
Sir,

Recently, Nemati\cite{1} conducted a study exploring the effects of pranayama on test anxiety in 107 Iranian postgraduate students. Pranayama is central to yoga and one of its most powerful methods for improving people’s wellbeing; however, there is relatively little research on its effects on anxiety. Thus, I applaud the work Nemati has done on this important topic. One of the biggest criticisms against current empirical research on yoga is the lack of methodological rigor in many studies. Therefore, yogic researchers must carefully consider their experimental designs if they are to address this criticism and progress the field. It is in this spirit of promoting growth and refinement among yogic research, that I highlight some methodological concerns of the Nemati study.

Nemati\cite{1} used a randomized control design to demonstrate a significant effect of pranayama on test anxiety. Participants were randomly allocated to either a control or pranayama condition. Participants in the pranayama condition were provided with visualization and affirmations prior to pranayama breath manipulations. The control group received no intervention. Participants in the pranayama condition demonstrated significant reductions in test anxiety; the control group did not. However, the pranayama intervention itself was problematic because of the explicit inclusion of visualization and affirmations and its lack of classical pranayama techniques.

Nemati’s pranayama intervention required participants visualize energy flowing through their body while using mantras (i.e., “I am able to do”) in conjunction with deep inhalations, retention of breath, and exhalations. However, the visualization and affirmations used by Nemati may be similar to well-known cognitive restructuring techniques used in many types of psychotherapy. For instance, cognitive behavioral therapy (CBT), one of the most effective and widely researched psychotherapies,\cite{2} uses both visualizations and “self-talk” to address psychological distress.\cite{1,4} Cognitive restructuring in CBT often involves identifying the unhelpful or erroneous interpretations underlying distress while developing more rational or helpful interpretations delivered via affirmations or “self-talk”. Imaginal exposure via visualizations can also be used to both safely expose people to distressing situations and develop an image of themselves managing these scenarios. Thus, cognitive restructuring techniques similar to those used by Nemati\cite{1} are essential components of this effective psychotherapy. In fact, the establishment of cognitive restructuring as an effective mechanism for reducing test anxiety is shown by studies published more than 30 years ago.\cite{5-7} Therefore, Nemati\cite{1} may have inadvertently confounded any affect that the breath manipulations of the pranayama had on participants’ test-anxiety by including cognitive techniques in the pranayama that are similar to preexisting cognitive restructuring mechanisms.

Similar concerns have occurred with other psychotherapies, such as thought field therapy (TFT) and emotional freedom techniques (EFT). Similarly to yoga, these energy therapies propose that body energies have an important role in the promotion of health and well-being and that illness can be the result of blockages and/or poor or incorrect movement of the energy within the body.\cite{8,9} EFT and TFT propose that tapping specific acupuncture points on the body while saying affirmations promotes psychological change by freeing the movement of energy within the body.\cite{8,9} However, strong arguments have been presented suggesting that it may be the cognitive restructuring components of these therapies (the affirmations) and not the tapping of energy centers that produces reductions in psychological distress.\cite{10} Similarly, eye movement desensitization and reprocessing (EMDR) is a common treatment for posttraumatic stress disorder (PTSD) which involves watching moving stimuli while imagining a previously traumatic incident; however, there is some controversy about whether the eye movements are a necessary component of the intervention or whether the mechanism of change is merely prolonged imaginal exposure coupled with cognitive restructuring.\cite{11} Thus, researchers of psychological interventions need to be careful about introducing confounding techniques into their interventions and if they do try to justify them with theory or at least acknowledge them as limitations that need further investigation.

My second concern with the study is the validity of the “pranayama” technique used. Pranayama, as described in most classical yoga texts, including the Hatha Yoga Pradipika, as inhalation, exhalation, and retention of the breath that is manipulated by closing or partial closing of the nostrils. Ujjayi breathing, which is breathing through restricted larynx, can also be added to further lengthen in the inhalations and/or exhalations. However, while retention after inhalation was included in the Nemati\cite{1}
intervention, no nostril manipulation was used. Some may argue that this still is pranayama; others may say this type of breathing is preparation for pranayama. My view is the later and I am also unclear as to how it differs from standard abdominal breathing used in most psychotherapies.

Thus, Nemati’s[1] study is limited by two main problems. The behavioral strategies used in the intervention-the breathing techniques-are not clearly pranayama or at least not clearly differentiated from standard abdominal breathing techniques, and the cognitive strategies used are too similar to standard cognitive restructuring components of existing psychotherapies and may also have reduced the effect of the pranayama breathing itself. Hopefully future research on pranayama can benefit from considering these limitations and tailoring their interventions accordingly. Future researchers could refine Nemati’s study by using a randomized control design that allocates participants to either a nadi shodhana pranayama only condition (alternative nostril breathing), a visualization and affirmations only condition, a combined nadi shodhana, visualizations and affirmation condition, or a control group. This would help, provided a more precise indication of the effects of pranayama breathing on test anxiety.

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