Reports on Global Health Research
Kyriakoulis P, et al. Rep Glob Health Res 7: 204.
https://www.doi.org/10.29011/2690-9480.100204
www.gavinpublishers.com

Research Article

A Qualitative Exploration of Panic and Cold Facial Immersion

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Citation: Kyriakoulis P, Caballero CL (2024) A Qualitative Exploration of Panic and Cold Facial Immersion. Rep GlobHealth Res 7: 204. DOI: 10.29011/2690-9480.100204.

Received Date: 21 June, 2024; **Accepted Date:** 01 July, 2024; **Published Date:** 05 July, 2024

Abstract

This study aims to qualitatively investigate the experience of cold facial immersion (CFI) for clinical and control participants, as well as the challenges participants identify in the use of CFI and their views of its utility as a treatment to manage anxiety and panic symptoms. This is a qualitative exploration of how the activation of the diving response via CFI reduces panic and anxiety symptoms. Semi-structured interviews were used to collect data, and thematic analysis of those data delineated two categories and eight themes. The study presents a thematic analysis of the common symptoms of panic and the management of symptoms among the clinical participants, along with thematic analyses of all participants' experience of CFI. A total of 30 participants, of whom 15 were males and 15 were females, participated in this study. Given that CFI may not always be easy or practical to perform, its key challenges and benefits are discussed, along with various methods of applying this intervention and alternative methods for activating the diving response.

Keywords: Anxiety; Psychopathology; Psychophysiology; Diving Response;

Introduction

Panic disorder (PD) is a severe, intensely distressing, and highly prevalent anxiety disorder characterized by spontaneous and recurrent panic attacks [1]. It is characterized by a high degree of subjective distress and is often occupationally and socially disabling [2-4].

Although PD has frequently been treated with psychopharmacological interventions and cognitive-behavioral therapy (CBT), alone or in conjunction [5], treatments remain costly and limiting and have high attrition rates, given the complexity and chronic nature of PD. Evidence shows that catastrophic belief associated with panic symptoms is a mediating factor contributing to either remission or persistence of PD [6]. Research has demonstrated the efficacy of CBT in decreasing anxiety sensitivity, which, in turn, reduces panic symptoms [7-10]. In particular, the CBT practices of psychoeducation about anxiety-related bodily sensations, strategies to develop a tolerance to these sensations, interoceptive and in vivo exposure exercises, and cognitive restructuring of catastrophic appraisals of anxiety-related bodily sensations reduce panic symptoms in PD patients [11, 12]. Breathing retraining has been used both in conjunction with CBT and as a stand-alone treatment to target panic symptoms and to correct dysfunctional breathing patterns; however, it has yielded mixed results [11, 13, 14]. One concern that has been raised is that breathing retraining may prevent participants from learning that their catastrophic beliefs are irrational and hence counterproductive [11, 14].

An alternative to breathing retraining to counteract panic or anxiety negative emotional states may be to activate the diving response, an innate adaptation known to conserve oxygen in the body. The diving response (DR) is activated via cold facial immersion (CFI) and apnea; these combined stimuli have been shown to elicit parasympathetic nervous system responses that dramatically reduce heart rate and produce anxiolytic effects [15]. The physiological adaptations associated with the DR include a reduced heart rate (bradycardia), diminished cardiac output, vasoconstriction, reduced blood flow to peripheral capillary

beds and increased blood pressure. Cardiovascular adjustments and their pronounced bradycardic effect serve as an oxygen-conserving reflex that is aimed at preserving life during asphyxia by enhancing blood flow to vital organs (heart, brain, and lungs) [16-19]. In many respects, the nervous, cardiovascular, and respiratory physiological adjustments that act to promote oxygen conservation during the DR are the opposite of those triggered in PAs.

Incorporating the DR into treatment may complement existing CBT treatments, which are the gold standard for PD. The pronounced bradycardia experienced during the activation of the DR can help mitigate catastrophic beliefs or misinterpretations.

Aim

This study aims to explore the current strategies used by clinical participants to manage anxiety and panic symptoms as well as to identify the key challenges experienced by individuals with PD in managing their symptoms. Furthermore, this study aims to explore the experience of CFI for PD patients and healthy controls as well as the challenges participants identify in the use of CFI and their views of its utility as a treatment to manage anxiety and panic symptoms. Preferences for practical strategies to activate the DR are explored, and challenges with the CFI task are discussed.

Material and Methods

Participants

A total of 30 participants, of whom 15 were males and 15 were females, participated in this study. As per Study 2, reported in Chapter 6 of my dissertation [15], 15 participants had a primary diagnosis of PD (with or without agoraphobia) by the criteria of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5); additionally, 15 participants who did not meet the criteria for PD or any other mental illness were recruited into the control group. The participants in the clinical group had an average age of 36.3 years (SD = 13.8), while the participants in the control group had an average age of 33.1 years (SD = 7.7). The PD and control group each comprised of 6 males and 9 females.

All participants were asked to read and complete the written informed consent form prior to engaging in any parts of the study. This study obtained ethic's approval from Swinburne University Human Research Ethics Committee (SUHREC) with the reference number SUHREC Project 2014/010.

Materials

Appendix A includes the qualitative questionnaire that was used to interview participants from Groups 1 and 2. Figure 1 provides an overview of the experimental procedure for this qualitative study.

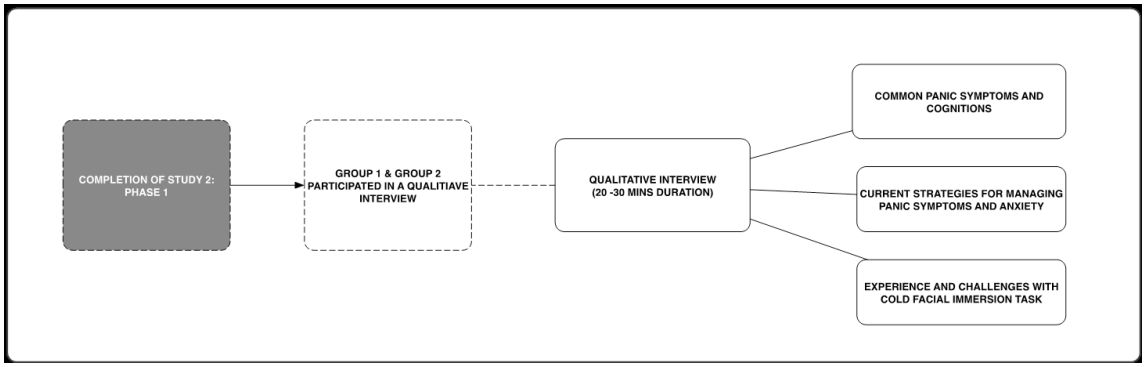

Figure 1: Group 1 and Group 2 participated in a Qualitative Study.

Two lists of questions were developed as part of the qualitative interview and agreed upon for the researcher to ask participants. The first list of questions explored challenges experienced and strategies used in managing anxiety and panic symptoms and thoughts. The second list of questions explored the participants' experience of CFI and their views on its utility as an intervention to assist in managing anxiety/panic thoughts and symptoms. The participants were recruited specifically for this study. Participants were required to complete a consent form and agree to participate in an interview. Interviews were conducted face to face following the completion of the Time 3 task of Study 2 Phase 1. The interviews lasted an average of 30 minutes each. Clinical participants were asked both sets of questions, addressing their experience of anxiety and panic symptoms and their experience of the CFI task. For example, participants were asked, "What are the challenges you face in managing your anxiety/panic symptoms?" Participants in the control group were asked only the questions related to their experience of the CFI task. For example, they were asked, "How would you describe your experience of cold facial immersion?" Demographic data such as age, gender, and current employment status were gathered as part of Study 2, Phase 1. The interviews were recorded, transcribed verbatim, and deidentified for data analysis.

Data Analysis

A thematic analysis of the 30 transcripts was undertaken. Initially, interview transcripts were grouped and analyzed according to the question type (i.e., anxiety/panic questions or CFI questions) and by group (clinical or control group). This resulted in 3 sets of data for analysis: anxiety/panic-related questions for the clinical group (15 transcripts), CFI experience questions for the clinical group (15 transcripts), and CFI experience questions for both the clinical group and control group (30 transcripts). For the analysis, an inductive approach was applied, where the identified categories and themes emerged from the data. Transcripts were read several times, and a list of broad categories was developed and expanded as the analysis progressed. For allocating data to specific categories, the "unit of meaning" was selected as the unit of coding (Dey, 1993). With this method, a unit of meaning is conveyed by content rather than form. As participants in qualitative interviews vary in the manner in which they express themselves, some succinctly and some in greater depth, consideration was not given to the number of words but rather to the meaning conveyed. Once thematic categories were established from the initial exploratory research questions, coding was performed using the QSR NVivo qualitative data analysis software package. The transcripts were initially coded into 23 broad categories identified in the data. Once the transcripts had been coded with the broad categories, the categorized text was read and analyzed to identify themes within categories. To establish sufficient reliability to proceed with the analysis and interpretation of the data, a second researcher familiar with the aims and objectives of the study reviewed the data, the categories and the themes within categories. This is known as the double coding method (Boyatzis, 1998). Discussions were held between the two researchers to reach agreement over the final categories and themes within categories.

For the questions relating to challenges experienced by the clinical group in managing panic/anxiety thoughts and symptoms, refinement of an initial 13 categories (whereby categories were expanded, combined or renamed) resulted in five broad categories: cognitive disruption, disability burden, debilitating fear, debilitating symptoms, and unhelpful thinking.

For the questions relating to strategies commonly used by the clinical group to manage anxiety/panic thoughts and symptoms, refinement of an initial 10 categories resulted in three broad categories: cognitive strategies, physical strategies, and mindfulness strategies.

For the questions asked of the clinical group regarding the experience of CFI, refinement of an initial 16 categories resulted in five broad categories: the initial experience of CFI, the experience after CFI, practicing CFI, perceived challenges in practicing CFI, and the utility of CFI in assisting with panic and anxiety.

For the questions asked of the control group regarding CFI, refinement of an initial 14 categories (whereby categories were expanded, combined or renamed) resulted in four broad categories: the initial experience of CFI, positive experiences after practicing CFI, perceived challenges in practicing CFI, and the utility of CFI in assisting with panic and anxiety.

Results

All 30 participants in the qualitative study participated in the interviews, which resulted in 30 interview transcripts. The results of this study are presented in four parts. The first part reports the results of a thematic analysis of the 15 transcripts related to the challenges faced by PD patients in managing anxiety- and panic-related thoughts and symptoms. The second part reports the results of a thematic analysis of the 15 transcripts related to the strategies used by clinical participants to manage such thoughts and symptoms. The third section presents the results of a thematic analysis of the 15 interview transcripts related to PD patients' experience of the CFI intervention. The fourth section reports the results of a thematic analysis of the 15 interview transcripts related to the control group's experience of the CFI task.

Section 1. Challenges Experienced in Managing Anxiety- and Panic-Related Thoughts and Symptoms

The final categories and themes from the thematic analysis of the qualitative questions on anxiety/panic for Group 1 appear in Table 1. The themes are described in further detail, and individual quotes from participants are used for illustrative purposes. Participants identified a range of factors that challenged them in managing their anxiety/panic.

Category	Themes within categories	Participant Quotes
Cognitive Disruption	Derealization or Depersonalization	*You become detached, and everything becomes hazy.*
	Difficulty Thinking	*I can't think clearly*.
Disability Burden	Avoidance	*I try and avoid situations that will bring it on.*
	Escape Behavior	*I usually stay by myself to feel better with the sensations, or flee or run away.*
		With work, finding it hard to work, hard to stay in a job.
	Impact on daily functioning	
Anxiety and panic-related fear	Dying	I think I might die because my chest is moving up and down
	Fainting	Well I'm scared of fainting
	Loss of control	…symptoms come on and persist, I feel anxious and not in control
	Uncertainty	The uncertainty and the fear is a challenge
Panic Cognitions	Predictive & Catastrophic Thinking	*….think about things which might go wrong*
	Racing Thoughts	*When the onset of the panic attack is occurring, I usually the mind is racing*
	Worrying	*Continual probably worrisome thought process that leads eventually to a panic attack*
Physiological Symptoms	Cardiorespiratory Symptoms	*Struggling to breathe, I don't realize that I'm not breathing at all.*
	Vestibular Symptoms	*If I am having a panic attack it's usually I get hot flushes.*

Table 1: Themes and Categories in relation to Panic Cognitions and Symptoms for Group 1 (Clinical Participants).

Cognitive Disruption Experienced During Anxiety and Panic

Derealization or Depersonalization

When asked what challenges they experienced in managing anxiety or panic symptoms, many participants discussed feeling a sense of being so overwhelmed by their symptoms that they lost touch with reality:

… you lose a sense of reality….

You become very detached.

Difficulty Thinking

When asked what challenges they experienced in managing anxiety or panic thoughts, many participants discussed difficulty in ordering their thoughts:

… anxiety and panic thoughts are entangled, can't separate them from one another, makes it more difficult….

I can't think clearly.

Disability Burden of Panic and Anxiety

Avoidance Behavior

When asked what challenges they experienced in managing anxiety or panic thoughts, many participants discussed a need to avoid situations that might trigger anxiety or panic:

On a plane, for example, I do not travel if I do not get an aisle seat. There is no way that I will be able to travel on a plane if I have to sit between people or you know there's no way out.

… in a back seat of a car, I will never sit in between, and if there's a crowded train, I will never get on it….

Escape Behaviour

When asked what challenges they experienced in managing anxiety or panic thoughts, many participants discussed feeling a strong need to escape situations:

I get a strong feeling or need to escape.

Disruption of daily Functioning

When asked what challenges they experienced in managing anxiety or panic thoughts, many participants discussed how their symptoms and thoughts impacted their ability to engage in everyday life:

With work, finding it hard to find work, hard to stay in a job….

And if I need to do something then I will spend a lot of time preparing and informing myself.

Anxiety- and Panic-Related Fear

Fear of Dying

Catastrophic thinking and, in particular, fear of dying was evident in many of the clinical participants:

Difficulty with fear of death, I think I might die because my chest is moving up and down.

Initially, it was a huge challenge. I didn't understand what was happening. So, you really believe those symptoms that you're going to die, that you're going to have a stroke, that you need to call an ambulance….

Fear of Fainting

A fear of fainting was also discussed by a couple of clinical participants:

… well, I'm scared of fainting….

I have thoughts around feeling faint, thinking that I would pass out….

Loss of Control

A sense of losing control or not being in control was a challenge that many clinical participants discussed in relation to managing both symptoms and thoughts related to panic and anxiety:

Difficult to control thoughts in the beginning; try to stay calm; symptoms come on and persist. I feel anxious and not in control….

I feel something is wrong with me; I can't control the symptoms because I'm overwhelmed by them.

Fear of Uncertainty

A sense of not knowing what is happening was also discussed as a challenge in relation to managing anxiety and panic:

Being unsure of what is happening….

…how long is it going to last? Is it going to be a lengthy one? Is it going to go fast? That uncertainty and the fear is a challenge….

Anxiety and Panic Cognitions

Predictive and Catastrophic Thinking

The majority of clinical participants reported a preoccupation with predictive or catastrophic thoughts that contributed to their challenge in managing anxiety and panic:

…thinking about things which might go wrong….

…trying to predict what can happen you know, or is it happening right now….

I think I might die because my chest is moving up and down.

Racing Thoughts

Trying to manage racing thoughts associated with anxiety and panic was described as a significant challenge for clinical participants:

When the onset of the panic attack is occurring, usually the mind is racing….

Thoughts, yeah, thoughts can race…. I can leap around from some different subject matters randomly; they're not linked at all.

Worrying

General worrying was also discussed by clinical participants as a contributor to the challenge of managing panic and anxiety thoughts and symptoms:

… continual probably worrisome thought process that leads eventually to a panic attack ….

I worry about things which might go wrong….

Physiological Symptoms

Respiratory Symptoms

Coping with respiratory symptoms associated with anxiety and panic was described as a major challenge for clinical participants:

Struggling to breathe, I don't realize that I'm not breathing at all….

Challenges are more breathing, like I know that … when I'm anxious I don't breathe well.

Vestibular Symptoms

Participants also described difficulties coping with the following vestibular symptoms:

Shakiness that I feel that's challenging, feeling somewhat disorientated.

… the most challenging thing and my trembling…and of course the trembling gets to the point that everyone notices, that disturbs me a lot….

Section 2. Strategies Used to Manage Anxiety and Panic Thoughts and Symptoms

The final categories and themes from the thematic analysis relating to strategies used by clinical participants to manage anxiety/panic thoughts and symptoms appear in Table 2. The themes are described in further detail, and individual quotes from participants are used for illustrative purposes. Participants identified a range of strategies they used to assist them in managing their anxiety/panic.

Category	Themes within categories	Participant Quotes
Cognitive Strategies	Thought Stopping	*Stop yourself from generating negative…. panicky thoughts*
	Self-talk and Reassurance	*I started to tell myself, I started to self-talk myself out go it.*
	Psychoeducation	*I did a lot of reading, and that helped me understand.*
	Distraction and Refocus	*Yeah, I will find distractions, things that I can really concentrate on, like a singular thing.*
Physical Strategies	Breathing techniques	*I would concentrate on the breathing which is a good distraction so it helps the anxiety to pass*
	Physical activity	*I try to do a bit of stretching…. because I get a lot of muscle tension.*
Mindfulness Strategies	Mindfulness and Acceptance techniques	*I would just relax and take a breath, and before this I would just let the anxiety do its thing, let the panic attack happen*
	Meditation	*I use prayer meditation*

Table 2: Themes and Categories relating to panic management strategies for Group 1 (Clinical participants).

Cognitive Strategies used to Manage Anxiety and Panic

Thought Stopping

A common strategy discussed by clinical participants was trying to stop thoughts that contributed to their panic and anxiety:

… stop yourself from thinking….

Stop yourself from generating negative … panicky thoughts….

Self-talk and Reassurance

When asked what strategies they employed to assist them in managing panic and anxiety symptoms, many clinical participants discussed using self-talk and reassurance:

… you just tell yourself it will pass. And that's what you keep telling yourself. You're not going to die; you're not having a stroke.

Yeah, you almost have to tell yourself it isn't real, it isn't happening, especially when you're in that really heightened state of panic.

Psychoeducation

Among the strategies discussed, clinical participants mentioned that educating themselves on their conditions and learning about themselves were helpful strategies for managing their panic and anxiety:

So the way I did, because my personality is that type, I started to research and investigate it myself. So I did a lot of reading, and that helped me understand.

Distraction and Refocusing

Many clinical participants described the use of distraction techniques and tried to refocus their thoughts:

I would concentrate on the breathing, which is a good distraction, so it helps the anxiety to pass….

… trying to focus more on thoughts on one single thing.

… refocusing the thoughts correctly….

Also, and I try not to do this too much, but I do find other things to do as a form of distraction. Such as playing an instrument, or reading a book, messing around on the computer.

Physical Strategies

Breathing Techniques

When asked what challenges they experienced in managing anxiety or panic symptoms, many participants discussed a sense of being so overwhelmed by their symptoms that they lost touch with reality:

Breathing … yes, I try, but it doesn't help me. I try whenever I feel that I might get a panic attack …. I do breathing exercises before … but I'm not too sure whether that works, to be honest….

I've tried mindfulness and relaxation, and controlled breathing, but it's not as effective as I would like it to be ….

Physical Activity

Another strategy discussed by clinical participants was exercising and trying to keep physically active:

I feel like … that I … needed to go for a run….

I've been trying to incorporate some form of exercise as well, but I have very limited energy for each day … I try to do a bit of stretching as well, because I get a lot of muscle tension.

Mindfulness Strategies

Meditation

While mindfulness was most commonly discussed, some clinical participants specifically identified meditation as a strategy to manage anxiety and panic symptoms:

I use prayer meditation ….

Doing those sorts of things, it's a bit of like meditation where, you, kind of, focusing on one area, and that, I found that can help, a lot.

Section 3. Clinical Participants' Experience of the CFI Task

The final categories and themes from the thematic analysis, relating to clinical participants experience of CFI and their views regarding its utility in helping manage anxiety/panic, are shown in Table 3. The themes are described in further detail, and individual quotes from participants are used for illustrative purposes. Participants described their experience and perceptions of the CFI task and its utility as an intervention.

Category	Themes within categories	Participant Quotes
Initial experience with CFI	Relaxed state	*I…felt relaxed while my face was immersed*
	Calm effect	*I felt, a rush of calmness while …my face was in there*
	Physical Discomfort	*I felt sinus pain… above the bridge of the nose… it was just like pressure*
	Anticipatory Anxiety	*I felt scared to begin with but knew things were under control*
Experience post CFI	Relaxed state	*I was surprisingly really relaxed*
	Calming effect	*My thoughts went away felt frozen at the moment. Really present.*
	Mindful state	*…easier to focus on the here and now*
	Reduced panic symptoms and cognitions	*I didn't have the thoughts, sensations and symptoms of anxiety that I usually have*
	Confidence and Empowerment	*Once it's done you get this feeling of accomplishment.*
Practicing CFI	Motivation to practice CFI	*I want to practice CFI, as hopefully it will help*
	Predicted regularity of practice	*I definitely would practice it on a regular basis.*
	Practice during panic	*Very likely, to practice it in a panic attack, because found it helpful*
Perceived challenges with practicing CFI	Time challenges	*…it's more finding the time… cos I'm pretty busy*
	Physical challenges	*Only challenge is lasting 30 seconds, and increasing the capacity for breath-hold.*
	Accessibility and convenience	*the only challenge I see is access to the cold water when out,*
	Social Acceptance	*it's kind of you know weird to do it in public*
Utility of CFI in assisting panic/anxiety	Simplicity and practicality	*I think it's great… something so simple, that can calm you..*
	Reducing panic symptoms and thoughts	*It reduces panic symptoms and negative thoughts…very helpful*
	Effectiveness as an intervention	*I think it would be beneficial, it would be effective for most people*

Table 3: Themes and Categories regarding Participants Experiences of the Cold Facial Immersion Task for Group 1.

Initial Experience of the CFI Task

Relaxed State

Many clinical participants described a general state of relaxation in the initial stages of the CFI task:

… felt comfortable after 10 seconds. Felt relaxed by the end of it. I was stressed that I won't last 30 seconds but I got through it.

I … actually felt relaxed while my face was immersed

… when I put my face into the cold water, I just thought, like, the temperature just brought my heart rate down….

Calming Effect

When describing their initial experience, clinical participants also discussed feeling calm as a result of the CFI task:

I felt a rush of calmness while my face was in there….

… when I realized how calming it all was, I allowed myself to experience that calmness and embrace it. So, when I came up, I was still in that calm level.

Physical Discomfort

Although some clinical participants described feelings of relaxation and calm, it was evident that some participants' experience of the CFI task involved some physical discomfort:

I felt a bit dizzy … or not dizzy but disoriented … from the cold water….

… apart from getting a bit of pain in the sinus area because the water was cold … but turned out I had some sort of cold coming on….

Anticipatory Anxiety

Some participants talked about a general feeling of uncertainty and feeling fearful and nervous in the lead-up to and/or at the beginning of the CFI task:

I felt scared to begin with but knew things were under control.

Initially, I was petrified….

Yeah. I was more anxious before….

Feeling anxious before the CO_2 challenge was an experience described by some of the participants:

I didn't have an immediate … anxiety, until … shortly after once everything went back to room temperature, right before I inhaled the mixture, there was, I started to feel some, worry thoughts I think that was more to do with the fact that I was about to inhale; knowing what was coming next; or what I was supposed to do next….

Some participants were also concerned because they believed they could not be able to hold their breath for the duration of the CFI task:

… I didn't know what to expect. I didn't think I would be able to hold my breath for 30 seconds. The shock of the water, didn't think I would last 30 seconds.

I was actually worrying about … if I could actually hold my breath long enough and not spoil the experiment.

Experience After Completing the CFI Task

Relaxed State After CFI

Following completion of the CFI task, many of the clinical participants described a state of relaxation:

I was quite surprised I could hold my breath for that long, and it really was quite relaxing, to be honest.

I was surprisingly really relaxed.

Some participants also described the experience of a lowered heart rate consistent with relaxation:

I noticed the relaxing heart rate; I felt mellow, relaxed, and wasn't as fearful of taking a breath of the CO_2. So, it was easier following the CFI.

Calming Effect

When asked how they felt following the CFI task, many clinical participants also reported feeling a state of calm:

I did not feel too tense … after I did the cold water immersion. If you ask me about, you know, how tense I felt, I think I felt relatively calm … after immersion….

There was no surprises, there was no funny sensations through my body or my mind … [I felt] perfectly calm, you know….

I certainly felt calm from the cold water.

Mindful State

Some clinical participants also reported a state of mindfulness following completion of the CFI task:

Thoughts went away, felt frozen at the moment. Really present.

… easier to focus on the here and now

The CFI distracts everything, distracts my thinking, because I was concentrating on getting to the 30 seconds and the breath holding….

Reduced Panic Symptoms and Cognitions

Many of the clinical participants described having reduced or absent panic thoughts and symptoms following completion of the CFI task:

It reduced my panic, yes, because I felt it reduced anxiety, because before I had a lot of high anxiety, which is anticipatory….

The cold water got rid of fear or anxiety or panic thoughts. Felt no anxiety or panic.

I didn't have the thoughts, sensations and symptoms of anxiety that I usually have….

I didn't have any worrying thoughts at all, I think because I was so surprised how pleasant the experience was….

Some participants went beyond describing an absence of panic cognitions and symptoms to reporting positive and optimistic thinking:

Following the CFI, thoughts were positive, I have more of a positive mindset; because it was relaxing, it cleared my mind and thoughts….

My optimistic thinking improved….

Confidence and Empowerment

Clinical participants described a sense of confidence and accomplishment from being able to complete the CFI task:

So, it was easier following the CFI. I felt empowered about managing my symptoms; I feel more confident now. The CFI distracts everything, distracts my thinking because if I get through something difficult, I feel more confident, and the next time I don't think about it as much….

… once it's done, you get this feeling of accomplishment.

Practicing CFI

Motivation to Practice CFI

Participants were asked about the likelihood that they would practice CFI and, more specifically, how motivated they would be to use CFI as a strategy to assist with the management of panic and anxiety thoughts and symptoms. Many described it as a good strategy and reported that they felt motivated to practice it if needed:

It would definitely help me out. I wouldn't be scared at home alone. It's a good strategy; it teaches you to relax and calm down. As you calm down so quickly, it's very effective.

I see it as an excellent strategy to reduce symptoms. I could keep calm, walk to bathroom, put cold water in my face when having a panic attack; this would relax me.

I want to practice CFI, as hopefully it will help, very hopeful; it did help in the lab, but that was in a controlled setting. Should do it when panic sensations coming on.

Perceived Challenges in Practicing CFI

Physical Challenges

Challenges with breath holding and water temperature were among some of the physical challenges identified by clinical participants:

… taking a deep breath, and if not in control, if I was to take a deep breath, it would help, as it would calm my symptoms so I think it would be a win-win.

… lasting 30 seconds, and increasing the capacity for breath hold. I think it would help me particularly with my anxiety and panic, as I hyperventilate and need to take deeper breaths.

Accessibility and Convenience

Clinical participants also discussed the convenience of practicing CFI in certain situations and identified a lack of access to water as a potential challenge in practicing CFI:

Only challenge is finding ice or access to cold water when out….

Well, obviously, access to water, a container where you can… submerge your face, that's obviously not always available, and, you know, something that you need to organize when it happens….

I'm in a truck all day so … it's not like I can find the nearest bucket to fill water up … that's going to be a challenge; it'll be hard if I can't use it if I'm at work or anywhere else.

Social Acceptance

Challenges with practicing CFI in public places or while out were also identified as potential barriers to practicing CFI:

I don't see any challenges, other than being in public in front of others. That's the only challenge, as I would feel embarrassed sometimes, depending on where I am and who I am with.

You are going to look silly if you've got all wet hair coming out of the [water].

Predicted Regularity of Practice

Following on from motivation to practice CFI, participants were asked how regularly they could see themselves using CFI. Many of them indicated that it would be a practice they would use regularly:

…whatever I find effective, I use on a regular basis….

…if I found that it was effective, you know, of course I would; I would really do anything to try and help out, you know, the onset of an anxiety or panic attack, because it's not a nice experience to go through….

Some participants also commented on the likelihood that they would use it while having a panic attack:

Very likely to practice it in a panic attack, because I found it helpful, I don't see any challenges with it. It's a strategy that I have to do more often….

… it's … difficult when I'm … out, but if I'm at home … I can, like, just wash my face with some cold water in the sink….

Utility of CFI in Helping to Manage Panic/Anxiety

Simplicity and Practicality

When considering the usefulness of CFI as a strategy for managing anxiety and panic, some clinical participants commented on the simplicity and practicality of this strategy:

I've gone to a psychologist … to help me with my panic attacks … the programs are almost … impossible to follow. By using this, which is a very simple technique … I think I would feel much better.

Depending on results, I think … it would be the most … easiest technique for someone who has … if you want to treat panic disorders it requires … breathing exercises, you know, twice a day,

then muscle exercise twice a day ... you know, you have to follow it very strictly … so it is difficult … this technique will be very easy; you can do that in the shower….

I can see it rolling it out as an intervention, each time you have anxiety putting your face in cold water as this is a very easy-to-use method and practical.

Some clinical participants also discussed the utility of using CFI to reduce panic symptoms and thoughts during panic attacks:

It reduces panic symptoms and negative thoughts; I think it would be very helpful.

I want to practice CFI, as hopefully it will help, very hopeful; it did help in the lab, but that was in a controlled setting. Should do it when panic sensations coming on.

Well, it can help me relax and forget about the anxiety.

Effectiveness as an Intervention

When considering its long-term use, some participants considered CFI to be a potentially useful intervention for managing panic and anxiety thoughts and symptoms:

It would definitely help me out. I wouldn't be scared at home alone. It's a good strategy; it teaches you to relax and calm down. As you calm down so quickly, it's very effective. I see it as an excellent strategy to reduce symptoms.

From what I've learnt, I think it would be very beneficial. So, I even think that if I ever start to get into a state of panic, I might actually get a bucket of water and just throw my face into it. I think that would be very beneficial. Definitely.

… I would see it, well, in the future it would be a very good intervention, like a very good technique to help people … who have anxiety and panic disorders.

Section 4. Control Participants' Experience of the CFI Task

The final categories and themes from the thematic analysis, relating to the control participants' experience of CFI and their views regarding its utility in helping manage anxiety/panic, appear in Table 4. The themes are described in further detail, and individual quotes from participants are used for illustrative purposes. Participants identified a range of strategies they used to assist them in managing their anxiety/panic.

Category	Themes within categories	Participant Quotes
Initial experience of CFI	Mindful calming effect	*I felt the coldness calmed me down*
	Relaxed state	*Relaxing, could feel tension in facial muscles reduced*
	Reduced Heart rate	*I felt the heart rate was going down*
	Anticipatory Anxiety	*Yeah, I was a bit nervous holding my breath…*
	Discomfort with cold water	*… it was difficult to hold my breath for that long, 30 seconds*
Positive experience after practicing CFI	State of Mindfulness	*I think they [thoughts] were really reduced on the moment*
	Relaxed state and reduced heart rate	*straight away I could definitely feel my heart… beating slower*
	Reduced anxiety symptoms and thoughts	*Could feel anxiety go down…*
	Sense of confidence and accomplishment	*I felt like I had more self confidence*
Perceived challenges with practicing CFI	Accessibility and convenience	*Having access to cold water if I'm outside somewhere.*
	Social Acceptance	*…it's kind of you know weird to do it in public*
	Physical discomfort with water	*some people don't feel as comfortable with their face under water*
Utility of CFI in assisting panic/ anxiety	Effective stress and anxiety relief	*Well it can help me relax and forget about the anxiety*
	Induce mindfulness and relaxation	*I find being in cold water relaxing*
	Simplicity and practicality	*It's easy and practical to use…people can practice this quite easily*
	Useful for people that suffer anxiety	*I would also recommend it to people who are going towards panic attacks*
	Likelihood of practicing CFI	*I would recommend it to friends and family. I would practice it more often*

Table 4: Themes and Categories regarding Participants Experiences of the Cold Facial Immersion Task for Group 2.

Initial Experience of CFI

Mindful Calming Effect

Many control participants described a mindful and calm state in the initial stages of the CFI task:

It was refreshing….

It was really good; it was calming in the sense that, yeah, you just couldn't hear anything, and it was, just everything was blocked out for a bit.

… the calming effect—within one or two seconds, I could feel myself slowing down.

Relaxed State

Many control participants also described feeling relaxed during the initial stage of the CFI task:

Relaxing, could feel tension in facial muscles reduced, …

Relaxing….

… when I took my head out, I actually felt quite refreshed and felt quite nice, actually….

Reduced Heart Rate

Some of the control participants also reported feeling a reduction in their heart rate in the initial stages of the CFI task:

Well … when I put my face into the cold water, I just thought, like, the temperature just brought my heart rate down….

I felt the heart rate was going down….

Anticipatory Anxiety

Some control participants described experiencing anticipatory anxiety before and in the initial stages of the CFI task, particularly with regard to being able to hold their breath for 30 seconds:

Yeah, I was a bit nervous holding my breath….

I guess before the face immersion, I probably had a little bit of anxiety, because I even asked, 'Do I have to hold my breath for 30 seconds?' Because I questioned it, and I thought, I don't know if I can … like, I don't know; I've never tried this before; I haven't been underwater before, like scuba diving, and I'm uncomfortable with water….

Discomfort with Cold Water

Furthermore, some control participants reported some level of discomfort in the initial stages of the CFI task:

… I felt a little hot after a few seconds….

I felt cold towards the end of 30 seconds, …

I felt dizzy and jittery….

Positive Experience After Practicing CFI

State of Mindfulness

Many control participants discussed feeling a state of mindfulness following the completion of the CFI task:

… calm…similar to like doing, like, meditating or yoga or something, just calming ….

I guess it just completely clears your mind, I wasn't really thinking of anything ….

Oh yeah, I think they [thoughts] were really reduced in the moment….

Relaxed State and Reduced Heart Rate

Following completion of the CFI task, many of the control participants described a state of relaxation:

The feeling that I had afterwards—it was like … when you go for a swim in the ocean, and then afterwards … you kind of feel relief and refreshed….

I feel like straight after [CFI] it was just such a relaxing sensation; I kind of wanted to stay like that, but obviously it didn't last that long….

Reduced Anxiety Symptoms and Thoughts

When asked how they felt following the CFI task, many control participants also reported experiencing reduced anxiety symptoms and thoughts:

I was a bit nervous going into it, and then, like, I don't really remember what I was thinking….

I was just kind of like waiting for what was gonna happen, but I just felt calm and just kind of relieved….

Sense of Confidence and Accomplishment

Some control participants also reported feeling a sense of confidence and accomplishment upon completing the CFI task:

And I could say it was … I felt like I had more self-confidence….

I had more self-confidence….

I was surprised I could hold my breath for thirty seconds without really having trained for it.

Perceived Challenges in Practicing CFI

Accessibility and Convenience

Some control participants identified convenience and access to water as some of the potential challenges in practicing CFI:

I was thinking maybe time…. if I had to get ready to go for work, it's not ideal time, …. but maybe like, I don't know, like… as soon as you wake up, it would be good….

Access to the bucket or cold water that you can actually immerse your face in.

Social acceptance

Some control participants identified potential challenges of water accessibility and convenience in practicing CFI:

I don't know … in your house it's more practical, there isn't no other persons … I guess with me personally, embarrassment in public.

… if I was out no, and for me I think when I'm feeling anxious it's more so when I'm out, you know, more like social anxiety. So, in that sense, probably not so practical.

Physical Discomfort with Water

Some control participants also mentioned physical discomfort with water as a potential barrier to practicing CFI:

You know, some people don't feel as comfortable with their face underwater. I taught a 'learn to swim' program, and, you know, half of the system is just teaching people to keep their face in the water. So that might be a difficulty. But for your everyday average person who doesn't mind it, I think it will be fine.

Utility of CFI in Helping to Manage Panic/Anxiety

Effective Stress and Anxiety Relief

When asked about the usefulness of CFI in assisting in the management of anxiety and panic, many control participants discussed its use as a form of stress and anxiety relief:

If I ever felt that I was anxious, I think it would help it … because it helps relax. So, it would definitely help relax the situation.

It could really assist me if I have anxiety, as I felt refreshed, and this may help with stress and anxiety.

It would be a great way to help control many of the physical symptoms of anxiety, as the CFI has a very calming effect.

Induce Mindfulness and Relaxation

Another common benefit identified by control participants as adding to the effectiveness of CFI in assisting the management of anxiety and panic was that it induced mindfulness and relaxation in their experience:

It's also very good distraction. It's a very mindful experience; I can see this calming me and my anxiety and stress and in terms of thinking as well….

It's like …going swimming in the ocean; it's like … almost, like, …. refreshing … and like you're putting something in the past and then kind of looking at something in a different way. I don't know how to explain that ….

Blood flow to the head is relaxing following the cold facial immersion; that will definitely help me relax. With panic and anxiety thoughts, I think it will help because of the shock to the system, and because of the thoughts stopping….

Simplicity and Practicality

Many control participants also emphasized the simplicity and ease of practicing CFI as another element of its effectiveness in helping individuals to manage anxiety and panic:

I think a combination with other things, even if you were to do this regularly at home, as such, I think, you know, if you're, you know, a place where you can't really, you know, excuse yourself for a few minutes to go and do that, then you could use other techniques….

This would impact me in a positive way. I would let other people know about this technique because it's easy and practical to use, and people can practice this quite easily.

Usefulness for People who Suffer from Anxiety

Many control participants discussed CFI specifically in terms of its usefulness in assisting individuals who suffer from anxiety:

Yeah, pretty positive, like it seems to be helping … I think it's positive, I think it would be helpful, and not many people would have probably considered something like this.

It'd be a positive impact, and I would then also recommend it to other people.

I guess if it's been proven to work, then the fact that can also lend support to, when you're describing it to the person to give them confidence, well, it's been tested and it actually works….

Likelihood of Practicing CFI

When asked about whether they were likely to practice CFI, many participants indicated that it would be something they would consider practicing:

It could really assist me if I have anxiety, as I felt refreshed, and this may help with stress and anxiety. It's also very good distraction. It's a very mindful experience; I can see this calming me and my anxiety and stress and in terms of thinking as well.

If it had more of an empirical basis, I would be more likely to practice, and it will have a positive impact.

Discussion

The aims of the current study were to identify the current challenges that clinical participants face in managing their panic and anxiety symptoms and thoughts, as well as their experience of CFI and their views of its utility as an intervention to assist in managing anxiety/panic-related thoughts and symptoms. The results from this qualitative study proved to be a rich source of data, enabling the illumination of some valuable information. They will be discussed in two parts: first, the current challenges will be discussed; then, the experience and application of the CFI task will be discussed.

Challenges with the Management of Anxiety and Panic Thoughts and Symptoms

The key factors identified in relation to managing anxiety/panic-related thoughts and symptoms included cognitive disruption, disability burden, anxiety/panic-related fear and panic cognitions. Cognitive disruption entailed challenges such as derealization and depersonalization themes and difficulty thinking and concentrating. The cognitive disruption experienced by PD sufferers, characterized by difficulty concentrating and feeling easily distracted, has been compellingly linked to their disability burden, as it can negatively impact their performance at work and in interpersonal relationships [20].

Disability burden was a key factor that the clinical participants found to be a challenge in managing anxiety symptoms and thoughts. The themes identified comprised avoidance/escape behaviors and impact on daily functioning, which reflect the magnitude of one's perceived experience of feeling debilitated. PD is an anxiety disorder that can have a significant impact on people's lives. Our findings corroborate previous research reporting that PD accounts for high levels of social, marital, occupational and physical disability [3, 21] and in primary health-care and community settings, PD is regarded as one of the costliest mental health conditions [22, 23], potentially imposing even more of a disability burden than severe mental disorders [24, 25].

Avoidance and escape behaviors, which were identified as themes associated with the disability burden, may occur in response to perceived threat and anxiety, which, in turn, may drive the maintenance of threat perception and anxious beliefs [26]. Research suggests that individuals high in experiential avoidance present with more panic symptoms, panic cognitions, fear, and loss of control than their fewer avoidant counterparts [27].

Impact on daily functioning was notable as an important theme, contributing to the disability burden of clinical participants. PD is often considered to have a chronic course that has been associated with significant life impairment [21]. This impact on daily functioning caused by the chronic nature of the symptoms, the avoidance and escape behaviors and the debilitating physiological and cognitive symptoms reported generally by PD participants pose a significant challenge in managing anxiety symptoms and panic and anxiety thoughts.

Anxiety and panic-related fears were another key area identified, encompassing the following themes: fears of dying, fainting, losing control and uncertainty. All these themes pose significant challenges, given that fear is very much accentuated in the abovementioned perceived threats. These fears may be quite common in anxiety-provoking situations in anxiety sufferers; however, in PD sufferers, they are more severe and frightening, given that individuals fear their own bodily symptoms, loss of control, and uncertainty. These fears are especially exaggerated in PD patients, given that PD is characterized by recurrent and spontaneous PAs. Clinical participants reported fears and exaggerated anxiety regarding the unlikely prospect that they may lose consciousness, die, or have a heart attack.

Loss of control and fear of uncertainty were challenges that many clinical participants discussed in relation to managing both symptoms and thoughts related to panic and anxiety. In particular, participants described the difficulty they faced in controlling their thoughts and anxiety/panic, as their symptoms were often magnified due to the disproportionate fear they experienced and their uncertainty about when the PA would cease. Participants reported difficulty in managing symptoms such as loss of control and uncertainty. Often, these symptoms may be exacerbated by the lack of a perceived internal locus of control, an accentuated fear response and the perception of a threat due to either interoceptive or exteroceptive stimuli [11].

Anxiety and panic cognitions were also among the factors identified by the qualitative study. These cognitions had the following themes: predictive and catastrophic thinking, racing thoughts and worrying. There is considerable evidence that panic cognitions and catastrophic cognitions facilitate the maintenance of PD [28-30]. PD participants reported a preoccupation with overthinking and worrying about things potentially going wrong, predicting what is about to happen and thinking the worst. Furthermore, they reported difficulties managing racing thoughts before and during the onset of PA. Tangential thinking and predictive, catastrophic thinking were identified by PD patients as presenting challenges. These cognitive symptoms are often experienced during PA and are often reported concurrently with mind racing by PD individuals. Worrying was another significant contributing factor in their PAs; clinical participants reported that worry presented challenges in the management of their panic thoughts and anxiety symptoms. Our findings are consistent with previous empirical evidence supporting the cardinal role of catastrophic cognitions in the maintenance of PD and agoraphobia [31]. This provides compelling evidence for the cognitive theory of panic, which proposes that symptoms are maintained by patients' catastrophic misinterpretation of both internal and external cues [11].

In the current study, clinical participants reported challenges in managing cognitive symptoms as well as physiological symptoms of anxiety. Physiological symptoms of anxiety a set of contributing factors comprising cardiorespiratory symptoms and vestibular symptoms. Coping with cardiorespiratory symptoms and vestibular symptoms associated with anxiety and panic was described by clinical participants as a major challenge. PD patients have difficulty managing these symptoms, as they are likely to perceive these symptoms as threatening and are likely to believe that something is terribly wrong with them. These findings corroborate previous research showing that the construct of anxiety sensitivity is related to PD [32-35].

Cognitive strategies are a key theme in the management of anxiety and panic thoughts and symptoms; these strategies comprise the

following categories: thought stopping, self-talk and reassurance, psychoeducation, and distraction and refocusing strategies. Thought-stopping techniques are among the most common strategies that are reportedly used to interrupt mind racing or the negative spiraling of anxious thoughts. Such strategies have included dismissing or disputing negative catastrophic thoughts. Participants reporting having some difficulty with thought-stopping techniques when they were having a panic attack, suggesting that they are not highly effective in practice.

Self-talk and reassurance were other strategies that participants employed to assist them in managing anxiety and panic symptoms. Participants reported practicing positive self-talk, reassuring themselves that nothing bad would happen or telling themselves that their distress would pass. Some of the techniques that fall under this category are repeated comforting self-talk, reiterating to oneself that the situation will be resolved and that there is no reason to worry, and "riding the wave" are among some of the techniques that fall under this category. The strategies used by the participants in the qualitative study are among the techniques commonly applied in many cognitive treatments [36].

Among the strategies discussed, clinical participants mentioned psychoeducation to be helpful; this strategy is a key component of cognitive behavioral therapy and breathing retraining [12]. Participants reported that educating themselves about the symptoms and their nonthreatening nature was common in the management of anxiety and panic symptoms.

Many clinical participants reported using distraction techniques and attempting to refocus their thoughts. Distraction techniques included changing their environment; having someone distract them; or trying to focus on something else, on a single thought, or on breathing. They reportedly used these strategies to distract themselves from mind racing and from focusing on catastrophic thinking and panic symptoms. Common distraction techniques included playing an instrument, reading a book, using a computer recreationally, drawing, coloring and mentally detaching from one's surroundings. The qualitative data supported the notion that although some CBT strategies assist with the management of panic and anxiety symptoms, their benefit remains quite limited. This appears to be in line with the ideas of Craske et al. (2014) and Hoffman and Smits (2008), who proposed that CBT is still far from optimal [12].

Physical Strategies

Breathing techniques were among the physical strategies used to manage anxiety or panic symptoms. Many participants reported feeling a sense of being so overwhelmed by their symptoms that they lost touch with reality. Practicing deep diaphragmatic breathing yielded mixed results, with some participants finding it helpful and others reporting that breathing exercises provided limited assistance with their panic symptoms. Breathing retraining has proven to be effective; however, it needs to be practiced as a preventative strategy on a regular basis rather than at the onset of panic to reverse the symptoms [37-39]. It was difficult to determine whether participants in our study practiced deep breathing on a regular basis, as this was not explored in the interview.

Breathing retraining is commonly used in the treatment of PD to purposefully reduce anxious arousal [11]. Although several studies suggest that this intervention is effective in reducing both the frequency and severity of panic [40-42], concerns have been raised about its efficacy when used routinely [43-45].

Our findings from the qualitative interviews suggest that although breathing retraining was commonly applied by participants, both during PAs and routinely as a preventative strategy, there were mixed reports of whether they found breathing retraining to be helpful. Some of the perceived challenges included that breathing exercises were difficult to practice and that they did not always work. Additionally, it is quite common for people with anxiety sensitivity to experience relaxation-induced anxiety when they practice breathing exercises and relaxation techniques [46].

Physical activity was another strategy discussed by clinical participants and was used to manage panic and anxiety symptoms. Participants reported exercising and trying to keep physically active, which included walking, pacing, running and stretching. Reports in the literature have demonstrated that people who are regarded to be physically active and engage in regular physical exercise (2-3 times per week) have a decreased prevalence of anxiety disorders [47, 48]. A number of studies have demonstrated that limited doses of physical exercise can have acute anti-panic effects, reducing the risk of PAs not only in healthy individuals [49-51] but also in participants with high anxiety sensitivity [52, 53] and in participants with PD [54, 55]. Our findings suggest that although PD patients used physical exercise as a strategy to help manage their symptoms, they explained that exercise was still quite limited in terms of its efficacy and utility. Moreover, participants reported that it was difficult to find the time and to maintain an exercise routine.

Mindfulness Strategies

The practices of mindfulness and acceptance were discussed by many clinical participants as a strategy that they employed to assist in the management of anxiety and panic symptoms. Observing and noticing thoughts, bodily sensations and feelings and practicing mindful breathing, relaxation and acceptance were among the strategies in this category that participants used. Some participants described "riding the wave" and allowing anxiety to take its course, while others reported practicing self–talk in a mindful way while pushing through and persevering. Mindfully focusing on things on the external environment as well as bodily sensations was another strategy that patients used when experiencing panic or anxiety. The consensus in our clinical group was that some participants found it helpful, whereas others practiced the mindfulness strategies but did not find them helpful.

Although some participants reported finding these strategies beneficial, many reported experiencing challenges in managing their symptoms with mindfulness. This appears to be in line with reports in the literature suggesting that mindfulness strategies and acceptance and commitment therapy (ACT) were no more effective than established treatments [56].

While mindfulness was most commonly discussed, some clinical participants in our study specifically identified meditation as a strategy to manage anxiety and panic symptoms. Prayer meditation and more general meditation were among the techniques reportedly used by the participants in the qualitative study. Meditation practices such as prayer meditation, gratitude meditation, and self-compassion meditation are becoming increasingly popular; however, these strategies have some limitations, as it is difficult to engage in such strategies during a PA. More empirical evidence is needed regarding meditation strategies.

Experience of CFI

The initial experience of CFI was described as positive by both clinical and control participants. Although there was some anticipatory anxiety or discomfort related to breath holding and the cold temperature of the water, participants in both groups described a feeling of calmness and relaxation associated with the CFI. Several participants reported that they relaxed so much that they felt their heart rate was reduced. Similarly, both groups had similar experiences after CFI, describing it as a pleasant mindful experience that elicited feelings of calmness, relaxation, and stillness. A number of participants described feeling surprised at how relaxed they felt, how their minds had cleared, and how their anxious thoughts had subsided. Based on the data gathered in the qualitative interviews, the CFI task was referred to as a mindful experience that was rejuvenating. Interestingly, this is consistent with anecdotal evidence suggesting that free diving is a mindful experience, one that is characterized as being fully present and feeling invigorated, energized, calm and relaxed.

Regarding the practice of CFI on a regular basis, participants in the clinical group expressed hope that CFI would help with their anxiety. Moreover, many of the participants did present the possibility that they would practice this on a regular basis, given that they found the CFI beneficial in reducing their panic and anxiety symptoms when practiced during the experimental study. Both groups felt they had a reduction of anxiety as a result of the CFI and described a sense of confidence and feeling of empowerment from completing the CFI, particularly when they were surprised with their ability to hold their breath for 30 seconds and with the relaxation that they experienced.

When participants were asked about perceived challenges, accessibility, and convenience (such as access to water) and concerns about being judged or embarrassed if they performed the CFI task in the presence of others were among the most common barriers described by both groups. The clinical group and control groups differed in their responses, as the former group identified more physical challenges such as the inability to hold their breath for 30 seconds or tolerate the cold water. Time challenges were also identified as a potential barrier, partly the time needed to set up the CFI task, which may take an average of several minutes, as well as the time needed to practice. A number of clinical participants perceived the time taken to set up the CFI task as a positive factor, as it may be considered a distraction from the panic symptoms. Despite the abovementioned challenges that both groups foresaw with the CFI task, most participants were willing to practice it when having a PA.

With respect to the utility of the CFI task, both the clinical and control participants chiefly emphasized the simplicity and practicality of the CFI; its ability to induce a mindful, invigorated and relaxed state, and its potential to be an effective intervention for anxiety and stress management. Given its practicality, easy application, and immediate benefits, participants stated that they would recommend it to friends and family.

Both clinical and control participants in the study were also asked in what ways they would prefer to activate the DR. Some of the most frequent preferences for how to activate the DR included CFI, splashing cold water on the face, taking a cold shower, applying an ice pack on the face, and wearing a specially designed facial mask that activates the DR. Participants suggested that a facial mask would be the most accessible option, something that they could carry with them wherever they went. When experiencing a PA, they could wear the facial mask and activate it so that it would cool the sensitive areas of the face that activate the DR.

Study Limitations

A limitation of the qualitative study was that the interviews were quite short, ranging from 10 to 30 minutes. Another noted limitation is that the cold water in both our studies was regulated between 7°C and 12°C, while the room temperature was maintained at a constant 22°C. Reports of physical discomfort caused by cold water temperatures have also been noted in the literature (Manley, 1990); such discomfort may have impacted patients' CFI experience. An improvement for future studies may be to use water temperatures ranging from 10°C to 15°C, which can elicit the same bradycardic response without causing pain and physical discomfort for participants [57, 58].

Future methodological considerations for the acquisition of qualitative data may include more in-depth and comprehensive interviews and reconsideration of whether to interview control participants. The inclusion of the control group in the interview process may not be necessary, given that we are more interested in responses that elicit information about panic symptoms experienced by the clinical participants and the utility and application of the CFI task to assist PD patients with managing panic symptoms. Furthermore, additional questions should be asked to explore the strategies that clinical participants are currently using to manage

their symptoms, i.e., how frequently they are practicing the strategies, how effective the strategies are, and what challenges they entail. Furthermore, collecting additional information about the application of the DR and CFI and preferences regarding how and when to use it may help us gather more comprehensive information about its utility and potential future directions for it as a new treatment approach.

Implications and Conclusions

The findings of the qualitative exploration indicate that CFI induces calming, relaxing and anxiolytic effects in both PD patients and control participants. This likely occurs because CFI activates the DR, which is an innate human adaptation that has an oxygen-conserving effect, reduces the heart rate considerably, and redistributes blood to the most vital organs for survival, including the heart and brain. CFI is also described as a mindful and very tranquil experience, and participants reported feeling very present and focused during the task and invigorated and rejuvenated once they had completed it. Participants reported that they found CFI easy and practical and that they were likely to use it on a regular basis, particularly if they found it effective. Although there were some perceived challenges with accessibility, the majority of participants were intrigued with the calming effects of CFI and its practicality and ease of applicability. Moreover, participants were intrigued with alternative methods that one could use to activate the DR. Hence, they reported that they were likely to use interventions activating the DR, given that they found CFI surprisingly beneficial. Activation of the DR appears to demonstrate promise as an anxiety management technique and warrants further investigation.

Acknowledgement: The author wants to acknowledge that parts of this paper were taken from his dissertation. Citations and reference are stated accordingly.

Funding: No funding source provided financial support for the preparation of this article.

Conflict of Interest: No potential competing interest was reported by the authors.

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Appendix A: Qualitative Questions

Qualitative Interview Questions

1) What are the challenges you face in managing your anxiety/panic symptoms?

2) What are the challenges you face in managing your anxiety/panic thoughts?

3) How would you describe your experience of cold facial immersion?

4) Describe any changes you experienced in your anxiety/panic symptoms following cold facial immersion?

5) Describe any changes you experienced in your anxiety/panic thoughts following the cold facial immersion?

6) What current strategies do you use to help manage your anxiety/panic symptoms? What strategies do you use to manage your thoughts?

7) How could cold facial immersion assist you in managing your anxiety/panic symptoms and thoughts?

8) If you found that CFI assisted you in managing your anxiety/panic symptoms and/or thoughts how likely would you be to practice CFI during a panic attack? Are there any challenges that might prevent you from using CFI?

9) If you found that CFI assisted you in preventing your anxiety/panic, how likely would you be to practice CFI on a regular basis? Are there any challenges that might prevent you from using CFI?

10) If this research was to demonstrate that CFI is an effective intervention in assisting the management of anxiety/panic how would this impact you?

11) What other challenges do you forsee with using CFI to help manage your anxiety/panic?

12) Which of the following methods would you consider using to mimic cold facial immersion and activate the diving response:

a) ice pack /frozen vegetable packet applied to the face

b) specially designed waterproof facial mask

c) splashing cold water to your face

d) taking up swimming as a sport/exercise

e) other

13) If the activation of the diving response was to be used as an intervention for managing anxiety symptoms how do you see this developing into an intervention?