Abstract

This research is aimed at improving mental health care services offered to students in the faculty of the East West University (EWU) by creating an experimental diagnostic tool combining the analysis of psychophysics-guided behaviors along with outcomes from the electroencephalogram (EEG) method. Today, there is limited diagnostic work conducted on improved mental health issues in an educational setting, as the major tool is the self-report questionnaire, which may be influenced in various ways, including stigma in the process of responding or lack of personal awareness of the situation. Based on this consideration, the key aim of this research is to fill this aspect by providing an objective diagnostic tool concerning behaviors associated with psychological responses to stimuli in the brain.

The proposed framework is based on the integration of both sources of evidence that are quite complementary to each other. Psychophysics is one scientific method that measures systematically individual responses to emotionally significant stimuli, and EEG is real-time electrical activity measures of the human brain that focuses on finding out response patterns of an individual regarding his or her attention, sensitivity, and regulation of emotions, the minute changes of which make an individual vulnerable to anxiety and depression problems. Unlike focusing on various diagnostic labels of an individual, this framework adopts an individualized perspective that provides an opportunity to evaluate various emotional and cognitive patterns of an individual by focusing on their experiences and various academic and psychological factors.

The proposed work will be planned as Phase-I: Feasibility and Validation Study and will require one year for completion. The first phase will involve coordinating activities with team members, approval procedures and procurement of EEG and computerized equipment. The next steps will include pilot studies in calibrating procedures for recording EEG, refining methods of electrode positioning, and designing experimental tasks related to reaction time and perceptual thresholds. The stage of development will lead to the development of an experimental software toolset that combines behavioral and EEG measurements during experimental sessions. Subsequently, systematic signal processing and systematic machine learning algorithms will facilitate research concerning trends of affective dysregulation to emerge.

This pilot phase is expected to give several outcomes. To start with, the research will generate an approved psychophysics-EEG protocol that can be used to conduct a pilot study to identify emotional risk indicators in a student population of the university. Second, it will provide a working prototype software platform of data visualization and analytical evaluation. Third, the results will be disseminated to the developing science of computational mental health via peer-reviewed journals and conferences. Lastly, the project will provide a methodological platform that can be expanded and improved in subsequent research in other universities and research institutions.

In addition to the research contributions, the project will assist EWU in promoting a healthier learning environment since it will provide opportunities to identify emotional adversities sooner and provide support in a timely manner. The research can minimize disruption in academics and enhance the well-being of students by acting in advance before distress sets in. The project correlates with the United Nations Sustainable Development Goals, in particular, SDG 3 (Good Health and Well-Being) by enhancing access to early mental health care, SDG 4 (Quality Education) by overcoming psychosocial obstacles to learning, and SDG 9 (Industry, Innovation, and Infrastructure) by changing the responsible use of innovative diagnostic technologies to higher learning.