Wearables Smart Watch Ingenious Device Observing Mental Illness Psychological Pain

Dan Riga*

Department of Stress Research and Prophylaxis, Vasile Goldis Western University, Moscow, Russia

ABSTRACT

Background: Both mental and physical health are essential for overall health. However, it is often difficult to monitor emotional, psychological, and social well-being remotely. The goal of this scoping review is to look into studies that use PPG-based wearable sensors to detect and monitor mental health and stress.

Methods: The PRISMA framework was used to conduct a literature review for this scoping review. Five medical databases yielded a total of 290 studies. Studies were considered eligible if non-invasive PPG-based wearables were worn on the wrist or ear to measure heart vital signs.

Keywords: Wearable devices; Stress monitoring; Patients; Monitor mental health; Wearable sensors

INTRODUCTION

Individuals in most industrialized countries and many emerging economies suffer from mental illness. The stress of study, life, and work can result in a variety of negative emotions that, in the long run, can lead to mental health issues such as chronic stress, anxiety, and depression [1]. Unfortunately, many people do not seek assistance or consult professionals. Stress is a nearly universal human experience; however, different people define it differently. Most people associate stress with negativity, but this is not always the case. Eustress is defined as daily stress with positive connotations, such as marriage, promotion, or having a new-born. On the other hand, there is anxiety, which has a negative impact [2].

Wearable sensors are therefore excellent candidates to help people monitor and control their stress levels in real time. Different techniques can be used to analyses the data gathered by different sensors. The majority of the studies in this review use wearable PPG-based devices with machine learning algorithms to detect stress. Algorithms are promising tools for categorizing mental health status. This classification is carried out taking into account various features retrieved from sensor data. PRISMA was followed in conducting this scoping review. Studies were found by searching for papers published between the PubMed, midline, embassy and Web of science databases [3].

The objective was to collect studies that were eligible that assessed or investigated mental health using wearable sensors or PPG sensors in conjunction with other wearables.

LITERATURE REVIEW

Wearables smart phone smart watch smart device monitoring mental health or mental disorder psychological distress mental distress stress anxiety generalized anxiety disorder depression major depressive disorder only the title, abstract, and keywords were used for searches. The requirements to be clinical studies, and 1 joint real-life and clinical that were screened for this review six conference papers with full-text availability and journal papers are included in the articles that meet the eligibility requirements [4]. The papers that are included cover the following mental health topics: Stress, depression that results in and mental workload we have decided to only tabulate the extracted data from the stress-related studies because the majority of the papers on PPG and stress concentrate on this topic.

The stress studies that were part of this review all followed a similar format in general. Data were initially gathered from participants using a wearable technology. Participants were asked to complete a variety of stress tests in order to ensure that different levels of stress existed during the data collection. Even though there were many different formal stress tests, the majority of them followed this format a controlled period of rest, an intense activity to cause stress, a controlled period of rest and recovery data were gathered, processed, and categorized based on participant stress levels after collection. The accuracy was then compared to a there was only that discussed the use of PPG wearables to identify suicidal behaviours [5].

DISCUSSION

In this study, wrist-worn PPG devices were required to be worn for patients who had been admitted to the psychiatric unit or presented to the emergency room due to acute suicidality. The Columbia suicide severity scale was required of the patients. In patients who had a decrease in of at least 25%, there was an increase in the high-frequency component of the Chakma, et al. conducted a study to determine whether the results of a PPG-based research watch could be predicted. Patients who wore the watch to gather data on their heart rate and autography, patients who completed a survey, and patients there are numerous design decisions to be made once a methodology for processing the PPG data has been chosen [6]. One must choose the type of signal preprocessing to use for hardware, and one must also choose whether signal preprocessing is desired for ML. The majority of the studies in this review used one of two pre-processing techniques: Either averaging/normalizing the PPG signal or applying filters to eliminate unwanted signals. While smoothing the signals in this way may make the device slower at detecting changes in mental health because more signals of a new pattern than input signals of an old pattern must be processed, the advantage of doing so is that it does not remove any of the data. Accurately determining when a patient is under stress is the experiments' first limitation. Self-report questionnaires, which rely on a patient's capacity to evaluate their own experiences, were frequently used in studies. Due to the assessment's inherent subjectivity, the accuracy may vary depending on the participants. Some studies employed physical sampling techniques like salivary cortisol measurements, which are much less subjective but much more expensive and challenging to apply as a measurement tool in daily life because they need specialized scientific equipment. Other studies simply compared the PPG signal to that of another sensor to determine accuracy, depending on the health parameter being measured by PPG. Although this formally assesses the signal's precision or its capacity to extract a particular health parameter.

CONCLUSION

Studies on the use of wearable PPG sensors for mental health monitoring are analysed in this scoping review. The majority of the studies concentrated on stress detection. Similar experimental techniques were used in these studies, but the designs and varieties of PPG wearables that were employed varied greatly. Conclusions about the most accurate device could not be made because of the use of different participant sample sizes, the absence of ground truth or the use of subjective ground truth, and the different methodologies and classifications. However, each study was able to identify some type of stress, proving that PPG is effective at identifying stress. Despite the fact that research suggests that using PPG wearables to track mental health issues is ineffective.

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