

HEART RATE VARIABILITY AS A POTENTIAL PREDICTOR FOR TREATMENT OUTCOME IN PATIENTS WITH OBSESSIVE-COMPULSIVE DISORDER

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BACKGROUND

- **Heart rate variability (HRV)** has recently been suggested as a valuable predictor for treatment outcome in several psychiatric disorders^{1,2}.
- In **anxiety disorders** a higher HRV was predictive of better psychotherapy response than lower HRV³. In contrast, lower resting HRV was found to be a predictor for better therapy outcome in patients with **non-anxious depression**⁴.
- Despite findings of lower HRV in obsessive-compulsive disorder (OCD)⁵, studies on the **predictive utility of HRV for treatment response in OCD** are lacking.

RESEARCH OBJECTIVE

This study aimed to investigate **HR and HRV as potential predictors for treatment outcome in OCD** by regressing HR and HRV onto symptom change (remission with Y-BOCS ≤ 12 , change in Y-BOCS score in %).

METHODS

SAMPLE

- **In total:** 86 patients with OCD on a waiting list for cognitive behavioral therapy

Characteristic	Females (n = 46)	Males (n = 40)	t	p
Age (years)	29.93 (9.33)	31.80 (8.39)	t(84) = 0.97	.335
BDI-II	20.59 (11.80)	17.69 (10.20)	t(83) = -1.20	.234
OCI-R	26.98 (13.34)	27.41 (10.79)	t(83) = .162	.872
Y-BOCS	24.22 (5.69)	22.60 (5.28)	t(84) = -1.37	.176

- **Comorbidities:** 67 patients had one or more comorbid disorders (females n = 33)
- **Medication:** 52 patients were unmedicated (females n = 29)

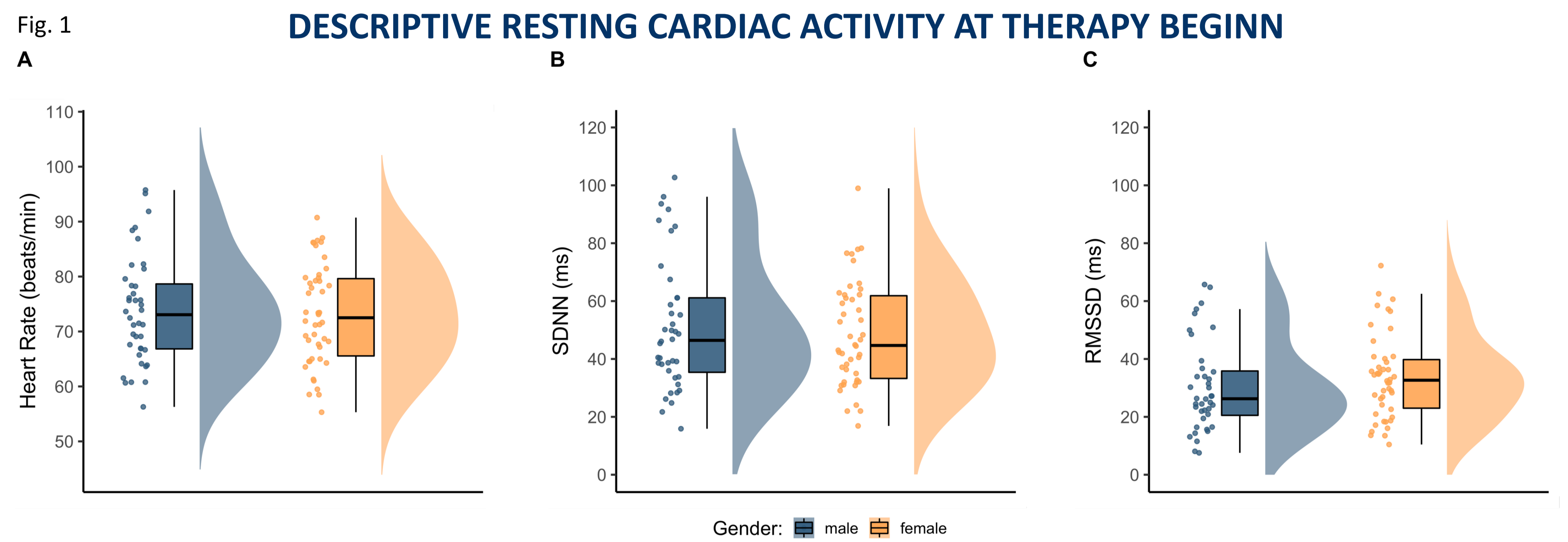
RESTING STATE PARADIGM

- Electrocardiogram was recorded during a 5-minute resting state paradigm

DATA ANALYSIS

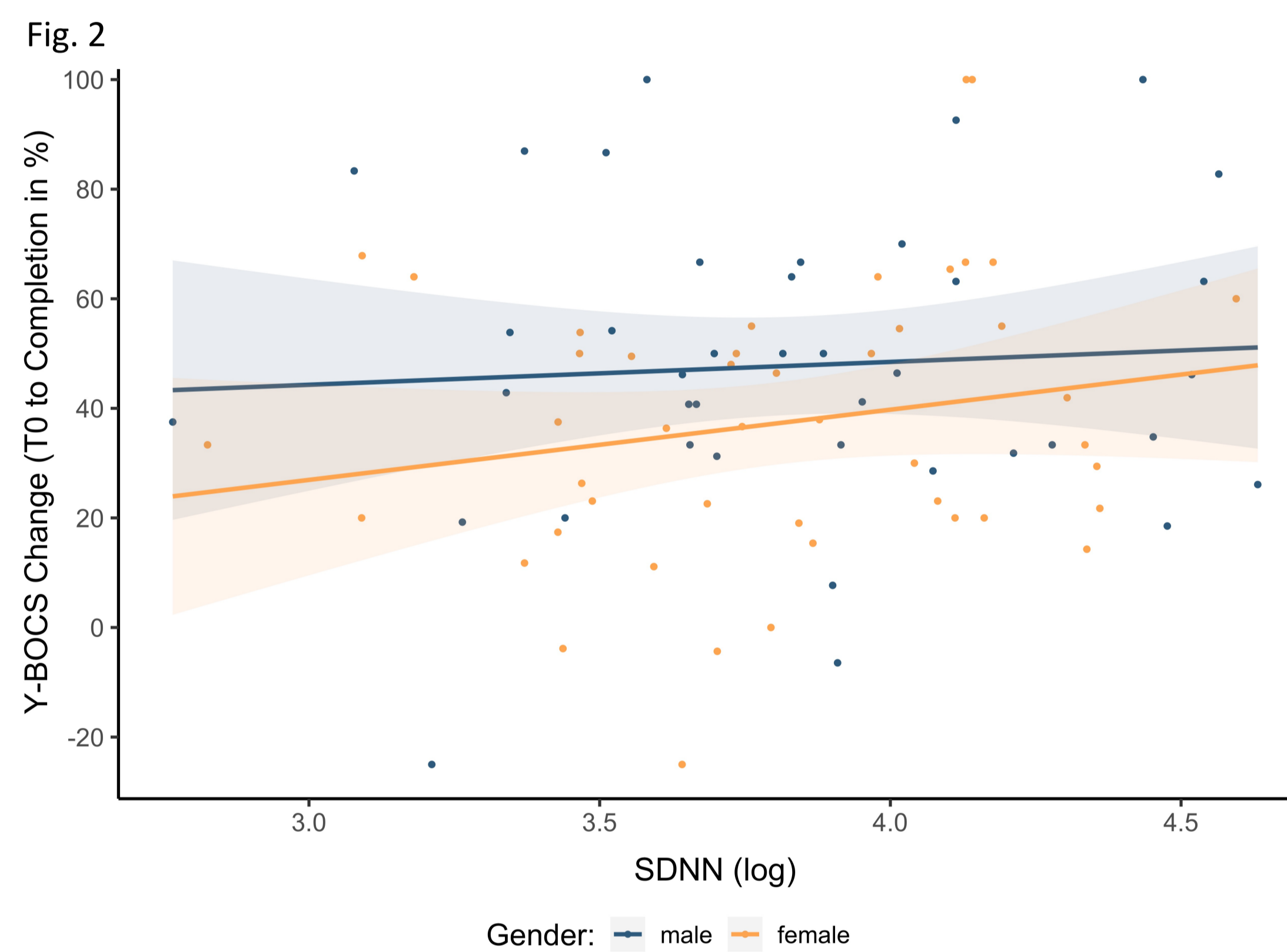
- **Multiple regressions** on change in symptom severity (remission Y-BOCS ≤ 12 , Y-BOCS score at the beginning vs after completion of therapy; Reliable Change Index Y-BOCS ≤ 1.96) across and within gender groups
- Y-BOCS (at the beginning of therapy), HRV (LogSDNN, LogRMSSD) or HR (MeanHR), (gender), and age as predictors
- **Control analysis** including medication status and depressive symptoms (BDI-II)

RESULTS

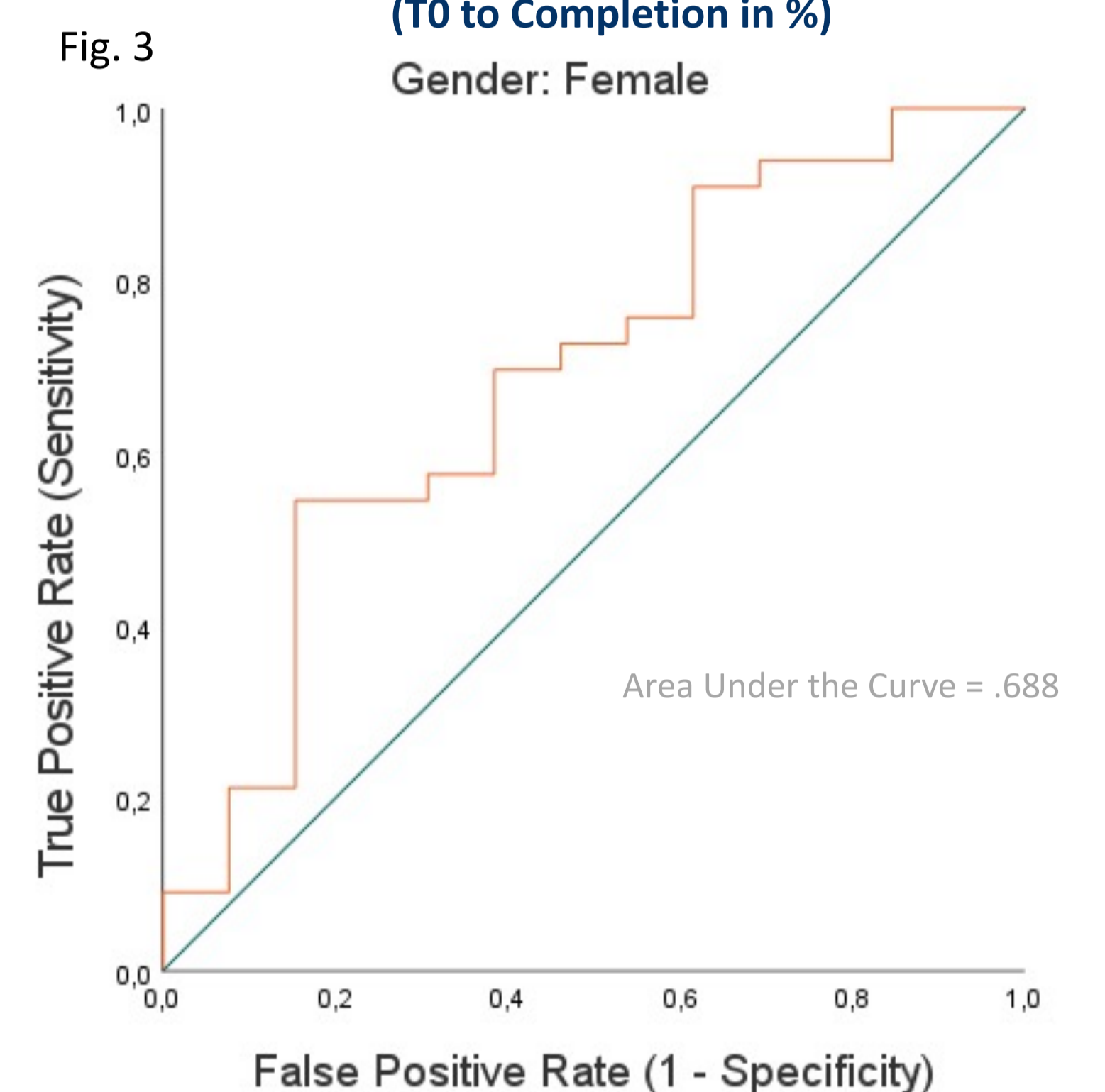


MULTIPLE REGRESSIONS

- Analyses on **remission (Y-BOCS ≤ 12)** resulted in a three-way-interaction between LogSDNN, gender, and age on trend-level. Follow-up within gender groups revealed a trend-level interaction between LogSDNN and age on **remission** in female patients. All genders: LogSDNN x Age x Gender: $p = .050$; Adj. OR = 0.70, 95% CI [0.47, 0.98]; Within females: LogSDNN x Age: $p = .057$
- Effects of HRV on **symptom reduction**: Female patients with higher resting LogSDNN show greater reduction in Y-BOCS score after therapy completion (Fig. 2 & 3). LogSDNN: $b = 23.01$, 95% CI [1.14, 44.89], $t(41) = 2.13$, $p = .039$.
- No effects of HRV on treatment outcome in **male patients with OCD**. All p s < .05.



ROC CURVE – YBOCS CHANGE



- Further variables of symptom reduction (i.e., Reliable Change Index Y-BOCS ≤ 1.96) replicated gender differences in predictive HRV. LogSDNN: $p = .029$; Adj. OR = 14.63, 95% CI [1.66, 210.84].
- No effects of HR on treatment outcome generally. All p s < .05

CONTROL ANALYSES

- **Medication status (medicated vs. unmedicated):** no change in effects in models regressing on remission or symptom reduction
- **Depressive symptoms:** when depressive symptoms (BDI-II) included, no change in effects in models regressing on symptom reduction, but significant **interaction between BDI-II and LogSDNN as predictors for remission**.

DISCUSSION & CONCLUSION

SUMMARY

- First results suggest **predictive utility of HRV**, particularly in **female patients with OCD**.
- Female patients with OCD and with a **higher HRV at rest showed better treatment response** in greater reduction in obsessive-compulsive symptoms than females with lower resting HRV. Our findings **do not support predictive value of HRV in male patients with OCD**.

LIMITATIONS

- **Comorbidities**, specifically depression, seem to be confounding and need further investigation
- More **physiological variables** need to be accounted for (e.g., weight, fitness, hormonal status)
- Further HRV variables (i.e., RMSSD) showed quadratic relations to symptom severity and need to be investigated.

CONCLUSION

- Altogether, these prospective findings support the notion that **HRV is a transdiagnostic biomarker of treatment outcome** and that it might help to determine which patients with OCD will respond to psychotherapy.

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¹ Chalmers, J. A., Quintana, D. S., Abbott, M. J., & Kemp, A. H. (2014). Anxiety disorders are associated with reduced heart rate variability: A meta-analysis. *Frontiers in Psychiatry*, 5, 80.

² Koch, C., Wilhelm, M., Salzmann, S., Rief, W., & Euteneuer, F. (2019). A meta-analysis of heart rate variability in major depression. *Psychological Medicine*, 49(12), 1948–1957.

³ Wendt, J., Hamm, A. O., Pané-Farré, C. A., Thayer, J. F., Gerlach, A., Gloster, A. T., Lang, T., Helbig-Lang, S., Pauli, P., Fydrich, T., Ströhle, A., Kircher, T., Arolt, V., Deckert, J., Wittchen, H. U., & Richter, J. (2018). Pretreatment cardiac vagal tone predicts dropout from and residual symptoms after exposure therapy in patients with panic disorder and agoraphobia. *Psychotherapy and Psychosomatics*, 87(3), 187–189.

⁴ Kircanski, K., Williams, L. M., & Gotlib, I. H. (2019). Heart rate variability as a biomarker of anxious depression response to antidepressant medication. *Depression and Anxiety*, 36(1), 63–71.

⁵ Jüres, F., Kaufmann, C., Riesel, A., Grützmann, R., Heinzel, S., Elsner, B., Bey, K., Wagner, M., Kathmann, N., & Klawohn, J. (under review). Heart rate and heart rate variability as biomarkers for obsessive-compulsive disorder: Evidence from patients and unaffected first-degree relatives. *Biological Psychology*