

BMJ Open Study protocol of ConquerFear-HK: a randomised controlled trial of a metacognition-based, manualised intervention for fear of cancer recurrence among Chinese cancer survivors

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To cite: Ng DWL, Fielding R, Tsang C, *et al.* Study protocol of ConquerFear-HK: a randomised controlled trial of a metacognition-based, manualised intervention for fear of cancer recurrence among Chinese cancer survivors. *BMJ Open* 2023;**13**:e065075. doi:10.1136/bmjopen-2022-065075

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-065075>).

Received 24 May 2022

Accepted 30 December 2022



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ABSTRACT

Introduction Fear of cancer recurrence (FCR) is a prevalent and frequently debilitating response to a cancer diagnosis, affecting a substantial proportion of cancer survivors. Approximately 30% of local Hong Kong Chinese cancer survivors in a recent survey reportedly experienced persistent high FCR over the first-year post-surgery. This was associated with lower levels of psychological well-being and quality of life. A manualised intervention (ConquerFear) developed primarily based on the Self-Regulatory Executive Function Model and the Rational Frame Theory, has been found to reduce FCR effectively among Caucasian cancer survivors. The intervention now has been adapted to a Chinese context; ConquerFear-HK. The primary aim of this study is to evaluate its efficacy vs a standard-survivorship-care control (BasicCancerCare) in FCR improvement in a randomised control trial (RCT).

Methods and analysis In this RCT, using the sealed envelope method, 174 eligible Chinese cancer survivors will be randomised to either the ConquerFear-HK or BasicCancerCare intervention. Both interventions include six sessions over 10 weeks, which will be delivered via face to face or online by trained therapists. The ConquerFear-HK intervention incorporates value classification, metacognitive therapy, attentional training, detached mindfulness and psychoeducation; BasicCancerCare includes relaxation training, dietary and physical activity consultations. Participants will be assessed at prior randomisation (baseline; T0), immediately postintervention (T1), 3 months (T2) and 6 months postintervention (T3) on the measures of FCR (Fear of Cancer Recurrence Inventory) as a primary outcome; metacognition (30-item Metacognitions Questionnaire) and cognitive attentional syndrome (Cognitive-attentional Syndrome Questionnaire) as process outcomes; psychological distress (Hospital Anxiety and Depression Scale), cancer-related distress (Chinese Impact of Events Scale), quality of life (European Organisation for Research and Treatment of Cancer Quality of Life Core

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A randomised controlled trial is used to evaluate the effectiveness of a culturally adapted metacognitive intervention for fear of cancer recurrence in Chinese settings.
- ⇒ This study includes an active control condition offering standardised survivorship care.
- ⇒ Intervention fidelity will be assessed and highly monitored.
- ⇒ An unblinded randomised trial design is used.
- ⇒ Our sample includes only local Chinese cancer survivors, limiting generalisability.

Questionnaire) and treatment satisfaction are secondary outcomes.

Ethics and dissemination Ethics approval has been obtained from HKU/HA HKW Institutional Review Board (ref: UW19-183). The patients/participants provide their written informed consent to participate in this study. The study results will be disseminated through international peer-review publications and conference presentations.

Trial registration number NCT04568226.

INTRODUCTION

With a rising incidence and improved outcomes, the number of cancer survivors is growing rapidly.¹ Cancer survivors confront a set of needs or face numerous physical and emotional challenges.² Fear of cancer recurrence (FCR), defined as ‘fear, worry or concern relating to the possibility that cancer will come back or progress’,³ is the most common uncertainty or concern,^{4,5} as well as the strongest and the most frequently reported unmet need among cancer survivors.⁶ On average, 42%–70% of cancer survivors reported high



FCR.^{7 8} Such high FCR appears to remain stable over time.⁹⁻¹² Our recent longitudinal study showed that 3 in 10 Chinese cancer survivors persistently experienced high FCR over the first 12-month postsurgery.¹²

Experiencing some FCR is a normal, realistic response to a cancer diagnosis. Unmanaged high FCR, however, may be detrimental. The negative impact of high FCR on psychological well-being and quality of life (QoL) has been widely reported.¹³ High FCR has been associated with poor health-related QoL in cognitive, physical, emotional, role and social functioning,^{14 15} an inability to plan for the future (eg, returning to work),¹⁶ lower surveillance rates⁷ and an increased healthcare cost due to excessive medical reassurance-seeking,^{7 17 18} highlighting the need for evidence-based interventions to manage FCR, and ultimately to improve cancer survivors' overall experience throughout cancer survivorship.^{19 20}

A number of psychological interventions for FCR have been developed and evaluated in randomised controlled trials (RCTs), with most adopting a cognitive-behavioural therapies (CBTs).¹⁹⁻²¹ A recent systematic review and meta-analysis of 23 psychological interventions on FCR defined the significant effect of CBTs on cancer survivors with high FCR, and showed that cancer survivors in contemporary CBTs with a cognitive process focus vs traditional CBTs with a cognition content focus had a greater improvement on FCR,¹⁹ given the belief about cancer recurrence is not completely irrational.¹³

A novel, contemporary CBT-based intervention, namely ConquerFear, was recently developed to specifically target FCR.^{13 22} ConquerFear puts a focus on metacognitions (ie, beliefs about worry) without directly challenging the FCR thoughts.¹³ Its underlying theoretical framework is principally derived from the Self-Regulatory Executive Function (S-REF) model²³ and the Relational Frame Theory (RFT),²⁴ the theoretical bases of Metacognitive Therapy and Acceptance and Commitment Therapy, respectively. Theoretically, at least a transient rise in distress and existential concerns is a natural reaction to a cancer diagnosis, which is likely to initiate worrying.^{21 25} However, such worry becomes ruminative and problematic in cancer patients with dysfunctional metacognitive beliefs about worry, in which guide a particular pattern of information processing, known as Cognitive Attentional Syndromes (CAS) embodying perseverative negative thinking, attentional bias for threat-related stimuli and the use of unhelpful coping strategies (eg, avoidance and thought suppression).^{13 21 25} For example, positive beliefs about worry (eg, 'worrying helps me cope') may reinforce the use of worry and/or rumination as a distress management strategy, potentially, leading to and maintaining FCR. Likewise, negative beliefs about worry (eg, 'my worrying is dangerous for me') may prompt the control of worry via thought suppression and avoidance, which may counterproductively favour the attentional processing of threat and promote intrusive and catastrophic thoughts; all of which can exaggerate and maintain FCR.^{25 26} Modifying metacognitive knowledge

(S-REF) and interrupting maladaptive information processing (S-REF), additionally promoting a valued-based living (RFT), therefore, become the core components of ConquerFear.^{13 22}

The efficacy of ConquerFear has been evaluated in an RCT involving 222 Australian patients with breast, colorectal or melanoma skin cancer, indicating that cancer survivors in the ConquerFear intervention had statistically greater improvement than did survivors in a relaxation training control intervention at postintervention and 3-month follow-up assessments on FCR and metacognition.²² Specifically, the observed FCR improvement in the ConquerFear intervention was mediated by the changes in metacognition and intrusive thoughts between preintervention and postintervention, partially validating the theoretical framework underpinning ConquerFear.²¹ The existing evidence for the therapeutic effects of the ConquerFear intervention, however, involved mostly Western settings with predominantly anglophone survivors. Despite the associations of high FCR with maladaptive metacognition and CAS such as intrusive and avoidant thoughts consistently reported in our previous local studies with Chinese cancer survivors,^{12 27} it is unknown if the ConquerFear intervention is culturally meaningful for Chinese patients with cancer. The present RCT study is therefore developed that aims to estimate the direct effect of ConquerFear on reducing FCR, maladaptive metacognition and CAS, as well as the indirect effect of ConquerFear on FCR through its effect on maladaptive metacognition and CAS among Chinese cancer survivors, compared with an active control intervention that offers standard survivorship care including relaxation training, dietary and physical activity consultations.

The following hypotheses will be tested:

1. Compared with participants in the control group, participants in the ConquerFear intervention will show greater reduction in FCR.
2. Compared with participants in the control group, participants in the ConquerFear intervention will show greater reduction in maladaptive metacognition.
3. Compared with participants in the control group, participants in the ConquerFear intervention will show greater reduction in maladaptive CAS.
4. There will be an indirect effect of ConquerFear intervention on FCR through its effect on maladaptive metacognition and CAS.

METHODS AND ANALYSIS

A multicentre, prospective, parallel RCT will be used to assess the effect of a culturally adapted ConquerFear intervention on FCR among Chinese cancer survivors. This RCT study was registered with ClinicalTrials.gov (registration number: NCT04568226) and HKU clinical Trials registry (registration number: HKUCTR-2908). The actual start date of this RCT is 21 July 2021, and is expected to be completed by 31 August 2023.

Participants

Therapists

Both ConquerFear¹³ and the active control intervention, namely, BasicCancerCare are therapist-delivered interventions. Four therapists who are either clinical psychologists or social workers with extensive counselling experience, two registered dietitians, a registered cancer specialist nurse and two exercise specialists have been recruited from The University of Hong Kong Jockey Club Institute of Cancer Care (HKU JCICC), a local cancer care centre offering multidisciplinary healthcare services to patients with cancer, to deliver the study interventions. Participating therapists in the ConquerFear intervention are required to attend a 1-day training workshop that involves a review of the ConquerFear intervention manual, developed by the Psycho-Oncology Co-operative Research Group based at the University of Sydney,¹³ and practice of the intervention techniques with feedback from the clinical lead psychologist of HKU JCICC. Participating therapists in the BasicCancerCare intervention include counsellors, registered dietitians and exercise specialists who are involved in the development of the control intervention manual.

Patients

Cantonese-speaking or Mandarin-speaking Chinese patients who (1) are over the age of 18 years, (2) are recently diagnosed with curable (stages 0–III) breast cancer, colorectal or gynaecological cancer, which are among top 10 common cancers in Hong Kong,²⁸ (3) have surgery as a primary treatment, (4) have completed hospital-based adjuvant treatments (including radiotherapy and chemotherapy) within the past 18 months, (5) with the cut-off scored ≥ 13 on the Fear of Cancer Recurrence Inventory-Short Form (FCRI-SF)²⁹ and (6) are able to read and write will be recruited. Exclusion criteria are: non-Chinese ethnicity; metastatic cancer; with a current diagnosis of depression or psychosis or are currently receiving psychological treatments; and with language difficulties or intellectual disability.

Recruitment

The recruitment will be conducted at six medical centres in Hong Kong that offer breast, colorectal or gynaecological cancer care. Potentially eligible patients, screened and identified by oncologists at their site, will be approached by a research assistant while they are waiting for consultation. After explanations of the study, participants' rights and the safeguards used to preserve anonymity, those agreeing to participate will give informed written consent, and complete the FCRI-SF to further determine their eligibility for the study enrolment. Eligible patients with FCRI-SF scores ≥ 13 will be recruited and complete the baseline assessment immediately (preintervention; T0). For those with scores below 13 will be thanked and given the helpline number of HKU JCICC if they wish to seek support.

Randomisation

Participants will be randomly assigned to the ConquerFear (the intervention arm) or BasicCancerCare intervention (the control arm), using a computer-generated block randomisation sequence generated by a statistician who is blinded to the identity of participants and therapists. Each recruiting site will use a block randomisation structure with randomly permuted block sizes of 2, 4 and 6 to reduce selection bias and ensure close balance of the numbers in each arm. The serially labelled opaque sealed envelope method will be used for randomisation. After the completion of the baseline assessment, the research assistant will break a sequentially numbered envelope and inform participants of their group allocation result. Participants, however, are unaware of which the primary intervention is being tested. Intervention sessions will be scheduled with participants by phone afterwards. Consolidated Standards for Reporting of Trials will be adhered to.

To prevent selection bias in therapists, participants in both arms will be randomly assigned to one of the participating counsellors using randomisation block sizes of 4 and 8, and participants in the control arms will also be randomly assigned to one of the dietitians/exercise specialists using randomisation block sizes of 2, 4 and 6. After the participant recruitment, a project coordinator will break a sequentially numbered envelope and forward the randomisation results along with patients' contact details to the corresponding therapists via encrypted emails.

Interventions

ConquerFear-HK

ConquerFear-HK is adapted from a previously developed theoretically based,²⁵ manualised ConquerFear intervention.¹³ The key goals of the intervention are to: (1) teach strategies for reducing worry and excessive threat monitoring; (2) modify underlying unhelpful metacognitive beliefs about worry; (3) develop appropriate monitoring and screening behaviours, (4) encourage acceptance of the uncertainty brought about by a cancer diagnosis and (5) clarify values and encourage engagement in values-based goal setting.¹³ After evaluating the feasibility of the original five sessions ConquerFear intervention, which was specifically developed for the predominantly white Australian cancer population, in a single-arm pilot study (unpublished) the participating counsellors reported that cultural modification of the intervention content and an extra session were needed to improve its acceptability and feasibility in practice, respectively. Also, considering that the participating therapists might have only limited knowledge about appropriate self-examination and medical surveillance, in the original ConquerFear intervention, the participating therapists were advised to seek recommended guidelines for self-examination practice from a specialist clinician prior to a particular session; the trial participants were guided to seek further clarification from their physicians if they were unsure of

**Table 1** Detailed content for the ConquerFear-HK intervention

Session	Content	Home-based practice
1	<p>Provide information about possible symptoms of recurrence of breast, colorectal or gynaecological cancer</p> <p>Provide guideline to help patients distinguish those from benign physical complaints</p> <p>Reassess self-examination practices and medical surveillance (conducted with a cancer specialist nurse)</p> <p>Develop a behavioural contract to help patients to engage in recommended levels of self-examination and follow-up tests (if needed)</p> <p>Psychosocial assessment</p> <p>Model on which treatment is based is explained</p> <p>Discussion of existential changes brought about by cancer</p>	
2	<p>Identification of triggers (thoughts, feelings and behaviours) and attempted coping strategies</p> <p>Values classification exercise</p>	Examine values identified in the session and devise relevant goals
3	<p>Discuss impact of past life experience and vulnerability factors (eg, personality) on FCR</p> <p>Discuss rationale and practice of attention training technique (ATT), a technique designed to help patients to reduce their tendency to ruminate and improve their attentional control when thoughts about recurrence occur.</p>	<p>Reflect on past experiences and how these have shaped responses to cancer</p> <p>Practice ATT on a daily basis throughout the remainder of the intervention and document in workbook.</p>
4	<p>Introduce the practice of detached mindfulness, designed to enhance meta-awareness of cognition (eg, thoughts or feelings) and the ability to become an objective observer of the content of thoughts without the need for evaluation or reaction</p>	<p>Continue daily practice of ATT</p> <p>Practice application of detached mindfulness on response to thoughts which trigger FCR.</p>
5	<p>Discuss the role of threat monitoring and avoidance, identify avoidant or excessive behaviours</p> <p>Introduce worry postponement as a technique for responding to residual worry</p> <p>Discuss beliefs that underpin FCR (eg, beliefs about the benefits of FCR, or beliefs about physical harm caused by FCR)</p> <p>Test the validity of these beliefs through Socratic dialogue</p> <p>Provide information about follow-up care and lifestyle change to reduce the risk of cancer recurrence.</p>	<p>Continue daily practice of ATT</p> <p>Practice detached mindfulness in response to emerging thoughts about FCR</p> <p>Practice worry postponement</p>
6	<p>Develop new plan for dealing with FCR</p> <p>Review goal setting task</p> <p>Consolidate skills learnt throughout the programme</p> <p>Develop relapse prevention plan</p>	

FCR, fear of cancer recurrence.

the given guidelines. The ConquerFear-HK intervention additionally involves a registered cancer specialist nurse as to provide a more comprehensive guidance to the participants.

Participants allocated to the intervention arm will therefore receive six individual intervention sessions (45–60 min each) over 10 weeks, and will be given home-based practices and readings to practice the skills learnt in each session. [Table 1](#) shows the detailed session-by-session content for the ConquerFear-HK intervention.

BasicCancerCare

In recognition of the importance for survivorship care to include comprehensive lifestyle guidance to help with survivors' maintenance of health in long term, participants allocated to the control arm will receive a six sessions BasicCancerCare intervention over 10 weeks which incorporates relaxation training, dietary and physical activity consultations, as detailed in [table 2](#). The key goals of the BasicCancerCare intervention are to: (1) teach relaxation techniques including abdominal breathing and active

Table 2 Detailed content for the BasicCancerCare intervention

Session	Content	Home-based practice
1	Conducted by a trained counsellor	Practice abdominal breathing and active progressive muscle relaxation daily
	Introduce different relaxation techniques	Prepare a 24-hour dietary recall record
	Practice abdominal breathing	
	Practice active progressive muscle relaxation	
2	Conducted by a registered dietitian	Prepare a 3-day dietary recall record
	Explain the concept of BMI and the importance of maintaining a healthy body weight	
	Explain the concept of healthy eating	
	Introduce food group classification	
	Assess the client's dietary quality based on the dietary recall record	
	Provide personalised advice and meal plan	
3	Conducted by an exercise specialist	Practice home-based exercise
	Explain the concept of regular exercise	
	Practice different stretching exercises	
	Practice cardio and weight training exercise	
	Introduce and practice basic home-based exercise	
4	Conducted by a trained counsellor	
	Review abdominal breathing and progressive muscle relaxation techniques	
	Reinforce the use of relaxation technique	
	Develop plan for future practice of relaxation techniques	
5	Conducted by a registered dietitian	
	Provide an introduction to fats	
	Provide an introduction to calcium	
	Assess the client's dietary quality based on the dietary recall record	
6	Conducted by an exercise specialist	
	Practice stretching exercises	
	Introduce and practice intermediate level home-based exercise	

BMI, body mass index.

progressive muscle relaxation techniques by a trained counsellor, (2) offer personalised diet and physical activity advice by a registered dietitian and an exercise specialist, respectively, (3) enhance survivors' perceived control over illness, thereby leading to better adjustment to cancer and (4) provide an exposure control for the ConquerFear group. The BasicCancerCare does not address cognitive process in relation to FCR.

Both the ConquerFear-HK and BasicCancerCare interventions will be mainly conducted face to face. To improve intervention completion rates, online sessions will be available to participants if they are unable to attend the face-to-face sessions. A set of intervention materials (eg, recordings, ppt slides) for online sessions has been prepared by the participating therapists.

Intervention fidelity checks

Several fidelity strategies will be used in both arms to monitor and enhance the reliability and validity of intervention delivery including (1) self-report evaluation

checklists completed by therapists after each session; (2) regular reviews of completed evaluation checklists by the research team and (3) and regular case meetings.¹³ Additionally, the ConquerFear-HK intervention sessions will be recorded and 10% of randomly selected session recordings will be independently reviewed by the research team using the revised cognitive therapy scale (CTS-R)³⁰ to assess counsellors' competency in cognitive therapy.¹³ Feedback will be given where any drifts from the ConquerFear-HK protocol is identified.

Pilot study of ConquerFear-HK

A two-arm non-RCT pilot study was conducted between 8 October 2020 and 24 May 2021 to evaluate the feasibility, acceptability and likely efficacy of ConquerFear-HK and BasicCancerCare among Chinese patients with cancer (unpublished). In this pilot study, 22/24 (92%) and 9/9 (100%) eligible cancer survivors were recruited and provided informed consent in the intervention (five cases for each counsellor) and control arms (at least two



cases for each therapist), respectively. In the intervention group, 77% completed all the ConquerFear intervention sessions with 35% in a blended mode of delivery; in the control group, 90% completed all the BasicCancerCare intervention sessions with 13% in a blended mode of delivery. All the participants in either the intervention or the control arm were highly satisfied with the received intervention. In particular, participants in the intervention arm reported that the intervention was useful for them to manage their FCR. The change difference in total FCRI scores from preintervention to postintervention between the intervention (mean=-17.59, SD=17.70) and control groups (mean=-8.38, SD=14.38) was statistically insignificant ($p=0.21$). The extremely small sample size in both groups (intervention group: $n=17$; control group: $n=8$), however, might have reduced the statistical power of the performed t-test (24.80%), enhancing the possibility of committing a type II error (a false negative). Total FCRI scores reduced significantly from preintervention to postintervention in the intervention group ($p=0.001$), but did not differ in the control group ($p=0.14$), highlighting the potential effect of ConquerFear-HK on FCR.

Outcome variables

All outcome variables will be assessed using a set of standardised questionnaires containing the measures described below. Questionnaires will be completed face-to-face on enrolment in the study before randomisation (preintervention; T0), immediately after intervention completion (postintervention; T1), 3 months (T2) and 6 months postintervention (T3) on their visits to the clinics. If clinical follow-up interview is unable to arrange, telephone delivered interview will be conducted instead. A voice mail and text reminders will be sent to the participants who are unreachable by phone contact. Collected data will be stored separately from personal information in a locked cabinet and entered into an encrypted computer file linking only with a unique participants number, accessible only to authorised research assistants and investigators.

Primary outcome

FCR: FCR will be assessed using the 42-item FCRI at four assessment points (T0-T3).²⁹ FCRI comprises seven subscales: trigger, severity, psychological distress, functional impairment, reassurance, insights and coping strategies measured using 5-point Likert scales (0 = 'never'; 4 = 'a great deal or all the time').²⁹ Total scores range from 0 to 168; with higher scores indicating higher FCR. The FCRI has demonstrated good internal consistency (Cronbach's $\alpha=0.75-0.91$), convergent validity and test-retest reliability at a 1-month interval.²⁹ Good internal consistency of the Chinese FCRI was also observed in our previous FCR study with local cancer survivors (Cronbach's $\alpha=0.78-0.95$) (unpublished).

Process outcomes

Process outcomes include metacognition and CAS, assessed at T0-T3.

Metacognition

Metacognition will be assessed using the 30-item Metacognitions Questionnaire-30 (MCQ-30), consisting of five subscales assessing Positive beliefs about worry (eg, 'Worrying helps me cope'), Negative beliefs about worry (ie, uncontrollability and danger; eg, 'My worrying is dangerous for me'), Cognitive Self-Consciousness (eg, 'I am constantly aware of my thinking'), Cognitive Confidence (eg, 'I do not trust my memory') and Need to control thoughts (eg, 'If I could not control my thoughts, I would not be able to function'), using 4-point Likert scales (1 = 'do not agree'; 4 = 'agree very much').³¹ High scores indicates greater maladaptive metacognition. The Chinese version of the MCQ-30 has been widely used in cancer contexts, showing good internal consistency of all the subscales (Cronbach's $\alpha=0.83-0.87$), except for Need to control thoughts (Cronbach's $\alpha=0.58$).^{12 27}

Cognitive attentional syndrome

The severity of CAS will be assessed using the 16-item Cognitive-Attentional Syndrome Questionnaire (CAS-1).³² Responses are rated on 9-point Likert scales (0 = 'none of the time'; 8 = 'all of the time') for the first eight items and on 11-point Likert scales (0 = 'I don't believe this at all'; 100 = 'I'm completely convinced this is true') for the last items. The responses on the last eight items are recorded to range between 0 and 8 before being summed up.³³ The total CAS score ranges from 0 to 128, with higher scores as indicative of more CAS. Good internal consistency has been obtained (Cronbach's $\alpha=0.85$).³³

Secondary outcomes

Measures of cancer-specific distress, general psychological distress, QoL and treatment satisfaction will be included as secondary outcome variables at T0-T3.

Cancer-specific distress

Cancer-specific distress will be measured by the 22-item Chinese Impact of Events Scale-revised (CIES-R) which consists of three subscales that measure avoidance, intrusive thoughts and hyperarousal symptoms.^{34 35} Each item is assessed on five-point Likert scales, with higher mean scores indicating greater symptoms. The CIES-R subscales have shown good internal consistency (Cronbach's $\alpha=0.83-0.89$).³⁵

General psychological distress

The Chinese 14-item Hospital Anxiety and Depression Scale^{36 37} comprising two 7-item subscales that measure anxiety and depression. Each subscale total scores range from 0 to 21 with higher scores suggesting higher distress. Good internal consistency of each subscale was reported in cancer context (anxiety, Cronbach's $\alpha=0.89$; depression, Cronbach's $\alpha=0.85$).³⁸

Quality of life

QoL will be measured by the Chinese version of the 30-item European Organisation for Research and Treatment of Cancer Quality of Life Core Questionnaire (EORTC QLQ-C30), consisting of five functional subscales (physical, role, emotional, cognitive and social functioning), three symptom subscales (pain, fatigue and nausea/vomiting), a global health subscale, five single symptom items (eg, sleep disturbance, dyspnoea, appetite loss, constipation and diarrhoea) and an single item for financial difficulty.^{39 40} High scores on the functional and global health subscales indicate better functioning and QoL, respectively. High scores on the symptom subscale or item indicate more symptom(s). Acceptable internal consistency of EORTC QLQ-C30 was reported (Cronbach's $\alpha=0.72-0.87$), except for the physical and cognitive functional subscales (physical, Cronbach's $\alpha=0.67$; cognitive, Cronbach's $\alpha=0.45$).³⁹

Treatment satisfaction

A 17-item treatment satisfaction questionnaire was developed by our team to evaluate overall satisfaction with the intervention. It assesses the comprehensibility of the component of each intervention session, its length, number of sessions and overall satisfaction with the intervention. The questions are reworded to fit the content of the ConquerFear-HK and BasicCancerCare interventions, respectively.

Potential covariates

Other secondary outcomes, which have been shown to be associated with FCR/cancer-related distress or treatment outcomes, will be assessed as potential covariates: (1) coping style,⁴¹ assessed using the 28-item Chinese Brief Coping Orientation to Problems Experienced (BriefCOPE)^{42 43}; (2) intolerance of uncertainty,⁴⁴ assessed using 12-item Intolerance of Uncertainty Scale⁴⁵; (3) experiential avoidance, an attempt to deliberately avoid and/or escape from the reality of having cancer,⁴⁶ assessed using the 7-item Acceptance and Action Questionnaire-II^{47 48}; (4) self-efficacy for chronic disease,⁴⁹ assessed using the Self-Efficacy for Managing Chronic Disease 6-item Scale⁵⁰; (5) therapeutic alliance,^{13 51} assessed using the 12-item Working Alliance Inventory Short-Form Revised⁵²; (6) treatment expectancy,^{13 53} assessed using the 6-item Credibility/Expectancy Questionnaire⁵⁴ and (7) participants' self-reported sociodemographics and clinical data extracted from patients' medical records after the completion of the study.

Sample size

The effect size is estimated based on the original study to examine the impact of ConquerFear intervention on FCR, in which an effect size (Cohen's *d*) of 0.46 was demonstrated.²² Assuming an estimated effect size of 0.46, a sample size of 75 per arm (a total sample of 150) is required to achieve a statistical power of 80% in univariate analysis with significance level set at 0.05.^{55 56}

The attrition rate for an RCT is estimated to be 16%, based on our recent randomised controlled trial on yoga therapy (unpublished). Based on our pilot study, the attrition rate is expected to be lower. Therefore, an anticipated 16% attrition rate and sufficient power to compare between arms give us a target of 174, with 87 per arm.

Statistical analysis

Intention-to-treat approach will be applied for data analysis. Descriptive statistics will enable comparison of intervention and controls groups at baseline. Unadjusted changes in the FCR scores (ie, the primary outcome) from baseline to each assessment time point will be compared between groups using the Student's *t*-test. To examine the impact of baseline variables including the process outcomes (metacognition and CAS) and potential covariates on the changes in FCR scores, univariate and multivariable linear regressions will be performed. Those variables with $p<0.2$ in univariate analysis will be included as candidate covariates in multivariable analysis.²² In multivariable linear regression, backward elimination will be used. Only significant variables at a 5% significance level will be retained in the multivariable models.²² To further assess the effect of the interventions on FCR scores over time and control the random effects of therapists and modes of intervention delivery, a generalised estimating equation (GEE) accounting for repeated measures, will be conducted. GEE can handle cases with missing data with an assumption that data are missing completely at random.⁵⁷ An intervention \times time interaction on FCR scores will be explored in the GEE analysis to examine if change in FCR scores by time differs by intervention arm. To adjust for potential confounders of FCR scores, candidate covariates identified in the univariate analysis will be additionally included in the model. For secondary outcome measures, identical analysis approach will be used to compare intervention and control groups.

The indirect effect of ConquerFear intervention on FCR through its effect on maladaptive metacognition and CAS will be tested using mediation analysis following Baron and Kenny's four-step approach.⁵⁸ In step 1, a fully adjusted linear regression model will first regress FCR scores assessed at T1 on baseline FCR scores. In step 2, the proposed mediators, changes in metacognition and CAS from baseline to T1 will be independently regressed on baseline FCR scores. In step 3, FCR scores at T1 will be regressed on each of the proposed mediators. Finally, in step 4, FCT scores at T1 will be regressed on baseline FCR scores and the proposed mediators.

Patient and public involvement

Thirty-one cancer survivors were involved in the pilot study conducted in October 2020, and provided feedbacks on the design of the questionnaire and intervention, which helped refine the wording and clarity of the questionnaire and intervention materials, as well as improve the setting of the intervention. Summaries of

study results will be disseminated to the public via peer-reviewed publications and conference presentations.

DISCUSSION

FCR represents a prominent unmet need among cancer survivors, indicating that current cancer care systems are not providing adequate psychological support for cancer survivors with high FCR.⁵⁹ There is an obvious need for interventions that help managing FCR. ConquerFear^{13 22} is a novel, evidence-based and theory-informed intervention specifically targeting FCR. However, its potential impact on FCR improvement in non-Caucasian settings has still yet to be determined, despite the growing cancer populations in Asia. It is estimated that Asia accounts for approximately half of all cancer incidences worldwide in 2020.⁶⁰ Specifically, 24% occurs in Chinese-dominated countries including China, Singapore and Malaysia.⁶¹ It is therefore imperative to examine if the ConquerFear intervention is culturally appropriate to apply in Chinese cancer populations. This RCT study is believed to be the first to test the efficacy of a culturally adapted ConquerFear-HK to improve FCR among Chinese cancer survivors.

The RCT will further consolidate the underlying conceptual framework of ConquerFear derived from the S-REF model²³ and the RFT,²⁴ by providing additional evidence to support the causal relationship of FCR with metacognition and CAS among Chinese cancer survivors. More importantly, the RCT study will provide a solid basis for the implementation of the ConquerFear-HK into local clinical settings, expand current cancer care systems by offering a more refined evidence-based survivorship care plan for managing FCR, and ultimately improve QoL in this population; all of which appear to be in line with emerging priorities in survivorship cancer care which highlight the importance of surveillance and management of psychosocial effect after a cancer diagnosis.⁶²

Ethics and dissemination

Ethics approval has granted by HKU/HA HKW Institutional Review Board (ref: UW19-183). Participants will provide their written informed consent to participate in this study. The study results will be shared through peer-reviewed publications and international conference presentations.

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Acknowledgements We would like to thank the cancer survivors who participated in the pilot study, and provided us with feedback on the design of the questionnaire and intervention.

Contributors DWLN, WWTL and PB were responsible for the initial study design. DWLN, WWTL, RF, CT, CNG, JC and AO were responsible for cultural modification of the ConquerFear-HK intervention content. DWLN, WWTL, KIWM, JWCT and WWYL were responsible for the development of the control intervention content. CT, CCF, AK, SN, DS, MC, O-KC and KLKC will be responsible for coordinating the recruitment sites. DWLN and WWTL will be responsible for data management and analysis. All authors were involved in drafting the manuscript and have read and approved the final draft. There was no independent steering committee in the trial.

Funding This work was supported by General Research Fund of the Research Grant Council of Hong Kong (Project no. 17616619).

Disclaimer The design of the study and the collection, analysis, interpretation and reporting of data are entirely independent of the funding body.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Consent obtained directly from patient(s).

Provenance and peer review Not commissioned; externally peer reviewed.

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