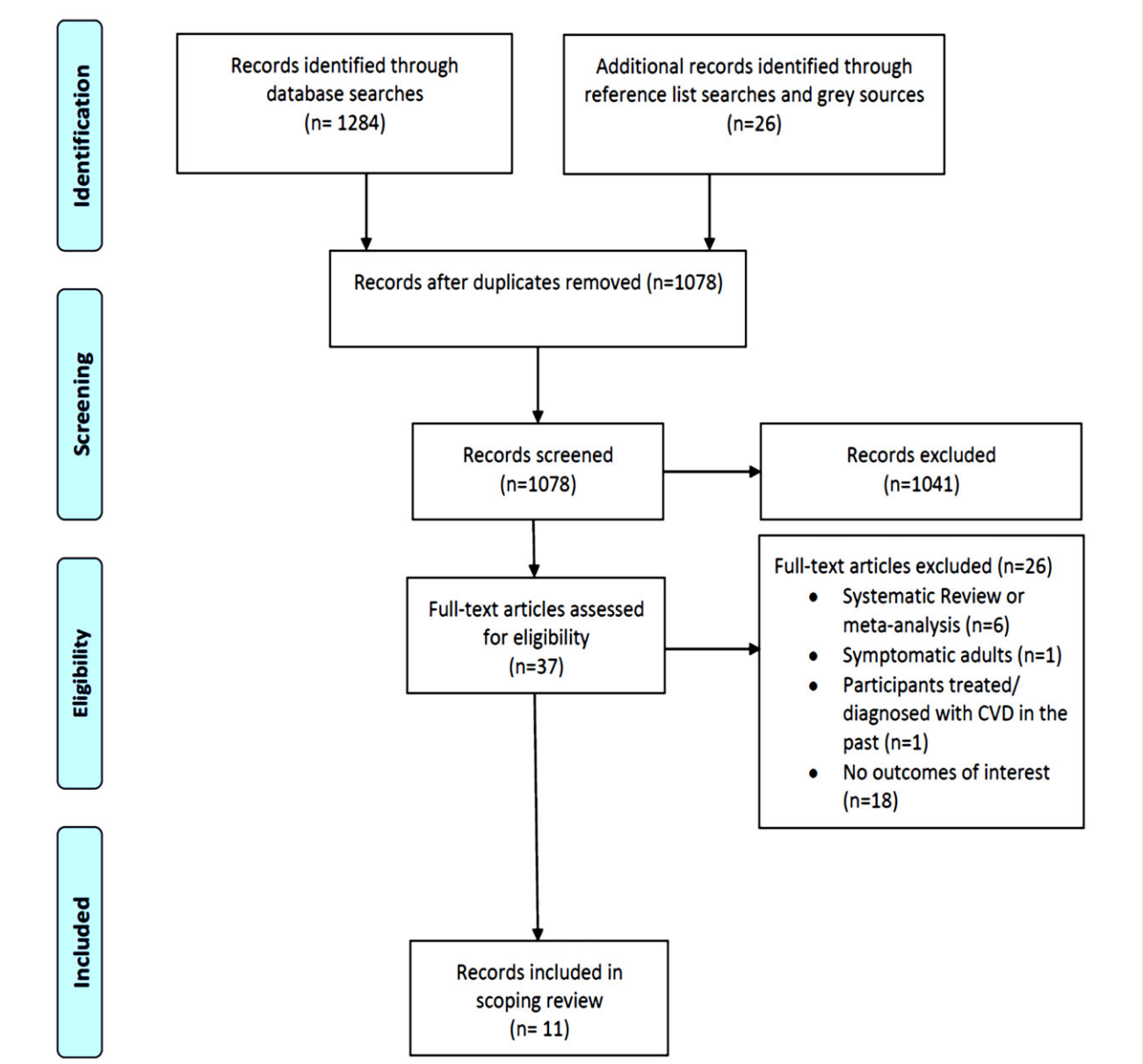


Figure 1 Summary of the search, selection, and inclusion process.

were not screened using imaging or did not receive any vascular imaging results.

Results

Selection and sources of evidence

The purpose of this scoping review was to report the scope and nature of evidence on psychological distress and HRQoL following the provision of vascular imaging results. We retrieved a total of 1284 articles using the search strategies (see Supplementary material online, Supplementary *File S1*) and 26 articles using grey literature sources and reference list searches. Of these, 37 were accessed in full text, and 11 met the inclusion criteria as depicted in *Figure 1*. All the articles that met the inclusion criteria were peer-reviewed (*Table 1*).

Characteristics of studies

Study setting and population

Studies were conducted in different settings (i.e. hospital, medical centre, and radiology centre) and included both male and female participants aged ≥28 years. The number of participants included in the studies ranged from 30 to 1169. Caucasians were included in some studies ($n = 3$)[52–54], whereas ethnicities were mixed ($n = 3$)[13,14,55] or not specified ($n = 5$)[56–60] in other studies. Most studies were conducted in the USA ($n = 7$), followed by Switzerland ($n = 2$), Denmark ($n = 1$), and the Netherlands ($n = 1$) (*Table 1*). Participants with personal/known history or symptoms of CVD

Table 1 Summary of literature

Study details	*n*	%
Year of publication		
1996–2005	3	27
2006–2015	7	64
2016 to current	1	9
Record type/source		
Pre–post design studies (peer-reviewed articles)	3	27
Prospective studies (peer-reviewed articles)	4	36.5
Randomized controlled trial (RCT) (peer-reviewed articles)	4	36.5
Secondary research (e.g. reviews)	0	0
Grey literature (non-peer-reviewed articles)	0	0
Population		
Smokers	3	27
Athletes	1	9
Active-duty army personnel	1	9
Post-menopausal women	1	9
Adults at risk of CVD due to one or more risk factors	5	46
Location		
USA	7	64
Switzerland	2	18
Denmark	1	9
Netherlands	1	9

were excluded from all studies. Only two studies reported excluding participants with psychiatric disease.[58,59] Of these, a study also reported excluding participants who were identified as consuming a high level of alcohol, used cannabis in the past 3 months or related drugs.[59] Full list of studies included and details of participant inclusion/exclusion in individual studies have been provided in Supplementary material online, Supplementary *Files S2 and S3*.

Study designs, screening, and behavioural strategies

Study designs/types included RCTs ($n = 4$), pre–post ($n = 3$), and prospective non-randomized studies ($n = 4$) (*Table 1*). Imaging methods included computed tomography (e.g. Cardiac Computed Tomography, Double-Helical Computed Tomography, non-contrast-enhanced Cardiac CT, Multidetector Computed Tomography, EBCT, and Low-dose Coronary Computed Tomography) and carotid ultrasound (e.g. B-mode ultrasound). Screening results and their interpretation were provided by healthcare professionals ($n = 3$), study investigators ($n = 2$) or unspecified ($n = 6$). Common behavioural support to facilitate adherence to lifestyle recommendations following screening included advice for lifestyle modification, smoking cessation counselling, intensive case management (ICM), and the nicotine replacement therapy (NRT). Further details of these aspects and information from included studies are provided in Supplementary material online, Supplementary *Files S3 and S4*.

Measures of psychological distress and health-related quality of life following screening

Measures of psychological distress following screening included multiple-item scales (56%, $n = 5$) and single-item measures (44%, $n = 4$). The use of single-item measures (e.g. a single question to assess worry following screening) was reported in some studies ($n = 4$).[13,14,53,60] In other studies, multiple-item scales such as Taylor Anxiety Score ($n = 1$), Major Depression Inventory questionnaire ($n = 1$), Beck Depression Inventory ($n = 1$), PRIME-MD self-reported Patient Health Questionnaire ($n = 1$), Perceived Stress Scale ($n = 1$), and Impact of Event Scale (IES) ($n = 1$) were used. HRQoL was examined using the Short-Form Health Survey questionnaire (SF-36) ($n = 4$),[52,55,58,59] Ferrans and Powers Quality of Life Index Cardiac IV (QoL Index) ($n = 1$),[14] and Perceived Wellness Score ($n = 1$).[56]

Outcomes related to psychological distress and health-related quality of life

Psychological distress

A total of nine studies reporting outcomes on psychological distress following the provision of vascular imaging results were included in this review (*Table 2*).[13,14,53–55,57–60] These included RCTs ($n = 2$),[55,59] pre–post studies measuring outcomes before-and-after screening results were provided ($n = 3$),[14,57,58] and prospective studies ($n = 4$).[13,53,54,60] Outcomes related to psychological distress included anxiety ($n = 3$), depression ($n = 4$), worry ($n = 4$), and perceived stress ($n = 3$). Outcomes were measured at baseline and between 2 and 30 months after vascular screening. The type of results provided/medium, outcome assessment instruments, participant details, individuals who provided support, and the type of support provided following screening for each of the studies included in this review can be found in Supplementary material online, Supplementary *File S3*. All key findings related to psychological distress and outcome measures are presented in Supplementary material online, Supplementary *File S4*.

Randomized controlled trials

Overall, two RCTs reporting outcomes related to psychological distress following the provision of vascular imaging results were identified in the literature.[55,59] One RCT showed no significant effect of imaging, with or without intensive case management, on symptoms of anxiety, depression, and stress scores measured at 12 months of post-screening.[55] Another RCT showed no significant difference in perceived stress, anxiety, and depression scores in the intervention (imaging and smoking cessation program) and control (smoking cessation program) groups, and between those who had plaques or disease and those without plaques at 12-month follow-up.[59]

Pre–post non-randomized studies

We found three pre–post or before-and-after studies that reported outcomes on psychological distress (e.g. depression, anxiety, perceived stress, and worry) following screening.[14,57,58] Findings on psychological distress following the provision of vascular imaging results were mixed. A significant decrease in worry levels was found in participants in the lower CAC scores group at 3-month follow-up in one study.[14] However, three studies reported no significant increases in depression scores, perceived stress, anxiety, and worry levels in

Table 2 Outcomes examined in included studies

Authors/Year	Anxiety	Depression	Worry	Perceived stress	Impact of event/ post-traumatic stress	Perceived wellness	QoL
Johnson *et al.* (2015)[14]			✓				✓
Lederman *et al.* (2007)[56]						✓	
Nielsen *et al.* (2012)[57]		✓					
Obuchowski *et al.* (2007)[52]							✓
O'Malley *et al.* (2003)[55]	✓	✓		✓			✓
Rodondi *et al.* (2008)[58]	✓	✓		✓			✓
Rodondi *et al.* (2012)[59]		✓		✓			✓
Rupard *et al.* (2002)[13]			✓				
Sandwell *et al.* (2006)[53]			✓				
Schurink *et al.* (2017)[54]	✓				✓		
Wong *et al.* (1996)[60]			✓				

participants with higher CAC scores at 2, 3 and 6 months post-screening.[14,57,58] Also two studies found lower scores for anxiety, depression, and perceived stress in participants with abnormal results following screening.[57,58]

Prospective non-randomized studies

Outcomes on psychological distress were reported in four prospective studies.[13,53,54,60] Outcomes reported included worry ($n = 3$), anxiety ($n = 1$) and post-traumatic stress (clinically relevant and less severe psychological distress examined using IES) ($n = 1$) following the provision of vascular imaging results.[53,54,60] Three out of four studies found that worry of developing coronary artery disease, anxiety or psychological distress significantly increased with higher CAC scores/presence of CAC at 6 months, mean 16 months, and 12–24 months post-screening.[53,54,60] The other study showed no significant difference in worry levels between coronary artery calcification present and absent groups. Worry was assessed at an average of 8 months after screening.[13]

Health-related quality of life

HRQoL was examined in six studies—four RCTs[52,55,56,59] and two pre–post studies.[14,58] Outcomes were assessed at baseline, and within 2–24 months after vascular screening.

Randomized controlled trials

HRQoL was reported in four RCTs following screening.[52,55,56,59] One RCT showed a significant difference in 'role physical' (fewer physical health problems for screened participants) between CT screened participants and participants in the control group at 24 months.[52] The scores were similar for screened and control participants for the other seven subscales of the SF-36 survey questionnaire.[52] Three RCTs showed no evidence of any effect of imaging results or vascular screening on HRQoL.[55,56,59] Outcomes were assessed at baseline and 12-month follow-up.[55,56,59]

Pre–post non-randomized studies

Findings regarding HRQoL post-screening were mixed.[14,58] One study[14] found no significant differences at 3-month follow-up in HRQoL in the five CAC score risk groups (i.e. no risk/normal, very low risk, mild risk, moderate risk, and high risk).[14] Another study[58] showed a significant change in HRQoL in the group with plaques or those who received abnormal results (i.e. significant increases in both mental and physical health scores) at 2-month follow-up.

Discussion

Overall, 11 articles reporting outcomes on psychological distress and HRQoL following the provision of vascular imaging results were identified in this scoping review. Outcomes related to psychological distress and HRQoL following the provision of vascular imaging results were reported in RCTs, pre–post, and prospective studies. This is, to our knowledge, the first review to report the scope and nature of evidence in this area.

Key findings on psychological distress following screening were generally mixed. When analysing individual studies, we found three prospective studies that reported significant increases in worry, anxiety, and psychological distress among some individuals who were informed about abnormalities in their coronary arteries.[53,54,60] Previous research has also demonstrated that information about increased risks of illness can induce psychological distress.[40,61,62] However, some pre–post studies included in this review found lower scores for anxiety, depression, and perceived stress at follow-up in participants who were informed about abnormalities in their coronary or carotid arteries.[57,58] Higher levels of anxiety, depression, and stress before the provision of screening results can be attributed to the processes involved with the screening or uncertainty associated with screening and results. Others have reported that other components of screening such as invitation for screening, attending the routine screening or waiting at a screening clinic can precipitate psychological distress.[63,64] Uncertainty about outcomes of screening may have also resulted in higher levels of anxiety before screening

results were provided.[65] The findings can also be partly attributed to the timeframe of follow-up assessments.

Findings related to HRQoL following the provision of screening results were also mixed. However, we did find one pre–post study that showed significant changes in HRQoL (in the form of increases in mental and physical health scores) 2 months of post-screening. Findings related to HRQoL in this pre–post study were reported based on information from the International Quality of Life Assessment (IQOLA) Project.[66] Findings of the IQOLA Project SF-36 survey suggest that higher scores indicate less disability, improvement in quality of life or a more favourable health state.[66] Highest possible score for physical component summary (PCS) may indicate no disabilities, less physical limitations, or high energy level.[66] Highest possible score for mental component summary (MCS) may indicate no symptoms of psychological distress, frequent positive affect, or absence of limitations in performing daily duties due to emotional problems.[66] Therefore, findings suggesting significant increases in mental and physical health scores following carotid plaque screening are encouraging. Changes in HRQoL following screening may be attributed to stress responses (i.e. positive/negative appraisals of stress), coping options, and participants' abilities to engage in behaviours that can impact their overall HRQoL.[17,18] It is possible that some participants also felt powerless in relation to their future outcomes, and would not engage in any recommended preventive behaviours that can improve HRQoL.

Our review shows that outcomes on psychological distress were assessed using only self-reported measures. We suggest that the inclusion of clinical assessments and/or well-validated measures of self-reported symptom severity are considered when designing such interventions. This may be useful to identify potential psychological impacts of imaging that may be difficult to detect via self-report assessments. In many instances, we also found that studies measured only one psychological variable (e.g. worry) following the provision of imaging results.[13,14,53,60] Adding more components of psychological assessment such as anxiety and depression following screening may have important implications for the overall evaluation of psychological distress following screening. Also, psychological distress was assessed in some studies using single-item measures.[13,14,53,60] Multiple-item measures are often viewed as having better psychometric properties.[67]

The SF-36 questionnaire was mostly used for evaluating HRQoL in the studies included in this review. The SF-36 is a very popular instrument for evaluating HRQoL and measures two distinct concepts—a physical dimension using physical component summary scores, and a mental dimension using mental component summary scores.[68] PCS and MCS are evaluated by the scoring of eight scales including role physical, physical functioning, vitality, general health, social functioning, bodily pain, role emotional, and mental health. Though SF-36 is widely used to evaluate HRQoL, the validity of this instrument as a total measure of HRQoL is often questioned in cases when the special algorithms for calculating summary measures are not used[68–70] and it is unclear whether special algorithms were used in the studies we included in this review. Future studies can improve the measure of HRQoL by using the special algorithms for calculating summary measures of PCS and MCS.[70]

Given that the provision of information suggesting the existence of disease or poor health status can be considered a severe life stressor or threat and therefore lead to different responses, it is important that individuals who undergo screening are provided with psychosocial support. There are, however, different guidelines concerning what should follow the provision of positive screening results. For example, the United Kingdom guidance for cancer screening suggests that the provision of positive screening results should be followed by psychological support.[71] Further, the Canadian and USA guidance advocate clinical assessment before any consideration to referring individuals for psychological intervention.[72,73] To our knowledge, there is no specific guidance as to what criteria or assessment should be undertaken before the offer of psychological support (e.g. support groups) or referral for therapeutic support.

Common behavioural support to facilitate adherence to lifestyle recommendations reported in the studies included in this review were advice/counselling for lifestyle modification, smoking cessation counselling, ICM, and the NRT. Other behavioural lifestyle interventions aimed at improving the management of other conditions (e.g. obesity) have utilized varying levels of behavioural and psychological support to improve adherence to lifestyle recommendations.[74–77] These included individual psychotherapy, group psychodynamic therapy (for developing problem-solving strategies, emotional expression, and improving body perception), cognitive-behavioural programme, and individual and group counselling.[74–77] Future studies could maximise the potential benefits of providing vascular imaging results to participants by incorporating other stress management techniques and psychosocial interventions, such as Cognitive-Behavioural Stress Management (CBSM), which has been demonstrated to decrease negative mood and perceived stress.[78] CBSM is also useful for changing cognitive appraisals, improving perceived social support, facilitating problem-focused coping, and decreasing sympathetic nervous system arousal and release of stress hormones such as cortisol.[78,79] Stress management strategies can support participants to be less reactive to screening results while empowering them to modify their lifestyle to prevent any clinical disease. For example, the Cognitive Emotional Behavioural Therapy may help improve self-esteem and reduce emotional eating, anxiety and depression.[80]

Other moderators of behaviour such as self-efficacy and perceived control were not accounted for or adjusted when reporting outcomes on psychological distress and/or HRQoL in the studies. Also, some RCTs did not report the effects of severity of disease (i.e. CAC scores and carotid plaque presence) on psychological distress and/or HRQoL.[52,55] Though positive self-efficacy beliefs are not the only cause of important outcomes, they may play a crucial role in how individuals react to screening results. For example, individuals with a strong sense of self-efficacy approach threatening situations with the belief that they can manage or control them.[37] This has been linked to lower vulnerability to depression and lower levels of stress.[37] Also, individual response to threat may be dependent on the severity of the perceived threat;[17,18,21,25] therefore, it's unclear why the severity of asymptomatic disease shown in the results was not considered in the analysis of outcomes in some studies.

Implications for practice

This review provides implications for practice and future research on cardiovascular screening. Clinical assessment for psychological distress and the use of more reliable and/or comprehensive instruments

such as The Penn State Worry Questionnaire[81] to measure worry may be considered for future interventions.

Also, including psychosocial interventions such as CBSM may be useful for optimizing the effectiveness of providing vascular imaging results to participants and reducing the potential harms of screening. Such support can be important to ensure that individuals who may receive abnormal results do not experience any form of psychological distress and are not discouraged from participating in future studies or screening programmes. It is recommended that some of these stress management techniques are included in future cardiovascular screening and other screening programmes aimed at reducing the burden of non-communicable diseases. Additionally, psychological assessments must be included in vascular screening interventions and other population-based CVD screening (ideally, at multiple time points) to identify individuals who are at an increased risk of experiencing psychological distress immediately or overtime following screening. Researchers and practitioners can make progress in determining how to best support individuals at different time points after screening with adequate information on how individuals react to screening findings.

Limitations

Only studies reporting carotid or coronary artery plaque screening were included in this review. There is also a possibility that this review may have missed some studies due to database selection or where studies were published. Moreover, the instruments that were used to assess psychological distress and HRQoL (e.g. SF-36) following screening have several weaknesses. However, this review provides important information that will be useful for researchers and clinicians to design interventions that best support individuals who may undergo vascular screening.

Conclusions

Screening for asymptomatic CVD with non-invasive imaging can help identify vascular disease in its subclinical phase; therefore, providing an opportunity to initiate risk factor management before the occurrence of any advanced disease or adverse cardiac events. However, screening findings suggesting the existence of disease may lead to different emotional responses impacting HRQoL. Our review has covered the breadth of evidence on psychological distress and HRQoL following the provision of non-invasive vascular imaging results. We have identified key gaps and described key interventions and strategies that could maximise positive outcomes in future interventions and reduce the potential harms of screening. Moreover, our review shows that measures of psychological responses to vascular screening can be improved.

Supplementary material

Supplementary material is available at *European Journal of Cardiovascular Nursing*.

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Conflict of interest: There are no conflicts of interest.

Data availability

The authors confirm that the data supporting the findings of this study are available within the article and its online supplementary materials.

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