

FMSS und Fundamental Frequency (f₀) - Concurrent and Predictive Validity

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Authors

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Introduction

Expressed Emotion (EE) is a measure of the family environment (Hahlweg, 2005). The EE rating is obtained by identifying emotions, feelings, and attitudes expressed by a care-giver about a patient using audio- or video tapes. Families are rated as being low (LEE) or high Expressed Emotion (HEE). HEE is divided in high Criticism (HCC) and high Emotional Overinvolvement (HEOI). EE can be assessed by the lengthy (45 – 90 minute) “Camberwell Family Interview” (CFI), the short “Five Minute Speech Sample” (FMSS, Magaña et al., 1986), or self-rated questionnaires, e. g. the “Family Questionnaire” (FQ, Wiedemann et al., 2002). EE has been demonstrated to be a reliable, cross-culturally valid psychosocial predictor of relapse in patients with schizophrenia, mood disorders and other illnesses. In this project data from the randomized control trial “Standardized Intervention in Care-givers (Parents/Partner) of Eating Disordered Inpatients: A Randomized Controlled Trial” (project no. 06-10, Naab & Quadflieg) was used. Aim of this study is to investigate the effects of a DVD intervention for care-givers on their EE-status, which was assessed by telephone, using the FMSS, and the FQ. The audio tapes were coded by an independent rater. The coding is time-consuming and raters need to be trained. An alternative to use trainers is to analyze the audio recordings to assess the fundamental frequency f_0 which measures emotional arousal through the human voice. The higher the f_0 range the higher is the emotional arousal of an individual. The elevation of f_0 is a non-invasive and valid method to measure emotional arousal with the human voice. In this study outcome was defined by changes of the EE status measured by FMSS and changes in FQ-subcales.

Objectives

In this project the FMSS audio-tapes were reanalyzed by measuring the fundamental frequency f_0 using the Praat software. The *first aim* was to investigate the concurrent validity of the FMSS-rating, the FQ and the f_0 variables. The *second aim* was to investigate the validity of the f_0 variables with regard to their validity to predict outcome of the DVD intervention.

Methods

Sample. The participants were recruited in a psychosomatic clinic over 17 month. The sample consisted of $N = 196$ care givers of patients with an eating disorders (Anorexia and Bulimia

nervosa). After application of the exclusion criteria $N = 160$ female care-giver were taken into account. The mothers were $M = 49.0$ years ($SD = 6.3$) old.

Assessment. There were three assessment points in the trial: t1 (baseline), t2 (end of the intervention) and t3 (3-month follow-up). The “Five Minute Speech Sample” (FMSS) is a short measure for assessing Expressed Emotion (EE). During the FMSS relatives are asked to talk about their feelings and thoughts about the patient without interruptions of the interviewer. There are two categories “Criticism” and “Emotional Overinvolvement” which are scored by external raters. The Family Questionnaire (FQ) is a short self-rating questionnaire for assessing EE status of relatives of schizophrenic patients. It has two subscales: Criticism (CC; $\alpha = .92$) and Emotional Overinvolvement (EOI, $\alpha = .80$). The f_0 is highly associated with the biological processes of speech production. Higher f_0 variability is associated with higher emotional arousal. It has been shown that f_0 range is significantly correlated with physiological variables of emotion like heart rate, blood pressure, and cortisol (Weusthoff et al., 2013).

Results

EE status. The EE-status based on the FMSS was assessed at pre (t1) and follow-up (t3). 60% of the female care-givers had high EE ratings at pre. At follow-up the high EE ratings were reduced to 35%. There were no differences in the EE status between intervention and control group at pre and follow-up assessment.

Concurrent validity. At pre and follow-up non-significant correlations between HEE and LEE care-givers and the fundamental frequency variables f_0 means and f_0 ranges resulted. But there were significant correlations between EE-status and FQ-subcales for female care-givers: FQ-Criticism-scale ($r_{pre} = .18^*/ r_{t3} = .31^{**}$) and FQ-EOI-scale ($r_{pre} = .22^{**}/ r_{t3} = .21^*$), while none of the f_0 variables correlated significantly.

Prediction of the outcome. There were no significant differences in changes of EE status from pre to follow up assessment in the intervention and control group: In FQ there were significant changes from pre to post ($d_{intra} = .44$ to $.70$) but no significant differences between intervention and control group.

Conclusions

The *first aim* was to investigate the concurrent validity of FMSS ratings and f_0 variables, resulting in non-significant correlations, suggesting that f_0 variables will not be sufficient to measure the EE-status. *Tone* of voice is defined as tone of voice in specific sentences (Magaña et al., 1986). However, here fundamental frequency variables f_0 were analyzed for the whole five minutes. So maybe the analysis method was too general for the specific meaning for *tone* of voice in EE ratings. The concurrent validity of f_0 with the FQ-subscale data at pre- and follow-up assessment, resulted in non-significant correlations. The FMSS ratings and the FQ-subcales correlated. This corresponds with results as reported in the literature (Duclos et al., 2012).

The *second aim* was to investigate the validity of f_0 with regard to predict outcome of the DVD intervention. 66% of care-givers had a positive outcome (LEE) at follow-up, however there was no difference between intervention and control group. The questionnaire outcomes showed

medium ($d = .44$ to $.70$) intra-effect sizes and the inter-effect sizes showed non-significant differences for intervention and control group.

How to explain the non-significant findings? In this study, the FMSS was assessed via telephone. This is in contrast to the established procedure in which the FMSS is assessed in a direct face-to-face situation. Another problem is the way the task was introduced. The interviewers asked for very critical and emotional situations in family life. Maybe the mothers were prompted to express more critical comments. This may explain the unusual high rate of high EE ratings (60%).

Following these arguments it would be necessary in future studies to repeat the FMSS assessment using the standard procedure in order to fully analyze the potential of the fundamental frequency f_0 variables in intervention research.

References

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