The Essential Network (TEN): Protocol for an implementation study of a digital-first mental health solution for Australian healthcare workers during COVID-19

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Abstract

Background: The COVID-19 pandemic has placed healthcare workers (HCWs) under severe stress, compounded by barriers to seeking mental health support among HCWs. The Essential Network (TEN) is a blend of digital and person-to-person (blended care) mental health support services for HCWs, funded by the Australian Federal Department of Health as part of their national COVID-19 response strategy. New blended services need to demonstrate improvements in mental health symptoms and test acceptability in their target audience, as well as review implementation strategies to improve engagement.

Objective: The primary objective of this implementation trial is to design and test an implementation strategy to improve uptake of TEN. The secondary objectives are examining the acceptability of TEN among HCWs, changes in mental health outcomes associated with use of TEN, as well as reductions in mental health stigma among HCWs following use of TEN.

Methods: The implementation trial contains three components: a consultation study with up to 39 stakeholders or researchers with implementation experience to design an implementation strategy; a longitudinal observational study of at least 105 healthcare workers to examine the acceptability of TEN and the effectiveness of TEN at one and six months in improving mental health (as assessed by Distress Questionnaire (DQ-5), Patient Health Questionnaire (PHQ-9), Generalised Anxiety Disorder (GAD-7), Oldenburg Burnout Inventory (OBI-16), and Work and Social Adjustment Scale (WSAS)) and reducing mental health stigma (Endorsed and Anticipated Stigma Inventory (EASI)); and an implementation study where TEN service uptake analytics will be examined for three months before and after the introduction of the implementation strategy.

Results: The implementation strategy, designed with input from the consultation and observational studies, is expected to lead to an increased number of unique visits to the TEN Website in the three months following the introduction of the implementation strategy. The observational study is expected to observe high service acceptability. Moderate improvements to general mental health (DQ-5, WSAS) and a reduction in workplace- and treatment-related mental health stigma (EASI) between the baseline and 1-month timepoints.

Conclusions: TEN is a first-of-kind blended mental health service available to Australian HCWs. The results of this project have the potential to inform the implementation and development of blended care mental health services, as well as how such services can be effectively implemented during crisis. Clinical Trial: N/A

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Abstract

Background

The COVID-19 pandemic has placed healthcare workers (HCWs) under severe stress, compounded by barriers to seeking mental health support among HCWs. The Essential Network (TEN) is a blend of digital and person-to-person (blended care) mental health support services for HCWs, funded by the Australian Federal Department of Health as part of their national COVID-19 response strategy. TEN is designed as both a preventative and treatment for common mental health problems faced by HCWs. New blended services need to demonstrate improvements in mental health symptoms and test acceptability in their target audience, as well as review implementation strategies to improve engagement.

Objective

The primary objective of this implementation study is to design and test an implementation strategy to improve uptake of TEN. The secondary objectives are examining the acceptability of TEN among HCWs, changes in mental health outcomes associated with use of TEN, as well as reductions in mental health stigma among HCWs following use of TEN.

Methods

The implementation study contains three components: a consultation study with up to 39 stakeholders or researchers with implementation experience to design an implementation strategy; a longitudinal observational study of at least 105 healthcare workers to examine the acceptability of TEN and the effectiveness of TEN at one and six months in improving mental health (as assessed by Distress Questionnaire (DQ-5), Patient Health Questionnaire (PHQ-9), Generalised Anxiety Disorder (GAD-7), Oldenburg Burnout Inventory (OBI-16), and Work and Social Adjustment Scale (WSAS)) and reducing mental health stigma (Endorsed and Anticipated Stigma Inventory (EASI)); and an implementation study where TEN service uptake analytics will be examined for three months before and after the introduction of the implementation strategy.

Results

The implementation strategy, designed with input from the consultation and observational studies, is expected to lead to an increased number of unique visits to the TEN Website in the three months following the introduction of the implementation strategy. The observational study is expected to observe high service acceptability. Moderate improvements to general mental health (DQ-5, WSAS) and a reduction in workplace- and treatment-related mental health stigma (EASI) between the baseline and 1-month timepoints.

Conclusions

TEN is a first-of-kind blended mental health service available to Australian HCWs. The results of this project have the potential to inform the implementation and development of blended care mental health services, as well as how such services can be effectively implemented during crisis.

Introduction

Background

The stress of the COVID-19 pandemic is placing healthcare workers (HCWs) at increased risk of poor mental health [1], with posttraumatic stress disorder (PTSD) a major concern [2–5]. Mental health treatments can

lower the risk of HCWs developing mental ill-health [1], yet few appropriate services are available at the necessary scale for all specialisations of HCWs. The Australian healthcare workforce is currently estimated at 800,000 [6]. This figure will likely continue to grow alongside population growth, indicating that large-scale solutions are required. Early in the COVID-19 pandemic, researchers called for evidence-based self-guided mental health services for HCWs, citing reluctance to seek help coupled with the challenges of delivering quality support to thousands of time-poor consumers [7]. Blended care services that integrate digital (websites and apps) and person-to-person (including telehealth) services [8] can rapidly scale while offering a personalised choice of evidence-based care options [9]. In this manner, blended care is a promising means of providing large-scale mental health services to healthcare workers during the ongoing COVID-19 pandemic.

Over and above scalability, mental health services must be sensitive to the specialised needs of HCWs. As HCWs battle the pandemic they face numerous sources of stress, such as fear of infection [10], unsupportive workplaces [11] and even watching colleagues die [12]. HCWs also vary in how they manage these stressors across time [13]. Therefore, HCWs need adaptable mental health services that can help with to a range of concerns, from situational distress to moral injury [14] to PTSD[2,3]. Yet, even services tailored to HCWs have seen little uptake despite high reported demand [15]. One likely explanation is the lack of psychological safety many HCWs experience when accessing mental health care. Concerns about stigma [1,16], confidentiality, and discrimination from colleagues or employers [17,18] keep many HCWs from using the available services. Blended care can address some of these concerns through digital services (e.g. anonymous chat-based therapies, accessing tailored resources without registration), while still providing the flexibility for HCWs who prefer person-to-person care to access these services.

To fully leverage the potential of blended care to support HCWs during the COVID-19 pandemic and beyond, services must be implemented in a way that ensures HCWs feel psychologically safe to use them. Thus far, little is known about implementing these services is a way that builds trust and increases uptake of available services. The few studies within the COVID era describe institution-specific implementation practices without data on the effectiveness of implementation strategies [19] . Studies implementing HCW-specific mental health services from previous pandemics are largely of poor quality and evaluate the effects of an intervention rather than implementation strategies to facilitate uptake and engagement [20]. These challenges exemplify implementation science in digital health, which is yet to produce a unified implementation framework to guide not only the reporting of strategies but also the evaluation of certain approaches [21,22]. Understanding how to effectively implement HCW-specific mental health services could boost uptake of available care and inform the development of new services as the pandemic continues to unfold.

The Essential Network

The Essential Network (TEN) was funded by the Australian Government Department of Health as part of their national COVID-19 response strategy. TEN follows a sequential blended care approach [9] using an integrated service model that spans four care phases: (1) well-being promotion; (2) early detection and preventative interventions; (3) low-to-moderate intensity services for HCWs experiencing pre-clinical distress; and (4) person-to-person clinical services for HCWs mental health difficulties or clinical distress. In this

sequential blended care approach, users engage with digital resources and treatment options as required and progress to person-to-person clinical services where necessary. This selection of treatment options is made possible by a ‘digital ecosystem’ that brought together a network of existing and new services from partner organisations with interests in the mental health of HCWs. Services are made available through a single web-based digital hub accessible across desktop, laptop and mobile web browsers. Digital services comprise of an online mental health assessment, mental health resources and advice for assisting individuals and their colleagues, and links to other relevant resources and organisations (e.g. psychiatrists who treat HCWs, peer support organisations). Person-to-person services comprise up to five individual clinical consultations with either a clinical psychologist or psychiatrist delivered either via telehealth or in-person at our clinic in Sydney, NSW, Australia. Users can select and explore the digital and/or person-to-person options that they believe best match their needs.

Figure 1: Example screenshots from the TEN Website, which home page (left), an online mental health assessment tool (top right) and includes evidence-based tools for practical self-help (bottom right).

Implementation Framework

This study will examine the implementation of The Essential Network (TEN), a blended mental health service for Australian HCWs established during COVID-19, funded by the Australian Federal Government. The Consolidated Framework for Implementation Research (CFIR) framework will be used to guide this examination as the constructs within CFIR span both implementation and effectiveness within a health service context [23]. However, some adaptation of CFIR will be required. CFIR assumes that an intervention will be implemented in a single organisation or industry, unlike TEN, which spans many organisational structures and professions. Similarly, the frameworks consolidated within CFIR were largely aimed at implementing singular, intervention-based face-to-face services, rather than multi-channel digital services like TEN. Previous attempts to consolidate implementation strategies for digital mental health have focused on delivering specific digital programs as an alternative to traditional mental health services, rather than linking users to a range of care options in the way TEN does [21]. Work is underway to consolidate optimal digital health implementation strategies [22] however no such framework exists yet. For these reasons, in our study, the CFIR subconstruct definitions described by Damschroder et al. [23] will be adapted to the digital and multi-organisational nature of TEN, guided by the digital-specific implementation strategies suggested by Graham et al. [21] (see Table 1) [24].

Table 1. Table depicting CFIR constructs and example interview questions.

CFIR Construct	Sub-construct	Example Interview Question
Intervention Characteristics	Intervention source	N/A – TEN was externally developed.
	Evidence strength and quality	Interviews: Questions regarding perceptions of the quality of TEN website/offering and beliefs that the care options offered will benefit the mental health of HCWs
	Relative advantage	Interviews: Questions regarding awareness of TEN equivalents and perceived advantages of TEN.
	Adaptability	Interviews: Questions regarding the capacity for TEN to be adapted to needs of professional* groups.
	Trialability	Interviews: Questions regarding feasibility of implementation and evaluation of TEN within a single organisation or professional groups*
	Complexity	Interviews: Questions regarding difficulty of implementing TEN
	Design quality and packaging	Interviews: Questions regarding perception of quality of TEN presentation to organisations and users*
	Cost	Interviews: Questions regarding resourcing (financial, personnel etc) and opportunity costs of using TEN.
Outer Setting	Patient needs and resources	Interviews: Questions regarding knowledge of member/employee needs* and how these align with organisational strategy.
	Cosmopolitanism	Interviews: Questions regarding organisational networks
	Peer pressure	Interviews: Questions regarding knowledge of related organisational efforts and how these might affect organisational endorsement of TEN.
	External policies and incentives	Interviews: Questions regarding external policy considerations and how these might affect organisational endorsement of TEN.
Inner Setting	Structural characteristics	Interviews: Questions regarding social architecture, age, maturity, and size of an organisation and profession*
	Networks and communications	Interviews: Questions regarding how organisations communicate with member or employees (generally and in relation to mental health)
	Culture	Interviews: Questions regarding norms, values, and basic assumptions of an organisation and profession*

CFIR Construct	Sub-construct	Example Interview Question
	Implementation climate[2]	Interviews: Questions regarding current endorsement of TEN and whether TEN competes with other initiates for resources or strategic importance.
	Readiness for implementation[2]	Interviews: Questions regarding readiness of organisation to assist with implementation strategy*.
Characteristics of individuals	Knowledge and beliefs about the intervention	Interviews: Questions regarding value and knowledge of both TEN and digital/blended mental health*.
	Self-efficacy	Interviews: Questions regarding the capabilities of both stakeholder and members/employees* to execute implementation strategies.
	Individual stage of change	Interviews: Questions regarding stage of change most members/employees* are likely in with respect to using TEN and/or blended mental health services*.
	Individual identification with organisation	Interviews: Questions regarding how stakeholders perceive the relationship between their organisation and members/ employees*
	Other personal attributes	Interviews: Questions regarding what personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning styles of their members/employees* are likely to affect implementation of TEN

[1] Language adapted to multi-organisational context of TEN
[2] Adaptation of original CFIR definitions to TEN

Study Objectives

The primary objective of this study is to work with HCW researchers, industry partners and active TEN users to design and test an implementation strategy for TEN. The secondary objectives are to examine the acceptability of TEN, to measure any changes in psychosocial well-being associated with use of TEN, as well as whether TEN reduces mental health stigma among HCWs.

Methods

Study Design

This study will follow an effectiveness-implementation hybrid design [24]. The protocol has three components (Figure 2). The *consultation study* component (Study 1) is a series of semi-structured qualitative interviews conducted with stakeholders to explore the needs of Australian HCWs and develop an implementation strategy for TEN. The *observational study* component (Study 2) is a pre/post observational study with Australian HCWs evaluating the acceptability TEN, provide feedback on the implementation strategy, and examine any changes in mental health outcomes are associated with use of the service. The *implementation study* (Study 3) component will be a pre/post audit of TEN users both before and after the implementation strategy is implemented.[25].

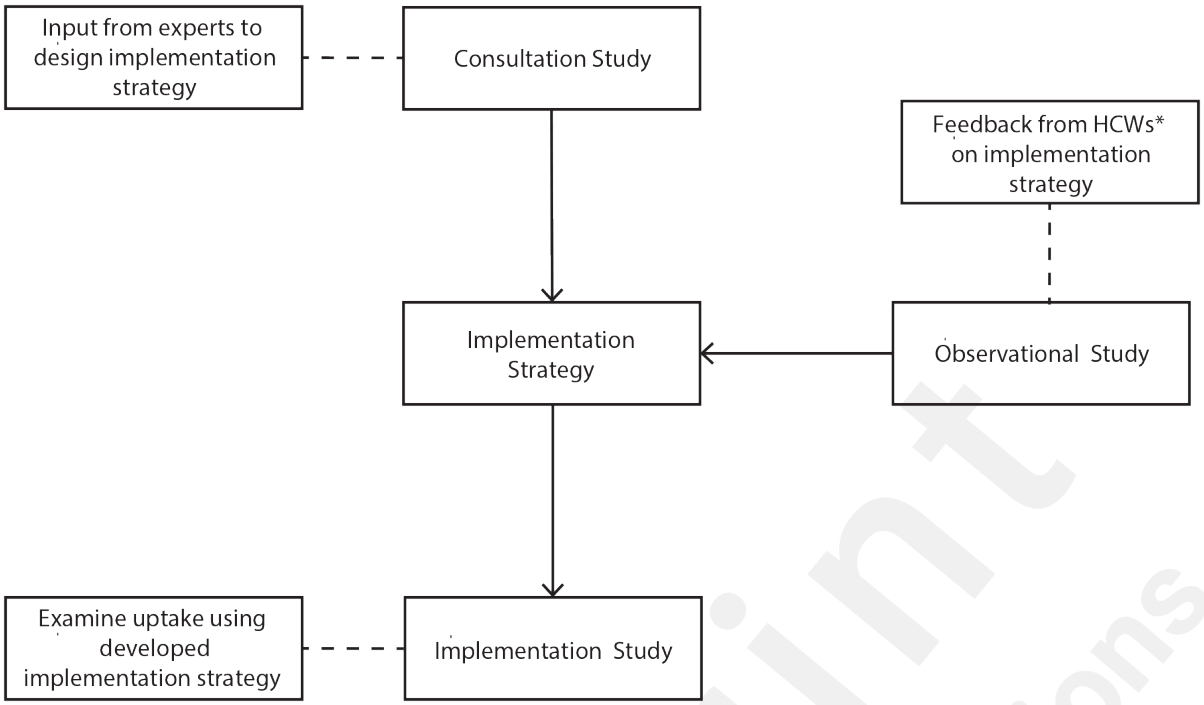

Figure 2. Flow chart depicting the design and components of the implementation study. *Healthcare workers.

Study Setting

There is no specific study site. Semi-structured interviews carried out as part of the consultations will be conducted online via videocalls (e.g. Zoom, Microsoft Teams). As a digital mental health hub, participants in the observational study will be able to participate in the study and access the TEN service from any location in Australia. If applicable, face-to-face consultations through the TEN Clinic may be conducted at the Black Dog Institute, Randwick, NSW 2031 or via telehealth.

Study 1: Consultation Study

Participants

Participants in the consultation study will be representatives from Australian professional organisations (*n* = 15 – 18) relevant to mental health or HCWs as well as researchers and/or staff from the Black Dog Institute (*n* = 10 – 21) working on projects relevant to HCW's mental health.

Recruitment

Participants for the consultation component will be approached directly to discuss participation and/or emailed an invitation to the study and provided with an online participant information statement and consent form.

Data Collection

Qualitative data will be captured in semi-structured interviews with HCW researchers and industry partners who represent the interests and views of their respective disciplines. Interview questions will be structured to elicit information directly relevant to the key constructs comprised by CFIR, and derived from the subconstruct descriptions provided by Damschroder et al. [23]. Where appropriate, questions regarding some CFIR subconstructs will be adapted to a multi-organisational and/or digital context.

Study 2: Observational Study

Participants

Participants in the observational study will be self-identified Australian HCWs who currently reside in Australia and have sufficient English proficiency to participate. Participants status as HCWs will be verified using the Australian Health Practitioner Regulation Agency's register of practitioners. Participants who cannot be verified using the register of practitioners will be contacted on a case-by-case basis to confirm eligibility.

Recruitment

Participants for the observational study will be recruited through advertisements on social media, emails sent to health professionals on an internal Black Dog Institute mailing list, emails from TEN partner organisations, as well as information about the study on the Black Dog Institute and TEN websites. Prospective participants who engage with advertisements or study details on the TEN Website will be redirected to the online participant information statement and consent form. Participants who elect not to participate in the study will be provided with a link to TEN and informed they may use the service freely and anonymously.

Data Collection

Quantitative data will be collected through an observational study with Australian HCWs (Figure 2). Participants will provide online consent using the e-Consent feature of REDCap. People who decline to participate will be provided with a link to TEN and asked to complete a brief survey asking why they opted not to participate.

After consenting, participants will provide information on demographics and mental health (Table 2), service acceptability (Table 3), as well as complete baseline mental health and stigma outcomes (Table 4). Mental health outcomes are identical to the TEN online assessment. To avoid the participant needing to repeat the online assessment on the TEN Website after completing the baseline mental health outcomes, the survey baseline will provide the same assessment feedback. Participants will then be provided with a link to the TEN Website and asked to engage with the service naturalistically for six months. The link provided to each participant is unique and associated with their consent record number. User engagement (e.g. pages viewed) with the TEN Website is recorded automatically through the SAS Customer Intelligence 360 (SAS CI 360) platform. SAS CI 360 is a commercial website analytics package that records website use. Using unique TEN Website links sent to participants, the TEN Website use of study participants will be extracted and linked to their other study data. Participants will be recommended to bookmark this link and their unique link will be provided to them by email at baseline and after the 1-month follow-up.

After using TEN for one month, participants will be provided with a survey containing service acceptability (Table 3), mental health and stigma outcomes (Table 4), feedback on the implementation strategy (Table 5), and self-reported service engagement (Table 5). After completing the survey, participants will be informed that their TEN Website usage will be monitored for a further five months to examine persistence with the service. After six months, participants will be provided with a follow-up survey about employment (Table 2) and mental

health outcomes (Table 4).

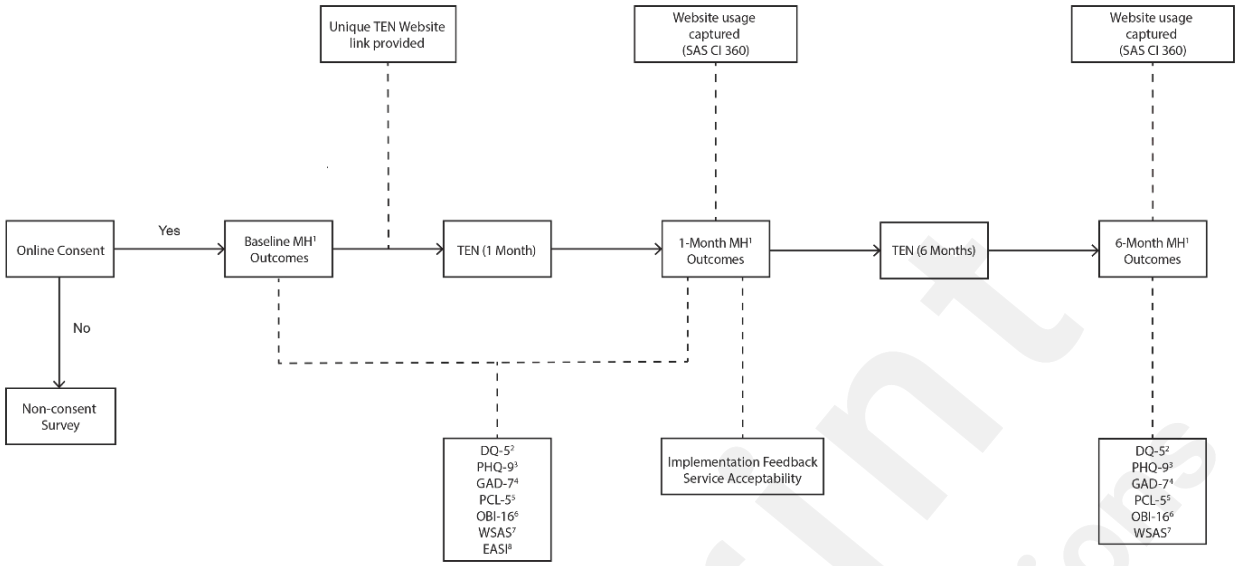

Figure 2. Flow chart depicting a progression through the observational study. [1]Mental health, [2]Distress Questionnaire, [3]Patient Health Questionnaire, [4]Generalised Anxiety Disorder, [5]Posttraumatic Stress Disorder Checklist, [6]Oldenburg Burnout Inventory, [7]Work and Social Adjustment Scale, [8]Endorsed and Anticipated Stigma Inventory.

Table 2. Table depicting questions examining demographic and baseline mental health.

Baseline Question	Timepoint	Classification	Type of Question
Gender	Baseline	Demographics	Single selection
Age	Baseline	Demographics	Single selection
Where are you located?	Baseline	Demographics	Single selection
What best describes your profession?	Baseline	Demographics	Single selection
Have you previously used the TEN service?	Baseline	Mental Health	Yes / No
COVID-19 affected my mental health	Baseline	Mental Health	Likert scale
Have you ever seen a doctor, counsellor, or other health professional about your mental health?	Baseline	Mental Health	Yes / No
If you were seeking help for a mental health problem, what type of service would you most likely choose?	Baseline	Mental Health	Multiple selection
Which of the following were the most important reasons why you chose to participate in this study?	Baseline	Mental Health	Multiple selection
Which parts of TEN are you most interested in?	Baseline	Mental Health	Multiple selection
What is your current employment status as a healthcare worker?	6 Month	Employment	Single selection

TEN Service Acceptability

Service acceptability will be examined through survey questions provided to participants at both the 0- and 1-month timepoints. The questions will examine whether TEN met the participants' mental health needs and the TEN services they found the most useful (Table 3). People who decline to participate in the study will be prompted with an optional survey with a single question asking them why they opted not to participate in the study.

Table 3. Table depicting questions examining TEN service acceptability.

Service Acceptability Question	Timepoint	Type of Question
If you were seeking help for a mental health problem, what type of service would you most likely choose?	Baseline	Multiple selection
Which of the following were the most important reasons why you chose to participate in this study?	Baseline	Multiple selection
Which parts of TEN are you most interested in?	Baseline	Multiple selection
If you needed to, would you use the TEN Clinic if there was a service charge?	1 Month	Yes / No
If you needed to, would you use the TEN Clinic if it was provided under Medicare?	1 Month	Yes / No
TEN met my mental health and wellbeing needs.	1 Month	Likert scale
TEN improved my awareness of my mental health	1 Month	Likert scale
TEN improved my psychological coping skills	1 Month	Likert scale
A mental health service I found through TEN improved my psychological coping skills	1 Month	Likert scale
I would recommend TEN to a colleague.	1 Month	Likert scale
Which parts of TEN were most useful to you?	1 Month	Multiple selection
Why did you find these parts of TEN useful?	1 Month	Free text
Did TEN make it easier for you to find the mental health support you wanted?	1 Month	Yes / No
Did TEN help you learn about new sources of support?	1 Month	Yes / No
Did you have any other feedback about TEN?	1 Month	Free text

Mental Health and Psychosocial Outcomes

Mental health and psychosocial outcomes will be examined through surveys provided to participants at both the 0-, 1-, and 6-month timepoints. The questionnaires employed examine a range of outcomes, including the Distress Questionnaire (DQ-5) [25], the Patient Health Questionnaire (PHQ-9) [26], the Generalised Anxiety Disorder (GAD-7) [27], the Posttraumatic Stress Disorder Checklist (PCL-5) [28], the Oldenburg Burnout Inventory (OBI-16) [29], the Work and Social Adjustment Scale (WSAS) [30], and the Endorsed and Anticipated Stigma Inventory (EASI) [31] (Table 4). In order to address workplace stigma unique to HCWs, a question addressing mandatory reporting concerns was added into the workplace stigma subscale of the

EASI. Except for the EASI, these questionnaires are identical to those used in the TEN online assessments. Completed online assessments are automatically collected and stored on UNSW servers. Any completed online assessments will be linked back to the participant using their IP address collected during online consent.

Table 4. Table depicting mental health and psychosocial instruments.

Questionnaire	**Outcome**
DQ-5	Psychological distress
PHQ-9	Depression
GAD-7	Anxiety
PCL-5	Post-traumatic stress disorder
OBI-16	Burnout
WSAS	Social- and work-related impairment
EASI	Mental health stigma

TEN Implementation Feedback

Feedback on the strategy will be examined through survey questions provided to observational study participants at the 1-month timepoint. Participants will first be presented with a brief overview of the implementation strategy. The questions after this overview will examine whether the implementation strategy is an effective strategy for engaging HCWs, as well as open-ended feedback on the implementation strategy (Table 5).

TEN Service Engagement

Engagement with TEN will be examined through survey questions provided to participants at the 1-month timepoint, as well as through website and service analytics. The questions will examine self-reported usage of TEN (Table 5). Website user analytics are automatically collected through the SAS CI360 platform whenever a user interacts with the TEN Website. These user analytics include the IP address of the user as well as which pages or resources were accessed and when. User analytics will be linked to the participant using the IP address provided during consent. TEN Clinic clinicians will also provide data from person-to-person clinical services, including whether a participant accessed the TEN Clinic and the number of sessions.

Table 5. Table depicting questions examining the implementation strategy and service engagement.

Implementation Feedback Question	**Type of Question**
Would you agree that this would be an effective strategy for engaging most healthcare workers with TEN?	Likert scale
Would you agree that this would be an effective strategy for engaging your specific healthcare profession with TEN?	Likert scale
Do you have any thoughts about this strategy or suggestions for other strategies to engage more healthcare workers with TEN?	Free text
Service Engagement Question	
How much did you use the TEN service over the month?	Likert scale
Roughly how many times would you say you accessed TEN over the month?	Numerical

Sample size

Sample size calculations were based on the primary analysis: a random intercepts mixed-effects model estimating change in WSAS scores from baseline to 1 month in a single group of participants. Estimated scores at baseline were derived from 249 TEN mental health assessments performed between 28/06/21 and 31/08/21. These scores represent HCWs self-selecting to engage with the TEN service and, as such, are analogous to the observational study participants at baseline. The mean of scores in this group was 14.9 (SD=8.9). The cut-off score for a clinical case on the WSAS is 11, thus to reduce from the mean untreated score of 14.9 to a subclinical score requires an 3.87-point reduction. With variance-covariance of random effects derived from the standard deviation in WSAS scores from current TEN users of 8.9, and accounting for 20% attrition, a sample size of at least 105 is required to detect a true reduction of this size with 80% power and significance level of $\alpha = 0.05$.

Study 3: Implementation Study

Participants

Participants in the implementation study will be self-identified Australian HCWs.

Data Collection

Quantitative data will be collected through an audit of usage of the TEN Website and TEN Clinic both for a period of three months before and after the implementation of the implementation strategy. While the exact implementation strategy will be determined by the results of the consultation study, example strategies from the literature include identifying ‘champions’ within an organisation to drive uptake or develop incentives, such as continuing professional development activities [32]. TEN Website data includes completed online assessments automatically recorded on UNSW servers and website analytics (e.g. number of unique users, pages viewed) automatically collected through the SAS CI360 platform. TEN Clinic data includes service analytics data are routinely captured by clinicians in the delivery of TEN Clinic services. Surface-level nonidentifiable TEN Clinic data will be examined as part of the implementation study (e.g. number of referrals, number of consultations).

Results

Study 1: Consultation Study

Data Analysis

A framework analysis using the CFIR will be conducted to thematically analyse and interpret the semi-structured interviews from the consultations. Each transcript will be analysed separately by two investigators who will meet periodically throughout data collection to discuss emerging themes and resolve discrepancies. The sample size is expected to be sufficient for thematic saturation [33].

Ethics

The consultation component received approval from the UNSW Human Research Ethics Panel (HC Number 3500) on 7 June 2021.

Study 2: Observational Study

Data analysis

Descriptive statistics will be used to report overall acceptability of TEN. The results from the observational study will be analysed using linear mixed models to examine changes in reported psychosocial benefits over time (i.e. baseline, 1 month). Patterns of service engagement and baseline outcome severity will be classified using cluster analyses or latent class analyses. These patterns will be used to examine how service engagement influences outcomes, as well as stratify participants baseline outcomes for subset analysis. Kaplan-Meier curves with TEN engagement data be used to examine persistence with TEN over the course of the 6-month follow-up (i.e. when participants ceased accessing the service). Missing data will be addressed using maximum likelihood estimation. This will answer the research questions by examining acceptability of TEN among HCWs, patterns of service usage over time, any benefits observed after engaging with the TEN service, as well as persistence with the service over time.

Ethics

The observational component received approval from the UNSW Human Research Ethics Committee (HC Number 210394) on 22 July 2021.

Study 3: Implementation Study

Data Analysis

Descriptive statistics will be used to report usage of the TEN Website and TEN Clinic over the three-month period both pre- and post- implementation strategy. T-tests will be used to compare overall usage of the TEN service for these two periods. Linear mixed models to examine latent growth in service usage following the implementation strategy.

Ethics

Ethics approval for the implementation study will be sought from the UNSW Human Research Ethics Committee following design of the implementation strategy.

Discussion

Blended digital and person-to-person care has significant potential to support mental health of HCWs through service flexibility and widespread availability. To date, however, the potential of blended care has been hampered by a lack of knowledge around the optimal implementation of such services. The CFIR framework provides a structured approach to implementation that will guide the development and application of implementation strategies for TEN. Using a hybrid implementation-effectiveness study, the present implementation study will span three separate components. Through a series of consultations an implementation strategy tailored to HCWs will be developed. Feedback on this strategy will be provided by HCWs participating in an observational study of TEN, from which data on the effectiveness of TEN will be acquired. Finally, the implementation strategy will be implemented and compared against the previous

engagement strategies. The knowledge created by this project will inform the development and both delivery of blended mental health services and services for HCWs, including how such services can be rapidly launched and implemented during times of crisis.

Potential Limitations

While the implementation strategy has not yet been designed, the wide availability of TEN makes it difficult to examine site- or specialisation-specific implementation strategies or service upgrades. While the goal of TEN is to provide a blended care service for all Australian HCWs, this lack of specificity may hamper implementation within specific HCW specialisations. The future of blended health is platforms that can be easily customised to different contexts – allowing for tailored implementation strategies and service upgrades. Similarly, the broad aims of the implementation of TEN may not be easily generalisable to other, more specific, contexts.

This implementation study and observational study will also be carried out during the ongoing COVID-19 pandemic. TEN itself was designed to support the mental health of HCWs during the pandemic. As such, changes in the COVID-19 context in Australia, such as outbreaks, restrictions, and the vaccination rollout, are likely to affect both uptake of the service and mental health outcomes. Such wider events will be considered when interpreting the results of both the implementation strategy and observational study.

The observational study is also limited by a lack of an appropriate control arm and use of randomisation. Common mental health outcomes, such as distress, anxiety, and depression, have the potential to improve over time without intervention. While subgroup analyses examining usage of the service may shed some light on improvement without the use of the TEN service, it remains that a randomised-controlled trial design with a suitable control would provide more robust data on efficacy.

Due to common concerns around mandatory reporting among HCWs [34], the TEN Website was designed to be accessed anonymously (i.e. without registration). While this is a strength of the service itself, it poses problems for measuring participant engagement with the TEN Website during a prospective study. The method employed in the observational study – providing users with a unique website link – is error-prone. While participants are asked to bookmark the link and will be provided with the link via email, it remains that participant may simply access the TEN Website without using their unique link. During data analysis, participant website analytics will be compared against self-reported usage to understand the extent of such errors.

By using a blended care approach, TEN can overcome common barriers to HCWs engaging with mental health services – primarily by allowing HCWs to anonymously access digital resources. Nonetheless, it remains that many HCWs will still choose not to engage with person-to-person services due to concerns around mandatory reporting. Further, while the lack of registration to access TEN ameliorates concerns around digital privacy, it requires computer skills that some HCWs may be lacking. While these are issues beyond the scope of the present evaluation, they need to be considered and addressed when designing and implementing mental health services for HCWs.

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Conflicts of Interest

Authors PAB and MJB are supported by funding for TEN.

Authors' Contributions

Authors MJC and PAB were responsible for initial draft of the manuscript. Authors MJB, JN, TS, SH, LM, AS, NC, JT, SBH, and HC provided input on subsequent drafts of the manuscript. Authors MJC, PAB, and MJB were responsible for the design of the implementation study. Authors PAB, MJB, JN, SBH, and HC were responsible for the development and delivery of TEN.

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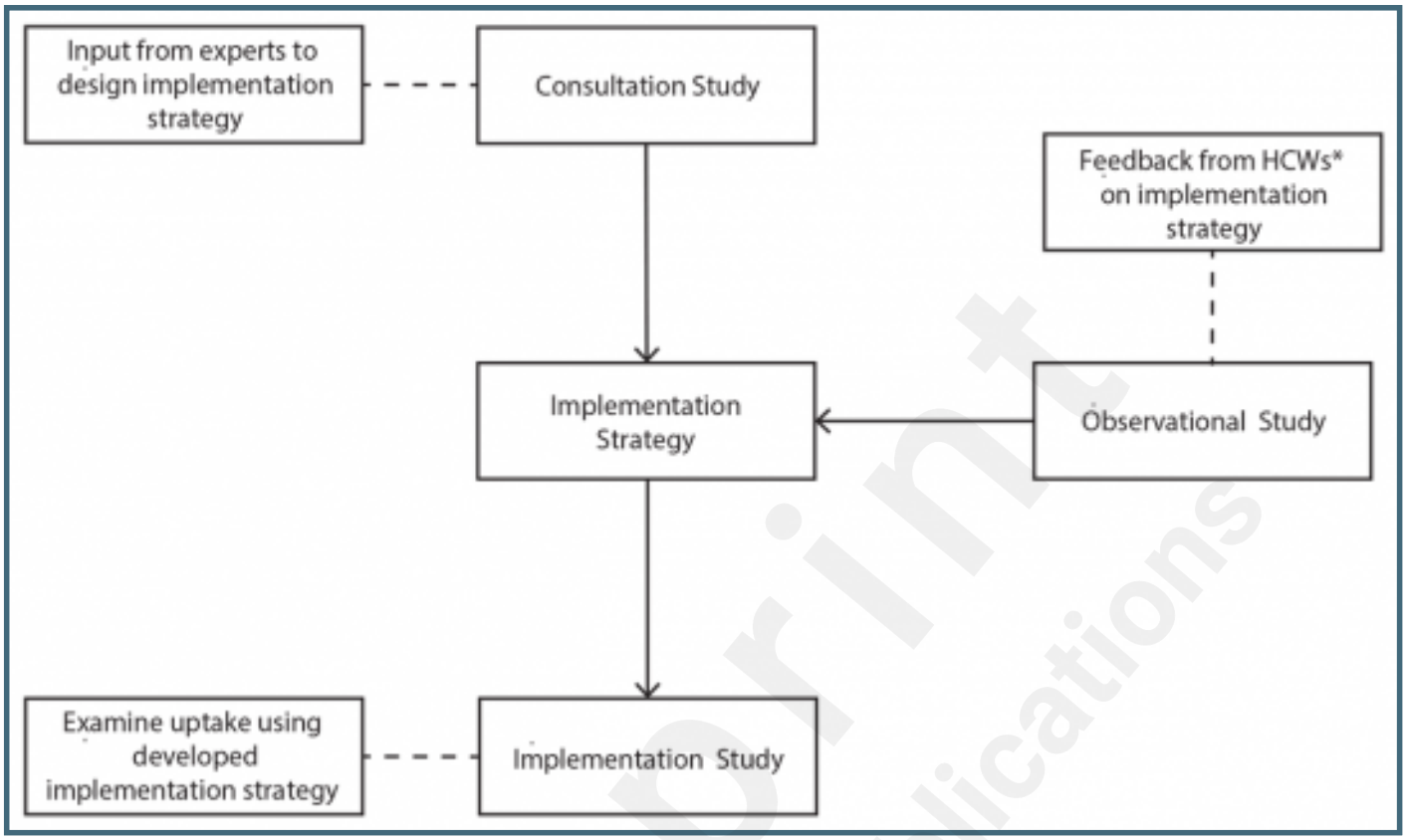
Supplementary Files

Figures

Example screenshots from the TEN Website, which home page (left), an online mental health assessment tool (top right) and includes evidence-based tools for practical self-help (bottom right).

Flow chart depicting the design and components of the implementation trial. *Healthcare workers.



Flow chart depicting a progression through the observational study. 1Mental health, 2Distress Questionnaire, 3Patient Health Questionnaire, 4Generalised Anxiety Disorder, 5Posttraumatic Stress Disorder Checklist, 6Oldenburg Burnout Inventory, 7Work and Social Adjustment Scale, 8Endorsed and Anticipated Stigma Inventory.