

THE WELLSING PROJECT

An Investigation into the Effect of Individual Online Singing for Well-Being on Emergency
Service Personnel with Post-traumatic Stress Disorder.

By

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Part 1 - Project Proposal

1.1. Project Title.

An Investigation into the Effect of Individual Online Singing for Well-Being on Emergency Service Personnel with Post-traumatic Stress Disorder.

1.2. Context

The overarching aim of this research project is to investigate the effectiveness of structured, self-administered and independent singing interventions, delivered online, to positively enhance mental health and well-being for emergency service personnel with post-traumatic stress disorder (PTSD). Research outcomes may guide the ongoing development and refinement of evidence-based vocal pedagogy aimed at supporting individuals with mental health illness (American Psychiatric Association, 2025). Further, outcomes may advance current knowledge with regard to the mechanisms through which active participation in singing may support symptom management and recovery (Williams *et al.*, 2018; de Witte *et al.*, 2022). However, whilst singing interventions are recognised for their universal appeal and potential neurobiological and psychosocial benefits (Wei *et al.*, 2024), the literature lacks standardised and detailed reporting of vocal exercises and repertoire used within singing for mental health studies, making synthesis and replication challenging. Therefore, this research project aims to provide a transparent basis for standardised vocal pedagogy intervention and to investigate its effect on mental health and well-being, serving the unique needs of emergency service personnel with post-traumatic stress disorder (Nowakowska *et al.*, 2019).

Grounded by Self-Determination Theory (SDT) (Deci and Ryan, 2000) this study is influenced by my personal experience with PTSD, acquired from more than two decades in law enforcement in Australia whilst holding a professional singing career alongside. Singing became a protective factor in my recovery and aided in: mood management and stress reduction (Stewart and Lonsdale, 2016; de Witte *et al.*, 2022); rebuilding resilience and social identity (Foley *et al.*, 2021); restoration of executive functioning (Schellenberg, 2004; Williams *et al.*, 2018; Shakespeare and Whieldon, 2018; Lanius *et al.*, 2015). Investigating the intersection at which the neurological, psychological and physiological benefits of singing converge with the deficits experienced in PTSD has been the focus of my research, with the express purpose of providing complementary non-clinical therapeutic singing interventions for individuals with PTSD

in future (Yehuda, 2015). As I do not currently operate a vocal studio, this project is approached primarily through the lens of a researcher.

1.3. Justification

Active participation in singing has been shown to improve mental health outcomes (Williams *et al.*, 2018), reduce symptoms of depression (Petchkovsky *et al.*, 2013), enhance functioning and mood (Shakespeare and Whieldon, 2018) and reduce stress (de Witte *et al.*, 2022). Singing activities may fulfill fundamental psychological needs for autonomy, competence and relatedness (Deci and Ryan, 2000) and may elevate mood (Dingle *et al.*, 2021), promote relaxation (Besk-Gernsheim *et al.*, 2000) and enhance mental alertness and cognitive performance (Schellenberg, 2004). Whilst group singing offers well-being benefits (Williams *et al.*, 2018; Clift *et al.*, 2010; Clift *et al.*, 2017), independent singing allows individuals to overcome the fear of singing with others (Hogle, 2021) and promotes uninhibited emotional expression without fear of judgement (Davidson and Garrido, 2019). As singing influences emotional processes (van der Kolk, 2000), this project will explore the potential mental health and well-being benefits of independent, self-directed singing interventions, delivered online, for emergency service personnel with PTSD (Hogle, 2021).

Integrating evidence-based vocal pedagogy (Ragan and Kapsner-Smith, 2019; Sousa *et al.*, 2020) and digital health solutions (Alqahtani *et al.*, 2021) offers a promising accessible, cost-effective and less stigmatising approach to symptom management (Kyron *et al.*, 2023). This intervention is designed to address key adjunct therapeutic objectives: a reduction in anxiety (Subramanian *et al.*, 2023; Singh and Raghavendran, 2021; Jain, 2021; Ghordadekar *et al.*, 2020); an increase in interoceptive awareness (Hegberg *et al.*, 2019; Wallman-Jones *et al.*, 2023; Ahmadi *et al.*, 2022; Martin *et al.*, 2024) and; an improvement in vocal resonance by reducing vocal tract tension, symptomatic of PTSD (Scherer *et al.*, 2013; Ter *et al.*, 2022; Orhon *et al.*, 2022; Nam *et al.*, 2019; Sahin, 2020; Saldias *et al.*, 2020; Titze, 1996).

1.4. The Intended Impact

This project intends to produce a transparent, standardised, evidence-based and online intervention focused on vocal pedagogy, tailored to the neurological, psychological and physiological needs of emergency service personnel with PTSD (Wei *et al.*, 2024). Further, this research intends to measure the effectiveness of the intervention on the mental health and well-being of this population, providing a basis for replication and expansion in future

pedagogical studies given the methodological ambiguity found in singing for mental health literature (Williams *et al.*, 2018; de Witte *et al.*, 2022). The impact of research findings may guide the ongoing development of evidence-based vocal pedagogy and trauma-informed practice aimed at individuals with mental health illness (American Psychiatric Association, 2025) in pursuit of an accessible, low-cost, less stigmatising and complementary therapeutic modality (Nowakowska *et al.*, 2019).

1.5. The Outlined Intention

Adopting a pragmatic, mixed methods sequential explanatory design (Ivankova *et al.*, 2006) this research will be completed in three phases: (1) Narrative Literature Review, (2) Quasi-Experimental Research (Quantitative), (3) Unstructured Participant Interviews (Qualitative).

1.5.1. Literature Review

A narrative literature review will examine evidence-based vocal pedagogy practice that has been shown to reduce anxiety (Subramanian *et al.*, 2023; Singh and Raghavendran, 2021; Jain, 2021; Ghordadekar *et al.*, 2020), enhance interoceptive awareness (Hegberg *et al.*, 2019; Wallman-Jones *et al.*, 2023; Ahmadi *et al.*, 2022; Martin *et al.*, 2024), and address symptomatic vocal quality issues associated with PTSD (Scherer *et al.*, 2013). The review process will align with Efron and Ravid's (2019) structured approach, whereby the research topic is refined to ensure appropriate scope resulting in the development of a focused review question and identification of relevant keywords (Table 1). A comprehensive search of key databases including PubMed, Elsevier, Science Direct, Sage, ResearchGate, Google Scholar and the University of Wales Trinity Saint David online library will be conducted. This review will be supplemented by a search of grey literature for the latest insights into digital technologies.

Table 1. Keywords for Literature Search.

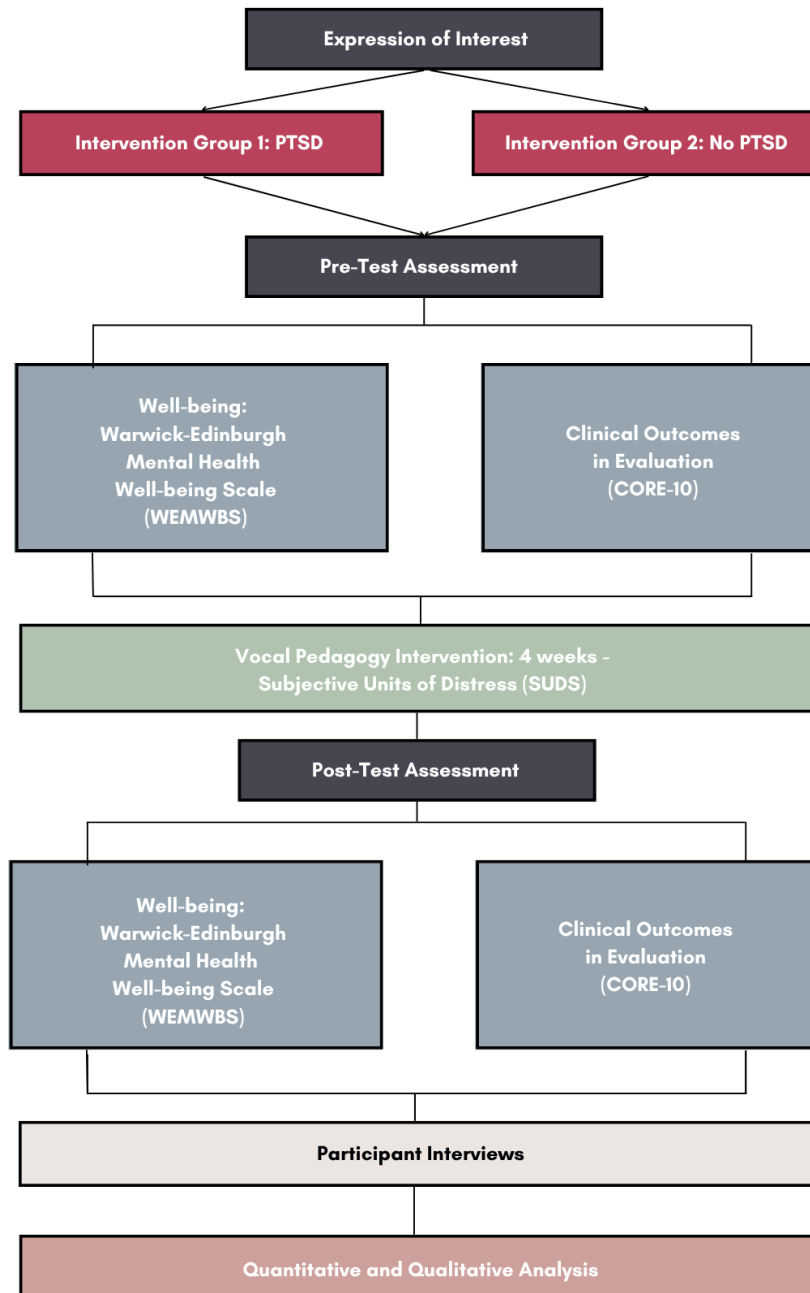
Keywords for Literature Search				
Breathing	Movement	Vocal Pedagogy	Technology	Psychology
Breathing Techniques for Singers	Movement and Singers	Vocal Pedagogy	Digital Technologies and Singing	Trauma-Informed Singing
Breathing	Movement and	Vocal Pedagogy	Digital	Trauma-Informed

Techniques for Anxiety	Anxiety	and Mental Health	Technologies and Mental Health	Vocal Pedagogy
Breathing and Vocal Pedagogy	Movement and Vocal Pedagogy	Singing and Mental Health / Well-being	Digital Technologies and Vocal Pedagogy	Negative Bias in Music Stimuli
Breathing and Emotion	Movement and Emotion	Singing and Emotion Regulation	Digital Technologies and Education	Cognitive Load in Music and Digital Technologies
Breathing and Emotion Regulation	Movement and Emotion Regulation	Individual Singing and Mental Health / Well-being	Digital Technologies Design	Symptom Management PTSD

1.5.2. Quasi-Experimental Research

This research will adopt a pragmatic, mixed-methods, repeated-measures design with within-subject factors. In the pre-test Onboarding Questionnaire (Appendix 8, 7.1) participants will be asked to self-report a diagnosis of PTSD. Based upon their response, participants will be assigned to one of two groups: Group 1 (PTSD) or Group 2 (Non-PTSD). Both groups will receive the intervention. A model of the research process is provided in Figure 1.

Figure 1. WellSing Project: Research Project Model.



Participants will be assessed pre- and post-intervention using the Clinical Outcomes in Routine Evaluation (CORE-10) (Appendix 5) and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) (Appendix 6) (Clift *et al.*, 2017; Williams *et al.*, 2019a; Williams *et al.*, 2019b). The participant group (Group 1 (PTSD) and Group 2 (Non-PTSD) are the independent variables whilst the dependent variables are the repeated measures of mental health (CORE-10) and well-being (WEMWBS). Purposive sampling (Creswell, 2009) will be utilised to recruit participants representing emergency service organisations (police, fire, ambulance) in Australia. Inclusion criteria require participants to be over the age of 18 years and be a current or former serving member of an emergency service organisation. Exclusion criteria is the inverse, individuals under 18 years of age and individuals who are not a current or former serving member of an emergency service organisation in Australia. No limitations were placed upon gender, ethnicity or geographical location and no prior engagement with singing will be required. Whilst potential participants hard of hearing were not excluded, future research should consider how best to include such participants, particularly concerning pitch accuracy (Xu *et al.*, 2022).

The overarching research question is: To what extent does participation in an independent, self-directed, online singing program impact the mental health and well-being of emergency service personnel with and without a diagnosis of PTSD? The following hypotheses are offered:

Null Hypotheses

H0a: Post-intervention, there will be no statistically significant difference in Clinical Outcomes in Routine Evaluations (CORE-10) scores between participant groups.

H0b: Post-intervention, there will be no statistically significant difference in Warwick-Edinburgh Mental Well-being Scale (WEMWBS) scores between participant groups.

Alternative Hypotheses

H1: Post-intervention, participants with PTSD will demonstrate a significantly greater reduction in Clinical Outcomes in Routine Evaluations (CORE-10) scores compared to participants without PTSD.

H2: Post-intervention, participants with PTSD will report significantly higher scores in Warwick-Edinburgh Mental Well-being Scale (WEMWBS) compared to participants without PTSD.

The intervention is a four week (Wang *et al.*, 2024) online program called The WellSing Project (Alqahtani *et al.*, 2021) which delivers foundational vocal pedagogy tailored to the unique needs of the population being studied (Scherer *et al.*, 2013; Wallman-Jones *et al.*, 2023; Subramanian *et al.*, 2023). Participants receive one voice lesson per week, each approximately 45 minutes duration (Lee *et al.*, 2023), to be completed in their own time and space within that week. Participants will be asked to rate their Subjective Units of Distress (SUDS) (Appendix 7) pre- and post-lesson, on a 10 point likert scale and will be encouraged to provide feedback on their experience in a short weekly questionnaire. At the completion of The WellSing Project, participants will be asked to complete an Offboarding Questionnaire (Appendix 8, 7.2) which will include the post-intervention CORE-10 and WEMWBS measures. Quantitative data will be statistically analysed using IBM SPSS and DataTab to produce empirical findings.

1.5.3. Participant Interviews

Unstructured interviews (Creswell, 2009) will be conducted via phone with willing participants to explore more fully, their personal experiences in undertaking The WellSing Project. These interviews will serve a dual purpose: to provide a more holistic understanding of participant experience and to gain insight into specific needs of the population that inform future solutions. Participants will be reminded to consult with their medical team prior to participation if relevant to their circumstances and that they may cease the interview at any time. Participant interviews will be recorded and qualitative data will be transcribed, including notations for pauses and nonverbal cues to ensure accurate representation (Riger and Sigurvinsdottir, 2016). The transcripts will then be analysed inductively using NVivo software, with a focus on thematic analysis (Riger and Sigurvinsdottir, 2016).

1.6. The Project Timeline

The project's implementation is detailed in the GANTT chart presented in Table 2. A more comprehensive project timeline is found in Appendix 1.

Table 2. WellSing Project GANTT Chart.

The WellSing Project									
Task	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Project Planning and Ethical Approval									
Literature Review									
Pre-Intervention Assessments									
Intervention Phase (4 Weeks)									
Post-Intervention Assessments									
Quantitative Data Analysis									
Qualitative Data Analysis									
Final Report									
Presentation									

1.7. Ethics and Insider Research

This research was granted ethical approval by the Wales Academy of Professional Practice and Research (WAPPAR) at the University of Wales Trinity Saint David (UWTSD) on the 3rd of February, 2025 (Appendix 2). Whilst the population under study does not strictly fit the criteria of ‘vulnerable persons’ (National Health and Medical Research Council, 2025) as they are deemed capable of informed consent, careful attention has been given to ensuring the research design mitigates any potential discomfort for participants with PTSD. Research design facilitates remote participation with a focus on self-administration, allowing individuals to engage in the security of their own home at their own pace. All participants are advised to consult their medical practitioner prior to agreeing to participate and are informed of their right to withdraw at any time without consequence (Appendix 8, 7.1). A Participant Information Sheet (Appendix 4) is provided which details the potential risks and benefits of The WellSing Project and details 24/7 mental health and organisation specific, welfare service contact information. Finally, informed

consent (Nusbaum *et al.*, 2017) will be obtained from participants via a Consent Form (Appendix 8, 8.2).

Collection of data will be via Google Forms which complies with the Australian Privacy Act 1988 (Office of the Australian Information Commissioner, 2025). Only essential data for the research purpose will be collected and anonymisation will be enacted in accordance with the University of Wales Trinity Saint David Research Data Management Policy (2022). Quantitative and qualitative data collected will be held on a secure password protected device, within two-factor authentication cloud storage accessible only to the primary researcher. The research is also influenced by several ethical frameworks: The Australian Code for the Responsible Conduct of Research (2018) which provides foundational principles for honest, ethical, and conscientious research within an Australian context and the University of Wales Trinity Saint David Research Ethics and Integrity Code of Practice (2022) which emphasises honesty, rigour, transparency, respect, and accountability. Guidance is also sought from codes of ethics from the Australian National Association of Teachers of Singing (2023), the Australian Music Therapy Association (2021) and the Australian Psychological Society (2007).

As an insider researcher, distinct advantages exist with regard to accessing difficult to reach participants, quickly establishing rapport and navigating the research process with a deeper, more nuanced understanding (Scott, 2022). However, insider research introduces nuanced ethical and methodological complexities. Being a member of the population to be studied necessitates rigorous reflexivity to remain objective (Chammas, 2020). Reflexivity is crucial in acknowledging how my own identity, background, and lived experience as a former police officer with PTSD intersects with the literature and influences this research (Asselin, 2003). Balancing empathetic understanding with critical detachment requires careful reflection and helps mitigate the influence of personal assumptions (Chammas, 2020). To mitigate bias, a disciplined self-reflection process will be maintained, complemented by regular supervision sessions. Clear boundaries will be established concerning the researcher role, the limitations of the intervention, and the availability of external support services for participants.

1.8. Individual Learning Outcomes

The individual learning outcomes are:

1. To investigate the potential impact of structured voice intervention programs on mental health and well-being of individuals with PTSD.

2. To increase knowledge and competence regarding the delivery of vocal pedagogy programs to individuals with PTSD.
3. To further develop skills in undertaking research and analysis of both quantitative and qualitative data.
4. To acquire knowledge with regard to the delivery of vocal pedagogy programs via digital technologies tailored to the requirements of individuals with PTSD.

Part 2 - Project Report

2.1. Introduction

Whilst singing interventions demonstrate promise for their neurobiological and psychosocial benefits for mental health and well-being (Bind *et al.*, 2023), existing literature frequently lacks detailed reporting of vocal exercises and repertoire needed for comprehensive synthesis and replication (Wei *et al.*, 2024; Dingle *et al.*, 2017). This research addresses this gap by establishing a transparent, standardised vocal pedagogy intervention for individuals with Post-Traumatic Stress Disorder (PTSD), with a focus on the unique needs of emergency service personnel (Klimley *et al.*, 2018). The primary aim is to investigate the effectiveness of independent, structured and self-administered singing interventions delivered online, on mental health and well-being (Hays *et al.*, 2019). This will be accomplished through an initial review of singing for mental health research with particular attention given to the impact of structured breathing (Kim *et al.*, 2013), movement (Malviya, 2022) and vocal exercises (Orhon *et al.*, 2022) on psychological well-being. Further, the design and usability requirements for online interventions will be briefly reviewed (Alqahtani *et al.*, 2021) in support of The WellSing Project. Ultimately, this research seeks to advance current understanding of the mechanisms by which active participation in singing may enhance well-being and inform the development of evidence-based online resources for emergency service personnel with PTSD.

2.2. Literature Review

This narrative literature review will examine evidence-based vocal pedagogy practice that has been shown to reduce anxiety (Subramanian *et al.*, 2023; Singh and Raghavendran, 2021; Jain, 2021; Ghordadekar *et al.*, 2020), enhance interoceptive awareness (Hegberg *et al.*, 2019; Wallman-Jones *et al.*, 2023; Ahmadi *et al.*, 2022; Martin *et al.*, 2024), and addresses symptomatic vocal quality issues associated with PTSD (Scherer *et al.*, 2013) to inform the design of The WellSing Project and associated research methodologies.

2.2.1. The Problem of Post-Traumatic Stress Disorder

Post-traumatic Stress Disorder (PTSD) is a consequence of severe emotional trauma arising from prolonged and systematic exposure to traumatic events (Pezzin *et al.*, 2018). According to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (American Psychiatric Association, 2013), the diagnosis of PTSD is characterised by four broad symptom clusters

including the intense re-experiencing of traumatic events through disruptive memories and nightmares (Hegberg *et al.*, 2019); avoidance of trauma related stimuli (Pant *et al.*, 2022); negative cognitions and mood (Pant *et al.*, 2022); difficulty concentrating and hyperarousal (Ophir *et al.*, 2020). It is reported that PTSD affects 7.6% of veterans and 3.5% of adults in the general population (Hegberg *et al.*, 2019). Emergency service personnel experience diminished mental well-being, heightened psychological distress and are diagnosed with PTSD at twice the rate of the general adult population (Kyron *et al.*, 2023). The prevalence of PTSD in active emergency service personnel is estimated at 10% and significantly higher amongst retired personnel (Phoenix, 2020). Whilst there are evidence-based psychological interventions available, including Cognitive Behavioural therapy (CBT) (Foa *et al.*, 1999), Eye Movement Desensitisation and Reprocessing Therapy (EMDR) (Pitman *et al.*, 1996), these therapies are time intensive, lack accessibility, require highly specialised training and experience high attrition rates (between 20-30%) (Hembree *et al.*, 2003).

Barriers to treatment initiation for emergency service personnel with PTSD include lack of motivation, cost, and accessibility (Sayer *et al.*, 2009), compounded by the perception of stigma and weakness (Haugen *et al.*, 2017; Jones *et al.*, 2020), with departmental psychological services being the least preferred option (Tamraker *et al.*, 2020). Kim *et al.* (2013) found that 39% of individuals with PTSD utilised complementary therapies, including mind-body practices, which positively impacted quality of life, reduced stress, and improved health outcomes. Singing, in particular, may benefit individuals with PTSD by engaging the parasympathetic nervous system (Perry *et al.*, 2023) and normalising cortisol levels (Fancourt *et al.*, 2016), thereby reducing psychological stress and enhancing cognitive and emotional control through disengagement from automatic thoughts (Sauer *et al.*, 2013; Perry *et al.*, 2023). Additionally, active participation in singing is broadly accessible, low-cost intervention that may circumvent negative connotations associated with conventional mental health treatment approaches (Dickstein *et al.*, 2010).

2.2.2. Singing as Adjunct Therapeutic Intervention

Singing has emerged as a promising therapeutic modality due to its neurobiological and psychosocial benefits stemming from its universal appeal and natural form of musical expression (Heydon *et al.*, 2020; Jones, 2020). Numerous global studies demonstrate the therapeutic efficacy of singing for mental health (Bind *et al.*, 2023; Fancourt and Perkins, 2018;

Foulkes, 2021; Baker *et al.*, 2018; Han *et al.*, 2018; Wei *et al.*, 2024), citing physiological benefits including reduced cortisol (Fancourt *et al.*, 2016), enhanced immune function (Kang *et al.*, 2018) and lowered blood pressure (Beck *et al.*, 2000; Clift *et al.*, 2010; Tavorima *et al.*, 2014). Psychologically, singing is linked to improved mood, positive emotions and enhanced emotional expression (Bailey and Davidson, 2002; Kreutz, 2014; Legace *et al.*, 2015). These outcomes demonstrate the potential opportunity for singing interventions to assist with emotion regulation, serving as a healthy distraction and providing grounding mechanisms for individuals with mental health illness (Bibb *et al.*, 2017; von Lob *et al.*, 2010; de Witte *et al.*, 2022).

However, music may also reinforce and exacerbate negative emotional states (Garrido and Schubert, 2013), therefore, it is imperative that careful consideration be afforded vocal exercise and repertoire curation aimed at maximising positive psychological outcomes and minimising negative affect (Juslin *et al.*, 2011).

Music is an established tool for promoting emotional well-being in individuals with a range of psychological disorders including depression (Petchkovsky *et al.*, 2013), anxiety (Hetland *et al.*, 2015) and PTSD (Bensimon *et al.*, 2008). The primary mechanism responsible for this therapeutic effect is emotion regulation, specifically, the modulation of arousal levels and enhancement of positive emotions whilst reducing negative emotions (Thayer *et al.*, 1994; Dingle *et al.*, 2017; Juslin *et al.*, 2011). Receptive engagement, such as passive listening to music, may improve emotional and cognitive function (Chan *et al.*, 2009; Forsblom *et al.*, 2009) but active participation is deemed to foster a unique coupling of perception and action, mediated by neural networks associated with both vocal function and emotional response (Han *et al.*, 2023).

Active engagement in music activates extensive sensory, motor, cognitive and emotional pathways in the brain (Vuilleumier and Trost, 2015; Salimpoor *et al.*, 2011) with potential to act on neural circuits associated with autonomic dysregulation seen in PTSD (Wang *et al.*, 2024). Brain imaging studies have demonstrated sustained morphological and functional changes in the hippocampus, amygdala and medial prefrontal cortex (mPFC) in individuals with PTSD (Nemeroff *et al.*, 2006; Francati *et al.*, 2007). An increase in amygdala volume and neural activity is observed in military veterans with PTSD, suggesting that chronic stress and fear strengthen fear-related neural networks (Pieper *et al.*, 2020; Morey *et al.*, 2020) which may impair stimuli discrimination, leading to hypervigilance (Pant *et al.*, 2022). Conversely, the hippocampus shows a reduction in volume (Boccia *et al.*, 2016) and hypoactivation correlated with symptom severity (Wu *et al.*, 2022) which contributes to fear and avoidant behaviours in

non-traumatic contexts (Pant *et al.*, 2022). Thus, chronic stress leads to decreased mPFC volume and hypoactivation, which negatively impacts its ability to regulate emotional processing by the amygdala (Pant *et al.*, 2022). This neurobiological model highlights that adjunct interventions for PTSD should focus on modulating hyperarousal, building a sense of agency and re-establishing neural communication between the amygdala and hippocampus (Pieper *et al.*, 2020; Morey *et al.*, 2020). As sound can activate brain regions linked to either pleasure or anxiety, singing may have a role to play in regulating emotion and cognition (Wang *et al.*, 2024).

Whilst some studies incorporating non-verbal music therapy have demonstrated benefits for symptoms of arousal and reactivity (Landis-Shack *et al.*, 2017), a systematic review by Baker *et al.* (2018) concluded that passive listening had no significant effect on PTSD symptoms and advocated for active music participation such as singing. With a paucity of singing for mental health studies involving PTSD participants, the therapeutic potential of singing for depression is of considerable interest given its comorbidity with PTSD. A comprehensive review by Wei *et al.* (2024) substantiates the efficacy of singing-based interventions in mitigating depressive symptomology and fostering social cohesion. Similarly, a meta-analysis conducted by Daykin *et al.* (2018) corroborated a positive association between music engagement and improved depression outcomes. However, the authors highlight the significant conceptual overlap between formalised music therapy interventions and other singing-based interventions, a finding which underscores the need for a standardised and adaptable therapeutic framework (Wei *et al.*, 2024).

2.2.3. Contrasting Group-based and Independent Singing Interventions

A systematic review by Williams *et al.* (2018) found that group singing interventions significantly enhanced mental health outcomes for adults diagnosed with mental health illness, with moderate to large effect size. Studies involving participants with severe and enduring mental health illness (Grocke *et al.*, 2013) and major depressive disorder (Petchkovsky *et al.*, 2013) demonstrated significant improvements in self-reported well-being and a reduction in depressive symptoms following participation in structured singing programs over 13 weeks of familiar song singing and song composition. A study by Clift *et al.* (2017) also reported significant reduction in mental distress and increased well-being after eight months' participation in a community singing group ($n=26$). In particular, Clinical Outcomes in Routine Evaluation (CORE-10) scores were significantly reduced and Warwick Edinburgh Mental Well-being Scale (WEMWBS) scores were significantly increased. However, the favourable therapeutic outcomes in group singing

may be confounded by social bonding and the emotional regulation it facilitates (Shakespeare and Whieldon, 2018) rather than the intervention's efficacy alone.

Whilst group-based singing interventions offer benefits for some populations, group-based therapies are not widely endorsed as a first-line treatment for PTSD due to the potential for maladaptive trauma comparisons among participants (Rudstam, 2023). Further, PTSD symptoms often result in avoidance of proximity to people, activities and places (Ophir *et al.*, 2020) highlighting an inherent challenge to group interventions. With the increasing integration of technology into therapeutic settings, the potential for independent, self-administered and online delivered singing interventions is elucidated (Perkins *et al.*, 2020; Wei *et al.*, 2024). The accessibility and flexibility of such interventions may promote engagement and facilitate autonomic nervous system balance (Foulkes, 2021).

2.2.4. Singing as Self-Administered Online Intervention

Leveraging technology in singing interventions represents an emerging trend (Foulkes, 2021), exemplified by online group sessions that enhance participant accessibility and foster community through integrated social platforms (Perkins *et al.*, 2020; Wei *et al.*, 2024). According to Wang *et al.* (2024) the design of such online interventions should be guided by three core functional requirements: community, personalisation and motivation. These requirements align with the tenets of Self-Determination Theory (SDT) (Deci and Ryan, 2000; Shi, 2023). SDT posits that intrinsic motivation, the internal drive to engage in an activity for its inherent satisfaction (Deci and Ryan, 2000; Davidson and Garrido, 2019), flourishes when three fundamental psychological needs are met: relatedness, autonomy and competence. Relatedness may be addressed by fostering a sense of community and shared experience, even in self-directed context where participants may engage with online communities, family and friends or develop rapport with the facilitator of singing interventions (Deci and Ryan, 2000). Autonomy, the opportunity for self-governance, is vital for individuals with PTSD who may possess a heightened need to re-establish personal agency (van der Kolk, 2006; Hogle, 2021). This sense of control is essential for learning (Davidson and Garrido, 2019) and trauma recovery (van der Kolk, 2006). Competence, or mastery over challenges, is crucial for developing a sense of self and improving overall well-being and psychological health (López-Garrido, 2023). Intrinsic motivation may be enhanced through incentives that reinforce adaptive behaviours (Hides *et al.*, 2019), whilst the ability to maintain distance or anonymity is

critical for cultivating a secure environment conducive to emotional expression (Lewis *et al.*, 2014).

A crucial issue in singing for mental health research is the lack of standardised therapeutic protocol which complicates the comparison and evaluation of intervention effectiveness (Wei *et al.*, 2024). The absence of a cohesive theoretical framework makes it challenging to establish a comprehensive understanding of the mechanisms of singing therapy (Kang *et al.*, 2018). Kang *et al.* (2018) proposed the evaluation of singing research across three variables: intervention strategies, intervention duration, and participant demographics. In a meta-analysis conducted by Wang *et al.* (2024) the majority of studies reviewed utilised therapist-led interventions involving active music making between 3-16 weeks duration. However, two of the studies involved self-directed interventions which resulted in significant improvements in PTSD symptoms (Hirschberg *et al.*, 2020; Lee *et al.*, 2018). These studies employed passive listening interventions that allowed participants to complete sessions at their convenience, enhancing flexibility and accessibility (Hirschberg *et al.*, 2020; Lee *et al.*, 2018). Intervention durations and frequencies varied, brief daily sessions (as short as 15 minutes) with total treatment duration of only four hours yielded significant symptom improvement in PTSD (Lee *et al.*, 2018). This finding suggests that short-duration interventions may be as effective as more time-intensive approaches.

A notable methodological challenge in this body of research stems from limitations such as small sample sizes, the absence of control groups, and heterogeneity in intervention duration and frequency (Regan, 2016). Despite these limitations, singing interventions tailored to particular populations show promise. The online Music 4 Mum's (M4M) program for new mothers experiencing postnatal depression demonstrated significant reductions in anxiety and stress within weeks of the intervention (Bind *et al.*, 2023). Similarly, the Individual Therapeutic Singing Program (ITSP-PD), adapted from neurological singing therapy for Parkinson's disease, improved both vocal function and depressive states by targeting the neural networks and muscular systems associated with vocalisation and emotion (Han *et al.*, 2018). These examples underscore the potential of a structured, evidence-based approach that integrates both functional and emotional dimensions of singing to address psychological and physiological deficits affecting quality of life for individuals with PTSD (Han *et al.*, 2018).

The perceived usability and usefulness of an online intervention are deemed critical determinants of efficacy (Holzinger, 2016). Participatory design studies in mental health and voice education cite simplicity in design and navigation as essential to prevent cognitive overload in individuals with PTSD (Alqahtani and Orji, 2020; Proudfoot *et al.*, 2010). The provision of clear rationale for intervention exercises (Kuhn *et al.*, 2002) and the integration of simple self-assessment tools, such as the Subjective Units of Distress Scale (SUDS) (Wolpe *et al.*, 1969) may cultivate a sense of autonomy and competence (Kim *et al.*, 2008). From a vocal pedagogy perspective, key requirements include video tutorials, gamification and prompts for skill acquisition (Shi, 2023). Further, offering flexible, customisable experience is essential to enhance participant satisfaction and reduce attrition rates (Arean *et al.*, 2016; Roepke *et al.*, 2015).

Post-traumatic Stress Disorder may negatively impact learning and memory by damaging critical brain structures (Mazaheri *et al.*, 2024; Boyraz *et al.*, 2016). This may lead to deficits in cognitive processing and emotion regulation, which disrupts sustained attention, working memory and executive control (Ouhmad *et al.*, 2024). A key feature of PTSD is the re-experiencing of traumatic memories with vivid immediacy (Jongedijk *et al.*, 2023), which is profoundly disruptive in cognitively demanding environments (Jones *et al.*, 2025) such as new skill acquisition. Furthermore, hyperarousal and attention bias cause individuals to monitor their surroundings excessively for threats which may interfere with their ability to focus on tasks (Boska *et al.*, 2025; Ouhmad *et al.*, 2024; Shalev *et al.*, 2001; Kimble *et al.*, 2014). Therefore, a central challenge for individuals with PTSD, the impaired ability to transition between the “survival brain” and the “learning brain” (Ford and Coutois, 2020).

Due to these vulnerabilities, it is essential for voice practitioners and researchers to carefully consider the neurological basis of trauma when curating and implementing singing interventions, as emotional content may impair memory encoding by competing with cognitive resources (de Montpellier and Talmi, 2025). Nonetheless, singing may facilitate the shift from sympathetic hyperarousal (survival brain) to a state of vagal safety and social engagement (learning brain) (Porges, 2022). This transition may be realised through three core functions related to singing: controlled breathing, physical movement, and vocalisation.

2.2.4.1. Benefits of Regulated Breathing

Research demonstrates that slow, regulated breathing has a balancing effect on the autonomic nervous system by enhancing parasympathetic activation and stimulating inhibitory signals (Kim *et al.*, 2013). This modulation reduces symptoms in individuals with subclinical PTSD (Kim *et al.*, 2013), increases vagal activity thereby lowering psychophysiological arousal and stress response (Kim *et al.*, 2013; Seppala *et al.*, 2014; Chen *et al.*, 2017). By engaging both the parasympathetic and sympathetic nervous systems, breathing exercises may induce a state of simultaneous alertness and calm (Seppala *et al.*, 2014). A study by Chen *et al.* (2017) found a significant reduction in participants' anxiety scores measured by the Beck Anxiety Inventory, after an eight week intervention of twice daily Deep Breathing (DB) sessions. This finding suggests that DB increases parasympathetic activity and reduces respiration rate (Chen *et al.*, 2017). Similarly, Chang *et al.* (2013) reported that a slow breathing rate of eight breaths per minute made parasympathetic nervous system activity dormant. Therefore, the ability of DB to regulate hyperactive sympathetic and hypoactive parasympathetic nervous systems, common in PTSD may favourably affect brain function by improving autonomic balance (Jerath *et al.*, 2015).

Diaphragmatic breathing, a form of slow and deep breathing often used in vocal pedagogy practice (Devi, 2021), modulates autonomic nervous functions which affect the brain, cardiovascular, respiratory and gastrointestinal systems (Hamasaki, 2020). The phrenic nerve which activates the diaphragm, is connected to the vagus nerve and its motion directly and indirectly influences the autonomic nervous system (Bordoni and Zanier, 2015). Diaphragmatic breathing has demonstrated statistically significant effects on lowering blood pressure, decreasing cortisol and reducing perceived stress (Hopper *et al.*, 2019) which is relevant to PTSD as the physiological stress response is mediated by the sympathetic nervous system and secretion of cortisol (Muscatell and Eisenberger, 2012). Existing singing interventions explicitly include breathing instructions (Kang *et al.*, 2018) utilising techniques such as pursed-lip breathing, diaphragmatic breathing and Pranayama yoga breathing (Engen, 2005; Hamasaki, 2020). However, isolated breathing exercises may have limited utility (Engen, 2005) as mindfulness and breathing practices can be challenging for individuals with heightened physiological arousal (Brown and Gerbarg, 2005). Therefore, structured exercises that provide immediate observable calming effects may be more advantageous (Brown and Gerbarg, 2005).

A highly structured vocal breathing technique, Accent Breathing Method (ABM), integrates breath to sound and movement through a coordinated interplay between respiratory muscles

and vocal folds (Chapman, 2006). This method may hold therapeutic benefits for individuals with PTSD as it aids in re-establishing a sense of bodily control (Subramanian *et al.*, 2023; Singh and Raghavendran, 2021), foster grounding and interoceptive awareness (Martin *et al.*, 2024; Wallman-Jones *et al.*, 2023), and reduce vocal tension, a common physiological manifestation of trauma (Scherer *et al.*, 2013). By controlling breath and vocal expression, singing may provide a calming effect which encourages emotional expression (Peter, 2023). Further, the breathing control skills acquired through singing may be transferable to daily life (Lord *et al.*, 2010). Consequently, the integration of ABM into a therapeutic singing intervention may provide a structured, evidence-based and trauma-informed tool for enhancing emotional regulation and supporting overall well-being.

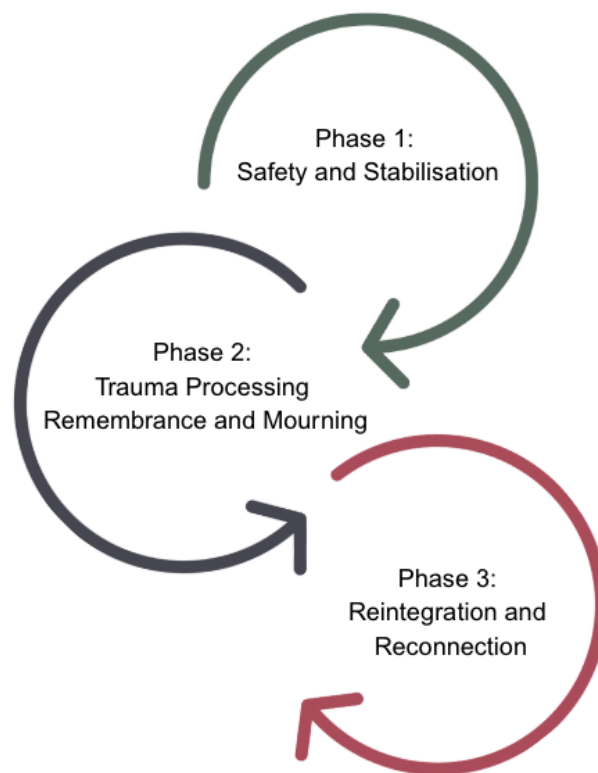
2.2.4.2. *Benefits of Voice-Based Movement*

Individuals with PTSD often exhibit reduced engagement in physical activity, which may contribute to co-occurring medical and cognitive disorders (de Assis *et al.*, 2008; Voss *et al.*, 2014). The therapeutic mechanisms of exercise for PTSD are not fully understood but may involve psychological, cognitive and neurological pathways (Hegberg *et al.*, 2019). Movement may reduce anxiety through its capacity to serve as a distraction from daily stressors (Kolt and McConville, 2000) and enhance body awareness by integrating sensory information and supporting affect regulation (Malviya, 2022). A focus on interoceptive, body-oriented therapies is critical for addressing a core challenge in PTSD, whereby individuals experience the present through physical sensations and emotions linked to past trauma (van der Kolk, 2006). By fostering self-awareness and self-regulation, singing related movement practice may lead to new action patterns and promote a sense of mastery and enjoyment (van der Kolk, 2006).

Whilst there are a variety of movement practices that may be beneficial for singing, including pilates (Mezzedimi, 2019) and Feldenkrais Method (Wallman-Jones *et al.*, 2023), the Alexander Technique (AT) (Schlinger, 2006) may hold therapeutic potential for individuals with PTSD. AT is a method of neuromuscular re-education that facilitates the release of habitual tension that impedes natural coordination and movement (Schlinger, 2006). By fostering awareness of the dynamic relationship between the head, neck and spine, AT aims to improve overall bodily freedom and functional efficiency critical to singing (Gelb, 1994). The capacity to address physical tension, mitigate the somatic manifestations of trauma and enhance mind-body integration make AT useful in both singing and PTSD (Morris and Hutchison, 2016). As trauma often results in a state of physical bracing, leading to ingrained patterns of muscular tension and

a sense of “disembodiment” (van der Kolk, 2014), AT offers a gentle, non-invasive method for individuals to become aware of these patterns and learn to release them (Morris and Hutchison, 2016). This process of mindful re-engagement with the body may serve as a potent grounding tool to reduce hyperarousal and supports the reintegration of the self (Herman, 1992). This practice of connecting intention with physical execution directly supports the third phase of Herman’s (1992) Three-Phase Trauma Recovery Model (Figure 2), which focuses on rebuilding a cohesive sense of self and re-engaging with the world (Herman, 1992).

Figure 2. Three-Phase Trauma Recovery Model (Adapted from Swetha *et al.*, (2024)).



2.2.4.3. Benefits of Vocal Exercises

Scherer et al. (2013) found that participants with PTSD demonstrated significantly different voice quality characteristics compared to control participants in terms of tense voice qualities, reduced frequency range in vowel production and reduced expressivity. These issues result from the impact of PTSD on motor control in speech production (Scherer *et al.*, 2013) and may be addressed through targeted vocalisation exercises. Common vocal exercises employed for this

purpose include: (1) stretching, (2) breathing exercises, (3) semi-occluded vocal tract (SOVT) exercises and, (4) resonant voice exercises (Ragan and Kapsner-Smith, 2019). Further, vocal warm up exercises enhance blood flow and oxygenation, promote muscle flexibility and improve vocal projection and articulation (Sousa *et al.*, 2020).

Undertaking vocal warm-up is essential for preventing vocal fold injury and achieving optimal voice function in both untrained and professional singers (Gish *et al.*, 2012; Portillo *et al.*, 2018). Optimal vocal technique is built on the efficient use of the body and the careful design of vocal exercises including patterns of pitches, vowels and consonants to develop technique and establish a mind-body connection (Nix, 2019). From a physiological standpoint, vocal exercises should be designed to stretch tendons, ligaments and muscles (Nix, 2019). Shorter exercises are less demanding on respiratory and adductory muscles, while longer exercises require more precise postural balance, breath control, and adductory skill (Nix, 2019; Ter *et al.*, 2022) which may initially be challenging for individuals with PTSD. Voiced fricatives (e.g., /v/, /z/) and voiced plosives (e.g., /b/, /d/) can also be used to promote effective airflow at the start of a vocal sound (Nix, 2019; Titze, 1996).

Semi-occluded Vocal Tract (SOVT) exercises are used to improve the quality of the resonant voice by reducing excessive tension in the vocal tract as seen in PTSD (Nam *et al.*, 2019; Sahin, 2020; Orhon *et al.*, 2022). SOVT aims to achieve normal voice intensity and power with less stress to the laryngeal tissue, less muscular effort and less energy expenditure (Orhon *et al.*, 2022). Suitable for new singers, SOVT exercises encourage production of a wide range of pitches and volumes without excessive impact on the vocal folds. For example, humming and straw phonation are exercises with a single source of vibration into the vocal tract, whilst lip trills and tongue trills are exercises with a secondary source of vibration that deploy a massaging effect on vocal organs (Saldias *et al.*, 2020). Untrained singers may consider straw phonation as a starting point and progress to TVW as competency improves (Ter *et al.*, 2022) therefore, SOVT exercises are an important inclusion in singing interventions for PTSD.

2.2.5. Conclusion

This review sought to explore the literature to establish an evidence-base for a transparent, standardised and replicable singing intervention tailored to the unique needs of emergency service personnel with PTSD (Wei *et al.*, 2024; Dingle *et al.*, 2017). Given the high prevalence of PTSD within this population and the barriers to conventional treatment such as stigma, cost

and accessibility (Kyron *et al.*, 2023; Haugen *et al.*, 2017), self-administered, evidence-based complementary interventions are needed (Hopper *et al.*, 2019). Singing, as an active and accessible modality, holds immense potential given its demonstrated ability to regulate nervous system, reduce cortisol and foster mind-body integration (Kim *et al.*, 2013; Fancourt *et al.*, 2016; van der Kolk, 2006).

Whilst traditional group singing interventions have demonstrated psychological benefits (Williams *et al.*, 2018), their format may be unsuitable for individuals with PTSD due to their tendency toward social avoidance and the risk of unhelpful trauma comparisons (Rudstam, 2023). This elucidates the opportunity for an independent, structured and self-administered singing intervention delivered online to promote autonomy and psychological safety (Porges and Dana, 2018). With a focus on established vocal pedagogy methods including, structured breathing (eg. Accent Breathing Method), movement (eg. Alexander Technique), and vocal exercises (eg. SOVT exercises), a robust initial framework for improving well-being (Kim *et al.*, 2013), enhancing interoceptive awareness (van der Kolk, 2006) and addressing symptomatic vocal quality issues associated with PTSD (Scherer *et al.*, 2013) emerges. By prioritising usability and trauma-focused design (Alqahtani *et al.*, 2021) this research seeks to inform the development of future vocal pedagogy resources that are both accessible and effective in supporting emergency service personnel in PTSD recovery.

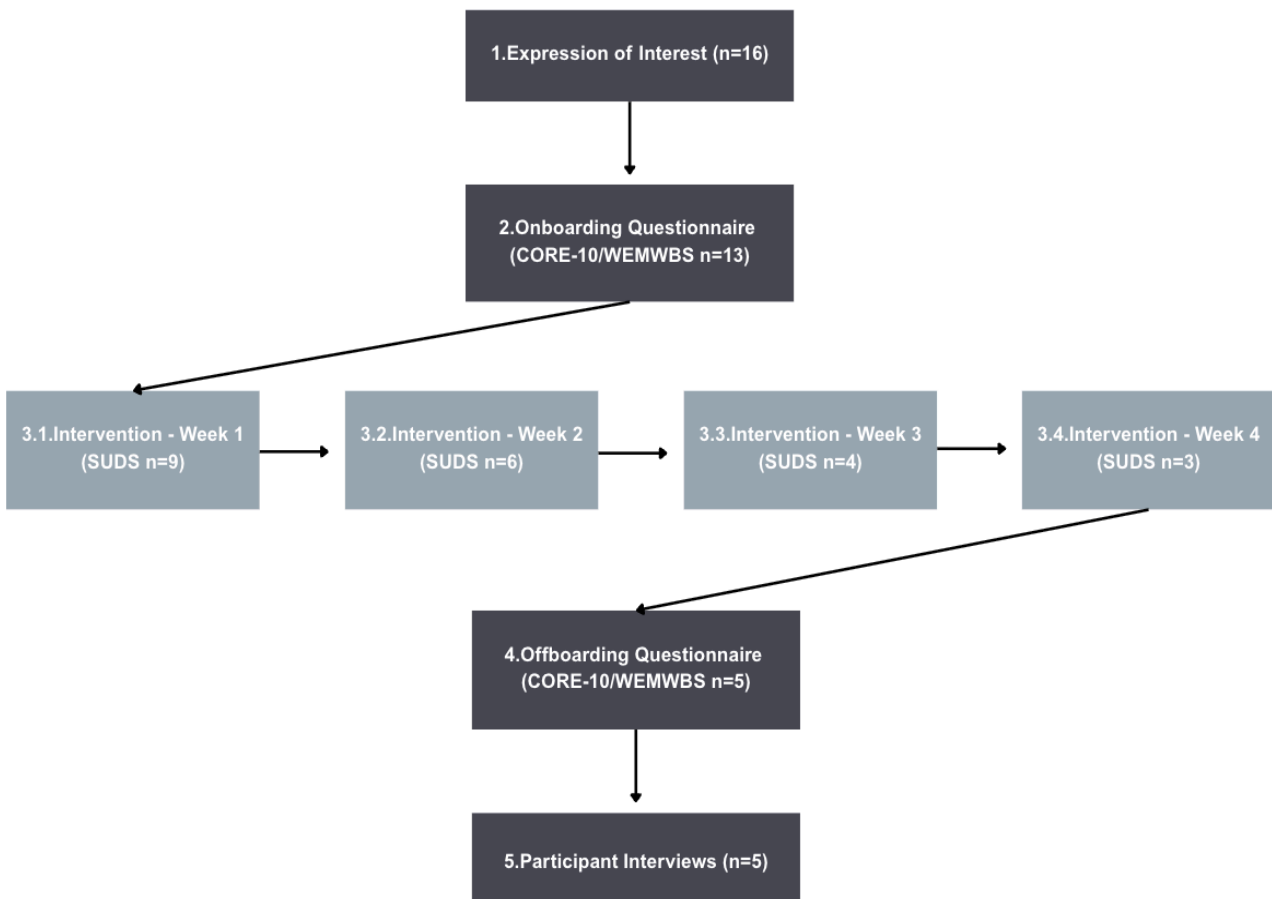
2.3. Methodology

The following methodology section details the research design and procedures used in The WellSing Project which adopts a pragmatic paradigm using a mixed-methods approach to gain a comprehensive understanding of the research problem (Creswell, 2009). Both quantitative and qualitative methods used for data collection and analysis serve to provide a robust and holistic examination of the program's impact on mental health and well-being.

2.3.1. Research Design

The WellSing Project adopts a pragmatic, sequential, mixed methods explanatory design with phased execution: (1) Expression of Interest; (2) Pre-intervention (onboarding) Questionnaire; (3) Intervention Program; (4) Post-intervention (offboarding) Questionnaire; (5) Participant interviews. Figure 3 provides a visual representation of the research design.

Figure 3. The WellSing Project Research Design.



Expression of Interest

Participant recruitment materials (Appendix 3) directed potential participants to an Expression of Interest form online (Appendix 8, 7.0) designed to collect only an email address for communication. Following submission of the form, participants were assigned a unique identifier using Research Randomizer (2024) and were subsequently provided with the pre-intervention (onboarding) questionnaire (Appendix 8, 7.1).

Onboarding Questionnaire

The pre-intervention Onboarding Questionnaire elicited demographic information including age, gender, emergency service affiliation and a self-reported diagnosis of PTSD and assigned to

comparison groups: (1) Group 1 (PTSD), (2) Group 2 (Non-PTSD). A Participant Information Sheet (Appendix 4) outlining the risks and benefits of participation was offered and informed consent was obtained (Appendix 8, 8.2). A vocal range estimator (AlanPiano1, 2010) to ensure the provision of appropriate intervention material tailored to participants' vocal range (soprano, alto, tenor, bass). Participants then completed two measures: the 10-item version of the Clinical Outcomes in Routine Evaluations (CORE-10) (Appendix 5) and the 14-item Warwick Edinburgh Mental Well-being Scale (Appendix 6).

Upon submission of the Onboarding Questionnaire, participants received a welcome email containing a short introductory video (Appendix 8, 1.0). The video, presented by the primary researcher, provided an overview of The WellSing Project, its research methodology and reaffirmed participants' right to withdraw at any time without consequence. Participants were advised that singing lessons may be completed at any time during the week, including being divided into smaller segments as needed. For technical difficulties due to the online nature of the intervention, vocal discomfort or questions, participants were directed to contact the primary researcher via email for prompt attention.

Intervention: The WellSing Project

Design of The WellSing Project was informed by participatory design principles, particularly those applied to mental health applications (Alqahtani *et al.*, 2021; McClelland *et al.*, 2018) and voice education (Shi, 2023; Titze 1996). The program followed a basic yet consistent structure: (1) Introduction (2) Theory (3) Vocal Warm Up (4) Song Singing (5) Cool Down (Appendix 8). Content research, design and creation was conducted by the primary researcher. All sessions were recorded and edited using iPhone and Canva video editing software. Each session was approximately 45 minutes duration (Lee *et al.*, 2023) with separate videos curated for four voice types (soprano, alto, tenor, baritone). These videos were securely stored on a G-Drive and participants received weekly access via email link directly to the relevant session for their voice type (Appendix 8).

In each session, participants were invited to log their mood using the Subjective Units of Distress Scale (SUDS) (Appendix 7), a self-assessment tool used to measure the intensity of distress or anxiety (Wolpe, 1969). The SUD scale is commonly used in cognitive-behavioural therapy to monitor progress with the scale ranging from 0 (total relaxation) to 10 (highest level of distress or discomfort (Wolpe, 1969). Participants recorded their SUDS at the beginning and

end of each session and were encouraged to provide additional written feedback regarding their experience.

The WellSing Project was designed for concurrent participation over four weeks between the 12th of May and the 9th of June, 2025. However, as the recruitment schedule expanded, participants joined the program at varying intervals. Even so, each participant, over a four week period, received one email per week containing a link to a brief questionnaire for logging their SUDS rating as well as a link to a 45 minute singing lesson tailored to their voice type. The duration of the project (four weeks) was selected to reduce the risk of disengagement, which is common in online interventions, and it also aligns with the minimum duration required for efficacious outcomes from vocal programs to observe a reduction in anxiety and stress (Bind *et al.*, 2023).

The program's content, outlined in **Table 3**, focused on a structured progression of vocal skill acquisition:

- **Week 1:** Voice Foundations: Breathing and Posture
- **Week 2:** Voice Foundations: Phonation and Movement
- **Week 3:** Voice Foundations: Resonance and Vocalisation
- **Week 4:** Voice Foundations: Articulation and Performance

Table 3. The WellSing Project Program session plan outlining key themes, exercises and repertoire used. For more detailed information, refer to Appendix 8.

Week 1: Breathing and Posture		
Section	Key Aspects	Content and Exercises
Introduction	Focus on the interconnectedness of breathing and posture for singing.	Discussion on creating a comfortable and safe space for singing.
Breathing Theory	Explanation of ventilation (inhalation and exhalation), gas exchange and conscious breath control.	Discussion on diaphragm, lung capacity, vocal folds and voice production (National Institute of Health, 2022) Accent Method Breathing: Focuses on

		controlled breathing from the belly (Chapman, 2006).
Posture Theory	Importance of optimal alignment, its support for breathing and resonance and promotion of vocal freedom.	Discussion on the body as a stable yet flexible framework for singing. SPLAT: An acronym to remind singers to loosen abdominal tension (Chapman, 2006).
Vocal Warm Up	Preparation for singing.	Half Fold: A physical stretch to prepare the body (Gelb, 1994). Beachball Stretch: Opens the back, ribs, and chest. Drone: Sustains the 'shoom' sound for resonance and breath control (Titze, 1996). Tongue Stretches: Loosens the tongue for articulation (Yu, 2016). Fricative Tones: Use of consonant sounds like /s/, /f/, or /z/ to create a continuous, controlled airflow (Nix, 2019). Trills: Vocal trills and rolled 'r' sounds to improve breath control and vocal flexibility (Orhon <i>et al.</i> , 2022). Vocal Scales: Singing ascending and descending scales on different vowels (Marchesi, 1970).
Song Singing	Practice combining lyrics and melody.	Song: "What a Wonderful World" by Louis Armstrong (Australian Broadcasting Commission, 2025).
Cool Down	Releasing tension after vocal work.	Sighs: A slow, breathy exhalation to release physical and vocal tension (Yu, 2016). Closed Hum Sirens: Humming from the bottom to the top of the vocal range and back down, with lips closed and the tongue tip behind the upper front teeth (Titze, 1996).

Week 2: Phonation and Movement		
Section	Key Aspects	Content and Exercises
Introduction	Exploration of phonation and the Alexander Technique.	Recap of Week 1 topics (diaphragm, dynamic posture, fricative tones).
Phonation Theory	The process of creating sound with the voice, including airflow, vocal fold vibration, and sound production.	Discussion on how phonation is used in singing (consistent sound, natural voice, pitch accuracy, avoiding strain).
Vocal Warm Up	Exercises from the Alexander Technique to release tension.	Alexander Technique-Based Exercises: Gentle movements and stretches designed to release ingrained physical tension, particularly in the neck, jaw, and shoulders (Gelb, 1994) Phonation-Focused Exercises: Exercises to promote easy, clear vocal fold vibration (Yu, 2016). Straw in Water: An exercise to build consistent airflow and improve vocal function (Ter <i>et al.</i> , 2022).
Song Singing	Focus on lyrics, rhythm, and melody.	Song: "Here Comes the Sun" by George Harrison (The Beatles, 2019).
Cool Down	Releasing tension after vocal work.	Sighs and Humming Sirens (Titze, 1996).
Week 3: Resonance and Vocalisation		
Section	Key Aspects	Content and Exercises
Introduction	Focus on the concept of resonance.	Recap of Week 2 topics (phonation, Alexander Technique exercises, "Here Comes the Sun").
Resonance Theory	Explanation of how the voice is amplified by the body's resonators (throat,	Discussion on the feeling of a 'buzzing' or vibration in the face.

	mouth, nasal passages). The concept of 'mask resonance'.	
Vocal Warm Up	Exercises to practice resonance.	Half-Fold Hum: Humming to a focused point on the lips to encourage a buzzing sensation (Saldías <i>et al.</i>, 2020). Buzzing Exercises: Using sounds like "Nee," "Nah," or a nasal "Ng" to direct sound to the facial mask (Coulton <i>et al.</i>, 2006). Yawn and Rose: Exercises to help lift the soft palate and create a feeling of spaciousness in the throat (Ragan and Kapsner-Smith, 2019). Straw Phonation: Blowing bubbles into a glass of water with a straw while singing a five-note scale to build consistent airflow (Ter <i>et al.</i>, 2022). Voiced Fricatives: Using the sounds 'V' and 'Z' in a scale to focus on vibration in the lips and tongue (Nix, 2019). Nasal Consonants: Singing scales on the sounds 'M', 'N', and 'NG' to develop "mask resonance" (Yu, 2016). Major/Minor Scales: Practicing scales to connect with the emotional mood of the music (Marchesi, 1970). Trills and Humming: Returning to trills and hum glides from previous weeks, focusing on vibration in the lips, nose, and face (Saldias <i>et al.</i>, 2020). Vowel Modification: Singing scales on "Ma," "Me," "Mi," "Mo," and "Mu," experimenting with the yawn posture to improve sound quality (Marchesi, 1970).
Song Singing	Practice singing the full song.	Song: "Count on Me" by Bruno Mars (Bruno Mars, 2020).

Cool Down	New exercises to release tension and check breath consistency.	Raspberry on a Siren: A lip trill while singing a siren sound to release tension and improve airflow consistency (Orhon <i>et al.</i> , 2022).
Week 4: Articulation and Performance		
Section	Key Aspects	Content and Exercises
Introduction	Focus on articulation and performance.	Recap of Week 3 topics (resonance, buzzing sensation, soft palate, nasal consonants, "Count on Me").
Articulation Theory	The clarity and precision of words in singing. The role of articulators (lips, tongue, jaw, soft palate, teeth).	Discussion on the importance of text intelligibility, emotional conveyance, and musicality. The difference between articulation and diction.
Vocal Onset	An overview of how a sound begins.	Explanation of Coordinated (balanced), Aspirated (breathy), and Glottal (hard) onsets (Richter <i>et al.</i> , 2024).
Vocal Warm Up	Practice glottal onsets, dynamics and articulation.	Alexander Technique: An exercise focusing on "Primary Control" (the head-neck-back relationship) to release tension and improve posture (Schlinger, 2006). Silent H: A technique to transition from a hard glottal onset to a smoother, coordinated one by placing a gentle, silent 'h' sound before vowels (Orhon <i>et al.</i>, 2022). Tongue Twister: Practicing a tongue twister to focus on clear articulation and repetitive consonant sounds like /s/, /t/, /d/, and /k/ (Richter <i>et al.</i>, 2024). Messa di Voce: An exercise using the sound "Ba" to practice a gradual increase (crescendo) and decrease (diminuendo) in volume on a single pitch (Marchesi, 1970).
Song Singing	Learning a song.	Song: "Hallelujah" by Leonard Cohen and

		performed by K.D. Lang (Samantha0605, 2011).
Cool Down	Releasing tension after vocal work.	Raspberry: Done on a siren to release tension (Ter <i>et al.</i> , 2022). Sighs: Taking a deep, yawning breath and sighing it out (Saldias <i>et al.</i> , 2020). Hum Siren: Humming a siren up and down a comfortable range with the tongue positioned behind the top front teeth (Titze, 1996).

Participant Interviews

All individuals who expressed interest in The WellSing Project ($n=16$) were invited to participate in a short, unstructured interview regarding their experience, whether or not they completed the program. Interviews were conducted via telephone and recorded using an inbuilt iPhone recording capability which transcribes to Notes on iPhone. The resulting files were then forwarded to the secure research data repository and deleted from the iPhone. Each participant was asked to confirm their consent to record the conversation once the recording had commenced. An initial question, “Tell me about your experience with the WellSing Project?” was intentionally broad and open-ended to allow for free speech and expression (Creswell, 2009). Where a participant was unsure what information to provide or asked for guidance, open-ended questions were asked in relation to broad themes, such as “How did you find the theory component?” and “Tell me how you found the online delivery method?” (Appendix 8, 6.6). This participant-led interview process highlights the potential for interviews to be considered along a continuum rather than strictly determined as unstructured or semi-structured (Rabionet, 2011).

Participant interviews were kept to approximately 10 minutes duration, depending upon participants willingness to share. The interviews were conducted by the primary researcher who advised participants they could end the interview at any time. The interviews were transcribed verbatim and analysed using thematic analysis within the NVivo software. All personal details were concealed during transcription to protect participant identity. The thematic analysis followed a multi-stage process: firstly, key phrases were extracted and grouped into preliminary categories; secondly, these categories were comprehensively analysed to identify emergent themes; thirdly, a closer examination of the data led to the identification of three superordinate

themes. The final stage of analysis involved a higher-level integrative narrative complemented by an in-depth discussion of the findings and potential interpretations (Ophir and Jacoby, 2020).

2.3.1.1. Measures

Clinical Outcomes in Evaluation (CORE-10)

The CORE-10 is a 10-item scale designed as a brief measure to assess psychological distress in routine mental health care and has excellent validity and utility in practical assessments (Clift *et al.*, 2017) (Appendix 5). A shortened version of the CORE questionnaire (34 statements), it consists of 10 statements describing feelings and behaviours related to mental distress and participants are asked to indicate how often they have felt or behaved in ways described, over the previous week, on a five point Likert scale ('Not at all' to 'All, or most of the time') (Clift *et al.*, 2017). Higher scores are indicative of greater mental distress (Clift *et al.*, 2017). The CORE-10 is scored using a simple sum of ratings (with reverse scoring for two positive items) and produces a scale from 0-40 with higher scores indicative of greater mental distress (Clift *et al.*, 2017). The CORE-10 is routinely used in singing for mental health research (Clift *et al.*, 2017; Coulton *et al.*, 2015; Williams *et al.*, 2018) and is used in this study to assess pre- and post-intervention distress levels.

Warwick Edinburgh Mental Health Well-being Scale (WEMWBS)

The WEMWBS is a 14 item scale designed to measure the positive aspects of subjective well-being and has good psychometric properties (Stewart-Brown *et al.*, 2009). The measure consists of 14 positively worded statements about feelings and thoughts and participants rate each on a five point frequency scale to reflect their experience over the previous two weeks (Clift *et al.*, 2017). It assesses both eudaimonic (meaning and self-actualisation) and hedonic (happiness, pleasure and pain avoidance) aspects of well-being (Ryan and Deci, 2001; Daykin *et al.*, 2018). The WEMWBS has been extensively validated in adult populations across a wide range of countries and cultures (Bass *et al.*, 2016) and is considered fit for use in program evaluations (Maheswaran *et al.*, 2012). The scale has been shown to be sensitive to the changes that occur in mental well-being promotion and mental illness treatment and prevention projects and is routinely used in singing for well-being studies (Fancourt, 2019; Coulton *et al.*,

2015; Grocke *et al.*, 2009; Williams, 2018; Clift *et al.*, 2017). It is used in this study to measure pre- and post-intervention subjective well-being.

Subjective Units of Distress Scale (SUDS)

The Subjective Units of Distress Scale (SUDS) is a widely used self-report measure for quantifying subjective distress, anxiety, and fear in real-time (Mattera and Zaboski, 2025) (Appendix 7). It is particularly valuable in research and clinical practice, especially within exposure-based treatments for anxiety disorders and PTSD (Mattera and Zaboski, 2025). The scale provides a rapid, quantifiable snapshot of a participant's psychological state, to monitor progress and assess intervention efficacy at the start and end of sessions (Shapira *et al.*, 2022). In this study, SUDS ratings are requested from participants before and after the singing intervention each week to assess changes in distress levels. This helps identify participants who may require further support and provides a continuous measure of the intervention's immediate impact. Whilst SUDS has notable psychometric limitations regarding construct validity (Mattera and Zaboski, 2025), its utility lies in its familiarity in PTSD populations and its capacity for immediate, real-world feedback. SUDS ratings are supplemented with qualitative inquiry (e.g. “Is there anything you’d like to share about your experience thus far?”) for contextualisation. In order to minimise any stigma attached to psychological ratings, SUDS was represented in this study as a continuum of 10 stars. Table 4 shows an example of the SUDS continuum.

Table 4. Anchors for Subjective Units of Disturbance Scale (Mattera and Zaboski, 2025).

Value	Description
0	No anxiety at all; Complete Calmness
1 -10	Very Slight Anxiety
10 - 20	Slight Anxiety
20 - 40	Moderate Anxiety; Definite Unpleasant Feeling
40 - 60	Severe Anxiety; Considerable Distress
60 - 80	Severe Anxiety; Becoming Intolerable
80 - 100	Very Severe Anxiety; Approaching Panic

2.3.1.2. Participants

Sixteen potential participants completed the Expression of Interest Form (Appendix 8, 7.0) online. Of those 16 participants, 13 completed the subsequent Onboarding Questionnaire (Appendix 8, 7.1). Participants represented emergency service personnel in Australia including: police (69%); ambulance (8%); with some performing dual roles, police and military (15%); police and fire (8%). Participant age range included: 30-39 (8%); 40-49 (30%); 50-59 (38%) and; 60-69 (24%), of which 6 were male and 7 were female. Participants self-reported PTSD diagnosis as yes (77%) and no (33%) with that diagnosis determined by a general practitioner (10%), psychologist and psychiatrist (80%) and psychiatrist (10%). Based upon the vocal range estimator included in the Onboarding Questionnaire, participants' vocal ranges included: Alto (53%); Tenor (16%), and; Baritone (31%). Surprisingly, there were no participants within the soprano voice range.

Inclusion criteria required participants to be over the age of 18 years and be a current or former serving member of an emergency service organisation. Exclusion criteria is the inverse, individuals under 18 years of age and individuals who are not a current or former serving member of an emergency service organisation in Australia. No limitations were placed upon gender, ethnicity or geographical location and no prior engagement with singing will be required. Whilst potential participants hard of hearing were not excluded, future research should consider how best to include such participants, particularly concerning pitch accuracy (Xu *et al.*, 2022). Participants with PTSD were advised to seek clearance from their medical practitioner prior to participation and that access to technology including internet access, computer equipment with audio capabilities would be required. Eligible participants were recruited through advertisements on social media via Code 9 Foundation, Police Veterans Victoria and through direct contact via email or social media from the primary researcher. Table 5 provides demographic information regarding the participants in this study.

Table 5. Details of Participants in The WellSing Project who completed Onboarding Questionnaire.

Participant Code	Gender	Age	Service	PTSD Diagnosis	Voice
17708	Male	50-59 years	Police	Yes	Baritone
12119	Female	30-39 years	Police	Yes	Alto
19295	Male	40-49 years	Police, Military	Yes	Tenor
13517	Female	50-59 years	Ambulance	Yes	Alto
18754	Male	50-59 years	Police, Fire	Yes	Tenor
12393	Female	50-59 years	Police	No	Alto
13013	Male	50-59 years	Police	Yes	Baritone
17800	Female	40-49 years	Police	Yes	Alto
16030	Female	40-49 years	Police	No	Alto
15257	Male	60-69 years	Police, Military	Yes	Baritone
18088	Female	40-49 years	Police	Yes	Alto
12643	Male	60-69 years	Police	Yes	Baritone
17541	Female	60-69 years	Police	No	Alto

Participants who completed all aspects of The WellSing Project were individuals *with* a diagnosis of PTSD, meaning that comparison could not be made between groups (Group 1 - PTSD and Group 2 - Non-PTSD). Thus, quantitative analysis was conducted *within* groups and hypotheses were amended to reflect this data collection outcome. Five participants agreed to be interviewed: PTSD (4), Non-PTSD (1); male (2), female (3); PTSD (2 male/2 female), Non-PTSD (1 female); completed the program including all questionnaires (3), completed the program excluding some questionnaires (1), did not start the program (1). As all participants in interviews represented a police organisation, the primary researcher was cognisant that structured questioning may cause a negative work-related association which was treated sensitively. This methodological approach was adopted to mitigate distress while still

accommodating the interviewee's preferred pace and degree of exposure (Ophir and Jacoby, 2020).

Participant Withdrawal

Notably, there were 2 participant withdrawals from The WellSing Project. The first participant completed the Onboarding Questionnaire but withdrew citing international travel plans afoot during the timeframe that the project was undertaken. The second participant withdrew after attempting the first singing lesson. This participant, who self-reported a diagnosis of PTSD and who had participated after receiving medical advice, cited challenges with concentration and difficulty keeping up with the pace of the lesson, resulting in overwhelm. This valuable insight highlights the importance of ensuring that individuals who undertake singing for well-being programs, in research or in practice, are in a stable phase of recovery and are supported to withdraw. This aspect is further explored in the Discussion and Conclusion section.

2.3.2. Ethics and Insider Researcher

This research was granted ethical approval by the Wales Academy of Professional Practice and Research (WAPPAR) at the University of Wales Trinity Saint David (UWTSD) on the 3rd of February, 2025 (Appendix 2). Whilst the population under study does not strictly fit the criteria of 'vulnerable persons' (National Health and Medical Research Council, 2025) as they are deemed capable of informed consent, careful attention has been given to ensuring the research design mitigates any potential discomfort for participants with PTSD. Research design facilitates remote participation with a focus on self-administration, allowing individuals to engage in the security of their own home at their own pace. All participants are advised to consult their medical practitioner prior to agreeing to participate and are informed of their right to withdraw at any time without consequence (Appendix 8, 7.1). A Participant Information Sheet (Appendix 4) is provided which details the potential risks and benefits of The WellSing Project and details 24/7 mental health and organisation specific, welfare service contact information. Finally, informed consent (Nusbaum *et al.*, 2017) was obtained from participants via an online Consent Form (Appendix 8, 8.2).

Collection of data was via Google Forms which complies with the Australian Privacy Act 1988 (Office of the Australian Information Commissioner, 2025). Only essential data for the research purpose was collected and anonymisation enacted in accordance with the University of Wales

Trinity Saint David Research Data Management Policy (2022). Quantitative and qualitative data collected is held on a secure password protected device, within a restricted and secure folder with two-factor authentication accessible only to the primary researcher. Participants were allocated a unique identifier (Research Randomiser, 2024) to be used throughout the research process, the key to which is preserved in an encrypted file accessible only to the primary researcher. For analysis purposes, the cleaned and anonymised data was moved to programs including IBM SPSS, DataTab and Nvivo on accounts solely accessible by the primary researcher. No hard copies of data were kept.

The research is also influenced by several ethical frameworks: The Australian Code for the Responsible Conduct of Research (2018) which provides foundational principles for honest, ethical, and conscientious research within an Australian context and the University of Wales Trinity Saint David Research Ethics and Integrity Code of Practice (2022) which emphasises honesty, rigour, transparency, respect, and accountability. Guidance is also sought from codes of ethics from the Australian National Association of Teachers of Singing (2023), the Australian Music Therapy Association (2021) and the Australian Psychological Society (2007). Further information regarding adherence to ethical considerations within this study may be found in Appendix 12.

As an insider researcher, distinct advantages exist with regard to accessing difficult to reach participants (Dwyer and Buckle, 2009), quickly establishing rapport and navigating the research process with a deeper, more nuanced understanding (Scott, 2022). However, insider research introduces ethical and methodological complexities. Being a member of the population being studied necessitates rigorous reflexivity to remain objective (Chammas, 2020). Reflexivity is crucial in acknowledging how my own identity, background, and lived experience as a former police officer with PTSD intersects with the literature and influences this research (Asselin, 2003). Balancing empathetic understanding with critical detachment requires careful reflection and helps mitigate the influence of personal assumptions (Chammas, 2020). To mitigate bias, a disciplined self-reflection process was maintained, complemented by regular supervision sessions. Clear boundaries were established concerning the researcher role, the limitations of the intervention, and the availability of external support services for participants. Research design minimised direct contact with participants, reducing the potential for influencing participant responses (Chammas, 2020). Regarding participant interviews, sufficient trust for disclosure was established without fostering a personal relationship that may compromise the objectivity of the data (Fleming and Zegwaard, 2018).

2.4. Findings

Quantitative analysis explored pre- and post-intervention comparisons between the CORE-10 and WEMWBS scores using a deductive approach (Creswell, 2009). Qualitative analysis of unstructured interviews were considered using an inductive, thematic analysis (Riger and Sigurvinsdottir, 2016)

2.4.1. Quantitative Analysis

The dataset analysed ($n=5$) included only those participants who completed *all* elements of the program including the onboarding and offboarding questionnaire which allowed for pre- and post-intervention comparison. All participants within this dataset were individuals *with* a diagnosis of PTSD, meaning that comparison could not be made between Group 1 - PTSD and Group 2 - Non-PTSD participants. Therefore the quantitative analysis seeks to address the following amended hypotheses:

Null hypotheses:

H0a: There will be no statistically significant difference in Clinical Outcomes in Routine Evaluations (CORE-10) scores between the pre-intervention and post-intervention measurements.

H0b: There will be no statistically significant difference in Warwick-Edinburgh Mental Well-being Scale (WEMWBS) scores between the post-intervention and pre-intervention measurements.

Alternative hypotheses:

H1: Participants will show a statistically significant decrease in their Clinical Outcomes in Routine Evaluations (CORE-10) scores from pre-intervention to post-intervention.

H2: Participants will show a statistically significant increase in their Warwick-Edinburgh Mental Well-being Scale (WEMWBS) scores from pre-intervention to post-intervention.

2.4.1.1. Assumption Testing

To evaluate the difference between two dependent groups across time (pre- and post-intervention CORE-10 and WEMWBS) a one tailed paired t-test was proposed, as the

amended hypotheses predicted the direction of change (Field, 2009). The data was prepared and no missing data nor outliers were identified (Baker, 2018). The threshold for statistical significance was set at $p = 0.05$ and power was set at 80% (Field, 2009). To gain a higher power level, a larger sample size is typically required to achieve statistical significance (Field, 2009), therefore, the small sample size gave rise to concerns regarding statistical power. Assumption testing was conducted on the *CORE-10 Pre-Intervention* and *CORE-10 Post-Intervention* data using four different statistical tests (Appendix 9), which indicated that the data did not deviate significantly from normal distribution (Kolmogorov-Smirnov Test $p = 1$; Shapiro-Wilk $p = 0.99$) (Appendix 9).

Assumption testing was conducted on the *WEMWBS Pre-Intervention* and *WEMWBS Post-Intervention* data using four different statistical tests (Appendix 9). *WEMBS Pre-Intervention* data returned contradictory results (Kolmogorov-Smirnov $p = 0.411$; Shapiro-Wilk $p = 0.16$). A review of the Quantile-Quantile Plot highlighted a non-normal distribution (Appendix 9). *WEMWBS Post-Intervention* was tested (Kolmogorov-Smirnov Test $p = 0.699$; Shapiro-Wilk $p = 0.147$) indicating that the data did not deviate significantly from normal distribution. The violation of assumptions necessitated the use of non-parametric testing for comparison of dependent variables *WEMWBS Pre-Intervention* and *WEMWBS Post Intervention*. These same assumption violations have been observed in similar studies in which small sample sizes are present and using the same measures (Clift *et al.*, 2017). Future research may need to consider the limitations of these measures, particularly the recording of non-normal distributions in small datasets.

2.4.1.2. CORE-10

Descriptive statistical analysis demonstrated that the *CORE-10 Pre-Intervention* group had higher values ($M = 13.6$, $SD = 2.07$) than the *CORE-10 Post-Intervention* ($M = 11.4$, $SD = 6.31$) (Table 6). The null hypothesis that there will be no statistically significant difference in CORE-10 scores between the pre-intervention and post-intervention measurements was tested using a one tailed t-test for paired samples. The result was not statistically significant ($t(4) = 0.8$, $p = 0.235$). A p -value of 0.235 was obtained, which is above the specified significance level of $p = 0.05$. The t -test result was therefore not significant for the present data and so the null hypothesis there will be no statistically significant difference in CORE-10 scores between the pre-intervention and post-intervention measurements is not rejected. The effect size d was 0.36 representing a small effect (Cohen, 1988) (Appendix 10). The *CORE-10 Pre-Intervention* scale

(10 items) showed a poor degree of internal consistency as indicated by Cronbach's alpha ($\alpha=0.2$). Likewise, the *CORE-10 Post-Intervention* scale (10 items) as indicated with Chronbach's alpha ($\alpha=0.58$). Internal consistency and reliability may be compromised due to the small sample size ($n=5$).

Table 6. Descriptive Statistical Analysis: CORE-10.

	M	SD	t	df	P	Cohen's d
CORE-10 PRE-INTERVENTION	13.6	2.07	0.8	4	.235	0.36
CORE-10 POST-INTERVENTION	11.4	6.31				

Whilst this analysis did not show a significant difference in post-intervention scores for the CORE-10, the effect size quantifies the magnitude of the difference between the paired data, indicating how meaningful the observation may be (Field, 2009). As statistical significance can be misleading due to its dependence on sample size, effect sizes provide a more robust measure of the true magnitude of an effect (Field, 2022). In this case, although the higher mean scores on the *CORE-10 Pre-Intervention*, compared to *CORE-10 Post-Intervention*, suggest a reduction in participant distress, a larger sample size is necessary to confirm the potential outcomes and establish a meaningful effect size (Cohen, 1988).

2.4.1.3. Warwick and Edinburgh Measure of Well-being

Descriptive statistical analysis demonstrated that the *WEMWBS Pre-Intervention* group had equal values (**Mdn** = 45) to the *WEMWBS Post-Intervention* group (**Mdn** = 45) (Table 7). The null hypothesis that there will be no statistically significant difference in WEMWBS scores between the post-intervention and pre-intervention measurements was tested using a non-parametric Wilcoxon Signed Rank test for paired samples. The result was not statistically significant (**W** = 1, **p** = 0.078). The null hypothesis that there will be no statistically significant difference in Warwick-Edinburgh Mental Well-being Scale (WEMWBS) scores between the post-intervention and pre-intervention measurements is thus not rejected. The effect size **r**=0.79, represents a large effect (Cohen, 1988). This means that with a larger sample size, there may be significance found between the *Pre-Intervention* and *Post-Intervention* well-being scores in favour of greater well-being (Appendix 10). This finding is consistent with similar

studies with small sample sizes (Clift *et al.*, 2017). Further studies will need to ensure greater sample size is measured. The *WEMWBS Pre-Intervention* scale, which consisted of 14 items, showed a poor degree of internal consistency as indicated by Cronbach's alpha ($\alpha=0.53$). Likewise, the *WEMWBS Post-Intervention* scale showed a poor degree of consistency as indicated by Chronbach's alpha ($\alpha=0.58$). Internal consistency and reliability may be compromised due to the small sample size ($n=5$).

Table 7. Descriptive Statistical Analysis: Warwick and Edinburgh Measure of Well-being.

	Mdn	W	P	r
WEMWBS PRE-INTERVENTION	45	1	0.78	0.56
WEMWBS POST-INTERVENTION	45			

2.4.1.4. Subjective Units of Distress Scale (SUDS)

Participants were asked to rate their mood using the SUD scale both before and after each weekly singing lesson (Appendix 7). However, not all participants completed this process, which complicated data analysis. Only genuine pairings of the *SUDS Pre-Intervention* and *SUDS Post-Intervention* scores each week were analysed using a Wilcoxon Signed Rank test to compare the difference between each dependent variable. As expected, there were no significant findings. Figure 2 presents the descriptive statistics (means) related to complete pairs of SUDS ratings across the four-week intervention period.

Figure 4. Subjective Units of Distress (SUDS) Mean Ratings Pre- and Post-Intervention.

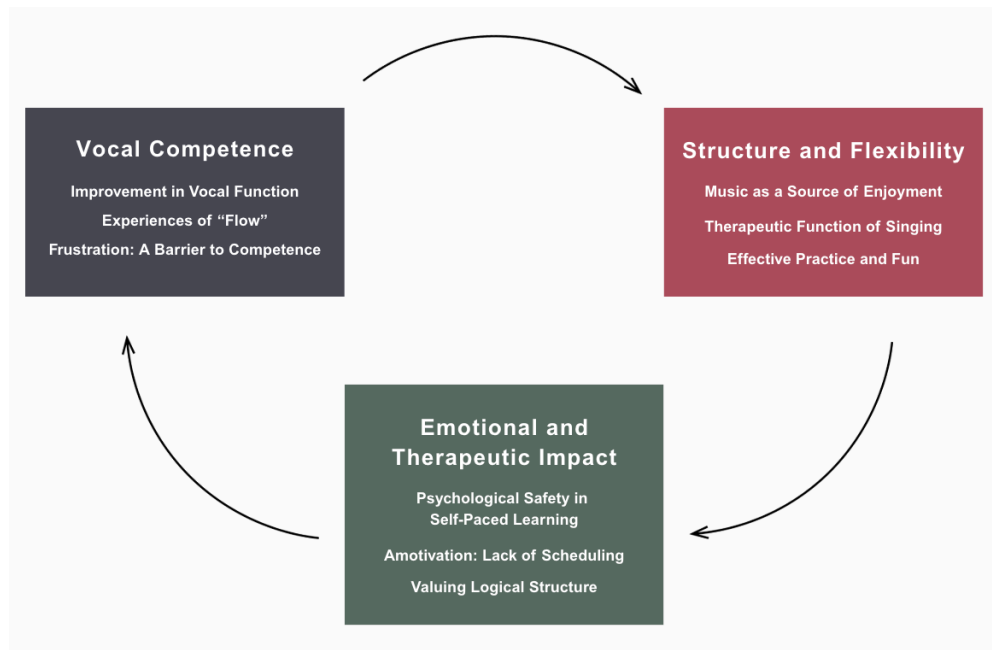


A decrease in SUDS scores from the pre-intervention to the post-intervention measurement indicates a reduction in a participant's level of perceived distress (Wolpe, 1969). Conversely, instances of increased distress ratings may be attributed to a variety of factors, including frustration with specific exercises, external stressors, technological issues, or difficulties with learning new skills (Gilbert, 2014). This increase may also represent a form of *eustress*, the beneficial stress associated with skill acquisition (Ophir and Jacoby, 2020). As Ophir and Jacoby (2020) found, "musicking" can lead to both a sense of vitality and hyperarousal, a core symptom of PTSD. This paradoxical juxtaposition of effects may account for the observed variations in SUDS ratings across time within the intervention.

2.4.2. Qualitative Analysis

Three broad themes emerged from the deductive thematic analysis of the Participant Interview transcripts: (1) Vocal Competence; (2) Structure and Flexibility; (3) Emotional and Therapeutic Impact (Figure 5). These themes are explored through the lens of Self Determination Theory (Deci and Ryan, 2000) in response to the research question: To what extent does participation in an independent, self-directed, online singing program impact the mental health and well-being of emergency service personnel with and without a diagnosis of PTSD?

Figure 5. WellSing Project: Thematic Analysis.



2.4.2.1. Theme 1: Vocal Competence.

This theme explores participants' experience in developing a sense of vocal and physical skill through the program's exercises and voice theory. The experience of "flow" is particularly relevant as participants describe moments where they felt challenged but not overwhelmed, leading to a state of focused engagement and a tangible improvement in skill level.

Improvement in Vocal Function

A key positive outcome for participants was the concrete improvement in their vocal abilities. Participant 12643, who has PTSD and other neurological conditions, noted that the singing taught them how to *"breathe properly and how to protect your voice"* and that it trained them to *"maintain a loud projected voice"*. This participant reported that *"my speaking abilities improved 100%"* because *"I started to mumble quite a bit... the singing has actually improved that for me a lot"* (Participant 12643). Participant 19295, who also has PTSD, reiterated the importance of practising vocal pitch and annunciation so that *"I don't mumble and talk too quickly because that's important to me, so those things really aided in my communication from a physical sense"*. This provides a clear, measurable sense of competence, directly addressing a physical challenge that may be found in PTSD with regard to tense voice quality, reduced frequency

range in vowel production resulting from the impact on motor control in speech production (Scherer *et al.*, 2016; Ter *et al.*, 2022; Orhon *et al.*, 2022). Other participants noted a general improvement in their singing ability and an appreciation for the theory behind it, even those with musical experience, *“I learnt some things still, which is great, and it was good”* (Participant 17800). Whilst no significant findings were elucidated, the quantitative analysis may hint at this positive effect through the reduction of mean scores between the *CORE-10 Pre-intervention* ($M=13.6$) and *CORE-10 Post-intervention* ($M=11.4$).

Experiences of “Flow”

The WellSing Project content sought to provide sufficient challenge to be engaging without being so difficult as to cause frustration. This is a core component of ‘Flow Theory’ (Csikszentmihalyi, 1991) whereby an individual becomes completely immersed in an activity, leading to enhanced concentration, increased alertness and accompanied by loss of self-consciousness (de Brabander and Martens, 2014). Participant 19295, for example, noted that the exercises were *“tailored to my particular type of voice so I didn’t think that at any stage... were outside the scope of my natural ability”*. This balanced approach facilitated a state of deep focus and enjoyment, with Participant 12643 reflecting:

“So while you are concentrating on one thing, I suppose it’s beneficial because, yeah I can understand what it means now, you’re actually not thinking about the bad things that have happened in the past, you’re concentrating on what you’re doing.”

This state of flow also aligns with regulation strategies outlined in music and emotion regulation literature, in particular, the strategy of *distraction* whereby an individual refocuses their attention away from a situation (Sakka and Juslin, 2018). Noteworthy, is that *distraction* may serve as either an adaptive or maladaptive emotion regulation strategy, contingent upon whether it is accompanied by an attitude of acceptance or avoidance (Wolgast and Lundh, 2017). Other participants *“enjoyed most of the exercises”* (Participant 17541) and were *“able to focus... without too much difficulty”* (Participant 19295) with others finding that some of the exercises were *“difficult but the majority of them weren’t that bad”* (Participant 12643).

Frustration: A Barrier to Competence

Competence relates to the experience of undertaking activities within reach of one’s own capacity (Deci and Ryan, 2000). Not all participants experienced balance between challenge

and skill acquisition. For some, specific exercises proved to be a source of frustration, directly affecting their sense of competence and thus, disrupting the potential for flow (Csikszentmihalyi, 1991). Participant 17541's experience with *"the trilling"* is a prime example of a thwarted sense of competence (Johansen *et al.*, 2023), as they found it *"incredibly frustrating because I couldn't get it consistently"* and others commented, *"I couldn't do it so it was sounding a bit funny"* (Participant 17800). Similarly, the duration of the scales were described as a *"little bit hard"* and made participants *"unsure about whether... I was actually singing or just making a noise"* (Participant 17541), leading to a feeling of inefficacy rather than mastery. However, that same participant reported *"I have found that in the shower it's a little bit easier"* (Participant 17541), highlighting a sense of *intrinsic* motivation to master the skill (Deci and Ryan, 2000). A question regarding the long term efficacy of skill acquisition in this context remains, as *"I still think if you gave me the scales now I probably wouldn't be able to"* (Participant 17541). This highlights challenges in asynchronous learning where there is no immediate feedback or the opportunity to clarify understanding (Kritik, 2025).

2.4.2.2. Theme 2: Emotional and Therapeutic Impact

Capturing the profound subjective experience of singing, this theme moves beyond the technical vocal skills to the deeper emotional and psychological effects. The interviews revealed that singing served as a form of emotion regulation, an enjoyable escape and a source of well-being.

Music as a Source of Enjoyment

Participants consistently described the music choices and singing components as a source of enjoyment and positivity. The songs chosen were *"uplifting"* (Participant 17541), which created a positive affective state and served as a *"nice way to end the session"* (Participant 17541). This intrinsic enjoyment is a key driver of engagement that is central to both SDT and Flow Theory, where the activity itself is its own reward (Davidson and Garrido, 2019). Participants also stated that it was *"really good to have a song to sing at the end"* with *"no judgement... I could just belt it out"* (Participant 17800). This sense of uplift had lasting effects *"especially a 'Wonderful World' and the 'Hallelujah' one at the end... that was a great one to finish on. I was singing it all day"* (Participant 17800). This aligns with a study by Macintosh *et al.* (2020) in which participants with PTSD who sang as part of a choir requested to sing 'happy tunes' and to 'find things that are actually uplifting'. However, not all participants in this study were as uplifted by the song choice

citing that “*some are a little bit boring*” (Participant 12643) indicating a personal preference for hard rock.

Therapeutic Function of Singing

Whilst this was not a clinical intervention for PTSD, participants noted a therapeutic benefit, particularly in relation to mental health. One participant, who sings in a band for “*mental health*” was specifically looking for “*tips and tricks*” to improve their singing for this purpose (Participant 18088). Another explicitly stated that the program “*hasn’t made [PTSD] worse, it hasn’t made it any better*” (Participant 12643), but the overall improvement in this participants’ speaking ability was a significant positive outcome. This suggests that whilst the program does not directly treat the underlying condition, engagement in a positive activity and mastery of new skills may contribute to well-being. This effect may also contribute to the reduction in mean scores between the *CORE-10 Pre-intervention* ($M=13.6$) and *CORE-10 Post-intervention* ($M=11.4$). Further, it may contribute to the potential for significance with large effect sizes ($r=0.79$) found between the *WEMWBS Pre-Intervention* and *WEMWBS Post-Intervention* scores (Appendix 10) in larger sample sizes.

Effective Practice and Fun

The interviews revealed a humorous and slightly “*embarrassing*” (Participant 12643) aspect of the program where participants felt a self-consciousness about the “*crazy exercises*” (Participant 12643). This illustrates the need for a private, safe space for the activities which participants highlighted in Week 1, “*I needed to ensure that the quiet space was indeed quiet*” (Participant 19295) and “*the last thing I need is my daughter to walk past...*” (Participant 12643). Where some participants found it challenging to create a private space to undertake the sessions, they were able to share lightheartedly with family members, “*my kids commented it was funny*” (Participant 17800) and, “*my Rottweiler did not appreciate my practice 🐕*” (Participant 12119). This reinforces an aspect of ‘play’ that is critical to recovery (Kenny, 1987). The fact that participants moved through this initial embarrassment to complete the program indicates a strong internal drive and a belief in the value of the exercises.

2.4.2.3. Theme 3: Structure and Flexibility

This theme explores the complex and paradoxical relationship between the program’s flexible, self-paced structure and the participants’ ability to effectively engage. Whilst the autonomy

afforded by online delivery was considered a crucial enabler for some, for others the lack of external structure created significant barriers to participation.

Psychological Safety in Self-Paced Learning

The flexibility of the program was a significantly positive factor for participants, particularly those with PTSD. The ability to engage with the program on their “*own time*” and “*when I felt ready and right to do it*” (Participant 17800) was repeatedly cited as a key benefit which is directly linked to autonomy within SDT (Deci and Ryan, 2000). This self-paced approach created a safe, controlled environment where participants did not feel pressured or “*judged*” (Participant 17800), which is vital for individuals who may feel a heightened need for control (van der Kolk, 2006). The absence of a fixed schedule allowed participants to align their engagement with their emotional and mental state, “*I was having just a rough week in general... so I sort of halved the session. But it was good being able to do that and then pop back again when I’m in the good mindset*” (Participant 17800). Other participants found it challenging to “*make sure I made time to commit to it and remember to commit to it*” (Participant 19295) demonstrating the impact of memory and cognition deficits in PTSD which may influence participation (Ophir *et al.*, 2020). Solutions may include reminders or notifications for participants so that they may reduce cognitive load (Alqahtani and Orji, 2020; Proudfoot *et al.*, 2010), even though participants used this as a learning opportunity, “*If I had noticed that I had forgotten to do something or hadn’t completed a particular element of it, that I went back to do it so I think that was a self-challenge more than anything else*” (Participant 19295).

Amotivation: Lack of Scheduling

For some participants, the very autonomy that others valued, became a source of difficulty. The absence of a fixed appointment time was a significant barrier, leading to procrastination and a sense of feeling overwhelmed (Proudfoot *et al.*, 2010). This indicates a thwarting of autonomy whereby the lack of structure led to a state of *amotivation*, as the participant was unable to mobilise the energy to start the intervention (Johanson *et al.*, 2023). This experience is in contrast to the positive aspects of autonomy and points to the complex relationship between freedom and structure (Deci and Ryan, 2000). The program’s design, which was intended to support autonomy, inadvertently created a ‘burden’ for those who may struggle with self-regulation and be in an acute stage of recovery from PTSD (Herman, 1992). One

participant highlighted that *“because I could do it at my leisure, my leisure doesn’t happen because I don’t have leisure”* (Participant 18088). Furthermore they reflected:

“...I was just so overwhelmed because I knew I didn’t have enough time to finish it all in one sitting and I really wanted to have it in one sitting and I didn’t want to mess up the next one coming through and I got really flustered with it but I think the main thing...it’s because I didn’t have a set appointment time” (Participant 18088).

Valuing Logical Structure

Participants who were able to engage successfully, praised the program's inherent logical structure, even in the absence of a rigid schedule. The clear and concise instructions, coupled with a logical progression of theory and exercises, helped them stay focused and motivated. This demonstrates a preference for a structured learning environment that provides clear guidance, *“well explained and glad you always have an example as I lose concentration easily”* (Participant 17800 - Week 2). Other participants *“didn’t find that very difficult to follow because of that streamlining process”* (Participant 19295).

2.5. Discussion and Conclusion

Perhaps the most salient finding is the dichotomous perception of the interventions' autonomy. For Participant 17800, the ability to complete the intervention in *“my own time”* and *“when I was in the right mindset”* was crucial to their engagement and enjoyment, preventing the intervention from becoming a *“burden”*. This is an example of autonomy support (Johansen *et al.*, 2023) where the intervention design facilitates the participants' internal drive by allowing them to align the activity with their personal needs. However, the experience of Participant 18088 presents a clear counter-narrative. For this individual, the lack of a *“set appointment time”* led to feelings of being *“overwhelmed”* and *“flustered”*, resulting in *amotivation* and a reluctance to begin the intervention (Johansen *et al.*, 2023). This underscores a critical point: whilst flexibility is often commended, it may be a significant barrier for individuals with PTSD who experience challenges with executive function (Ouhmad *et al.*, 2024) or who have demanding lives with little perceived *“leisure”* time (Participant 18088). Therefore, a purely unscheduled approach may not be universally beneficial and may lead to thwarting of autonomy (Johansen *et al.*, 2023) as the freedom to choose becomes a pressure to perform. This finding aligns with research by other scholars who argue that, particularly for participants with low initial motivation, some degree of external structure and accountability is necessary to facilitate engagement (Baumeister and

Vohs, 2007). The program's design, therefore, must be critically viewed not just as a source of autonomy but also as a potential source of what may be termed "the burden of choice" in a self-directed environment (Johansen *et al.*, 2023).

An objective of the program was to tailor activities to an optimal level of challenge, aligned with individual capabilities and designed to facilitate a progressive pathway as skills developed (Csikszentmihalyi, 1991). In the context of participants with PTSD, the aim was to foster relaxed alertness (Gilbert, 2014) and to avoid inducing anxiety or apathy throughout the learning process. However, the experience of Participant 17451 demonstrates a breakdown in flow state and a thwarted sense of competence, potentially leading to anxiety and disengagement (Johansen *et al.*, 2023). The struggle with the "*incredibly frustrating*" trilling exercise and feelings of "*just making a noise*" rather than singing points to a discrepancy between the level of challenge and skill and is complicated by a lack of immediate feedback (Csikszentmihalyi, 1991). This suggests that vocal exercises that are not universally accessible may require more adaptive or individualised instruction to maintain a sense of engagement.

Participants' comments regarding the "*uplifting*" nature of the songs and the enjoyment they derived from singing, align with the established literature on the use of music for mood and emotion regulation. The program's focus on breathing techniques (Chapman, 2006), as noted by Participant 12643, is not just a vocal skill but a therapeutic tool that may have broader benefits for overall well-being (Subramanian *et al.*, 2023; Singh and Raghavendran, 2021). As cited by Participant 19295:

"I found that ... concentrating on breathing in particular and... slowing down, just anything I do that's slowed down and particularly involving breathing I find of benefit even if it's not singing... I can easily just go, yep slowing down breathing or concentrating on breathing and having a mindfulness of it is very important. and so I related better to that and I guess singing was second to the process of getting to the singing if that makes sense".

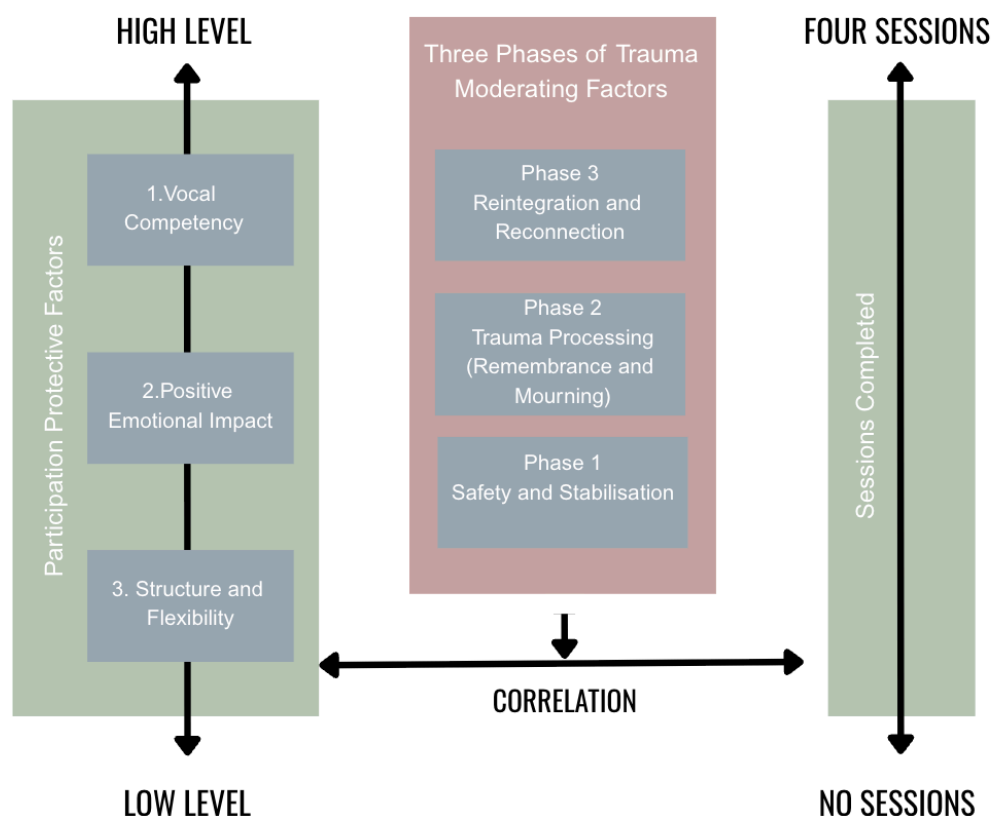
Furthermore, the program's necessity to create a "*safe space*" for engagement, even if a self-imposed one, like being at home alone, was a crucial component of its success. The "*embarrassing*" nature of the vocal exercises highlights the vulnerability inherent in vocal expression as Participant 17800 states, "*it reiterated that music and singing is very emotional*", but in the safety of their own home, they were able to let themselves "*feel vulnerable and... let it*

go". Self-consciousness was overcome as "*it was just for me*" (Participant 17541) and "*there was no judgement*" (Participant 17800) which made space for a sense of personal agency and self-acceptance (Wolgast and Lundh, 2017). This is particularly relevant in the context of PTSD where reclaiming a sense of physiological control and safe self-expression is a key part of the recovery process (van der Kolk, 2006). Cultivating a non-judgemental space for vocal expression appears to have facilitated this process even if the therapeutic benefits were not the goal for all participants. Noteworthy is that participants expressed a reluctance to sing in group settings, "*I probably would've felt a lot more self-conscious in a group*" (Participant 17541) and "*I probably would've been a bit shy*" and "*wouldn't have done that with other people even though I'm a mediocre singer*" (Participant 18088). This aligns with the literature on group interventions for individuals with PTSD (Ophir *et al.*, 2020; Rudstam, 2023).

The WellSing Project intervention appears to be optimally positioned within the third phase of the Three-Phase Trauma Recovery Model (Herman, 1992): *Reintegration and Reconnection*. This phase is characterised by rebuilding trust, a sense of self-identity and community engagement (Herman, 1992). As the program design emphasises independent, self-directed learning, it requires a level of emotional and physical stability that may not be accessible in the initial phases: *Safety and Stabilisation* and *Trauma Processing - Remembering and Mourning* (Herman, 1992). Engaging in a skill-based activity such as singing during these initial phases may be overwhelming and counterproductive which is exemplified in the withdrawal of a participant in this program. This emphasises the need for participant screening in future studies to ensure that they are at an appropriate stage of recovery to benefit from such interventions without experiencing distress. This also points to a clear delineation between singing interventions administered by music therapists and voice pedagogues in practice.

Recovery phases 1 and 2 may be best suited to clinical interventions administered by a registered music therapist, whilst phase 3 may be suitable for voice practitioners. Therefore, voice practitioners have a responsibility to recognise signs that a participant may be regressing to an earlier phase of recovery and refer the individual to a qualified music therapist, mental health or medical professional. This staged approach to care is crucial for maximising therapeutic benefits whilst safeguarding participant well-being. Figure 6 integrates the thematic analysis of The WellSing Project with Herman's (1992) Three-Phase Trauma Recovery Model.

Figure 6. Integrating The WellSing Project and Three-Phase Trauma Recovery Model.



The importance of sensitively tailoring solutions to individuals for individuals with PTSD is best represented in the sentiments of Participant 17800 upon being asked about their experience with The WellSing Project:

“A positive one. I felt respected with my PTSD. I definitely didn’t feel any judgement... I felt respected because this was aimed at people with PTSD. It was being respected for just what’s happened to me in my life and again singing is a passion for me. It really spoke to me”.

2.5.1. Limitations, Recommendations and Reflections

This study is subject to several limitations. The recruitment process yielded a small sample size, which precluded the possibility of a thorough statistical analysis and comparison of outcomes between participants with and without PTSD (Bind *et al.*, 2023; Clift *et al.*, 2017). It is also not possible to definitively attribute the observed changes to the singing activity itself. While the

study's high attrition rate is consistent with research on creative modalities for trauma healing (Macintosh *et al.*, 2020), qualitative feedback suggested that participants may have felt overwhelmed by elements of the program's design rather than being directly triggered by the content. Furthermore, the four-week duration of the intervention may have been insufficient to alter perceptions of well-being significantly, as many group singing studies run for six weeks or more (Lord *et al.*, 2010.; Clift *et al.*, 2017).

Future research should aim for a larger, more diverse sample from various emergency services and incorporate objective data, such as bio-markers (Fancourt *et al.*, 2016; Coulton *et al.*, 2015). Moreover, future recruitment strategies should be mindful of the participants' stage of PTSD recovery to mitigate the risk of distress or withdrawal due to overwhelming experiences. Future research may need to consider the limitations of the CORE-10 and WEMWBS, particularly the recording of non-normal distributions in small datasets. Methodological refinements should be considered including: a more robust method of determining a participant's vocal range; screening interviews to more accurately assess participants readiness and suitability; offering reminders, notifications or live Zoom sessions to accommodate the varied needs of lifestyles of this population; providing participants with scales of shorter duration to avoid frustration and boredom (Csikszentmihalyi, 1991).

Upon self-reflection (Dewey, 1933), this research presented significant methodological and psychological challenges. The technical requirements of content curation and creation, including video production and editing, proved to be a steep learning curve and a challenge to complete within the allocated timeframe. Whilst the remote participation format was preferred, partly to mitigate direct exposure to participant trauma, it was difficult to empathetically disengage, particularly in participant interviews. My personal experience with PTSD informed a key conceptual shift, reframing participant non-adherence and incomplete data as valuable insights into the real-world feasibility and barriers to participation, rather than a personal failure. This pragmatic perspective allowed me to integrate compassion and empathy into the research framework. This willingness to accept and analyse incomplete submissions represented a more flexible and robust methodology that accounts for the complexities of participant's lived experience, providing deeply meaningful data even in the absence of complete datasets.

The methodology and design of this study provided a robust framework for exploring the complex interplay between a structured vocal pedagogy program and the well-being of emergency service personnel. The study aimed to address the research question: To what

extent does participation in a self-directed online vocal pedagogy program impact the mental health and well-being of emergency service personnel with a diagnosis of post-traumatic stress disorder (PTSD)? By employing a mixed-methods approach, the research successfully integrated both quantitative metrics (CORE-10, WEMWBS) and rich, qualitative data from participant interviews. This allowed for a nuanced understanding of participant lived experiences, which was effectively synthesised through thematic analysis and critically examined using established theoretical frameworks: Self-Determination Theory; Flow Theory, and; Herman's (1992) Three-Phase Trauma Recovery Model. The findings from this analysis strongly suggest that the program held therapeutic value by fostering autonomy and competence, particularly for those in the reintegration phase of trauma recovery. In conclusion, this study provides compelling basis for the therapeutic potential of The WellSing Project in supporting the well-being of emergency service personnel with PTSD.

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APPENDIX 1. The WellSing Project Timeline.

The WellSing Project		
Task	Start Date	End Date
Project Planning and Ethical Approval	06.01.2025	28.03.2025
Develop Research Proposal	20.01.2025	27.01.2025
Obtain Ethical Approval	23.01.2025	20.02.2025
Design Research Framework	23.01.2025	20.02.2025
Refine Research Proposal	20.02.2025	28.02.2025
Design Research Tools	27.01.2025	05.03.2025
<i>Vocal Pedagogy Intervention</i>	28.01.2025	05.03.2025
<i>Pre-intervention Assessment</i>	14.02.2025	21.02.2025
<i>Post-intervention Assessment</i>	14.02.2025	21.02.2025
<i>Interview Questions</i>	21.02.2025	28.02.2025
Recruitment Campaign	25.02.2025	28.03.2025
<i>Create Recruitment Flyer</i>	25.02.2025	28.02.2025
<i>Create Expression of Interest Form</i>	28.02.2025	01.03.2025
<i>Advertise - Social Media</i>	01.03.2025	28.03.2025
<i>Advertise - Direct Contact with Organisations</i>	01.03.2025	28.03.2025
Recruit Participants	14.03.2025	28.03.2025
Literature Review	01.02.2025	01.05.2025
Prepare Keywords	01.02.2025	06.02.2025
Conduct Literature Search	06.02.2025	27.02.2025
Collate Literature	06.02.2025	27.02.2025
Synthesise Literature	27.02.2025	15.04.2025
Draft Literature Review	27.02.2025	20.04.2025
Finalise Literature Review	20.04.2025	01.05.2025

Pre-Intervention Assessments	01.05.2025	15.05.2025
Administer Baseline Assessments	01.05.2025	15.05.2025
<i>Clinical Outcomes in Evaluation (CORE-10)</i>	01.05.2025	15.05.2025
<i>Warwick Edinburgh Mental Well-being Scale (WEMWBS)</i>	01.05.2025	15.05.2025
Intervention Phase (4 Weeks)	10.05.2025	30.06.2025
Deliver Online Vocal Pedagogy Intervention (Well-Sing Project)	10.05.2025	30.06.2025
<i>Week 1 - Breathing and Posture</i>	12.05.2025	30.06.2025
<i>Week 2 - Phonation and Movement</i>	19.05.2025	30.06.2025
<i>Week 3 - Resonance and Vocalisation</i>	26.05.2025	30.06.2025
<i>Week 4 - Articulation and Performance</i>	02.06.2025	30.06.2025
Post-Intervention Assessments	02.06.2025	15.07.2025
Administer Post-Intervention Assessments	02.06.2025	15.07.2025
<i>Clinical Outcomes in Evaluation (CORE-10)</i>	02.06.2025	15.07.2025
<i>Warwick Edinburgh Mental Well-being Scale (WEMWBS)</i>	02.06.2025	15.07.2025
Quantitative Data Analysis	01.06.2025	30.06.2025
Data Entry and Cleaning	01.06.2025	15.06.2025
Statistical Analysis - IBM SPSS / DataTab (assumption testing, t-test, effect size calculations)	15.06.2025	30.06.2025
Qualitative Data Analysis	10.07.2025	30.07.2025
Conduct Participant Interviews	10.07.2025	30.07.2025
Transcribe Participant Interviews	10.07.2025	15.07.2025
Thematic Analysis - Nvivo	15.07.2025	30.07.2025
Final Report	01.07.2025	22.08.2025
Complete Draft Report	02.08.2025	06.08.2025
Submit Draft Report	06.08.2025	06.08.2025
Finalise Report	16.08.2025	22.08.2025

Submit Final Research Report	20.08.2022	22.08.2025
Presentation	20.08.2025	01.09.2025
Prepare Presentation Material	20.08.2025	01.09.2025
Prepare Slides	20.08.2025	01.09.2025
Prepare Notes	20.08.2025	01.09.2025
Present Research Findings	01.09.2025	05.09.2025

APPENDIX 2. WAPPAR Ethical Approval.



PG2 / E1 FORM

APPLICATION FOR ETHICAL APPROVAL

RESEARCH STUDENTS

This form is to be completed by the student within **SIX** months for full-time students and **TWELVE** months for part time students, after the commencement of the research degree or following progression to Part Two of your course.

Once complete, submit this form via the **MyTSD Doctoral College Portal** at (<https://mytsd.uwtsd.ac.uk>).

This document is also available in Welsh.

RESEARCH STAFF ONLY

All communications relating to this application during its processing must be in writing and emailed to pgresearch@uwtsd.ac.uk, with the title 'Ethical Approval' followed by your name.

STUDENTS ON UNDERGRADUATE OR TAUGHT MASTERS PROGRAMMES should submit this form (and receive the outcome) via systems explained to you by the supervisor/module leader.

In order for research to result in benefit and minimise risk of harm, it must be conducted ethically. A researcher may not be covered by the University's insurance if ethical approval has not been obtained prior to commencement.

The University follows the OECD Frascati manual definition of **research activity**: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

Ethical approval is not required for routine audits, performance reviews, quality assurance studies, testing within normal educational requirements, and literary or artistic criticism.

Please read the notes for guidance before completing ALL sections of the form.

This form must be completed and approved prior to undertaking any research activity. Please see Checklist for details of process for different categories of application.

SECTION A: About You (Principal Researcher)

1	Full Name:	Dannielle O'Keefe			
2	Tick all boxes that apply:	Member of staff:	☐	Honorary research fellow:	☐
	Undergraduate Student	☐	Taught Postgraduate Student	☒	Postgraduate Research Student

3	Institute/Academic Discipline/ Centre:	WAPPAR
4	Campus:	Carmathen
5	E-mail address:	hello@dokreative.com

6	Contact Telephone Number:	+61412089160
For students:		
7	Student Number:	2219673
8	Programme of Study:	MA Professional Practice (Vocal Pedagogy)
9	Director of Studies/Supervisor:	Louise Emanuel/Julie Crossman/Debbie Winter

SECTION B: Approval for Research Activity

1	Has the research activity received approval in principle? (please check the Guidance Notes as to the appropriate approval process for different levels of research by different categories of individual)	YES	☐	NO	☐
					Date
2	If Yes, please indicate source of approval (and date where known): Approval in principle must be obtained from the relevant source prior to seeking ethical approval	Research Degrees Committee	☐		
		Institute Research Committee	☐		
		Other: WAPPAR	☒		

SECTION C: Internal and External Ethical Guidance Materials

Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, location-specific codes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines. You may add rows to this table if needed.		
1	UWTSD Research Ethics & Integrity Code of Practice	☒
2	UWTSD Research Data Management Policy	☒
3	The Australian Code for the Responsible Conduct of Research (2018) The National Statement on Ethical Conduct in Human Research (2023)—Effective 1 January 2024 Australian Music Therapy Association Code of Ethics Australian Psychological Society Code of Ethics Australian National Association of Teachers of Singing Code of Ethics	☒

SECTION D: External Collaborative Research Activity

If there are external collaborators then you should gain consent from the contact persons to share their personal data with the university. If there are no external collaborators then leave this section blank and continue to section E.

1	Institution	N/A
2	Contact person name	N/A

3	Contact person e-mail address	N/A			
4	Is your research externally funded?	YES	☐	NO	☒
5	Are you in receipt of a KESS scholarship?	YES	☐	NO	☒
6	Are you specifically employed to undertake this research in either a paid or voluntary capacity?	Voluntary	YES	☐	NO ☒
7		Employed	YES	☐	NO ☒
8	Is the research being undertaken within an existing UWTSD Athrofa Professional Learning Partnership (APLP)?	If YES then the permission question below does not need to be answered.	YES	☐	NO ☒
9	Has permission to undertake the research has been provided by the partner organisation?	(If YES attach copy) If NO the application cannot continue	YES	☐	NO ☒

Where research activity is carried out in collaboration with an external organisation

10	Does this organisation have its own ethics approval system?	YES	☐	NO	☒
	N/A				

SECTION E: Details of Research Activity

1	Indicative title:	The Impact of Vocal Pedagogy on Self-Management of PTSD Symptoms via Digital Technologies.		
2	Proposed start date:	6 January 2025	Proposed end date:	22 August 2025
Introduction to the Research (maximum 300 words per section) Ensure that you write for a <u>Non-Specialist Audience</u> when outlining your response to the points below: • <i>Purpose of Research Activity</i> • <i>Proposed Research Question</i> • <i>Aims of Research Activity</i> • <i>Objectives of Research Activity</i> Demonstrate, briefly, how <u>Existing Research</u> has informed the proposed activity and explain • <i>What the research activity will add to the body of knowledge</i> • <i>How it addresses an area of importance.</i>				

3	Purpose of Research Activity The purpose of this research is to examine the potential of vocal pedagogy practice to aid in self-management of symptoms related to post-traumatic stress disorder (PTSD), when delivered through accessible digital technologies. As digital health and education solutions evolve, integrating evidence-based breathing, movement and vocal exercises offers a promising, accessible, cost-effective and less stigmatising approach to symptom management: breathing exercises including Buteyko Method (Subramanian <i>et al.</i>, 2023; Singh and Raghavendran, 2021; Jain, 2021; Ghordadekar <i>et al.</i>, 2020) have demonstrated reduction in anxiety; movement exercises derived from Feldenkrais Method (Hegberg <i>et al.</i>, 2019; Wallman-Jones <i>et al.</i>, 2023 Ahmadi <i>et al.</i>, 2020; Martin <i>et al.</i>, 2024) are shown to increase interoceptive awareness and well-being; vocal exercises including semi-occluded vocal tract and traditional vocal warm up exercises (Scherer <i>et al.</i>, 2013; Ter <i>et al.</i>, 2022; Orhon <i>et al.</i>, 2022; Nam <i>et al.</i>, 2019; Sahin, 2020; Saldias <i>et al.</i>, 2020; Titze, 2006) demonstrate improved quality of the resonant voice by reducing tension in the vocal tract. Tension in voice quality is symptomatic in PTSD (Scherer <i>et al.</i>, 2013). The study also seeks to explore the technical requirements of the target population with regard to design, functionality, usability and content for mobile application through participatory design (Alqahtani <i>et al.</i>, 2021). Findings from this study may inform the development of future digital interventions, promoting user-centered, personalised tools to support long-term mental health management in PTSD and related conditions through vocal pedagogy. References attached.
4	Research Question How does vocal pedagogy delivered through digital technologies impact self-management of PTSD symptoms?
5	Aims of Research Activity The aims of this research are: 1. To evaluate the potential effectiveness of vocal pedagogy delivered through mobile applications in self-management of symptoms of PTSD. 2. To examine design, functionality and usability requirements for digital vocal pedagogy tools in supporting self-management of PTSD symptoms. 3. To assess the impact of structured breathing, movement and vocal exercises on psychological well-being among individuals with PTSD. 4. To contribute insights for the development of future digital tools aimed at supporting mental health management in individuals with PTSD through vocal pedagogy.
6	Objectives of Research Activity The objectives of this research are: 1. To identify specific breathing, movement and vocal exercises that are most effective in promoting well-being and symptomatic relief for PTSD users. 2. To generate actionable recommendations for designing mobile applications that integrate vocal pedagogy tailored to the self-management needs of individuals with PTSD.
	Proposed methods (maximum 600 words) Provide a brief summary of all the methods that may be used in the research activity, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed. You do not need to justify the methods here, but should instead describe how you intend to collect the data necessary for you to complete your project.

7	This research proposes a pragmatic, mixed-methods approach. 1. Literature Review The literature review will serve to contextualise the research, identify existing gaps and build a theoretical framework around digital vocal pedagogy and its application for PTSD. It will also inform the design of the questionnaire, focus group and interview guides. Key databases will be searched for peer-reviewed articles related to trauma-informed vocal pedagogy, digital health interventions for PTSD and the effectiveness of breathing, movement, and vocal exercises in mental health management. The review will synthesise findings on the effectiveness of digital tools in PTSD treatment and voice education, focusing on mobile applications and virtual platforms. It will examine existing trauma-informed voice pedagogy models, emphasising specific vocal techniques and exercises that are demonstrated to reduce symptoms related to PTSD. 2. Questionnaire A questionnaire will be used to collect qualitative and quantitative data related to participants experience with breathing, movement and vocal exercises. The questionnaire will be both structured and semi-structured: • Part 1 will address demographic information including diagnosis. • Part 2 will address the use of exercises including frequency and preferences. • Part 3 will address the effectiveness of the exercises using a validated mood scale (eg. SUDS or similar). Consideration will be given to creating three comparison groups depending upon the number of participants. In this instance, one group will be assigned to breathing exercises, another to movement exercises and another to vocal exercises. The questionnaire will generate insights into the effectiveness of vocal pedagogy tools in symptom management. 3. Focus Group - Participatory Design A focus group will be conducted with between 5-10 participants with PTSD to explore the technical requirements including design, functionality, usability and content preferences for a vocal pedagogy focused mobile application in support of symptom management through participatory design (Alqahtani <i>et al.</i>, 2021; McClelland <i>et al.</i>, 2018; Shi, 2021; Aryana and Brewster, 2020). Participants will be selected from those having expressed interest in participating in further research in Module 3. The focus group may be conducted online or in person and will be moderated by the principal researcher. Upon commencement, the core principles of safety, trustworthiness, choice, collaboration, empowerment, and respect for diversity will be communicated along with expectations (Kezelman, 2021). Consideration will be given to having a psychologist present. Participants will be advised to consult their treating psychologist prior to participation and will be advised throughout, that they may withdraw at any time for any reason. The aim of the focus group is to understand the specific needs of individuals with PTSD with regards to technical requirements and preferences in mobile application design so that the solution is tailored to their needs. 4. Interview Interviews will be conducted with a smaller subset of participants (vocal pedagogy experts, PTSD therapists, mobile application developers) to understand the challenges and opportunities in designing digital tools that support PTSD symptom management. Semi-structured interviews will be designed with open-ended questions that explore participants' professional perspectives on the use of vocal pedagogy for PTSD, their experiences in developing or using digital health tools, and the integration of trauma-sensitive design principles. Interview participants will be purposively selected to provide expert insight into the intersection of vocal pedagogy and PTSD treatment, as well as the development of digital tools that address these needs. Interviews will be transcribed and analysed using qualitative methods such as coding for recurring themes and sub-themes. The interviews will yield professional perspectives that inform the second aim of the research—specifically on design requirements, functionality and the integration of therapeutic exercises into mobile platforms for PTSD.
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	Location of research activity Identify all locations where research activity will take place.
8	Phase 1 - Desktop literature review will be conducted in Malvern, Victoria, Australia. Phase 2 - Questionnaire will be delivered online to participants within Australia. Phase 3 - Focus Group will be conducted via an online platform such as Microsoft Teams or Zoom. Phase 4 - Interviews will be conducted in person where possible at a location to be determined, or via online platform such as Microsoft Teams or Zoom.
	Research activity outside of the UK If research activity will take place overseas, you are responsible for ensuring that local ethical considerations are complied with and that the relevant permissions are sought. Specify any local guidelines (e.g. from local professional associations/learned societies/universities) that exist and whether these involve any ethical stipulations beyond those usual in the UK (provide details of any licenses or permissions required). Also specify whether there are any specific ethical issues raised by the local context in which the research activity is taking place, for example, particular cultural and/or legal sensitivities or vulnerabilities of participants. If you live in the country where you will do the research then please state this.
9	This research will be conducted in Australia. This research is aligned with UK based ethical stipulations through adherence to: • The Australian Code for the Responsible Conduct of Research (2018) • The National Statement on Ethical Conduct in Human Research (2023)—Effective 1 January 2024 • Australian Music Therapy Association Code of Ethics • Australian Psychological Society Code of Ethics • Australian National Association of Teachers of Singing Code of Ethics

10	Use of documentation not in the public domain: Are any documents NOT publicly available?	NO	☒
		YES	☐
11	N/A		

	Does your research relate to one or more of the seven aims of the Well-being of Future Generations (Wales) Act 2015?	YES	NO
12	A prosperous Wales	☐	☒
13	A resilient Wales	☐	☒
14	A healthier Wales	☐	☒
15	A more equal Wales	☐	☒
16	A Wales of cohesive communities	☐	☒
17	A Wales of vibrant culture and thriving Welsh language	☐	☒
18	A globally responsible Wales	☐	☒
19	If YES to any of the above, please give details:		
	N/A		

SECTION F: Scope of Research Activity

	Will the research activity include:	YES	NO
1	Use of a questionnaire or similar research instrument?	☒	☐
2	Use of interviews?	☒	☐
3	Use of focus groups?	☒	☐
4	Use of participant diaries?	☒	☐
5	Use of video or audio recording?	☒	☐
6	Use of computer-generated log files?	☐	☒
7	Participant observation with their knowledge?	☐	☒
8	Participant observation without their knowledge?	☐	☒
9	Access to personal or confidential information without the participants' specific consent?	☐	☒
10	Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive?	☒	☐
11	Performance of any acts which may cause embarrassment or affect self-esteem?	☐	☒
12	Investigation of participants involved in illegal activities?	☐	☒
13	Use of procedures that involve deception?	☐	☒
14	Administration of any substance, agent or placebo?	☐	☒
15	Working with live vertebrate animals?	☐	☒
16	Procedures that may have a negative impact on the environment?	☐	☒
17	Other primary data collection methods. Please indicate the type of data collection method(s) below.	☐	☒
	N/A		

If NO to every question, then the research activity is (ethically) low risk and **may** be exempt from **some** of the following sections (please refer to Guidance Notes).

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

SECTION G: Intended Participants

If there are no participants then do not complete this section, but go directly to section H.

Who are the intended participants:		YES	NO
1	Students or staff at the University?	☐	☒
2	Adults (over the age of 18 and competent to give consent)?	X ☐	
3	Vulnerable adults?	☐	☒
4	Children and Young People under the age of 18? (Consent from Parent, Carer or Guardian will be required)	☐	☒
5	Prisoners?	☐	☒
6	Young offenders?	☐	☒
7	Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper?	☐	☒
8	People engaged in illegal activities?	☐	☒
9	Others. Please indicate the participants below, and specifically any group who may be unable to give consent.	☐	☒
	N/A		

Participant numbers and source	
Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited?	
10	How many participants are expected? Phase 1 - Literature Review No participants required. Phase 2 - Questionnaire Between 30-50 participants expected through purposive and snowball sampling via Police Veterans Victoria and Code 9 Foundation. Potential participants not connected to either organisation will be contacted directly. Phase 3 - Focus Group Between 5-10 participants expected through purposive and snowball sampling via Police Veterans Victoria and Code 9 Foundation. Potential participants not connected to either organisation will be contacted directly. Contact will also be made directly with previous participants who expressed interest in participating in further research on this topic. Phase 4 - Interviews Between 5-10 participants are expected through purposive sampling based upon their expertise in vocal pedagogy, mental health and mobile application development. Potential participants will be contacted directly via email.

11	Who will the participants be?	Participants will be current and former Emergency Service Personnel including police, fire, ambulance and support services. Participants will include those with a self-report diagnosis of post-traumatic stress disorder who are not receiving acute healthcare and not receiving social care work. Participants will also include those without PTSD, based on self-report. Participants will have the option to self-report diagnosis but will not be required to do so.
12	How will you identify the participants?	Engagement through social media, direct contact and email to Police Veterans Victoria and Code 9 Foundation. Consideration will be given to approach alternative support service organisations should further participants be required.

	Information for participants:	YES	NO	N/A
13	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	☒	☐	☐
14	Will you tell participants that their participation is voluntary?	☒	☐	☐
15	Will you obtain written consent for participation?	☒	☐	☐
16	Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)?	☒	☐	☐
17	If the research is observational, will you ask participants for their consent to being observed?	☐	☐	☒
18	Will you tell participants that they may withdraw from the research at any time and for any reason?	☒	☐	☐
19	With questionnaires, will you give participants the option of omitting questions they do not want to answer?	☒	☐	☐
20	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	☒	☐	☐
21	Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken?	☒	☐	☐
22	If NO to any of above questions, please give an explanation			
	N/A			

	Information for participants:	YES	NO	N/A
24	Will participants be paid?	☐	☒	☐
25	Is specialist electrical or other equipment to be used with participants?	☒	☐	☐
26	Are there any financial or other interests to the investigator or University arising from this study?	☐	☒	☐
27	Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims?	☐	☒	☐
28	If YES to any question, please provide full details			
	Video and audio recording may be used in interviews and focus groups held online or in person. Participants will be advised and may choose to not have their image recorded. Recording will be through online platform recording options such as Microsoft Teams and Zoom.			

SECTION H: Anticipated Risks

	Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them. If you have completed a full risk assessment (for example as required by a laboratory, or external research collaborator) you may append that to this form.		
1	Full risk assessment completed and appended?	Yes	☐
		No	☒
2	Risks to participants For example: sector-specific health & safety, emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information		

Risk to participants: Risk 1. Potential discomfort in response to music stimuli or questions regarding music, emotions, mental health and technology. Risk 2. Data security breach resulting in personal information being exposed. Risk 3. Sensitivity regarding disclosure of research methodology or intellectual property.	<i>How you will mitigate the risk to participants:</i> Risk 1. • Provide information in the form of Participant Information Sheet, prior to commencement of the online questionnaire, that discloses the exposure to music stimuli, breathing, movement and vocalisation exercises. • Provide a comprehensive consent form which discloses the benefits and risks associated with participation and specifies participant requirements so that an informed decision to participate may be made. • Provide an opportunity to reject or withdraw participation at any time without consequence. • Provide contact information for relevant support agencies with ease of accessibility throughout questionnaire, focus group or interview. • Direct the potential participant to seek advice from their treating general practitioner/psychologist/psychiatrist before consenting to participate. • Direct the participant to seek advice from their treating general practitioner/psychologist/psychiatrist throughout the research process if the need arises. Risk 2. • Ensure adherence to UWTSD Research Data Management Policy. • Anonymise data through assignment of research participant number or pseudonym. • Ensure only principal researcher has access to raw data. • Only collect personal information critical to research purpose. • Adhere to Australian Privacy Principles under the Privacy Act 1988. • Install two-factor authentication on all devices that hold research data. • Ensure any hard copies are filed within a locked receptacle with access only granted to principal researcher. Risk 3. • Ensure that participants understand the purpose of the research being undertaken and how data collected will be analysed and communicated. • Ensure all data is anonymised unless participant requests otherwise. • Ensure interview is held in private surrounds (even if online). • Ensure that intellectual property rights are understood and respected. • Ensure all data collected is secured in accordance with UWTSD Research Data Management Policy.
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3	If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities	
	This research does not propose to elicit sensitive, embarrassing or upsetting topics, nor will it likely result in the disclosure of information requiring mandatory reporting. Out of an abundance of caution, participants will be provided with information that refers them to their treating therapist or to relevant support services should they experience any discomfort or distress during the research process. They will be reminded throughout the process that they may withdraw consent at any time and cease participation without penalty.	
4	Risks to the investigator For example: personal health & safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest	
	Risk to the investigator: Risk 1. Failure to recruit sufficient participants. Risk 2. Risk of accusation of harm, impropriety or misconduct. Risk 3. Breach of data management policy. Risk 4. Emotional distress.	<i>How you will mitigate the risk to the investigator:</i> Risk 1. • Consider expanding the scope of eligible participants. • Consider engagement with other agencies that support the target population. • Utilise social media and direct mail to recruit further participants. • Consider offering questionnaire instead of interview. Risk 2. • Adhere to UWTSD Research Ethics and Integrity Code of Practice. • Adhere to ethical standard set out by relevant Australian governance bodies included in Section E, Question 9. • Maintain relationship with research supervisor to ensure appropriate action is taken throughout research process. • Maintain meticulous contemporaneous notes. Risk 3. • Adhere to UWTSD Research Data Management Policy. • Adhere to Australian Privacy Principles and Privacy Act 1988. • Ensure all research devices have two-factor authentication where possible. • Ensure all devices and sensitive documents are password protected. • Anonymise research data through code or pseudonym to protect personal information. Risk 4. • Maintain reflective journal. • Maintain exercise, sleep and singing techniques as mindfulness practice. • Maintain engagement in psychological support services.
5	University/institutional risks For example: adverse publicity, financial loss, data protection	

	Risk to the University: Risk 1. Reputational risk to public perception as a result of impropriety, misconduct, or breach of data management policy.	<i>How you will mitigate the risk to the University:</i> Risk 1. • Adherence to UWTSD Research Ethics and Integrity Code of Practice. • Adhere to ethical standards set out by relevant Australian governance bodies included in Section E, Question 9. • Maintain relationship with supervisor to ensure appropriate action is taken throughout research process. • Maintain meticulous contemporaneous notes. • Adhere to UWTSD Research Data Management Policy. • Adhere to Australian Privacy Principles and Privacy Act 1988. • Ensure all research devices have two-factor authentication where available. • Ensure all research devices and sensitive documents are password protected. • Anonymise research data through code or pseudonym to protect personal information. • Refrain for requesting any personal information beyond that which is critical to the research purpose.
6	Environmental risks For example: accidental spillage of pollutants, damage to local ecosystems	
	Risk to the environment: No environmental risks are identified with respect to this research project as it will be conducted primarily online.	<i>How you will mitigate the risk to environment:</i> (this box should expand as you type)

Disclosure and Barring Service				
	If the research activity involves children or vulnerable adults, a Disclosure and Barring Service (DBS) certificate must be obtained before any contact with such participants.	YES	NO	N/A
7	Does your research require you to hold a current DBS Certificate?	☐	☐	☒
8	If YES, please give the certificate number. If the certificate number is not available please write "Pending"; in this case any ethical approval will be subject to providing the appropriate certificate number.			

SECTION I: Feedback, Consent and Confidentiality

1	Feedback What de-briefing and feedback will be provided to participants, how will this be done and when?
	Participants will be provided with the researchers UWTSD position based email on the Participant Information Sheet, Consent Form and any recruitment material in order to ask any questions. Participants will be asked if they would like to be informed as to the outcome of the research. For those participants who wish to be informed, a results statement broadly outlining the research results will be prepared and emailed to their nominated email account before the 31st of December 2025.

2	Informed consent Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded in accordance with prevailing data protection legislation.
	Recruitment Material. Participant recruitment material will include a brief explanation of the research purpose, the research process and outline the inclusion/exclusion criteria. It will also outline the benefits and risks associated with participation and provide the researchers contact details for any questions. The material will also provide a link to an Expression of Interest Form (Google Drive) that has a downloadable copy of the Participant Information Sheet. Participant Information Sheet. The Participant Information Sheet will go into further detail with regard to the research purpose, process, benefits and risks, information management, support services and consent. This is to ensure that the potential participants may make a fully informed decision regarding their participation. Consent Form. Once the Expression of Interest is completed, the potential participant will be provided with the Consent Form which outlines in detail the elements required to be considered for informed consent. The participant will be required to tick a box that indicates their understanding of that element of consent and that they agree to participate. The participant will also be required to read the Participant Information Sheet and to acknowledge that they have read and understood the contents. Where participation is by way of Microsoft Teams or Zoom, online Participant Information Sheet and Consent Forms will still be required but consent will be through verbal acknowledgement also which will be recorded. Participants will be reminded that they may withdraw consent at any time without consequence.
3	Confidentiality / Anonymity Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case.
	Personal information will not be collected unless critical to research purpose. Where personal information is collected, participants will be provided a unique identifier either a participant number or pseudonym. Only the principal researcher will have access to the personal information of participants and the corresponding research participant code.

SECTION J: Data Protection and Storage

	Does the research activity involve personal data (as defined by the General Data Protection Regulation 2016 "GDPR" and the Data Protection Act 2018 "DPA")?	YES	NO
1	"Personal data" means any information relating to an identified or identifiable natural person ('data subject'). An identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. Any video or audio recordings of participants is considered to be personal data.	☒	☐
	If YES, provide a description of the data and explain why this data needs to be collected:		

2	It is anticipated that the moderating factors of Age, Gender and Diagnosis will be relevant to this research project. Age and Gender may influence how participants engage in the research and effect the research outcomes. Diagnosis of post-traumatic stress disorder is critical to participatory research to ensure that the target population is accessed. Email addresses will be the primary identifying personal data which is required to communicate with participants. With respect to interviews, video and audio recording will be used. This data may include images of participants faces and audio of their voices. Participants will be advised that they may turn off their recording to protect their identity should they choose. Individuals will have a unique identifier so names will not be used. Audio is required for collection of data and transcription.						
	<table border="1"> <tr> <td>Does it involve special category data (as defined by the GDPR)?</td> <td>YES</td> <td>NO</td> </tr> <tr> <td> 3 "Special category data" means sensitive personal data consisting of information as to the data subjects' – (a) racial or ethnic origin, (b) political opinions, (c) religious beliefs or other beliefs of a similar nature, (d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992), (e) physical or mental health or condition, (f) sexual life, (g) genetics, (h) biometric data (as used for ID purposes), </td> <td>☒</td> <td>☐</td> </tr> </table>	Does it involve special category data (as defined by the GDPR)?	YES	NO	3 "Special category data" means sensitive personal data consisting of information as to the data subjects' – (a) racial or ethnic origin, (b) political opinions, (c) religious beliefs or other beliefs of a similar nature, (d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992), (e) physical or mental health or condition, (f) sexual life, (g) genetics, (h) biometric data (as used for ID purposes),	☒	☐
Does it involve special category data (as defined by the GDPR)?	YES	NO					
3 "Special category data" means sensitive personal data consisting of information as to the data subjects' – (a) racial or ethnic origin, (b) political opinions, (c) religious beliefs or other beliefs of a similar nature, (d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992), (e) physical or mental health or condition, (f) sexual life, (g) genetics, (h) biometric data (as used for ID purposes),	☒	☐					
	If YES, provide a description of the special category data and explain why this data needs to be collected:						
4	Disclosure of Diagnosis (PTSD) is required to confirm participant belongs to target population. This will be sought through self-report.						

	Will data from the research activity (collected data, drafts of the thesis, or materials for publication) be stored in any of the following ways?	YES	NO
5	Manual files (i.e. in paper form)?	☒	☐
6	University computers?	☐	☒
7	Private company computers?	☐	☒
8	Home or other personal computers?	☒	☐
9	Laptop computers/ CDs/ Portable disk-drives/ memory sticks?	☒	☐
10	"Cloud" storage or websites?	☒	☐
11	Other – specify:	☐	☒
12	For all stored data, explain the measures in place to ensure the security of the data collected, data confidentiality, including details of backup procedures, password protection, encryption, anonymisation and pseudonymisation:		
	All data will be kept in password protected cloud storage on the business G-Suite system which will not be shared. Audio/visual data will be transcribed and would be shown to participants to check accuracy of reporting. Any USB sticks or portable devices used to store or transfer data will be password protected. All participants will be given a unique identifier to ensure confidentiality and this list will be kept securely in the password protected folder. All data recorded on paper will be stored in a secure receptacle accessible to the principal researcher only. All electronic and manual data collected will be held for a period of time as specified by UWTSD, after which, data stored electronically will be deleted and data recorded on paper will be destroyed.		

Data Protection

	Will the research activity involve any of the following activities:	YES	NO
13	Electronic transfer of data in any form?	☒	☐
14	Sharing of data with others at the University outside of the immediate research team?	☐	☒
15	Sharing of data with other organisations?	☐	☒
16	Export of data outside the UK or importing of data from outside the UK?	☒	☐
17	Use of personal addresses, postcodes, faxes, emails or telephone numbers?	☒	☐
18	Publication of data that might allow identification of individuals?	☐	☒
19	Use of data management system?	☒	☐
20	Data archiving?	☒	☐
21	If YES to any question, please provide full details, explaining how this will be conducted in accordance with the GDPR and Data Protection Act (2018) (and any international equivalents, where appropriate):		
	All data will be encrypted and kept in password protected cloud storage on the business G-suite account which will not be shared. Any USB or portable devices used to store or transfer data will be password protected. All data transfers will be encrypted and password protected. Where applicable, participants will be given a unique identifier to ensure anonymity and this list will be kept securely in a password protected folder accessible only to the principal researcher. The data will be stored until the completion of the project and then deleted. In accordance with the DPA 2018, participants will have the right to ask to see what data is held relating to them and to request this data be deleted. This will be possible up until the data is prepared for analysis. Beyond this time, the data set will not be able to be deleted as identification of individual responses may be impossible. If a participant requests their data be deleted prior to analysis, this will be done as soon as is practicable.		
22	List all who will have access to the data generated by the research activity:		
	Dannielle O'Keefe (principal researcher) Dr David Cane (research supervisor)		
23	List who will have control of, and act as custodian(s) for, data generated by the research activity:		
	Dannielle O'Keefe		
24	Give details of data storage arrangements, including security measures in place to protect the data, where data will be stored, how long for, and in what form. Will data be archived – if so how and if not why not.		
	All data will be encrypted and kept in password protected cloud storage on the business G-Suite account which will not be shared. Any USB sticks used to store or transfer data will be password protected and will be reformatted at the end of the project in order to destroy the data. The data will be stored until the completion of the project and then deleted.		
25	Please indicate if your data will be stored in the UWTSD Research Data Repository (see https://researchdata.uwtsd.ac.uk/). If so please explain. (Most relevant to academic staff)		
	N/A		
26	Confirm that you have read the UWTSD guidance on data management (see https://www.uwtsd.ac.uk/library/research-data-management/)	YES	☒
27	Confirm that you are aware that you need to keep all data until after your research has completed or the end of your funding	YES	☒

SECTION K: Declaration

The information which I have provided is correct and complete to the best of my knowledge. I have attempted to identify any risks and issues related to the research activity and acknowledge my obligations and the rights of the participants. In submitting this application I hereby confirm that I undertake to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice which is published on the website: https://www.uwtsd.ac.uk/research/research-ethics/		
1	Signature of applicant:	
		Date: 21 November 2024

For STUDENT Submissions:

2	Director of Studies/ Supervisor:	Laura James	Date: 3.2.25
3	Signature:	Laura James	

For STAFF Submissions:

4	Academic Director/ Assistant Dean:		Date:
5	Signature:		

Checklist: Please complete the checklist below to ensure that you have completed the form according to the guidelines and attached any required documentation:

☒	I have read the guidance notes supplied before completing the form.
☒	I have completed ALL RELEVANT sections of the form in full.
☒	I confirm that the research activity has received approval in principle
☒	I have attached a copy of final/interim approval from external organisation (where appropriate)
☒	I have attached a full risk assessment (where appropriate) ONLY TICK IF YOU HAVE ATTACHED A FULL RISK ASSESSMENT
☒	I understand that it is my responsibility to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice.
☒	I understand that before commencing data collection all documents aimed at respondents (including information sheets, consent forms, questionnaires, interview schedules etc.) must be confirmed by the DoS/Supervisor, module tutor or Academic Director.

RESEARCH STUDENTS ONLY

Once complete, submit this form via the **MyTSD Doctoral College Portal** at (<https://mytsd.uwtsd.ac.uk>).

RESEARCH STAFF ONLY

All communications relating to this application during its processing must be in writing and emailed to pgresearch@uwtsd.ac.uk, with the title 'Ethical Approval' followed by your name.

STUDENTS ON UNDERGRADUATE OR TAUGHT MASTERS PROGRAMMES should submit this form (and receive the outcome) via systems explained to you by the supervisor/module leader.

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DANNIELLE O'KEEFE

MEZZO SOPRANO

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☎ 0412 089 160

ABN: 38 714 202 743

14 November 2024

To: University of Wales Trinity Saint David

Research Title: 'The Impact of Vocal Pedagogy on Self-Management of PTSD Symptoms via Digital Technologies'.

I confirm that I approve of the research proposed into '*the impact of vocal pedagogy on self-management of PTSD symptoms via digital technologies*', to be carried out by Danielle O'Keefe, of Danielle O'Keefe Mezzo Soprano to be carried out between 6 January 2025 and 22 August 2025.

With kind regards,



Danielle O'Keefe

APPENDIX 3. WellSing Research Project Advertising Flyer.

EMERGENCY SERVICE PERSONNEL

OPPORTUNITY TO PARTICIPATE IN MUSIC RESEARCH



EXPRESSIONS OF INTEREST

Current and former Emergency Service Personnel (police, fire, ambulance) are invited to participate in the **WellSing Project**. This research project will investigate the potential impact of active participation in singing on the wellbeing of individuals, both with and without post-traumatic stress disorder (PTSD). Whilst research demonstrates significant benefits of group singing for wellbeing, group activities may not suit everyone. This project is focused on individual singing, to be undertaken in a comfortable space and at a time that suits the individual.

We are seeking eligible participants with and without PTSD.

This research is being conducted by Dannielle O'Keefe in conjunction with The University of Wales Trinity Saint David and The Voice Study Centre (UK) in support of a Masters of Professional Practice (Vocal Pedagogy). This research is independently funded. No financial incentive is offered.

WHAT TO EXPECT

Participation in this research is in three phases:

Phase 1
Participants are requested to complete a short questionnaire at the beginning of the project which will request demographic and wellbeing information and will take approximately 10-15 minutes to complete. A short questionnaire will also be administered at the end of the program.

Phase 2
Participants are requested to complete a course of individual singing lessons across a four week period (one lesson per week). The singing lessons will be delivered in a pre-recorded online format and emailed to participants at the beginning of each week. Participants may undertake the singing lessons at any time throughout the week, in the comfort of their own home. Each singing lesson is approximately 45 minutes duration.

Phase 3
Participants will be invited to attend a live, online focus group addressing their experience with the singing program and discuss their preferences and requirements for future engagement.

Participation is anonymous.

Individuals with PTSD are advised to seek advice from their medical practitioner prior to participation.

Expressions of interest may be withdrawn at any time by contacting the principal researcher via email.

ELIGIBILITY

Participants must:

- be over 18 years.
- be a current or former frontline serving member of an emergency service or military organisation.
- be able to hear, with or without aids.

There is no requirement for participants to have any musical experience.

NEXT STEPS

To express your interest in participating, scan the QR code below and enter your basic contact details. You will receive an email with a link to the Phase 1 questionnaire between the 5th and 10th of May, 2025. Please check your Junk Mail.

The WellSing Project will run between the 12th of May and the 9th of June, 2025.



Principal Researcher

Dannielle O'Keefe
B.Com, B.Mus

Research Supervisor

Dr David Cane
BSc, MA, MMus, PGDip (Adv.), PhD

For enquiries please contact the principal researcher:

Email: 2219673@student.uwtsd.ac.uk

Note: All information received is managed in accordance with Australian Privacy Principles and UWTSd Research Data Management Policy. Research data collated will be de-identified. Ethics approval granted by Wales Academy of Professional Practice and Research (UWTSd) 2219673.



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University of Wales
Trinity Saint David



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VOICE STUDY
CENTRE

APPENDIX 4. Participant Information Sheet.



WELLISING PROJECT

Participant Information Sheet

Introduction

Thank you for your interest in the WellSing Project. The following pages aim to provide you with further information, so that you can decide if you would like to take part in this research. Please take the time to read the information carefully. You may ask questions about any aspect you may not understand or want to know more about. You may also wish to discuss the research project with a relative, friend or medical practitioner, please feel free to do so.

What is this research project about?

This research project aims to study the effect of singing on mental health and wellbeing in emergency service personnel with and without post-traumatic stress disorder. The research is conducted by Dannielle O'Keefe, under the supervision of Dr David Cane, in conjunction with the University of Wales Trinity Saint David and The Voice Study Centre, in support of the Master of Professional Practice (Vocal Pedagogy). You are invited to participate in this research project due to your professional background, given that there is a higher prevalence of PTSD in emergency service personnel and this group remains understudied.

What will I be asked to do?

Participation in this research project is in three phases. In **Phase 1**, participants will be asked to complete a questionnaire that explores demographic and wellbeing information. Each participant will be issued a randomised code which is their identifier to be used throughout the research project to protect their privacy. This questionnaire must be completed prior to starting Phase 2 as information from it will be used to determine your voice type and therefore, the lessons you receive, based upon your voice type.

In **Phase 2**, participants will be asked to complete a short course of individual singing lessons across a four week period (one lesson per week). The singing lessons will be delivered in a pre-recorded, online format, emailed to participants at the beginning of each week. The singing lessons will cover the following topics:

- Week 1 - Voice Foundations: Breathing and Posture.
- Week 2 - Voice Foundations: Phonation and Movement.
- Week 3 - Voice Foundations: Respiration and Vocalisation.

- Week 4 - Voice Foundations: Articulation and Performance.

Participants will engage with the pre-recorded material through vocal exercises and song singing. Supporting links and information will also be provided. Participants may undertake the singing lessons at any time throughout the week, in the comfort of their own home or safe space. Each singing lesson is approximately 45 minutes long. The purpose of these singing lessons is to introduce participants to the basic tenets of singing and assumes no previous experience. If, at the completion of the project, you wish to continue singing lessons, please contact the principal researcher for referrals.

Participants will be requested to briefly log their wellbeing status before and after each lesson. Wellbeing data may be subject to quantitative and qualitative analysis. Phase 2 of the WellSing Project will run between the 12th of May and the 9th of June, 2025.

In **Phase 3**, participants will be invited to attend a live, online focus group to discuss their experiences of the singing program and to ascertain their preferences and requirements for future engagement. Participants in this focus group may remain anonymous through the use of their research participant code and may keep their camera off. If participants are not concerned about anonymity, they may identify themselves. This focus group will be recorded and the transcript will be subject to qualitative analysis. The focus group will be held on the 15th of June, 2025. This date is subject to change and participants will be notified via email.

What are the possible benefits?

This research project aims to expand upon the knowledge, insight and understanding regarding the effect of singing on wellbeing in emergency service personnel, with and without PTSD. This acquired knowledge may then be applied in professional practice within individual and group singing programs. It may also enhance the knowledge, skills and expertise of individual researchers, practitioners and institutions resulting in additional support services.

What are the possible risks?

This research project has been designed to minimise the risk of harm or discomfort to participants. Whilst the risk of negative experience or discomfort is considered low, it is acknowledged that individuals with PTSD may experience discomfort when listening to or actively participating in music making due to a range of factors. To address this, a list of 24/7 support services is provided below. Participants are also reminded to seek assistance from their existing medical support team. Should you experience discomfort or distress, you are free to withdraw from the research project at any time.



Lifeline: 13 11 14

<https://www.lifeline.org.au>

Beyond Blue: 1300 22 4636

<https://www.beyondblue.org.au>

Police Welfare Services Unit: 1300 090 995

<https://www.police.vic.gov.au/get-support>

Fire Rescue Victoria Employee Support Services: 1800 161 415

<https://ufuvic.asn.au/membership/support-services>

CFA Member Wellbeing Support Services: 1800 959 232

<https://ufuvic.asn.au/membership/support-services>

Ambulance Victoria: 1800 626 377

<https://www.ambulance.vic.gov.au/about-us/our-services/family-safe/accessing-support-services>

What will happen to information about me?

To safeguard your privacy, we will only request the minimum personally-identifiable information possible. Any personal information you provide will be stored separately and anonymised to ensure that you cannot be identified. This information will be retained for no longer than is necessary for the purposes of the research. If you withdraw from the research project, you may request that any data held about you be deleted. Every effort will be made to comply with this request. Please note, that it will not be possible to delete individual data once the collective data has been analysed.

All data collected will be stored securely on a cloud based storage platform on a password protected device with two-factor authentication, accessible only to the principal researcher. Any portable devices used to store or transfer data will be password protected and encrypted. At the completion of the research project, data collected will be held for a minimum of 10 years after the research results are published. Once records are of no further value, they will be destroyed.

Anonymised results from this research project may be published in the form of student empirical reports and potentially, in the research and conference literature. Data collected from this research project may be useful for research projects in the future. In this case, anonymised data collected from this research project may be reanalysed.



Who is funding this project?

This research project is independently funded by the principal researcher in fulfillment of requirements for the Master of Professional Practice (Vocal Pedagogy).

Will I hear about the results of this project?

Upon completion, the results of this research project may be made available to you in the form of student empirical reports. In order to obtain a copy of the results, please indicate when prompted at the end of the research questionnaire, or contact the principal researcher, Dannielle O'Keefe via email at 2219673@student.uwtsd.ac.uk.

Do I have to take part?

No, participation is entirely voluntary. You are not obliged to participate. You may decline to answer any of the questions or undertake any of the lessons, and you may withdraw your participation completely, prior to the data being analysed. If you decide to withdraw from the research project after you have submitted your responses, please notify the principal researcher via email at 2219673@student.uwtsd.ac.uk.

Who do I contact if I have concerns about the project?

If you have a concern or complaint about any aspect of the research project, the way it is being conducted or any questions regarding your rights as a research participant, then you may contact:

Dannielle O'Keefe - Principal Researcher
2219673@student.uwtsd.ac.uk

Dr David Cane - Supervisor (Voice Study Centre)
michael@voicestudycentre.com

Tracy Theobald - Assistant Director (Voice Study Centre)
tracy@voicestudycentre.com

This research project is carried out in accordance with the University of Wales Trinity Saint David Research Ethics and Integrity Code of Practice and the National Statement on Ethical Conduct in Human Research 2023, published by the National Health and Medical Research Council in conjunction with the Australian Research Council and Universities Australia. This research project has ethical approval from the Wales Academy of Professional Practice and Research (WAPPAR) at the University of Wales Trinity Saint David.



Will I be reimbursed for any expenses?

There are no anticipated expenses for participants and therefore no reimbursement will be offered.

Where can I get further information?

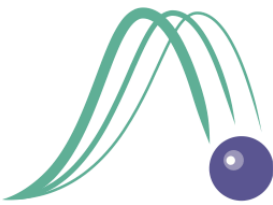
If you require further information, wish to withdraw your participation or you have any issues regarding this research project, you may contact:

Dannielle O'Keefe

Principal Researcher

Email: 2219673@student.uwtsd.ac.uk

APPENDIX 5. CORE10

 CORE-10	Client ID 	Age M ☐ F ☐
	Date form completed 	Stage S Screening H Referral V Assessment F First therapy session P Pre-therapy (unspecified) U During therapy A Last therapy session X Follow-up 1 Y Follow-up 2
	Therapist ID 	
	Service ID 	
	Episode Session	

IMPORTANT - PLEASE READ THIS FIRST

This form has 10 statements about how you have been OVER THE LAST WEEK.
Please read each statement and think how often you felt that way last week.
Then tick the box which is closest to this.

Over the last week...	Not at all	Only occasionally	Sometimes	Often	Most or all of the time	OFFICE USE ONLY
1 I have felt tense, anxious or nervous	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
2 I have felt I have someone to turn to for support when needed	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0	☐
3 I have felt able to cope when things go wrong	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0	☐
4 Talking to people has felt too much for me	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
5 I have felt panic or terror	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
6 I made plans to end my life	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
7 I have had difficulty getting to sleep or staying asleep	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
8 I have felt despairing or hopeless	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
9 I have felt unhappy	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐
10 Unwanted images or memories have been distressing me	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐

Total (Clinical Score*)

*Quick scoring if all items completed: add together the item scores to get the Clinical Score.

It is not recommended to compute a score if more than one item was omitted but if nine were completed:

add together the item scores, divide by nine to get the mean score, then multiply by 10 to get the Clinical Score.

THANK YOU FOR YOUR TIME IN COMPLETING THIS QUESTIONNAIRE

APPENDIX 6. Warwick and Edinburgh Well-Being Measure.

Warwick Edinburgh Mental Wellbeing Scale (WEMWBS)

Below are some statements about feelings and thoughts.

Please select the answer that best describes your experience of each
over the last 2 weeks.

	<i>None of the Time</i>	<i>Rarely</i>	<i>Some of the Time</i>	<i>Often</i>	<i>All of the Time</i>
	1	2	3	4	5
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

APPENDIX 7. Subjective Units of Distress Scale.

"SUDS" Distress Ratings

The <u>Subjective Units of Distress Scale</u> --- or SUDS --- is an easy way to track and let others know how much distress you are having at any given time. The scale ranges from zero to 100.		
SUDS Rating	Level	Description
 100	Extreme Distress	Exploding or Completely Overwhelmed! The most you can imagine. Not able to think, only react.
90's	High to Extreme Distress	Ready to explode! You can't think very clearly. At risk to make very bad choices.
80's	High Distress	High levels of fear, anxiety, sadness, anger, agitation, and/or body tension. These feelings cannot be tolerated for long. Bodily distress is substantial. It is difficult to focus on anything.
70's	Moderately High Distress	Feel agitated and tense. Beginning to feel overwhelmed. It's hard to focus.
60's	Moderate Distress	Most people would describe as a "bad day" but still able to do what you need to do.
50's	Mild to Moderate Distress	Unpleasant, nagging negative mood state (i.e. frustrated, feeling down, or worried) but is not enough to produce many bodily symptoms.
40's	Mild Distress	Mild feelings of tension, mild worry, mild sadness, or annoyance or irritation. Unpleasant but easily tolerated.
30's	"Normal"	Alert (but not distressed). Amount of tension and stress needed to keep your attention from wandering.
20's	Peaceful/Calm	Warm, mellow, contented feeling. Like when relaxing at the beach, or at home in front of a warm fire on a cold, wintery day, or walking peacefully in the woods
10's	Very Relaxed	Awake but very, very relaxed; almost dosing off. Mind wanders and drifts. Drowsy.
 Zero	Complete Relaxation	No distress at all. Slow, deep breathing. Asleep.

Melissa Butler, Ph.D., HSPP
Indiana University School of Medicine



Appendix 8. The WellSing Project Content

All video content created for The WellSing Project may be viewed by accessing the following link:

 [WellSing Project](#)

Contents

1.0. Welcome Video (4 mins)

1.1. WellSing Project Week 1 - Breathing and Posture - Alto (45 mins)

1.2. WellSing Project Week 1 - Breathing and Posture - Tenor (45 mins)

1.3. WellSing Project Week 1 - Breathing and Posture - Baritone (45 mins)

2.1. WellSing Project Week 2 - Phonation and Movement - Alto (45 mins)

2.2. WellSing Project Week 2 - Phonation and Movement - Tenor (45 mins)

2.3. WellSing Project Week 2 - Phonation and Movement - Baritone (45 mins)

3.1. WellSing Project Week 3 - Resonance and Vocalisation - Alto (45 mins)

3.2. WellSing Project Week 3 - Resonance and Vocalisation - Tenor (45 mins)

3.3. WellSing Project Week 3 - Resonance and Vocalisation - Baritone (45 mins)

4.1. WellSing Project Week 4 - Articulation and Performance - Alto (45 mins)

4.2. WellSing Project Week 4 - Articulation and Performance - Tenor (45 mins)

4.3. WellSing Project Week 4 - Articulation and Performance - Baritone (45 mins)

5.1. WellSing Project Week 1 - Breathing and Posture Video Content Notes

5.2. WellSing Project Week 2 - Phonation and Movement Video Content Notes

5.3. WellSing Project Week 3 - Resonance and Vocalisation Video Content Notes

5.4. WellSing Project Week 4 - Articulation and Performance Video Content Notes

6.0. Participant Interview Questions

6.1. Transcript of Participant Interview - Participant 19295

6.2. Transcript of Participant Interview - Participant 17800

6.3. Transcript of Participant Interview - Participant 18088

6.4. Transcript of Participant Interview - Participant 17541

6.5. Transcript of Participant Interview - Participant 12643

6.6. Participant Interview Questions

7.0. WellSing Project Expression of Interest

7.1. WellSing Project Onboarding Questionnaire

7.2. WellSing Project Offboarding Questionnaire

7.3. WellSing Project Week 1 - Questionnaire

7.4. WellSing Project Week 2 - Questionnaire

7.5. WellSing Project Week 3 - Questionnaire

7.6. WellSing Project Week 4 - Questionnaire

8.1. WellSing Project Participant Information Sheet

8.2. WellSing Project Consent Form

8.3. WellSing Project Advertising Flyer

8.4. WellSing Project Online Consent Form Responses (spreadsheet)

APPENDIX 9. Assumption Testing

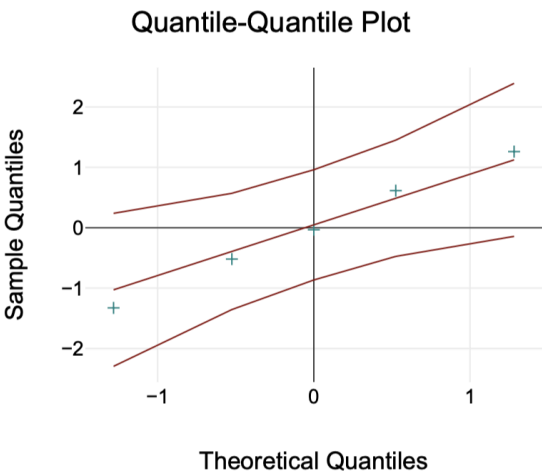
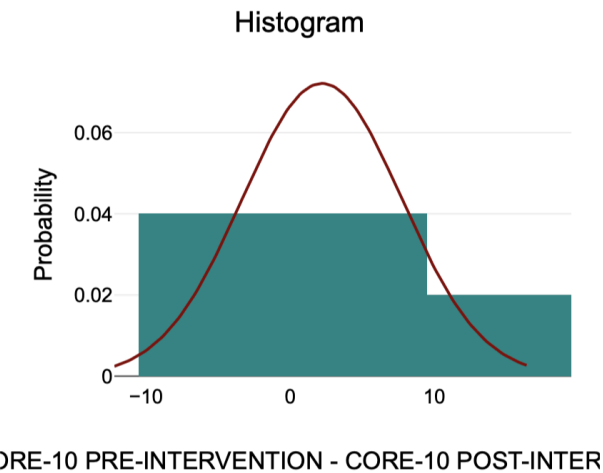
Assumption Testing for CORE-10.

Assumptions

Tests for normal distribution of CORE-10 PRE-INTERVENTION - CORE-10 POST-INTERVENTION

Copy Interpretation

	Statistics	p
Kolmogorov-Smirnov	0.13	1
Kolmogorov-Smirnov (Lilliefors Corr.)	0.13	1
Shapiro-Wilk	0.99	.992
Anderson-Darling	0.14	.935



Interpretation

This table shows the results of four different statistical tests used to assess whether your data follows a normal distribution. A high p-value (greater than 0.05) suggests that the data does not significantly deviate from normality.

All four tests indicate that your data do not deviate significantly from the normal distribution. This means that you can proceed with statistical methods that assume normality of the data. However, it is always a good idea to take a closer look at the QQ plot.

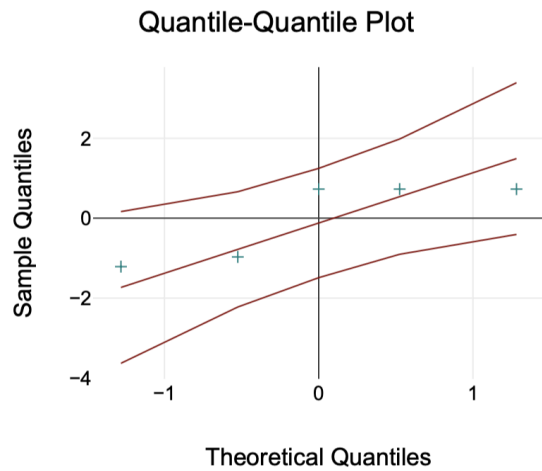
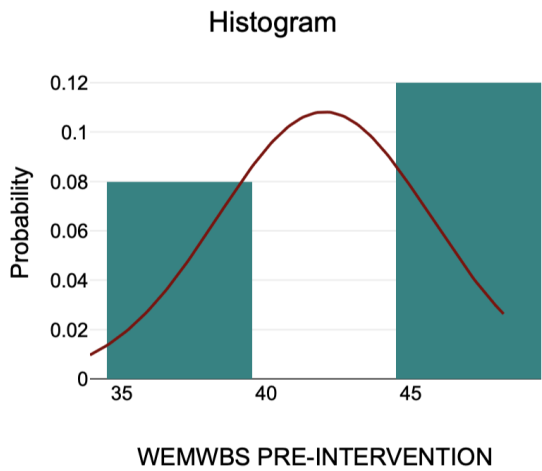
Assumption Testing for WEMWBS.

Assumptions ×

Tests for normal distribution of WEMWBS PRE-INTERVENTION

 Copy  Interpretation

	Statistics	p
Kolmogorov-Smirnov	0.37	.411
Kolmogorov-Smirnov (Lilliefors Corr.)	0.37	.027
Shapiro-Wilk	0.72	.016
Anderson-Darling	0.72	.023



Interpretation

This table shows the results of four different statistical tests used to assess whether your data follows a normal distribution. A high p-value (greater than 0.05) suggests that the data does not significantly deviate from normality.

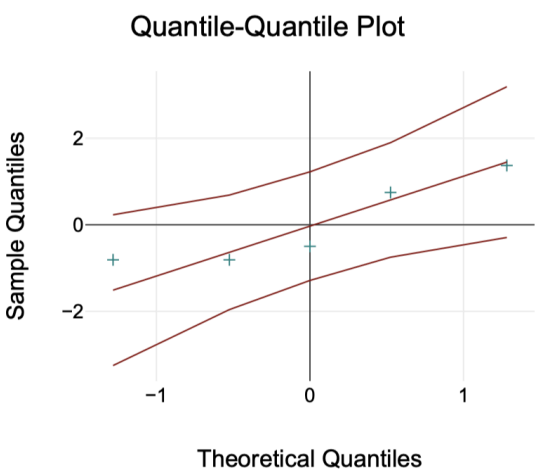
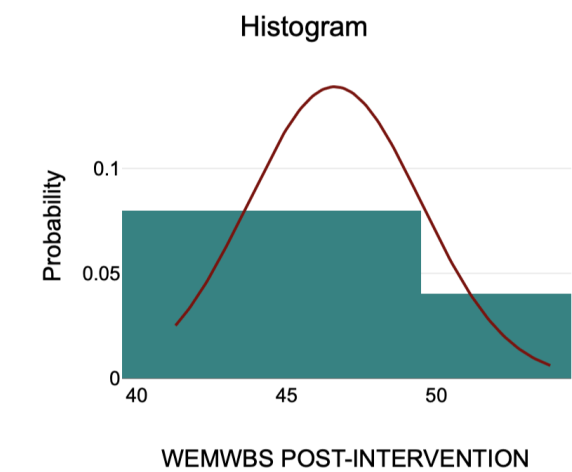
If, as in this case, the results of the different tests are contradictory, it is important to take a closer look at the QQ plot. Depending on the field you are researching, different tests are used to test for normal distribution. Therefore, it is best to look at other publications in your field to see which of the tests is mainly used.

Assumptions

Tests for normal distribution of WEMWBS POST-INTERVENTION

 Copy  Interpretation

	Statistics	p
Kolmogorov-Smirnov	0.29	.699
Kolmogorov-Smirnov (Lilliefors Corr.)	0.29	.215
Shapiro-Wilk	0.83	.147
Anderson-Darling	0.45	.15



Interpretation

This table shows the results of four different statistical tests used to assess whether your data follows a normal distribution. A high p-value (greater than 0.05) suggests that the data does not significantly deviate from normality.

All four tests indicate that your data do not deviate significantly from the normal distribution. This means that you can proceed with statistical methods that assume normality of the data. However, it is always a good idea to take a closer look at the QQ plot.

APPENDIX 10. Statistical Analysis - CORE-10

Summary

×

The *CORE-10 PRE-INTERVENTION* group had higher values ($M = 13.6$, $SD = 2.07$) than the *CORE-10 POST-INTERVENTION* group ($M = 11.4$, $SD = 6.31$). The null hypothesis that the variable *CORE-10 PRE-INTERVENTION* has a smaller or equal value compared to the variable *CORE-10 POST-INTERVENTION* was tested using a one tailed t-test for paired samples. The result was not statistically significant ($t(4) = 0.8$, $p = .235$). The null hypothesis was thus not rejected.

A p-value of .235 is obtained, which is above the specified significance level of 0.05. The t-test result was therefore not significant for the present data and the null hypothesis was not rejected. Therefore, it is assumed that both samples were from the same population.

Effect size

The effect size d was 0.36 . With $d = 0.36$ there was a small effect.

	d
small effect	0.2
medium effect	0.5
large effect	0.8

	n	Mean	Std. Deviation	Std. Error Mean
CORE-10 PRE-INTERVENTION	5	13.6	2.07	0.93
CORE-10 POST-INTERVENTION	5	11.4	6.31	2.82

	t	df	p	Cohen's d
CORE-10 PRE-INTERVENTION - CORE-10 POST-INTERVENTION	0.8	4	.235	0.36

Interpretation

This table presents the results of a paired samples t-test, which is used to compare the means of two related groups to determine if they are statistically different from each other. Here's how to interpret each component.

t (t-value)

This is the calculated t-statistic for the test, which in this case is 0.8. A t-statistic is a measure of the difference between the two groups relative to the variation in the data. A higher absolute value of the t-statistic indicates a greater difference between groups. The positive sign indicates the direction of the difference, suggesting that the mean score for the CORE-10 PRE-INTERVENTION group is higher than the CORE-10 POST-INTERVENTION group.

df (degrees of freedom)

The degrees of freedom for this test is 4. This value relates to the number of subjects in the study minus the number of groups being compared, in this case two. It's used to determine calculate the p-value for a given value of t.

p (p-value)

The p-value is .235, indicating the probability of observing the test results, or more extreme, given that the null hypothesis is true. A p-value of .235 means there's a 23.53% chance of obtaining these test results if the null hypothesis were true. Typically, a p-value of less than 0.05 is considered statistically significant, so this result suggests that there is no statistically significant difference between the CORE-10 PRE-INTERVENTION and CORE-10 POST-INTERVENTION means.

Cohen's d

This is a measure of effect size, which quantifies the size of the difference between the two groups. A Cohen's d of 0.36 is considered a small effect size. The effect size helps to understand the practical, as well as the statistical significance of the difference.

Reliability Statistics

 Copy  Interpretation

Cronbach's Alpha	Number of Items
0.2	10

Item-Total Statistics

 Copy  Interpretation

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CORE-10 item 1 pre	0.56	0.03
Core 10 item 3 pre	-0.12	0.27
core 10 item 5 pre	0.34	0.02
core 10 item 7 pre	0.66	-0.75
core 10 item 9 pre	0	0.21
CORE 10 item 2 pre	0.88	-0.16
core 10 item 4 pre	-0.25	0.41
core 10 item 6	-0.44	0.33
core 10 item 8 pre	-0.73	0.54
core 10 item 10 pre	0.88	-0.16

Cronbach's Alpha

Summary in words

Reliability Statistics

 Copy  Interpretation

Cronbach's Alpha	Number of Items
0.58	10

Item-Total Statistics

 Copy  Interpretation

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CORE-10 Item 1 Post	0.57	0.47
CORE-10 Item 2 Post	-0.26	0.69
CORE-10 Item 3 Post	-0.75	0.66
CORE-10 Item 4 Post	0.76	0.38
CORE-10 Item 5 Post	0.58	0.46
CORE-10 Item 6 Post	NaN	0.59
CORE-10 Item 7 Post	-0.2	0.74
CORE-10 Item 8 Post	0.84	0.4
CORE-10 Item 9 Post	0.91	0.48
CORE-10 Item 10 Post	0.68	0.44

APPENDIX 11. Statistical Analysis - WEMWBS

Summary

×

The *WEMWBS PRE-INTERVENTION* group had values ($Mdn = 45$) than the *WEMWBS POST-INTERVENTION* group ($Mdn = 45$).

The null hypothesis that the variable *WEMWBS POST-INTERVENTION* has a smaller or equal value compared to the variable *WEMWBS PRE-INTERVENTION* was tested using a one tailed t-test for paired samples. The result was not statistically significant, $W = 1$, $p = .052$. The null hypothesis is thus not rejected.

Effect size

The effect size r is 0.79. With $r = 0.79$ there is a large effect.

$$r = \frac{|z|}{\sqrt{n}}$$

Effect size r according to Cohen (1988)

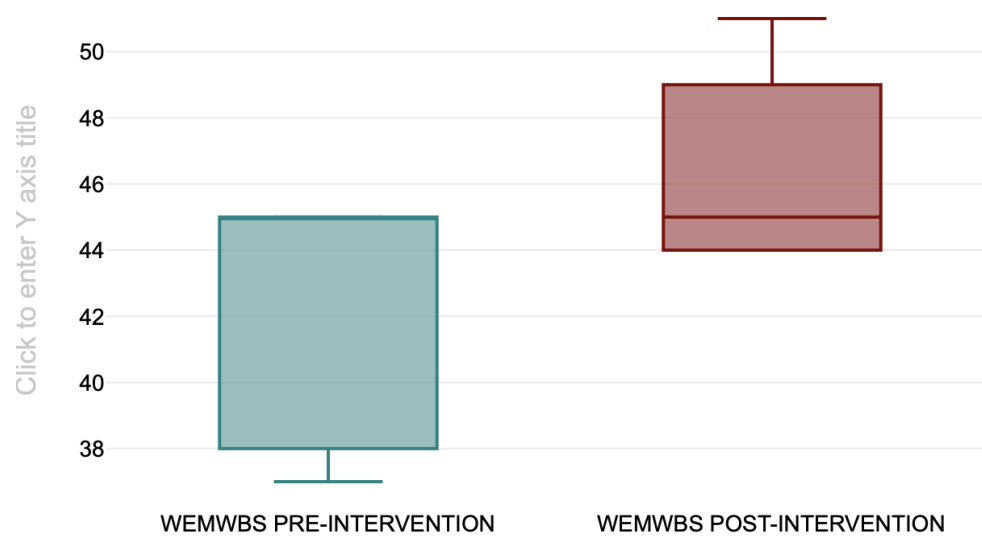
$|r| < 0.1$ no effect / very small effect

$|r| = 0.1$ small effect

$|r| = 0.3$ medium effect

$|r| = 0.5$ large effect

	n	Mean	Median	Standard deviation
WEMWBS PRE-INTERVENTION	5	42	45	3.69
WEMWBS POST-INTERVENTION	5	46.6	45	2.87



Ranks

Copy

		n	Mean Rank	Sum of Ranks
WEMWBS PRE-INTERVENTION - WEMWBS POST-INTERVENTION	Negative Ranks	4	3.5	14
	Positive Ranks	1	1	1
	Equal	0		
	Total	5		

- Negative Ranks: WEMWBS PRE-INTERVENTION < WEMWBS POST-INTERVENTION
- Positive Ranks: WEMWBS PRE-INTERVENTION > WEMWBS POST-INTERVENTION
- Equal: WEMWBS PRE-INTERVENTION = WEMWBS POST-INTERVENTION

Wilcoxon-Test

Copy Interpretation

	W	z	p	r
WEMWBS PRE-INTERVENTION - WEMWBS POST-INTERVENTION	1	-1.76	.052	0.79

Reliability Statistics

 Copy  Interpretation

Cronbach's Alpha	Number of Items
0.53	14

Item-Total Statistics

 Copy  Interpretation

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WEMWBS Item 1 Pre	0.01	0.55
WEMWBS Item 2 Pre	0.09	0.53
WEMWBS Item 3 Pre	-0.49	0.59
WEMWBS Item 4 Pre	0.17	0.51
WEMWBS Item 5 Pre	0.31	0.5
WEMWBS Item 6 Pre	0.44	0.44
WEMWBS Item 7 Pre	0.58	0.45
WEMWBS Item 8 Pre	0.6	0.4
WEMWBS Item 9 Pre	0.28	0.48
WEMWBS Item 10 Pre	0.6	0.4
WEMWBS Item 11 Pre	0.53	0.41
WEMWBS Item 12 Pre	-0.1	0.62
WEMWBS Item 13 Pre	-0.24	0.57
WEMWBS Item 14 Pre	NaN	0.53

Cronbach's Alpha

Summary in words

Reliability Statistics

 Copy  Interpretation

Cronbach's Alpha	Number of Items
0.41	14

Item-Total Statistics

 Copy  Interpretation

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WEMWBS Item 1 Post	-0.4	0.51
WEMWBS Item 2 Post	-0.53	0.6
WEMWBS Item 3 Post	0.24	0.37
WEMWBS Item 4 Post	-0.52	0.51
WEMWBS Item 5 Post	-0.4	0.49
WEMWBS Item 6 Post	0.63	0.11
WEMWBS Item 7 Post	0.7	0.27
WEMWBS Item 8 Post	0.95	0.17
WEMWBS Item 9 Post	-0.3	0.54
WEMWBS Item 10 Post	0.95	0.17
WEMWBS Item 11 Post	0.41	0.28
WEMWBS Item 12 Post	0.25	0.34
WEMWBS Item 13 Post	0.29	0.36
WEMWBS Item 14 Post	0.47	0.31

Summary

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With a Cronbach's Alpha of 0.41, your results suggest that there is poor internal consistency among the 14 items, raising significant concerns about their reliability in measuring the intended concept or construct. It would be advisable to review the items for their content, relevance, and alignment with the construct they are meant to measure. Consider revising the items, adding more items that are more closely related, or conducting further analysis to understand the low Alpha value. Additionally, other aspects of measurement quality, such as validity, should also be taken into account for a comprehensive evaluation.

For the interpretation of Cronbach's alpha, the following table from George and Mallery (2003) can be used as a rule of thumb

Cronbachs Alpha	Interpretation
> 0.9	Excellent
> 0.8	Good
> 0.7	Acceptable
> 0.6	Questionable
> 0.5	Poor
< 0.5	Unacceptable

Values much higher than 0.9 are again considered critical, as this indicates that some features are too similar and thus the same thing is coming out.

Appendix 12. Ethical Considerations for Participants.

Ethical Considerations for Participants

This research study was designed in accordance with the requirements set out by the National Health and Medical Research Council and the Australian Research Council. As such, safety and well-being of participants was paramount throughout.

Please note that this research study represents the discharge of Phase 1 (Literature Review), 2 (Questionnaire) and 4 (Interview) as detailed in the Application for Ethical Approval (see Appendix 1). The following information refers to identified risks and mitigation strategies also detailed in the Application for Ethical Approval (see Appendix 1).

General Considerations

The National Statement on Ethical Conduct in Human Research (2025) specifies eight participant groups that may require greater ethical consideration, one of which is people with cognitive impairment, an intellectual disability or a mental illness. The considerations relate to the capacity of the individual to consent and to participate in research. It was expected that individuals with PTSD would possess the capacity to consent and to participate in this research. Nevertheless, strategies were implemented to ensure that the risk of discomfort or distress was minimised or eliminated. Mental health support service contacts were available and accessibility through remote participation supported individuals with PTSD. It is worth noting that the statement also highlights that it is an ethical imperative to include people with physical or mental ill-health or disability in research (NHMRC, 2023),

In order to ensure the minimisation of the potential susceptibility of participants with mental ill-health to experience discomfort or distress, the research design enabled remote participation. This meant that participants were able to freely participate in the comfort and safety of their own home, using their own equipment and having full control over their experience and level of engagement. There was no requirement for participants to travel to a location to participate or to engage with other individuals. The participants were free to complete the research questionnaires and sessions at any time throughout an 8 week period (data collection timeframe) and to choose not to participate should they change their mind.

Risk Related Considerations

Risk 1. Potential discomfort in response to music stimuli or questions regarding music, emotions, mental health and technology.

The mitigation strategies detailed in Section H: Anticipated Risks (Risk 1) were employed throughout this research project and are represented in the following research tools:

1. Recruitment Material (see Appendix 8).
2. Expression of Interest (see Appendix 8).
3. Participant Information Sheet (see Appendix 8).
4. Onboarding / Offboarding Questionnaire (see Appendix 8).
5. Consent Form (see Appendix 8).
6. WellSing Project Online Sessions (Appendix 8)

Recruitment Material

Recruitment material explained in plain language the research purpose, how the research would be conducted and invited individuals to express their interest in participating. It was made very clear that participation was anonymous and voluntary and that expressions of interest could be withdrawn at any time. Participants with post-traumatic stress disorder were advised to seek advice from their medical practitioner prior to participation. A link to the Expression of Interest form was included in all recruitment materials.

Expression of Interest

The Expression of Interest form expanded upon the information provided in the recruitment material and provided a link to a comprehensive Participant information Sheet which potential participants were asked to review. Again, individuals with post-traumatic stress disorder were advised to seek advice from their medical practitioner prior to participation. Potential participants were also reminded that expressions of interest may be withdrawn at any time, for any reason. The Expression of Interest form required no personal information to be provided, only an email address for the questionnaire and sessions to be sent to. Upon submission of the Expression of Interest Form, a unique participant code was generated and an email sent to the address provided with a link to the Onboarding Questionnaire.

Participant Information Sheet

A comprehensive Participant Information Sheet was provided to participants at the Expression of Interest stage, the Onboarding Questionnaire stage, on Session Questionnaires and the Offboarding Questionnaire. This document included detailed information about the research project including:

- What is this research project about?
- What will I be asked to do?
- What are the possible benefits?
- What are the possible risks?
- What will happen to information about me?
- Who is funding this project?
- Will I hear about the results of this project?
- Do I have to take part?
- Who do I contact if I have concerns about the project?
- Will I be reimbursed for any expenses?
- Where can I get further information?

Participants were encouraged to discuss the research project with a relative, friend or medical practitioner and to ask questions of the researcher regarding any aspect that they may want to know more about.

Under the heading, “What are the possible risks?”, participants are advised that the research project has been designed to minimise the risk of harm or discomfort, however, it is acknowledged that individuals with PTSD may experience discomfort when listening to music and answering questions regarding emotions. A list of mental health support services with 24/7 access was provided including phone and website information. Further, a list of organisation specific welfare services was provided including phone number and email addresses. Participants were reminded to seek assistance from their existing medical team and that should they experience discomfort or distress, they were free to withdraw from the research project.

Under the heading, “Do I have to take part?”, participants were reminded that participation is entirely voluntary, there is no obligation to participate and they may withdraw participation at any time prior to data analysis. This specification was made as, once data is analysed, it would be impossible to identify individual participant data in order to remove it.

Onboarding Questionnaire

At the beginning of the questionnaire, participants are again reminded of the research purpose and that participation is voluntary, that they are not obliged to participate and that they may withdraw at any stage. Individuals with post-traumatic stress disorder are advised to seek advice from their medical practitioner prior to participation.

Participants were required to read and acknowledge their understanding of the Participant Information Sheet which details risks associated with participation and provides both general and organisation specific mental health support service contact information. Participants are then directed to the Consent Form.

At the beginning of each section of the Onboarding Questionnaire, participants are reminded that should they require mental health support services, they are to refer to the Participant Information Sheet for contact information or to contact their existing medical team.

Consent Form

All participants were required to complete the Consent Form prior to participation which covered all elements listed in Section G (13-28) of the Application for Ethical Approval. In particular, participants were required to acknowledge that they understand that should they agree to participate, they may withdraw at any time and refuse to answer any of the questions. Also, participants were required to acknowledge their understanding that should they inform the researcher that someone, or they, themselves, were at risk of harm, that the researcher may be required to report the incident to the relevant authorities with or without their permission.

Risk 2. Data security breach resulting in personal information being exposed.

The mitigation strategies detailed in Section H: Anticipated Risks (Risk 2) were employed throughout this research project.

Participation in this research project was anonymous. The primary reason for this was to ensure that all participants, but particularly those with post-traumatic stress disorder, were free to participate without concern for their responses being attributed to them personally. In addition, anonymous participation was preferred so as to encourage greater participation from the population being studied.

No personal information beyond an email address was requested from potential participants in accordance with the [University of Wales Trinity Saint David Research Data Management Policy](#). Upon receipt of the Expression of Interest, a unique participant code was allocated which participants were asked to enter at the beginning of the questionnaire. This meant that no personal information, not even their email address, was attached to the data collected throughout the questionnaire. A master file of participant codes was maintained and accessible by the principal researcher only via two factor authentication on a password protected device.

In the Participant Information Sheet, the section “What will happen to information about me?”, provided participants with detailed information regarding data security. In particular, they were advised that information about them will be retained for no longer than is necessary for the purposes of this research project and that all data collected will be stored securely (two factor authentication) on a cloud based storage platform on a password protected device. The data was collected using Google Forms through the researchers account with two-factor authentication. The data was only accessible to the researcher and has not been disclosed to any third parties. No hard copies have been made of the data.

Risk 3. Sensitivity regarding disclosure of research methodology or intellectual property.

Participants have been informed of the research purpose at each stage of the recruitment and onboarding process. In the Participant Information Sheet, further information was provided to participants regarding how the data collected will be analysed and communicated. All data was anonymised using unique participant codes. During Participant Interviews, participants were not referred to by name and transcripts removed any identifying information and referred to participants by their participant code. Participant Interviews were conducted from the researchers private studio via iPhone. Participants were asked if they consented to the call being recorded and were advised that they did not have to consent, written notes of the conversation could be taken instead. Consent to record these interviews was re-established with participants once the recording had been activated. Participants were advised that the

recording is a new iPhone feature that creates a recording of the conversation and commits it to transcript in the Notes application. Further, the recording and transcript would be securely stored on a two-factor authenticated Google Drive account on a password protected device. All recordings and transcripts would then be deleted from the iPhone. No further personal or sensitive identification data was requested.