

## 7.0 DISCUSSION

### 7.1 DEVELOPMENT AND VALIDATION OF TELE-YOGA MODULE

In the current study, we followed a scientific methodology to develop and validate a yoga module for PTSD and subsequently test feasibility. The TYM incorporated practices sourced from traditional yoga texts and diverse yoga styles, to manage PTSD symptoms. This style included *sudharshan kriya* for veterans (Bayley et al., 2022; Mathersul et al., 2019; Schulz-Heik et al., 2017), *kripalu yoga* for both civilians and military personnel, trauma-sensitive yoga for veterans and civilians (Kelly et al., 2021; Zaccari et al., 2022), *Satyananda yoga* reintegration (Quiñones et al., 2015), *Haṭha Yōga* for the flood survivors (Descilo et al., 2010; Telles et al., 2010) and kundalini yoga for the civilian community (Jindani et al., 2015). Our module can be utilized in all types of PTSD populations. The TYM integration of these diverse practices was validated by multidisciplinary experts, in alignment with trauma-sensitive yoga teaching principles (Emerson et al., 2009). Experts, with extensive experience in clinical and research settings, provided valuable insights into translating yogic practices into clinical practice. Their feedback informed the application of counseling concepts, content simplification, delivery clarity, and patient-specific precautions, enriching the development of the TYM. It involved collaboration between yoga and mental health experts, enhancing the credibility of the TYM. In our study, we applied CVR to analyze the results quantitatively (Lawshe, 1975). Additionally, we collected qualitative data via open-ended questions from experts and participants to gain a subjective perspective. This dual approach allowed us to comprehensively understand the results from both objective and subjective viewpoints, which is essential in research. Subsequently, the researcher developed TYM which underwent review by a mental health professional and a yoga expert. It also followed established yoga module development guidelines for RCTs (Katla et al., 2022; Sherman, 2012) including the tele yoga teaching guidelines (CCRYN, 2021).

In yoga studies, it is common to assess the effects of interventions from the perspective of the yoga personality concept known as *triguṇa*. This concept comprises three personality traits: *sattva*, which denotes purity and knowledge; *rajas*, which signifies activity and passion; and *tamas*, which represents inertia and ignorance. Similarly, physical traits in *ayurveda* and yoga are categorized

under *prakṛti*, which includes three constituents: *vāta*, *pitta*, and *kapha*. The Ayusoft system, correlating bodily constitution with psychological traits (VPI) according to ancient Indian medicine, was referenced (Shilpa & Murthy, 2011). In our study, significant correlations were found between *sattva* and *tamas*, *sattva* and *rajas* as well as *vāta* and *kapha*. Indian systems recognize personality as "*guṇas*," which can manifest as either a state or trait (Murthy & Kumar, 2007). This correlation prompts inquiry into whether underlying *guṇa* traits predispose individuals to disorders or if disorders mask specific *guṇa* states. Research suggests psychiatric disorders can affect personality traits. Yoga experts developing the TYM advised evaluating the dynamic nature of *guṇas* carefully. In our study, through the VPI scale, a predominance of *sattva* followed by *rajas* and *tamas* was observed. The heightened *sattva* in individuals with PTSD may result from effective coping strategies, masking, and personal growth experiences.

Our exploratory analysis revealed that individuals with higher scores in *sattva* exhibit significantly greater resilience compared to individuals with lower *sattva*. However, the physical characteristics, as defined by *prakṛti* (*vāta*, *pitta*, and *kapha*), were not related to any PTSD outcomes. This finding suggests that for long-term and durable change, interventions should attempt to develop *sattvic* qualities, which could facilitate positive changes in PTSD-related clinical outcomes. Further research is needed to understand how these factors contribute to *sattvic* qualities in PTSD.

Like other yoga validation studies, our intervention included *shithilikarana vyayama*, *āsana*, *prāṇāyāma*, *trāṭaka*, *yoga nidra*, and *yogic* counseling. *Trāṭaka* and *yogic* counseling practice was included in our TYM as per experts' suggestions. *Trāṭaka* has been shown to increase vagal tone and reduce sympathetic arousal (Raghavendra & Ramamurthy, 2014), these effects align with the commonly observed symptomatology of heightened sympathetic arousal in individuals diagnosed with PTSD. Interestingly, *trāṭaka* may be correlated to EMDR which is a proven therapeutic modality for PTSD and aims to bring recovery by inducing a mind-body connection through eye movement desensitization and reprocessing of traumatic memory (Schwartz & Maiburger, 2018). Yogic Counseling, rooted in fundamental yoga texts such as the *Pātañjali Yoga Sūtras*, *Pañcakośa Model*, and the *Bhagavad Gītā*, comprises several components crucial for coping with PTSD symptoms and fostering resilience. These include patient education on developing non-judgmental awareness of the mind-body complex, creating a space between the 'observer' (unchanging witness) and the 'observed' (changing thoughts, feelings, emotions, and sensations), and guiding better self-regulation (Bhide et al., 2023; Ramsahaye et al., 2023).

*The āsanas* reduce musculoskeletal and mental tension, enhance attentiveness, and foster mindfulness (Netz & Lidor, 2003). *Prāṇāyāma* correlates with emotional shifts (Carter & Carter III, 2016). *Yoga Nidra* induces a restful state, reducing stress responses and potentially rewiring the brain (Kumar, 2008; Pandi-Perumal et al., 2022). The combined impact of *āsanas*, *Prāṇāyāma*, *yoga nidra*, *trāṭaka*, and yogic counseling resulted in a substantial effect size (ES=2.52), surpassing the effects observed in previous research that focused on individual components.

As per the systematic review, experts' validation and existing tele-yoga literature (7.5 to 90-min sessions, once weekly to daily, for 2 to 12 weeks) (Donesky et al., 2017; Huberty et al., 2019, 2020; Jasti et al., 2020), our approach stands out for its extended duration and consistent frequency. Furthermore, a study that compared tele-yoga intervention doses showed greater adherence to the intervention with the lower dose (60 minutes per week) (Huberty et al., 2020). Our intervention spanned 12 weeks, occurring four days per week, surpassing durations in previous studies (Carter et al., 2013; Jindani et al., 2015; van der Kolk Laura et al., 2014). While the optimal duration remains unclear, our extended intervention aimed to explore the potential benefits of prolonged engagement. We acknowledge the uncertainty surrounding optimal intervention duration. Should it be a lifelong requirement or aimed at integrating into daily life, fostering a lasting transformation towards a PTSD-free existence? Our study sheds light on these questions.

Even after completing the intervention, participants were encouraged to maintain a healthy lifestyle using the provided resources. Long-term wellness is crucial, not just for preventing attacks of PTSD but also for overall health.

**7.2 STUDY 3 FEASIBILITY OF TELE-YOGA MODULE:** In the context of our study, feasibility encompasses multiple domains, each contributing to the overall success and sustainability of the yoga intervention. This study establishes tele-yoga as a safe and feasible intervention for 30 individuals with mild to moderate PTSD. These findings hold promise for facilitating the implementation of tele-yoga, enhancing access to yoga, and integrating holistic interventions into the care plans for individuals with PTSD. Feasibility trials play a crucial role in ensuring that larger RCTs are not only rigorous but also economically justifiable (Sherman, 2012). The acceptability of the yoga intervention is a critical aspect influencing participant engagement and overall outcomes. While a 20% dropout rate was observed in the TYM group, significantly lower than the 40% in the TAU condition, our findings suggest that TAU withdrawals were

unlikely to be related to the TYM intervention. Addressing missing data in the control group is essential, primarily attributed to limited participant interaction in TAU, resulting in predominantly missing not at-random data. Across the different modalities of psychological therapy for PTSD, dropout rates from individual studies ranged from 0%-65% (Lewis et al., 2020). The in-person yoga intervention for PTSD dropout rate of 5% (Vander kolt 2014) to 54% (Kelly et al., 2021), and pre-recorded yoga for stillbirth mothers with PTSD was 32%. Reasons for this may be because of the substantial time commitment for the yoga intervention, perceived heightened anxiety or triggers through enhanced mind–body awareness or interoception, and the use of a group yoga intervention format. The option to reschedule tele-yoga sessions and intervention received from home emerged as a positive contributor to a lower dropout rate than the existing literature. This flexibility, supported by evidence from tele-yoga interventions for myeloproliferative neoplasm patients (Huberty et al., 2018) (Selman et al., 2015) has shown a high retention rate. The implementation of tele-yoga delivery likely facilitated adherence by offering social interaction, individualization, and feedback. The role of social support emerges prominently in our study, aligning with the Social Support Model. Tele-yoga, by offering a supportive environment, facilitates engagement and satisfaction, potentially acting as a social buffer against PTSD symptoms. The intent to continue use (77.27%) reflects the perceived social support garnered through tele-yoga. In trauma literature, it is argued that trauma impairs psychological well-being by compromising our social sense of self and connection to the world (Haslam et al., 2018). Recovery occurs when individuals' sense of self and connection to others is restored, known as the “social causation” theory, where social resources, such as support, predict well-being (Johnson et al., 1999). The integration of social support and tele-yoga for individuals with PTSD holds promise in fostering holistic well-being. Social support, a crucial factor in mental health, acts as a buffer against the impact of PTSD (Wang et al., 2021). Tele-yoga enhances this support, offering a synergistic approach to address psychological needs and promote resilience in those facing PTSD challenges.

The online mode of addressing the social stigma associated with PTSD presents a contemporary solution, and tele-yoga emerges as a standard tool in this context. By leveraging digital platforms, individuals facing PTSD can access mental health support discreetly, mitigating the stigma often linked to traditional in-person interventions. Tele-yoga, as a specific facet of online mental health services, offers a structured and holistic approach. It not only addresses the psychological aspects

of PTSD but also incorporates physical well-being through yoga practices. This integrated approach aligns with the evolving landscape of mental health care, providing a promising avenue for stigma-free support.

Weekly-based yogic counseling, known to motivate individuals with PTSD, played a crucial role in initiating and sustaining TYM programs. Participants were instructed to practice for 30 minutes at home, using a condensed TYM or watching pre-recorded sessions. Regularity is crucial for PTSD participants, as consistent practice, whether supervised or self-motivated, helps transform their personality by addressing deeply rooted traumatic memories in the mind-body complex. Safety is paramount in any intervention, and our study emphasizes the importance of a supportive environment. A cross-sectional survey investigating yoga safety revealed that self-study without live feedback was associated with a higher risk of injury (Cramer et al., 2019). Telehealth interventions, such as tele-yoga, can optimize safety, particularly for individuals with severe PTSD symptoms. The expertise of the yoga therapist in our study likely contributed to safety, aligning with existing tele-yoga literature demonstrating safety. A trauma-informed approach (Hopper et al., 2010) in tele-yoga tailors' practices to participants' trauma experiences, emphasizing empowerment and safety. Tele-yoga aligns with trauma-informed principles by providing accessibility, flexibility, and privacy. Participants engage from their homes, minimizing triggers. This virtual space fosters a controlled environment, and tele-yoga supports collaborative relationships between instructors and participants. The yoga therapist can offer personalized support and modifications, enhancing the overall trauma-informed experience. Although the reduction of symptoms is indicative of therapeutic benefits and the patients attributed 80% of improvement to yoga intervention, this may not be entirely attributable to yoga, as most (75%) patients were on concurrent medication, and 3 (15%) were on psychotherapy (weekly or fortnightly once) as well throughout the yoga intervention. These outcome measures also demonstrated large effect sizes which can be used to help power future RCTs.

The results of our study provide evidence supporting the effectiveness of the TYM in reducing PTSD symptoms and improving psychosocial functioning among participants with mild to moderate PTSD. The change in the primary outcome variable, PCL-5 showed a large 2.52 effect size change, suggesting a substantial clinical improvement. Except for resilience, all other measures like psycho-social functions, anxiety and depression showed positive change, compared to the TAU group. These findings suggest that tele-yoga could be an effective component of

integrated care strategies for PTSD, providing a flexible, accessible, and comprehensive approach to managing both the core symptoms of PTSD and associated psychological and functional impairments. Further research should continue to explore the long-term impacts of tele-yoga, especially on resilience and other enduring aspects of mental health recovery.

One of the major social barrier's individuals, particularly those affected by domestic violence, encounter is the social stigma and fear of others' perceptions, which often inhibit them from seeking professional help. In trauma literature, it is well-documented that trauma can significantly impair psychological well-being by undermining an individual's social identity and their connection to the world (Haslam et al., 2018). Recovery is facilitated when an individual's sense of self and their connections with others are restored. Social support serves as a protective buffer against the impacts of PTSD (Wang et al., 2021). Integrating social support with interventions like tele-yoga could be particularly beneficial for individuals with PTSD, providing a psychologically safe platform that allows individuals to engage in therapy without the fear of societal judgment. This approach not only facilitates access to treatment within the confines of an individual's psychological comfort but also encourages individuals to positively rethink and re-engage with society. As individuals gain confidence and see improvements in their condition, they are likely to experience enhanced social interactions, which in turn can improve their social self-esteem and self-worth.

Apart from external buffering factors, a key internal buffer is inner resilience. In our study, while tele-yoga did not significantly impact resilience levels, resilience emerged as an important moderating factor between PTSD symptoms and mental health scores. Individuals with high resilience demonstrated greater resistance to anxiety symptoms, despite high scores in PTSD domains such as hyperarousal, negative alterations, and re-experiencing. Interestingly, those with high resilience showed a lower tendency toward avoidance behaviors. This suggests that individuals suffering from PTSD, despite internal wounds, can effectively confront external challenges as long as they maintain their inner hope and self-worth, which protect their resilience. Not all trauma survivors develop PTSD, and research has primarily focused on identifying risk factors associated with the development of trauma-related disorders (Sayed et al., 2015). However, less attention has been given to factors that enhance resilience. Numerous studies highlight the protective role of resilience against various psychiatric conditions. Generally, in trauma patients,

resilience is inversely related to symptoms of PTSD, anxiety, and depression, even when controlling for other contributory factors (Dhungana et al., 2022). Our findings reinforce the importance of developing resilience throughout the processes of experiencing, coping with, and recovering from trauma. This approach would not only aid in immediate symptom management but also contribute to long-term mental health and well-being.

Lastly, the widely recognized trauma-informed framework (Chen et al., 2022; Hopper et al., 2010) emphasizes tailoring treatment based on the nature of a participant's trauma, focusing on empowerment, safety, trust, support and collaboration while accounting for various socio-cultural factors. Tele-yoga aligns well with these trauma-informed principles by providing safe accessibility, flexibility, and privacy. Participants engage from their homes, minimizing exposure to external environmental triggers until they are ready to safely interact with the external environment. This virtual space allows instructors and participants to collaborate, creating an optimal therapy setting that aims for the best clinical outcomes.