

Watch It!; a Study into the Associations between Skin Conductance and Aggressive Behavior

H. Nijman¹, P. de Looft¹, E. Kuijpers², J. à Campo³, M. Stevens², M. Budy³, P. Ligtvoet¹ and M. Ouwerkerk⁴

¹Altrecht Aventurijn, Den Dolder, the Netherlands. H.nijman@altrecht.nl

²GGZE, Eindhoven, the Netherlands. ² erik.kuijpers@reconnect.com

³Mondriaan GGZ, Maastricht, the Netherlands. ³ j.a.campo@mondriaan.eu

⁴Philips Research, Eindhoven, the Netherlands. ⁴ martin.ouwerkerk@philips.com

Introduction

Measurements of Skin Conductance Levels (SCLs), and short term increases of skin conductance in response to triggers (Skin Conductance Responses; SCRs), have been used to assess (psychological) arousal for well over a century now [1]. The number of studies of SCLs and SCRs of hospitalised psychiatric patients residing at (locked) psychiatric admission wards, however, is limited [but for instance see 2]. One of the reasons for this probably is that measuring skin conductance, until recently, required a substantial amount of equipment to which the participant had to be attached to obtain these assessments. Nowadays it is possible to measure (changes in) SCLs and SCRs by means of small wearable devices in the form of regular watches or wrist bands. Such devices can be used to assess various psycho physiological parameters, among which the SCL, without the patient being restricted (i.e., having to sit in one place). This provides more opportunities to measure psycho physiological changes in psychiatric patients during their stay at a psychiatric ward, even when they are in a state of acute psychiatric crisis [3]. By means of such a wearable device (see photo 1), the associations between (changes in) the SCL and SCRs on the one hand, and agitated and aggressive behavior on the other, were studied among a group of acutely admitted (forensic) psychiatric patients. Aggressive behavior is a prevalent phenomena on (locked) psychiatric wards which threatens the safety and well-being of staff members and patients [for a review on the prevalence of aggressive behavior on psychiatric wards see 4].

Methods

In the current study, the arousal levels of 47 (forensic) psychiatric patients were preferably assessed during two full days (from 9 o'clock AM till 5 o'clock PM), or at least during one full day (i.e., for 15 of the 47 included patients only one day of assessments could be obtained). The patients were admitted either to the intensive psychiatric care ward of GGZE in Eindhoven, the Netherlands, the acute admissions ward of Mondriaan Mental Health institute in Maastricht, the Netherlands, or to the forensic psychiatric admissions ward Roosenburg in Den Dolder, the Netherlands. The SCLs of the participating patients were recorded at two Hertz by means of the Digital Tension Indicator – 2 (DTI-2; see Figure 1).

Photo 1. The Digital Tension Indicator – 2 (DTI-2) used in the current study to assess the skin conductance level of the participating patients



Each half hour, potential aggressive behavior was assessed by an observing staff member by means of the Social Dysfunction and Aggression Scale (SDAS) [5]. The SDAS consists of 11 items on which an observing staff member can document any agitated or verbal and physical aggressive behavior, ranging from mild to severe.

Statistical analyses

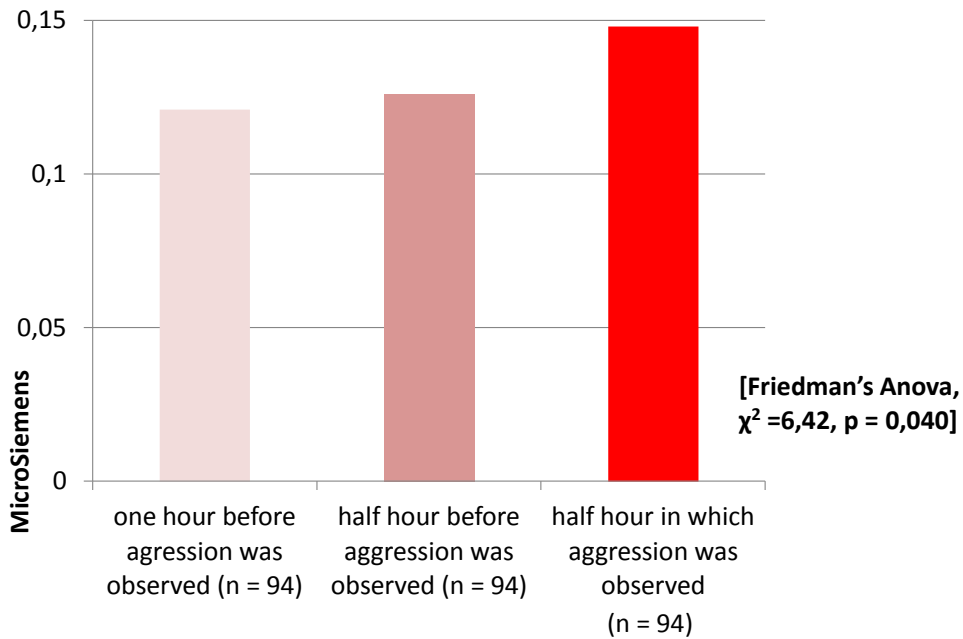
It concerns a within subject design in which the SCLs and SCRs during half hours in which aggression was observed were compared with the SCLs and SCRs during the half hour preceding the observation of aggression, as well as with the two consecutive half hours preceding the observation of aggressive behavior. A within subject was chosen as individuals have substantially different baseline SCLs in rest. Non parametric tests were used (i.e., the Wilcoxon Signed ranks test and Friedman's Anova) for the comparisons, as the SCLs were not normally distributed. For these comparisons, alpha was set at 0.05, two-tailed.

Results

Of the 47 participants, 42 (89%) had exhibited aggressive behavior as assessed with the SDAS during at least one half hour period. This sample of 42 patients consisted of 36 men (86%) and 6 women (14%) The most prevalent psychiatric diagnoses in this sample of 42 patients were psychotic disorders (59%), cluster B-personality disorders (28%) and mood disorders (13%).

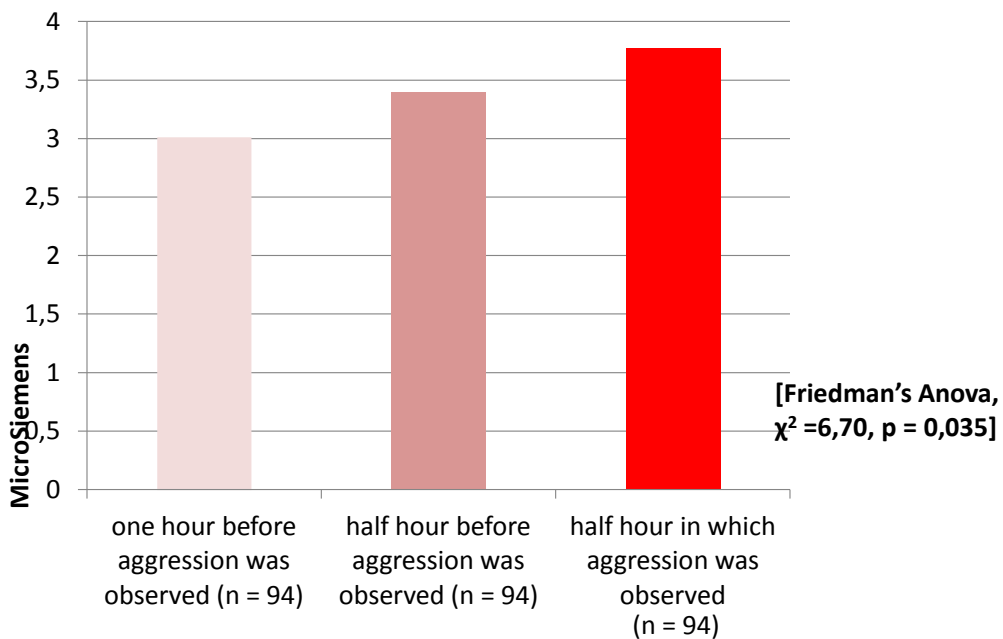
In Figure 1, the mean SCL during half hours in which the patients had displayed aggressive behavior is contrasted with the half hours preceding the observation of aggressive behavior.

Figure 1. The mean SCL during half hours in which aggression was observed (red bar) compared to the mean SCL in the preceding two half hour periods



In Figure 2, the number of SCRs during half hours in which the patients had displayed aggressive behavior is contrasted with the two half hours preceding the observation of aggressive behavior.

Figure 2. Mean number of SCRs (per minute) during half hours in which aggression was observed (red bar) compared to the number of SCRS in the preceding two half hour periods



Discussion

During half hours in which aggressive behavior had been observed, both the SCL and number of SCRs were higher (on average) when compared to the timeframe preceding these half hours. The differences, however, were limited in absolute terms, and the mean SCL of the patients as measured on the wrists of the participating patients with the DTI-2 in a general sense was low. Possibly, the measurement units for documenting aggression used in the current study, in which aggressive behavior was documented per half hour, are too crude to gain detailed insight in which potential changes in skin conductance are associated with aggressive behavior. A more precise documentation of the exact time the aggressive conduct started seems advisable for future studies on the associations between changes in electro dermal activity and aggressive behavior.

References

1. Boucsein, W. (2012). *Electrodermal activity (second edition)*. New York: Springer.
2. Campo, J.M.L.G., à Merckelbach, H.L.G.J., Nijman, H.L.I., Allertz, W.W.F., Yeates-Frederikx, M. (2000). Schizofrene symptomatologie en huidgeleidingsactiviteit. *Acta Neuropsychiatrica*, **12**, 177 - 182.
3. Kuijpers, E. , Nijman, H., Bongers, I.M.B., Lubberding, M., Ouwerkerk, M. (2012). Can mobile skin conductance assessments be helpful in signalling imminent inpatient aggression? *Acta Neuropsychiatrica*, **24**, 56 – 59.
4. Nijman, H., Palmstierna, T., Almvik, R & Stolker, J. (2005). Fifteen years of research with the Staff Observation Aggression Scale; A review. *Acta Psychiatrica Scandinavica*, **111**, 12 -21
5. Wistedt B, Rasmussen A, Pedersen L et al. The development of an observer-scale for measuring social dysfunction and aggression. *Pharmacopsychiatry* 1990; **23**; 249-252. Doi: 10.1055/s-2007-1014514