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Binaural Sound & Trauma-Induced Prolonged Grief Disorder: A Breakthrough Case Report

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Abstract

Controversy has emerged among mental health providers concerning the diagnosis of Prolonged Grief Disorder (PGD), with some perceiving that the diagnosis was medicalizing a normal condition. Heightened levels of PGD reaching the 50% level had been found among those who have experienced an unnatural loss. The author has designed the first iPhone treatment app for PGD, Resolve-It! Specifically, Resolve-It! is a binaural sound generator used for nonverbal remediation of varied emotional or physiologically based difficulties, including trauma, pain, addiction, and prolonged grief. Additional sections of this article include discussions on neuroanatomy, neuroinflammation, and suicidality. Finally, a case report is presented of a patient who grieved the loss of both of his parents over eight years. Verbatim aspects of his treatment are included, such as his statement provided after his initial treatment experience where he stated:

"I told you that it started at around an 8 to 9 intensity level, and by the end, it was down to around a 3 to 4. I don't understand how this can happen after only five minutes, but I feel excellent right now. I hope that this feeling doesn't go away."

Keywords: Memory Reconsolidation; Neuroinflammation; Prolonged Grief Disorder (PGD); Reset Therapy; Resolve-It!

Abbreviations: CBT: Behavioral Therapy; EMDR: Eye Movement Desensitization and Reprocessing Therapy; ERP: Exposure and Response Prevention; PTSD: Post-Traumatic Stress Disorder; PGD: Prolonged Grief Disorder; RT: Reset Therapy.

Introduction

"The picture shown by persons in acute grief is remarkably uniform. Common to all is the following syndrome: sensations of somatic distress occurring in waves lasting from twenty minutes to an hour at a time, a feeling of tightness in the throat, choking with shortness of breath, need for sighing, an empty feeling in the abdomen, lack of muscular power, and an intense subjective distress described as tension or mental pain." [1]. Before and following its introduction, Prolonged Grief Disorder (PGD) has generated extensive and continuing debate as to whether this disorder should be labeled a mental illness at all. On one side of the dispute, critics argue that labeling PGD pathologizes a natural human experience. A term frequently used among those in opposition is 'the medicalization of the human grief experience'. "The purpose of this paper is to show how medicalizing grief reinforces a research agenda dedicated to the search for pharmaceutical and psychological 'magic bullets ' [2].

Proponents of the diagnosis refer to the health risks associated with the condition among those afflicted. Some researchers strive to maintain an unbiased stance regarding this ongoing controversy by employing investigative procedures to substantiate or discredit the concept. [3]. The incidence of prolonged grief disorder (PGD) among most bereaved individuals is thought to range from 7-10% of the bereaved population [4-5]. In contrast, findings from the first meta-analysis of PGD following unnatural losses indicated that nearly half of the bereaved adults experienced PGD. [6]. The covariance between the diagnosis of prolonged grief disorder and post-traumatic stress disorder is high. [7-9]. A 2022 study revealed that symptoms of AD, PTSD, C-PTSD, and PGD clustered together quite strongly. [10]. Another study indicated that a positive relationship was found between Complicated Grief and PTSD, suggesting that addressing PTSD symptoms first may forestall the consequent development of complicated grief [11].

Psychopathologic verification, linked to complicated bereavement often found in comorbidities, is posttraumatic stress disorder (PTSD) [12].

Shared Features of PGD & PTSD

DSM-5, PTSD symptoms are clustered primarily into four categories, including alterations in arousal and reactivity, avoidance, intrusion symptoms, and negative alterations in cognition and mood [13]. The conclusion derived by the authors related to the above material is that the PGD diagnosis provided to our case report participant meets the required diagnostic criteria. Additionally, his specific circumstances were trauma-induced. Within this context, an alternative diagnosis of PTSD would also be considered appropriate.

Current Treatment Methods

Cognitive Behavioral Therapy (CBT) for prolonged grief was investigated through meta-analysis. Anxiety, depression, sadness, and somatic symptoms were included as outcome indicators. Seven articles were included in the analysis, and the sample size was 528 cases. The authors concluded that "CBT may contribute to improving the symptoms of grief, depression, and anxiety in PGD patients, but there was unsatisfactory efficacy on somatization symptoms." [14]. Another group of researchers examined the relationship between PGD and physical or somatic illnesses. The authors selected 18 studies with 13 (72%) identifying a significantly strong or moderate correlation. [15]. Another study compared EMDR with an integrated CBT approach. Nineteen grief-involved participants were randomly assigned to two treatment conditions over 7 weeks. Results revealed that both treatments were effective in reducing symptoms of grief, trauma, and distress [16]. Randomized controlled trials (RCTs) of CPT, which included 481 patients and 402 patients in the ET group, outperformed participants assigned to a treatment-as-usual control group or those subjects placed on a waitlist. The investigators ascertained that the participants achieved a CAPS-5 score decrease of 10 to 12 points even though two-thirds of patients receiving treatment retained their PTSD diagnosis (range, 60%-72%). "CPT and prolonged exposure were marginally superior compared with non-trauma-focused psychotherapy comparison conditions." [17]. In contrast, the following investigators conducted a pilot study using Reset Therapy over four treatment sessions. The investigators utilized a nonverbal binaural sound approach, treating eight PTSD combat veterans. These participants served in Vietnam. (V), (GW), and Iraq/Afghanistan (IA). Post-treatment, only one veteran continued to meet PTSD criteria (cut score above 33). Seven evidenced complete remission of the PTSD diagnosis. The average decrease in CAPS-5 scores was 46 points (Figure 1) among the eight participants, ranging from a high of 37 to a low of 1 [18].

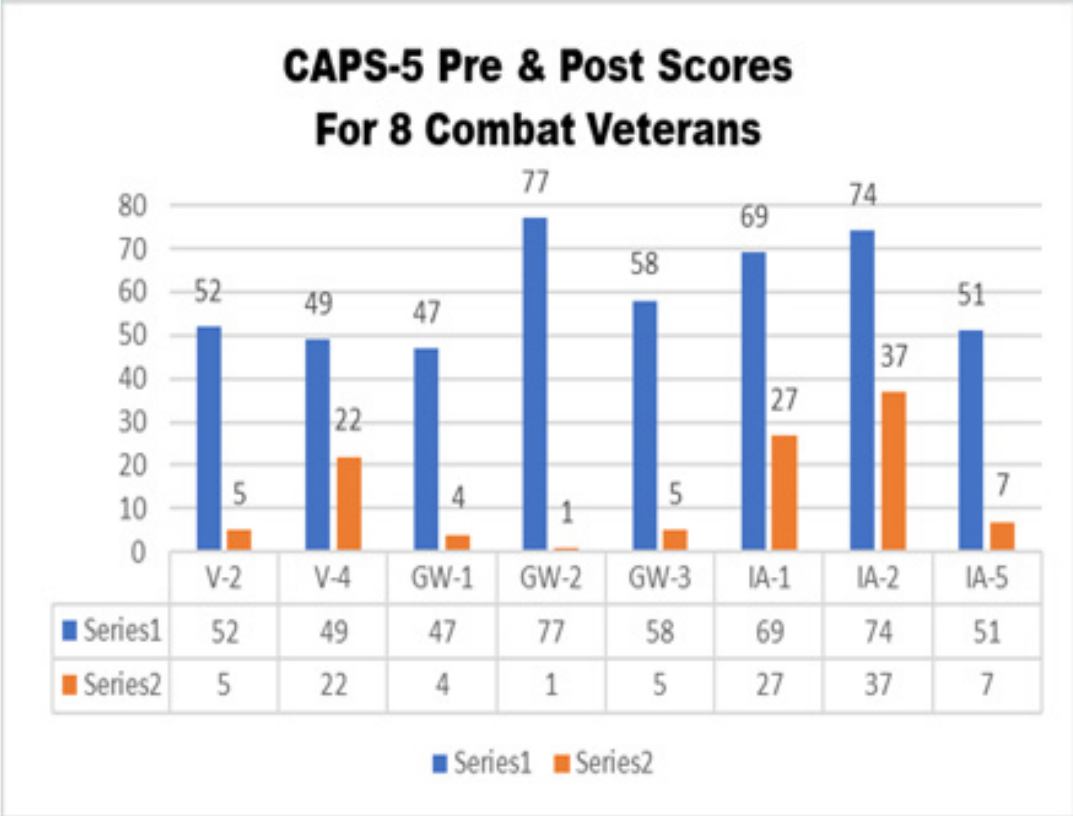

Figure 1: Pre & post-CAPS-5 Score

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Innovative Treatments

The following authors appear to be supportive of the development of innovative treatment approaches related to PTSD and, thus, to PGD as well [19]. A web-based intervention following cancer bereavement was found to be effective in reducing symptoms of prolonged grief disorder [20]. Infrared light therapy has been utilized by one of the authors for treatment of traumatic brain injury in a combat veteran as well as a civilian. It is thought to regulate mood, learning, and memory, as well as in the treatment of PTSD [21]. Currently, several apps are available for the iPhone to support individuals going through the grieving process. One of these, „My Grief app," is based on CBT principles. Comparatively high attrition rates were found in the control and intervention groups [22]. We believe a binaural sound-based intervention developed by the primary author (RESET Therapy) [RT] may be the first app to remediate the PGD condition clinically. RT had been found to rapidly unlock the emotional aspects of long-term memories of trauma among combat veterans with PTSD. An iPhone version of RT named Resolve-It! has been developed and utilized in this current case report. Its purpose is to provide home-based support that exceeds what is available in a traditional office visit. Resolve-It! is a binaural sound generator used for nonverbal remediation, control, and/or reduction of varied emotional or physiologically based difficulties. Nadar et al. [23] found, around the year 2000, that every time an emotionally charged memory is re-energized, it is restored (reconsolidated) within the brain's memory region. One might perceive these regions as being comparable to a locked storage vault for long-term emotionally charged traumatic memories. We have found that binaural sound, uniquely tuned to resonate with an elicited emotion such as grief, can effectively 'erase' the associated sensory-based feelings from stored memory. The content aspect of the memory remains, but the intense emotional aspect drops out once the memory is reconsolidated. This process is illustrated in the provided case report.

Neuroinflammation

A scarcity of research is available regarding neuroinflammation among individuals diagnosed with PGD. A Google Scholar search from 2018 revealed only two relevant items. The investigators in the first article reported that elevated inflammation levels were found in fatigued bereaved individuals as compared with non-fatigued bereaved individuals. [24]. A second item refers indirectly to PGD through its focus on the neuropsychological effects of loneliness and inflammation [25]. A recent article by the Australian Longitudinal Study of Women's Health has detected a causal association between chronic loneliness and early death in middle-aged women. Those women who suffered from ongoing loneliness had a 15% chance of dying early, as contrasted with 5% for those who never felt lonely. [26]. The following author suggests that an ongoing stress cycle precipitates and sustains the inflammatory process. "From a teleologic perspective, it follows that a nervous system response to threat resulting in hypervigilance may also manifest in an immunological response to threat, i.e., inflammation. It appears that stress/trauma begets inflammation, and inflammation begets mental health disorders and an increased the risk of developing PTSD." [27].

Suicidality

The authors of the following article examined severity correlations between the symptoms of prolonged grief disorder (PGD), depression, and recent suicidal ideation among bereaved family members. Two hundred twenty-five persons who survived the loss of a family member within a one-to-eight-year period were provided with self-report measures. The investigators found that "Depressive symptoms were positively related to suicidal ideation in the full sample; however, they were significant only in the presence of PGD symptoms in the subsample of suicidal ideators" [28]. Another recent study focused on bereaved versus non-bereaved men. The researchers found that "Compared to non-bereaved men, suicide-bereaved men are more likely to experience adverse psychosocial outcomes included increased suicide mortality, heightened susceptibility to mental health problems such as depression and posttraumatic stress disorder, and challenges in interpersonal relationships and social functioning." [29]. When a parent commits suicide, research findings show evidence of dangerous health outcomes for both children and parents, and in particular for adolescents. "The clinically relevant symptoms of PTSD were found in 36% of children, 65% of adolescents, and 37% of parents" [30].

Functional Neuroanatomy of PGD vs. PTSD

For both PTSD and PGD, it appears that neural activity in the amygdalo-hippocampal circuit during memory retrieval and reconsolidation may be modulated through the auditory pathway. Lindenfeld & Rozelle [31] reported that quantitative EEG (qEEG) brain mapping of a severe PTSD patient before binaural sound-based therapy indicated a deficit in the veteran's ability to restrain an amygdala-triggered chronic fight-or-fight response. Also present was left frontal lobe hyperactivation in the Broca's and Wernicke's speech regions of the brain, which was associated with disruptions in expressive and receptive speech. Subsequently, Miller and Lindenfeld [32] cited two lines of research that might explain the mediation of the therapeutic effect. First, auditory steady-state evoked potential (ASSEP) research has shown that neural activity in the amygdalo-hippocampal circuit during memory retrieval and reconsolidation can be modulated through the auditory system [33]. Secondly, auditory fear-conditioning research suggests that related regions are intertwined, including the thalamus's medial geniculate nucleus and the amygdala's basolateral complex [34]. Hwang et al. [35] hypothesized that PGD is characterized by an enhanced negative emotional bias that may underlie its key clinical symptoms. In a cross-sectional design, 33 chronically grieving older adults experiencing PGD were compared with 38 non-PGD participants. The participants were

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administered two different inventories to measure factors related to complicated grief. The contributors performed an emotional face-matching task during fMRI. The investigators observed that, compared to the non-PGD group, the PGD participants were characterized by dysregulated amygdala-centric neural activity and dysfunctional connectivity while processing negative affective stimuli and at rest [36].

The Default Mode Network (DMN) is correlated with self-focused thought and introspection that operates differently in PTSD than it does in PGD. Its functional connectivity at rest is reduced in PTSD [37], while in PGD, it exhibits elevated activity, connectivity, and negative thoughts coming to the fore [38]. Past imaging studies have proposed links between PGD's characteristic symptoms, which include profound yearning and the neural reward system. Kakarala et al. [39] systematically reviewed the research literature to investigate the connection between PGD and neural reward systems. The investigators selected twenty-four reports for their final evaluation finding: "diverse evidence for the activation of several reward-related regions of the brain in PGD." They viewed their findings as consistent with the perspective that PGD is a disorder of the reward system.

Fernández-Alcántara et al. [40] showed 19 complicated grief (CG) and 19 non-bereaved (NB) participants' pictures in three different categories, including death-related material. They were assessed using an inventory that distinguished between normal and pathological grief symptoms. The investigators observed intense responses in the CG group to death-related stimuli, with greater activation in the amygdala and middle frontal gyrus. These responses correlated positively with the CG's current experience of grief. The investigators consequently hypothesized that "The higher activation of these areas in the CG group while viewing death-related pictures may result from the greater emotional regulation needed to cope with this type of stimulus."

Bryant et al. used fMRI to differentiate among the functional neuro-anatomies that mediate PGD, PTSD, and major depressive disorder (MDD). They examined 117 participants that included those exhibiting PGD, PTSD, and MDD, and bereaved controls (BC). They presented sad, happy, or neutral faces at both supraliminal and subliminal levels to the participants. Distinct neural profiles for PGD were identified compared to other related pathologies examined. The activation of neural regions implicated in reward networks supported models of PGD that emphasized the roles of yearning and appetitive processes in PGD.

In summary, the stress response system, including the hypothalamic-pituitary-adrenal (HPA) axis and the amygdala, and the auditory processing system are involved in both the PTSD and PGD conditions. Additionally, both disorders can be associated with altered hippocampal function, which may impact memory and lead to difficulties recognizing safe contexts. Amygdala activation related to fear and threat is evidenced in both conditions. Additionally, both conditions can be characterized by reduced activity in the prefrontal cortex.

Differences have been noted between the conditions in specific regions, such as the brain's reward circuits. Distinct mechanisms differ for the processing of grief and loss in PGD as contrasted with PTSD. Also, the default mode network at rest is reduced in PTSD but elevated in PGD. We speculate that the shared functions outweighed the differences noted, suggesting that an auditory treatment intervention utilizing reconsolidation principles would effectively treat both conditions.

Psychometric Assessment

The Prolonged Grief Disorder (PGD-13 Revised) was utilized in the following case report, both before and after the completion of RT treatment. The PG-13-Revised instrument is a self-completed questionnaire comprising 13 items, with 10 items scored on a 5-point Likert-style scale. The scores range from 1 (not at all) to 5 (overwhelmingly). A score of 30 or more is consistent with a diagnosis of PGD. This survey is designed to assess symptoms of PGD including the presence of: Intense longing or yearning for the deceased; Preoccupation with thoughts and memories of the deceased; Difficulty re-engaging in life; Emotional numbness or detachment; Loss of meaning in life; Impairment in social, occupational, or other important areas of functioning [41].

Case report

RB's initial contact with the primary author occurred through telehealth contact late in 2024. He reported a failure to grieve and achieve closure following the separate but tragic deaths of both his parents within a six-month time window in 2015 and 2016. Inquiry into this matter found that RB was experiencing memories of his parent's loss frequently and particularly during holiday periods over the past eight years. Within the context of his first appointment on December 5, 2024, he was provided with the Prolonged Grief Disorder (PG-13-Revised) questionnaire, which yielded a score of 42. An example of a question asked on this form is: Q7 – Do you avoid reminders that the person who died is really gone? RB's answer was to respond in the most extreme column. This questionnaire was repeated post-treatment, with remarkable changes noted in the results. These differences will be discussed further within the context of this report. When asked what type of symptoms he was experiencing, RB reported that he suffered from feelings of numbness related to the loss; an inclination to avoid reminders about their deaths; feelings as though part of himself has died; intense emotional reactions such as anger, bitterness, sorrow; feeling that life was meaningless; feeling detached from others. His symptoms met the criteria for the diagnosis of Prolonged Grief Disorder, which is characterized by intense and persistent grief that causes problems and interferes with daily life.

RB was asked if he'd like to try an experimental treatment called Reset Therapy to remediate his condition. He was provided

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with details regarding this binaural sound-based intervention, and although somewhat skeptical, he agreed to proceed. He was consequently introduced to an iPhone app called Resolve-It! And further instructed in download procedures from the Apple Store. Next, he was trained on using the app, with specific instructions on independently adjusting the sound volume and frequencies. RB was told that this treatment depended on sensory input rather than his thinking processes. In other words, he would need to feel it to heal it. In essence, this is partially a mild form of exposure therapy. RB's initial task after setting the volume levels was to adjust the frequency slider to a point that resonated with the sensations of physical trauma. Next, he adjusted the Release Slider to a point where the trauma sensations subsided. Keep in mind that this all took place within the context of a telehealth session. He underwent a five-minute trial experience, reporting that: (12/05/2024) "It was immediate, and I know this sounds too good to be true, but something in me changed. When you first told me about it, I was very skeptical. You asked me to compare the intensity from when I started to how I was at the end of only 5 minutes. I told you that it started at around an 8 to 9 intensity level, and by the end, it was down to around a 3 to 4. I don't understand how this can happen after only 5 minutes, but I'm feeling terrific right now. I hope that this feeling doesn't go away." At his next weekly treatment session (12/12/2024), RB reported that he no longer felt the way he had regarding his parents' loss. He had used the app independently twice and found that the results remained consistently positive. At this point, he was offered the opportunity to obtain complete closure regarding the deaths of his parents. The primary author had previously treated combat veterans who lost a comrade within the context of combat. It was advised that they 'talk to the dead buddy to resolve the loss experience fully. Specifically, they were instructed to imagine themselves in a scenario where they and their buddy could interact with each other as if they were present in the moment. RB enacted the advisor's suggestion and reported that: (12/18/24) "I used the Resolve-It! App before Christmas to meet with my parents in my mind. Mom said that everything was good there and that she and Dad were together again and getting along well. My dad said things were fine, and he looked and sounded like he really meant it. He told me to do the opposite of what he did toward my mom. He also told me to love others deeply and never stop doing so. This experience shed new light on things for me. (Figure 2).

Figure 2: Resolve-It! Image

(12/27/2024) "Christmas was really good for me this year. He and mom are there in my memory now in a positive way. After this experience, you asked me to bring up my hurtful feelings again, but I wasn't able to bring up my painful emotions about it. They were gone! Now, I can talk about the loss of my parents and not be unsettled by it. Things have been going pretty well for me. I've had no reoccurrence of the emotional parts of the trauma related to my parents' deaths." As described, RB initiated therapy eight years after his parents' death primarily due to his inability to resolve his grief related to their tragic loss. Additionally, he found himself behaving like his father toward his wife, and he was determined to salvage this marriage by learning how to interact with her

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differently. Following his Reset Therapy experience, RB reported a significant improvement in his long-term memory abilities. He was asked to share his recollections with the therapist, recalling that: 1/03/2025: "Besides my loss of feelings following the death of my parents, I was having difficulty in relating to others. My father was verbally abusive to my mom. I don't want to be that kind a person with my girlfriend, but I find myself doing just that. I remember sitting there as a child when he was fighting with her (mom), and I couldn't do anything. I'd hear it, and I would get anxiety, but I was too scared to do anything about it. There was one time when I was finally able to tell him to stop, after I had grown older and no longer lived at home. My mother called me, and I went over there, and that's when he pulled a gun on her in front of me. He got charged with domestic abuse because my mother called the sheriff's department. They took the gun away, and he got arrested for that." RB recalled the events that transpired around the time of his mother's death. Before his treatment with binaural sound, he was unable to discuss details of this loss with anyone, keeping the incident locked within himself. Instead, he would tell people, "I don't Wana talk about."

(1/10/2025) After work, I came home and rang my mother's doorbell. I always checked on my mom to see if she was OK. She was supposed to have my one-year-old son over there, but thank God she did not. She didn't answer, so I went in and yelled Mom! Still no answer, so then I went into the back bedroom and found her lying face down on the bed, and she was cold and stiff. She had blood coming out of her mouth and nose. That's when I realized that she was dead. This was the first time that I had encountered a dead body. I called my brother and told him hysterically that mom was gone. I then called the local fire department and reported the matter. They sent the police out for an investigation to ensure that it wasn't foul play. Because my dad knew everybody in this world, the police who arrived were quite upset about matters because they knew my parents. I found myself crying a lot about it, and it had been going on for years, until I found you. This always seemed to happen after the fact, around things like holidays and birthdays that she wasn't present at. She was the heart of the family and would make things extra special. I tried to take on that role and do that after she was gone because you never know if this is the last holiday you'll get to share with someone you care about. My pastor offered to assist me, but he didn't get to where I needed to be. This was my pastor who had known me my whole life. As you can see, I'm now able to discuss this, but I wasn't able to do so before at all. Now, I can discuss this like I can discuss anything else because I have had help. I'm able to express what's going on. In his next therapy session, RB described in detail the occurrence of his father's demise.

(1/18/2025) "At the time of my father's death, I called him, but there was no answer. He was having some health issues, such as heart stuff, diabetes, high cholesterol, and high blood pressure. He was reaching the point where he was almost able to do volunteer fireman work again. His doctor cleared him, and I was going to take him to the firehouse. That is when I walked in and found the bed unmade, which was unlike him because he came from a military background. I kept looking and calling out to him, and then I went into the bathroom and found him slumped over on the toilet. I was initially shocked and angry, and then I became numb. I didn't know what to do, so I contacted the fire department in our area because that's where Dad volunteered. The numbness has remained with me. I do not like discussing this, but I've had thoughts of ending it myself. What stopped me was thinking about others I cared about, like my baby girl, and I didn't want her to go through the feelings I had.

12/31/2025) At his final treatment session, RB was once again provided with the PG-13 revised grief inventory. As noted previously, the cutoff level was 30, indicating that scores at or above this level substantiated the diagnosis of PGD. RG initially attained a score of 42, clearly placing him within the prolonged afflicted grief classification. Amazingly, after a few self-administered sessions, his final score was 2, thereby substantiating his self-perception that he was now free of the prolonged grieving experience.

Discussion

A uniquely tuned-in binaural sound provided through telehealth means rapidly and nonverbally resolved PGD symptoms in our case report participant. This change includes both psychological and somatic aspects, including his sleep disorder. This finding supports the memory reconsolidation theory proposed by Nader et al. Furthermore, it suggests that treatment targeting the subconscious mind can effectively and rapidly alleviate symptoms associated with trauma. Theoretically, the authors perceive that trauma-afflicted brain circuitry is reset to its pre-trauma level following three strategic steps. The first step involves activating the sensory aspects of the index trauma. In other words, you must feel it to heal it! Next, a mismatch is required that differs from the patient's implicit non-verbal understanding of how the world works. The means to create this mismatch via RT is to identify unique binaural sound frequencies that resonate with the sensory aspects of the targeted trauma. Finally, researchers have found that a window of vulnerability, lasting approximately 5 hours, exists before memory synapses have fully relocked to store the newly reconsolidated material [42].

Conclusion

We hypothesized that shared functions of the PGD and PTSD conditions outweighed the differences noted., We also suggest that an auditory treatment intervention utilizing reconsolidation principles would effectively treat both conditions. This clearly appeared to be a result, as indicated in the following material. As noted earlier, our study participant received the PGD-13 Revised before and following a brief course of self-administered Reset Therapy (RT) treatment via a telehealth platform. His pretreatment score (blue) on this instrument was 42, and his post-treatment score (orange) was 2. (Figure 3) illustrates this dramatic change.

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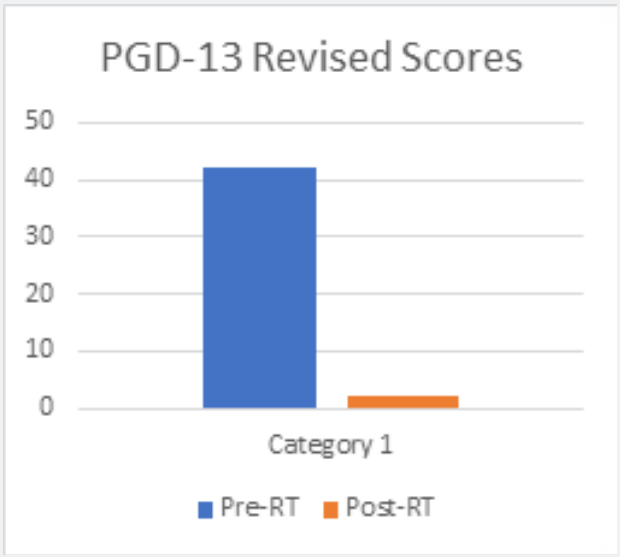

Figure 3: Pre-and post-Reset Therapy PGD-13 Revised Scores

Further research is indicated regarding using binaural sound for PGD remediation purposes. Due to the rapid change observed in this case and others, procedures such as fMRI or PET scans may shed light on the actual change process occurring in the brain. The sound-based intervention appears to alter the status of neuroinflammation in the treatment subject. Measuring the neuroinflammatory changes before and after the procedure would provide additional information. Prior research by this author and his colleagues has demonstrated efficacy with this treatment approach in remediating PTSD symptomatology [43]. Since RT can now be provided through telehealth means, delivering the treatment through group therapy may be considered. A step further might involve developing a You-Tube presentation to facilitate self-administration of the RT procedure.

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