

# A Simple Relaxation Exercise Reduces Stress In Obese Youth- A Path To A Healthy Lifestyle?

A. Stasinaki<sup>1</sup>, D. Büchter<sup>2</sup>, C.-H. I. Shih<sup>3</sup>, K. Heldt<sup>1</sup>, C. White<sup>2</sup>, D. Rüegger<sup>3</sup>, A. Filler<sup>4</sup>, P. Gindrat<sup>5</sup>, D. Durrer<sup>6</sup>, B. Brogle<sup>2</sup>, N. Farpour-Lambert<sup>7</sup>, T. Kowatsch<sup>4</sup>, D. l'Allemand<sup>1°</sup>

<sup>1</sup>Pediatric Endocrinology, <sup>2</sup>Adolescent Medicine, Children's Hospital of Eastern Switzerland, 9006 St. Gallen, <sup>3</sup>Management, Technology & Economics, ETH Zurich, <sup>4</sup>Institute of Technology Management, University of St. Gallen, <sup>5</sup>Fondation Sportsmile, Nyon, <sup>6</sup>EUROBESITAS center, Vevey, <sup>7</sup>Community Medicine, Primary Care & Emergency, University Hospital, Geneva, Switzerland. ° Swiss National Science Foundation Grant CR3111L\_159289

**Introduction** Lack of impulse control and impaired stress regulation may explain the development of obesity and its challenging therapy, already in youth. To improve self-regulation of overweight adolescents and subsequently their weight status, we tested, whether a biofeedback relaxation exercise decreases stress and whether relaxation services implemented in a novel Smartphone App supported intervention have effects on stress and weight outcomes.

**Methods** First 6 months' data in 30 adolescents with BMI >P.90 of an ongoing 12-month randomized controlled study: Patients try to relax over two minutes through a breathing exercise while observing in real time their arousal level measured as skin conductance with NeXus-10 (Fig. 1). Cortisol in blood as stress marker is measured before and after this exercise, at start, 3, 6 and 12 months. During the intensive phase of 6 months, 17 patients of the intervention group (IG) are equipped with a smartphone and a specially designed chat App with game character, which encourages them through a virtual coach to achieve daily activity or relaxation challenges and earn virtual rewards (Fig. 2). While 13 patients of the treatment as-usual group (CG) have monthly visits on site during the intensive phase, IG has only four visits. Beside BMI and BMI Standard Deviation Score (SDS), adjusted for age and sex, clinical parameters and stress questionnaires (TICS) are being assessed at start, 6 and 12 months.



Fig. 1

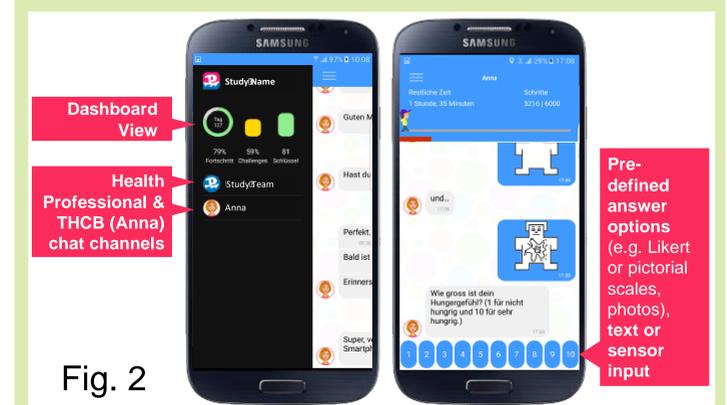


Fig. 2

## Results

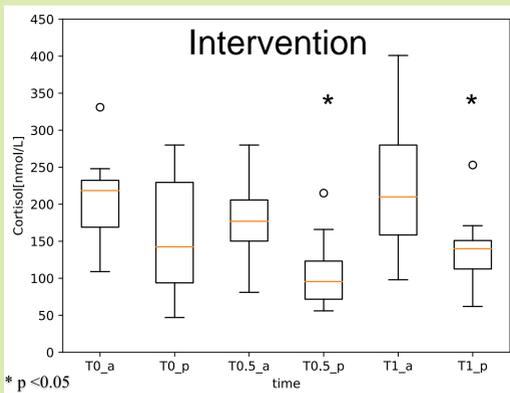


Fig. 3

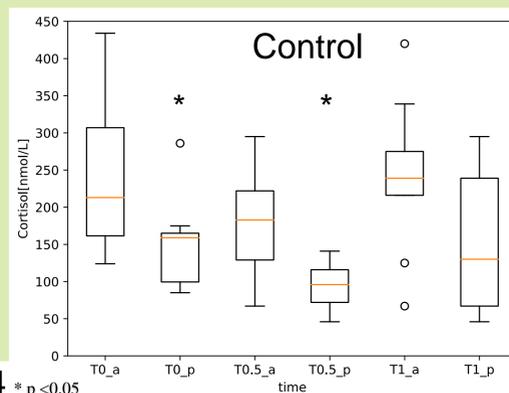


Fig. 4 \* p < 0.05

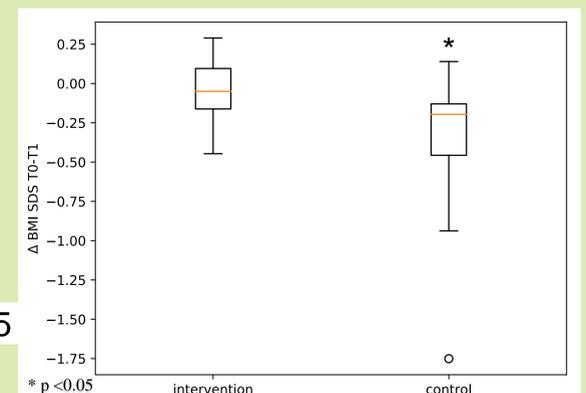


Fig. 5

Fig.3,4: T0\_a: at start, before biofeedback, T0\_p: at start, after biofeedback, T0.5\_a: after 3 months, before biofeedback, T0.5\_p: after 3 months, after biofeedback, T1\_a: after 6 months, before biofeedback, T1\_p: after 6 months, after biofeedback. In Fig. 3 one extreme outlier at T0\_a, 1200 nmol/L is not shown.

Age (13.6 years, 11-17), mean BMI ( $29.5 \pm 3.7 \text{ kg/m}^2$ ), mean BMI SDS ( $2.5 \pm 0.5 \text{ SD}$ ) and cortisol levels (median 217, 109-434 nmol/L) were similar in both groups at start. In the IG, cortisol levels decreased after the biofeedback session by 30% ( $p < 0.01$ ) after 3 and 30% after 6 months ( $p < 0.01$ ) (Fig.3). The CG exhibited a significant cortisol decrease by 36% ( $p < 0.01$ ) at start and 39% after 3 months ( $p < 0.01$ ) (Fig.4). After 6 months there was a trend in cortisol reduction in the CG by 35% ( $p = 0.051$ ). No long-term changes of cortisol were observed. BMI SDS was stabilized in the IG ( $\Delta \text{BMI SDS} = -0.05$ ) while decreased significantly in the CG (Mean  $\Delta \text{BMI SDS} = -0.4$ ,  $p = 0.02$ ) after 6 months (Fig.5). So far, no consistent correlations between changes in BMI SDS and cortisol during therapy were found.

## Conclusion

- Electrodermal biofeedback reduces acute stress hormone levels in obese adolescents and
- can be a valuable tool in obesity therapy, because it may help to manage emotions in this frequently impulsive age group.
- The long-term effects of biofeedback therapy on chronic stress and BMI are currently under investigation.

Bibliography: Nederkorn C et al: Impulsivity predicts treatment outcome in obese children. Behav Res Ther. 2007 May;45(5):1071-5. Epub 2006 Jul 7. Stephan K., Einfluss von Biofeedback auf Essverhalten, physiologische Stressreaktion und Entspannungsfähigkeit bei Adipositas. In Proceeding of the medical faculty Eberhard Karls Universität zu Tübingen, Tübingen, Deutschland. Yucha, C. B., Montgomery, D. (2008). Evidence-based practice in biofeedback and neurofeedback association for Applied Psychophysiology and Biofeedback. Wheat Ridge, CO 80033.

