***Supplemental Information***

Long-term Alteration of Heart Rate Variability following Childhood Maltreatment: Results of a General Population Study

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Short Title: Child Maltreatment and Heart Rate Variability

**Supplemental Methods.** Data assessment, Questionnaires, and Data preparation

**Supplemental Results.** Association of HRV and CM in the PSG-subsample and Association between HRV and the Interaction of CM and Age in the PSG-subsample

**Table S1.** Sample Characteristics Stratified for Sex

**Table S2.** Association of Childhood Maltreatment with Heart Rate Variability

**Table S3.** Association of Childhood Maltreatment with Heart Rate

**Table S4.** Association of Childhood Maltreatment with SDNN

**Table S5.** Association of Childhood Maltreatment with HF-HRV

**Table S6.** Association of Childhood Maltreatment with LF-HRV

**Table S7.** Interaction of Age with Childhood Maltreatment

**Figure S1.** Predicted HRV as a function of age and exposure to neglect during childhood in the complete sample and the PSG-subsample

**Figure S2.** Predicted HRV as a function of age and exposure to abuse during childhood in the complete sample and the PSG-subsample

**Supplemental Methods**

**Questionnaires**

*Childhood Trauma.* CM was evaluated utilizing the Childhood Trauma Questionnaire (CTQ; 1). The CTQ consists of 28 items and assesses various forms of CM across five subscales, encompassing emotional, physical, and sexual abuse, and emotional and physical neglect. Each item is rated on a 5-point Likert scale, indicating the frequency of occurrence from “never true” (1) to “very often true” (5). According to the manual, exposure to CM is defined by reporting at least one moderate exposure in any subtype of CM. In addition, childhood neglect is affirmed if individuals encounter at least one moderate exposure to physical or emotional neglect, while childhood abuse is characterized by at least one moderate exposure to emotional, physical, or sexual abuse. The validity and reliability of the CTQ have been proven previously [1], as well as its German version in both clinical and nonclinical samples [2,3]. In our complete sample (n = 3,438), Cronbach’s alpha (0.91) and Omega total (0.93) indicate excellent internal consistency.

*Depressive Symptoms*. Current depressive symptoms were assessed using the PHQ-9 questionnaire [4,5]. It consists of nine items, scoring the corresponding DSM-IV criterion A of depression within the last two weeks. The items are answered on a four-point scale, ranging from "not at all" (0) to "almost every day" (3). The total sum score (range 0 – 27) represents the severity of current depressive symptoms. The PHQ-9 is a well-established self-report screening instrument, known for its high reliability (α = .86 - .89) and validity [4,6]. This was further confirmed in our sample, with Cronbach’s alpha (0.83) and Omega total (0.83) indicating high internal consistency.

**Data preparation**

**HRV**

*Cardiologic examination - usHRV.* To improve the validity of HRV obtained from the 10-second 12-lead ECG, additional preprocessing steps were applied. As 10 seconds are very short and therefore falsely detected R-waves would have a significant impact on the derived HRV, especially at the beginning and end of the recording, each detected QRS-complex was verified across up to seven out of 12 leads (i.e. Einthoven I and II, Goldberger aVR and Wilson V3-V6). Thus, in accordance with Krause et al. [7], only RMSSD parameters calculated from those leads with the highest number of the same count of valid RR intervals, with a minimum criterion of five, and with at least two valid leads were considered for averaging. Finally, only those RMSSD values within one standard deviation of the distribution of the participant-specific values were averaged, resulting in one ‘multichannel’ RMSSD value. Additionally, participants were excluded from further analysis if their RMSSD values exceeded 250 ms or if they exhibited tachycardia during the examination (heart rate > 100 bpm). Such conditions suggest that the participant may not have been at rest, which makes the assessment of resting HRV inappropriate. Tachycardia at rest can be caused by a range of factors, including infection, fever, stimulant intake, or residual physical exertion [8]. Moreover, it may indicate undetected or emerging cardiovascular conditions. In these cases, HRV may no longer reliably reflect vagal mediated modulation, as the beat-to-beat intervals may no longer be predominantly regulated by sinoatrial node pacemaker cells [8,9]. Additionally, ECGs rated by certified staff as showing a non-sinus rhythm were excluded, as this might indicate maladaptive or pathological cardiac control, which would make the derivation of resting HRV implausible [9,10].

*Polysomnography - HRV.* After an instructed calibration, a participant-specific time window of 5 minutes was selected when the participants were lying and still awake (mean[standard deviation] and median time of rest before the 5 minute segment: M[SD] = 19.4[20.3] minutes, Mdn = 11.3 minutes). A hypnogram of the entire night was rated in 30-second segments by certified staff according to the AASM-2007 criteria. Overall, 21.4 % of the 5 minute segments contained N1 sleep. To ensure that the participant did not fall deeply asleep, the 5 minutes interval had to contain less than 50 % of sleep stage N1, as previous studies found no difference between wake and this sleep stage [11–13]. Finally, extreme outliers of the number of RR intervals and the logarithmized RMSSD values were excluded (RR-count range: 185 – 448; logRMSSD range: 1.75 – 4.93).

*Trait-like HRV.* HRV measurements according to the guidelines [10,14] were not available. However, there were two sources for deriving HRV (i.e., 10-second ECG and 5 minutes of wakeful rest at the beginning of a PSG) for a subgroup of SHIP-TREND-0. The obtained HRV values were averaged to minimize situation-specific variance and derive a more reliable, trait-like HRV [15,16]. Additionally, this trait-like HRV variable was used to conduct sensitivity analyses to validate and support the statistical findings using 10-second HRV in the complete sample.

**Supplementary Results**

**Association of HRV and CM in the PSG-subsample**

*Unadjusted Model.* Overall, exposure to CM was found to be associated with lower HRV in the PSG-subsample (trait-like HRV: β = -0.33 [95%-CI: -0.49, -0.16], *p* = 1.1e-04; HRV: β = -0.25 [95%-CI: -0.41, -0.08], *p* = .003; usHRV: β = -0.32 [95%-CI: -0.48, -0.16], *p* = 1.3e-04). Interestingly, the observed association was attenuated for HRV, while being comparable for trait-like HRV and usHRV.

*Base Model.* Taking age, sex, and medication with antihypertensive and psychopharmacological (i.e. tricyclic antidepressants and clozapine) into account, the negative association between HRV and CM was attenuated but remained stable in the PSG-subsample (trait-like HRV: β = -0.27 [95%-CI: -0.41, -0.12], *p* = 2.4e-04; HRV: β = -0.09 [95%-CI: -0.16, -0.02], *p* = .015; usHRV: β = -0.268 [95%-CI: -0.41, -0.12], *p* = 3.2e-04).

*Adjusted Models*. Further investigation of whether the association of CM and HRV can be explained by socioeconomic factors, BMI, lifestyle factors, and current depressive symptoms revealed that none of these factors alone nor together completely explained the observed effects. The associations were consistently stable in both samples and, moreover, comparable to those in the base models.

**Association of HRV and Neglect**

*Unadjusted Model.* HRV was found to be lower in individuals exposed to neglect during childhood in the PSG-subsample (trait-like HRV: β = -0.36 [95%-CI: -0.53, -0.18], *p* = 1.8e-04; HRV: β = -0.27 [95%-CI: -0.45, -0.10], *p* = .007; usHRV: β = -0.36 [95%-CI: -0.53, -0.18], *p* = 2.1e-04). Again, the observed effect was attenuated for HRV compared to usHRV and trait-like HRV.

*Base Model.* Additionally, adjusting for age, sex, and medication attenuated the negative association between HRV and neglect, but remained significant in the PSG-subsample of trait-like HRV and usHRV (trait-like HRV: β = -0.25 [95%-CI: -0.40, -0.10], *p* = .004; usHRV: β = -0.25 [95%-CI: -0.41, -0.10], *p* = .004). However, the significant *p*-value for HRV did not survive FDR correction (HRV: β = -0.17 [95%-CI: -0.33, -0.01], *p* = .114), although the 95%-CI suggests the same association direction.

*Adjusted Models.* The observed effects of CM and neglect on trait-like HRV and usHRV could not be explained by models adjusting either alone or together for socioeconomic factors, BMI, lifestyle factors, and current depressive symptoms. Moreover, the effect sizes remained consistently stable and were comparable to the corresponding base model. In contrast, these associations could not be confirmed by significant *p*-values for HRV, however, the 95%-CI indicated the same association patterns as for trait-like HRV and usHRV.

**Association of HRV and Abuse**

No association between HRV and abuse during childhood was found in the PSG-subsample (trait-like HRV: β = 0.01 [95%-CI: -0.24, 0.27], *p* = 1; HRV: β = -0.01 [95%-CI: ‑0.27, 0.24], *p* = 1; usHRV: β = 0.03 [95%-CI: -0.22, 0.29], *p* = 1), and neither in the base models or the additional adjusted models. However, with additional adjustments the β-values along with the 95%-confidence intervals shifted, trending to indicate a negative association between abuse and HRV.

**Association between HRV and the Interaction of CM and Age in the PSG-subsample**

The interaction between CM and age showed a trend toward significance in the unadjusted model for trait-like HRV (*p* = .065) and was significant for HRV (*p* = .013), but not for usHRV (*p* = .244). Including covariates led to a significant interaction for both trait-like HRV and HRV, while the results for usHRV were mixed. Specifically, the interaction between CM and age regarding usHRV was significant when adjusting for BMI (*p* = .041), socioeconomic factors (*p* = .009), and in the fully adjusted model (*p* = .005), but it was not significant when accounting for lifestyle factors (*p* = .068), current depressive symptoms (*p* = .059) or in the base model (*p* = .064).

Interestingly, post hoc analyses revealed only significant interactions between CM and age in the fully adjusted model, specifically for neglect and HRV (*p* = .014) and for abuse and trait-like HRV (*p* = .036).

**Association of HF-HRV and CM in the PSG-subsample**

Analyses using log-transformed HF-HRV revealed no statistically significant association with CM or abuse (see Table S5). However, a negative association with CM was suggested as a trend (β = -0.21, 95% CI [-0.39, -0.04], *p* = .054). A comparable pattern was observed for neglect, however, with a statistically significant negative association between HF-HRV and neglect in the model adjusted for socioeconomic factors (β = -0.22, 95% CI [-0.40, -0.05], *p* = .042).

**Association of LF-HRV and CM in the PSG-subsample**

Analyses using log-transformed LF-HRV showed a negative association with CM in the unadjusted model (see Table S6; β = -0.17 [95%-CI: -0.34, -0.01], *p* = .039), as well as in the model adjusted for the base model and socioeconomic factors (β = -0.20 [95%-CI: -0.37, -0.03], *p* = .024). No significant associations were identified for neglect or abuse.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Samples** |  | **Complete Sample** | | | | | | | | | | | |  | **PSG-subsample** | | | | | | | | | | | |  | **Δ Samples** |
|  |  |  | | | |  | **Sex Stratified** | | | | | | |  |  | | | |  | **Sex Stratified** | | | | | | |  |  |
|  |  | **Complete** | **No CM** | **Any CM** | **Δ CM** |  | **No CM** | | |  | **Any CM** | | |  | **Complete** | **No CM** | **Any CM** | **Δ CM** |  | **No CM** | | |  | **Any CM** | | |  |  |
|  |  |  |  |  | ***p*** |  | **Female** | **Male** | ***p*** |  | **Female** | **Male** | ***p*** |  |  |  |  | ***p*** |  | **Female** | **Male** | ***p*** |  | **Female** | **Male** | ***p*** |  | ***p*** |
| Sample size |  | 3,438 | 2,670 | 768 |  |  | 1,465 | 1,205 |  |  | 417 | 351 |  |  | 797 | 614 | 183 |  |  | 312 | 302 |  |  | 99 | 84 |  |  |  |
| Age M[SD] |  | 49.7 [14.7] | 48.9 [14.6] | 52.5 [14.7] | <.001 |  | 49.4 [14.6] | 48.3 [14.7] | .061 |  | 51.1 [14.9] | 54.2 [14.3] | .003 |  | 51.6 [13.3] | 51.2 [13.3] | 53.0 [13.4] | .112 |  | 52.9 [12.7] | 49.4 [13.7] | .001 |  | 51.3 [13.9] | 55.0 [12.6] | .060 |  | <.001 |
| Age range |  | 20 - 83 | 20 - 83 | 20 - 82 |  |  | 20 - 82 | 21 - 83 |  |  | 20 - 81 | 21 - 82 |  |  | 20 - 81 | 21 - 81 | 20 - 79 |  |  | 22 - 79 | 21 - 81 |  |  | 20 - 76 | 27 - 79 |  |  |  |
| Sex - Women [%] |  | 1,882 [54.7] | 1,465 [54.9] | 417 [54.3] | .779 |  | 1,465 | 1,205 |  |  | 417 | 351 |  |  | 411 [51.6] | 312 [50.8] | 99 [54.1] | .839 |  | 312 | 302 |  |  | 99 | 84 |  |  | .105 |
| lnRMSSD |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| usHRV M[SD] |  | 3.1 [0.7] | 3.2 [0.7] | 3.0 [0.7] | <.001 |  | 3.2 [0.7] | 3.1 [0.7] | <.001 |  | 3.1 [0.7] | 2.9 [0.7] | <.001 |  | 3.1 [0.7] | 3.2 [0.6] | 3.0 [0.6] | <.001 |  | 3.2 [0.6] | 3.1 [0.7] | .301 |  | 3.1 [0.6] | 2.8 [0.7] | .011 |  | .276 |
| HRV M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3.3 [0.6] | 3.3 [0.6] | 3.2 [0.6] | .003 |  | 3.4 [0.5] | 3.3 [0.6] | .543 |  | 3.3 [0.5] | 3.1 [0.6] | .047 |  |  |
| Trait-like HRV M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3.2 [0.5] | 3.3 [0.5] | 3.1 [0.5] | <.001 |  | 3.3 [0.5] | 3.2 [0.6] | .345 |  | 3.2 [0.5] | 3.0 [0.6] | .008 |  |  |
| RMSSD |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| usHRV M[SD] |  | 28.2 [22.4] | 29.0 [22.8] | 25.5 [20.5] | <.001 |  | 30.3 [23.5] | 27.5 [21.8] | .002 |  | 27.4 [20.6] | 23.2 [20.1] | .005 |  | 27.0 [21.2] | 28.2 [21.4] | 22.8 [20.0] | .003 |  | 28.7 [21.6] | 27.7 [21.2] | .568 |  | 24.3 [16.4] | 21.2 [23.5] | .302 |  | .153 |
| HRV M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 31.3 [18.8] | 32.3 [19.3] | 28.0 [16.6] | .007 |  | 32.5 [19.2] | 32.1 [19.4] | .816 |  | 29.8 [16.8] | 25.9 [16.1] | .120 |  |  |
| Trait-like HRV M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 29.1 [17.3] | 30.3 [17.8] | 25.4 [15.0] | <.001 |  | 30.6 [17.8] | 29.9 [17.7] | .638 |  | 27.0 [13.5] | 23.6 [16.6] | .122 |  |  |
| Valid RR-intervals |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ECG 10-s M[SD] |  | 10.0 [1.6] | 10.0 [1.6] | 10.0 [1.7] | .637 |  | 10.1 [1.6] | 9.8 [1.6] | <.001 |  | 10.1 [1.5] | 9.9 [1.8] | .026 |  | 9.8 [1.5] | 9.8 [1.5] | 10.0 [1.6] | .076 |  | 9.9 [1.6] | 9.6 [1.4] | .006 |  | 10.1 [1.3] | 9.9 [1.8] | .495 |  | .002 |
| ECG 10-s range |  | 5 - 16 | 5 - 16 | 6 - 15 |  |  | 5 - 16 | 5 - 16 |  |  | 6 - 15 | 6 - 15 |  |  | 6 - 15 | 6 - 15 | 7 - 15 |  |  | 6 - 15 | 7 - 14 |  |  | 8 - 14 | 7 - 15 |  |  |  |
| PSG 5-min M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 323.2 [42.4] | 322.3 [42.1] | 326.1 [43.1] | .278 |  | 326.3 [42.2] | 318.1 [41.7] | .015 |  | 326.1 [42.2] | 326.2 [44.4] | .990 |  |  |
| PSG 5-min range |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 203 - 443 | 212 - 443 | 203 - 426 |  |  | 212 - 436 | 223 - 443 |  |  | 203 - 421 | 231 - 426 |  |  |  |
| Heart rate |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10-s HR, BPM M[SD] |  | 66.7 [9.4] | 66.7 [9.4] | 66.9 [9.5] | .657 |  | 67.5 [9.3] | 65.7 [9.4] | <.001 |  | 67.3 [8.8] | 66.3 [10.4] | .123 |  | 65.5 [8.9] | 65.2 [8.8] | 66.3 [9.1] | .144 |  | 66.0 [9.1] | 64.4 [8.4] | .031 |  | 66.5 [7.8] | 66.1 [10.4] | .767 |  | <.001 |
| HR 5-min PSG, BPM M[SD] |  |  |  |  |  |  | 66.8 [8.3] | 65.7 [9.2] | .084 |  | 67.1 [8.1] | 67.4 [10.6] | .824 |  | 66.1 [8.4] | 65.9 [8.4] | 67.0 [8.4] | .111 |  | 66.9 [8.4] | 64.9 [8.3] | .003 |  | 66.9 [7.9] | 67.1 [9.0] | .897 |  |  |
| HR averaged, BPM M[SD] |  |  |  |  |  |  | 67.6 [9.0] | 65.8 [9.1] | <.001 |  | 67.4 [8.6] | 66.5 [10.1] | .174 |  | 65.8 [7.7] | 65.5 [7.6] | 66.7 [7.8] | .085 |  | 66.4 [7.8] | 64.6 [7.3] | .004 |  | 66.7 [7.1] | 66.6 [8.7] | .918 |  |  |
| SDNN |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ECG 10-s M[SD] |  | 26.3 [19.7] | 27.1 [20.2] | 23.6 [17.4] | <.001 |  | 27.1 [20.0] | 27.0 [20.5] | .924 |  | 24.7 [17.1] | 22.2 [17.6] | .049 |  | 25.0 [18.9] | 26.1 [19.8] | 21.4 [14.7] | .003 |  | 25.2 [18.5] | 27.1 [21.0] | .238 |  | 22.6 [14.0] | 20.0 [15.5] | .242 |  | .103 |
| PSG 5-min M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 58.4 [30.5] | 59.4 [31.1] | 55.2 [28.5] | .096 |  | 57.6 [30.3] | 61.3 [31.8] | .144 |  | 56.5 [27.5] | 53.6 [29.6] | .488 |  |  |
| averaged M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 41.8 [20.4] | 42.8 [21.1] | 38.3 [17.6] | .009 |  | 41.5 [20.5] | 44.3 [21.6] | .100 |  | 39.7 [16.1] | 36.7 [19.1] | .257 |  |  |
| LF-HRV HRV – PSG 5-min M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.5 [0.2] | 0.5 [0.2] | 0.5 [0.2] | .034 |  | 0.5 [0.2] | 0.6 [0.3] | <.001 |  | 0.5 [0.2] | 0.5 [0.2] | .502 |  |  |
| HF-HRV HRV – PSG 5-min M[SD] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.3 [0.3] | 0.3 [0.3] | 0.3 [0.2] | .154 |  | 0.4 [0.3] | 0.3 [0.2] | <.001 |  | 0.3 [0.2] | 0.3 [0.2] | .036 |  |  |
| ∆days ECG 10-s vs. PSG Mdn[range] |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 7 [0 - 83] | 7 [0 - 83] | 8 [0 - 77] | .381 |  | 16 [18] | 14 [18] | .188 |  | 17 [20] | 16 [19] | .651 |  |  |
| Body fat, percentage M[SD] |  | 29.3 [8.2] | 29.1 [8.0] | 29.8 [8.7] | .042 |  | 33.7 [6.8] | 23.6 [5.4] | <.001 |  | 34.8 [7.5] | 23.9 [5.8] | <.001 |  | 29.4 [8.1] | 29.2 [8.1] | 30.0 [8.2] | .233 |  | 34.9 [6.5] | 23.5 [5.0] | <.001 |  | 34.6 [6.8] | 24.6 [6.2] | <.001 |  | .697 |
| Body mass, kg M[SD] |  | 80.5 [16.8] | 80.2 [16.5] | 81.8 [17.6] | .025 |  | 73.1 [14.5] | 88.8 [14.7] | <.001 |  | 75.9 [16.8] | 88.8 [15.9] | <.001 |  | 82.1 [15.7] | 81.9 [15.2] | 82.7 [17.5] | .569 |  | 75.5 [13.9] | 88.4 [13.5] | <.001 |  | 77.1 [15.3] | 89.3 [17.8] | <.001 |  | .015 |
| Body height, cm M[SD] |  | 170.0 [9.4] | 170.3 [9.4] | 169.1 [9.1] | .002 |  | 164.3 [6.8] | 177.5 [6.7] | <.001 |  | 163.7 [6.5] | 175.4 [7.4] | <.001 |  | 170.4 [9.0] | 170.6 [9.0] | 169.9 [9.1] | .387 |  | 164.4 [6.6] | 176.9 [6.3] | <.001 |  | 164.9 [6.3] | 175.8 [8.3] | <.001 |  | .253 |
| Waist-to-hip ratio M[SD] |  | 0.9 [0.1] | 0.9 [0.1] | 0.9 [0.1] | <.001 |  | 0.8 [0.1] | 0.9 [0.1] | <.001 |  | 0.8 [0.1] | 1.0 [0.1] | <.001 |  | 0.9 [0.1] | 0.9 [0.1] | 0.9 [0.1] | .207 |  | 0.8 [0.1] | 0.9 [0.1] | <.001 |  | 0.8 [0.1] | 1.0 [0.1] | <.001 |  | .500 |
| Body mass index, kg/m² M[SD] |  | 27.8 [5.2] | 27.6 [5.0] | 28.6 [5.7] | <.001 |  | 27.1 [5.4] | 28.2 [4.5] | <.001 |  | 28.4 [6.4] | 28.9 [4.8] | .240 |  | 28.2 [4.9] | 28.1 [4.7] | 28.6 [5.5] | .267 |  | 28.0 [5.2] | 28.3 [4.2] | .487 |  | 28.4 [5.6] | 28.9 [5.3] | .543 |  | .034 |
| WHtR M[SD] |  | 0.5 [0.1] | 0.5 [0.1] | 0.5 [0.1] | <.001 |  | 0.5 [0.1] | 0.5 [0.1] | <.001 |  | 0.5 [0.1] | 0.6 [0.1] | <.001 |  | 0.5 [0.1] | 0.5 [0.1] | 0.5 [0.1] | .124 |  | 0.5 [0.1] | 0.5 [0.1] | .012 |  | 0.5 [0.1] | 0.6 [0.1] | .011 |  | <.001 |
| Antiantihypertensive - yes [%] |  | 987 [28.7] | 726 [27.2] | 261 [34.0] | <.001 |  | 416 [28.4] | 310 [25.7] | .123 |  | 139 [33.3] | 122 [34.8] | .678 |  | 254 [31.9] | 193 [31.4] | 61 [33.3] | .072 |  | 116 [37.2] | 77 [25.5] | .002 |  | 29 [29.3] | 32 [38.1] | .210 |  | .077 |
| TCAs or Clozapine - yes [%] |  | 50 [1.5] | 36 [1.3] | 14 [1.8] | .333 |  | 23 [1.6] | 13 [1.1] | .274 |  | 10 [2.4] | 4 [1.1] | .195 |  | 11 [1.4] | 8 [1.3] | 3 [1.6] | .743 |  | 6 [1.9] | 2 [0.7] | .169 |  | 0 [2.0] | 1 [1.2] | .665 |  | .874 |
| Smoking status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Never [%] |  | 1,289 [37.5] | 1,061 [39.7] | 228 [29.7] |  |  | 701 [47.8] | 360 [29.9] | .884 |  | 155 [37.2] | 73 [20.8] | .185 |  | 335 [42.0] | 273 [44.5] | 62 [33.9] |  |  | 171 [54.8] | 102 [33.8] | .686 |  | 41 [41.4] | 21 [25.0] | .809 |  |  |
| Former [%] |  | 1,188 [34.6] | 882 [33.0] | 306 [39.8] |  |  | 407 [27.8] | 475 [39.4] | .320 |  | 138 [33.1] | 168 [47.9] | .758 |  | 306 [38.4] | 218 [35.5] | 88 [48.1] |  |  | 91 [29.2] | 127 [42.1] | .667 |  | 40 [40.4] | 48 [57.1] | .364 |  |  |
| Current [%] |  | 957 [27.8] | 725 [27.2] | 232 [30.2] |  |  | 355 [24.2] | 370 [30.7] | .918 |  | 123 [29.5] | 109 [31.1] | .834 |  | 155 [19.4] | 123 [20.0] | 32 [17.5] |  |  | 50 [16.0] | 73 [24.2] | .239 |  | 17 [17.2] | 15 [17.9] | .323 |  |  |
| Current Smoking - yes [%] |  | 957 [27.8] | 725 [27.2] | 232 [30.2] | .090 |  | 355 [24.2] | 370 [30.7] | <.001 |  | 123 [29.5] | 109 [31.1] | .637 |  | 155 [19.4] | 123 [20.0] | 32 [17.5] | .005 |  | 50 [16.0] | 73 [24.2] | .012 |  | 17 [17.2] | 15 [17.9] | .930 |  | <.001 |
| Alcohol consumption, g/d M[SD] |  | 8.4 [12.9] | 8.4 [12.8] | 8.2 [13.2] | .690 |  | 4.0 [5.5] | 13.8 [16.5] | <.001 |  | 4.4 [8.8] | 12.6 [15.9] | <.001 |  | 8.8 [12.1] | 9.1 [12.5] | 7.6 [10.5] | .155 |  | 4.3 [5.6] | 14.0 [15.4] | <.001 |  | 4.6 [8.2] | 11.1 [11.8] | <.001 |  | .419 |
| Physically active - yes [%] |  | 2,384 [69.3] | 1,889 [70.7] | 495 [64.5] | .001 |  | 1,046 [71.4] | 843 [70.0] | .385 |  | 264 [63.3] | 231 [65.8] | .432 |  | 585 [73.4] | 463 [75.4] | 122 [66.7] | .280 |  | 237 [76.0] | 226 [74.8] | .746 |  | 68 [68.7] | 54 [64.3] | .468 |  | .024 |
| Education, years M[SD] |  | 12.3 [2.5] | 12.5 [2.5] | 11.8 [2.4] | <.001 |  | 12.3 [2.4] | 12.7 [2.5] | <.001 |  | 11.5 [2.4] | 12.0 [2.5] | .004 |  | 12.8 [2.4] | 12.8 [2.3] | 12.7 [2.3] | <.001 |  | 12.6 [2.3] | 13.3 [2.5] | <.001 |  | 11.9 [1.9] | 12.7 [2.4] | .012 |  | <.001 |
| Education, years Mdn[range] |  | 11 [0 - 17] | 11 [0 - 17] | 11 [0 - 17] |  |  | 11 [0 - 17] | 12 [0 - 17] |  |  | 11 [0 - 17] | 11 [0 - 17] |  |  | 13 [0 - 17] | 13 [0 - 17] | 12 [0 - 17] |  |  | 13 [0 - 17] | 13 [8 - 17] |  |  | 11 [8 - 17] | 13 [8 - 17] |  |  |  |
| EQ\_IN, Euro M[SD] |  | 1387 [722] | 1,419 [725] | 1,274 [702] | <.001 |  | 1,367 [678] | 1,483 [774] | <.001 |  | 1207 [654] | 1354 [747] | .004 |  | 1,413 [735] | 1,446 [735] | 1,298 [725] | .019 |  | 1,361 [645] | 1,535 [810] | .004 |  | 1,175 [623] | 1,438 [807] | .016 |  | .370 |
| PHQ-9 sum score M[SD] |  | 3.9 [3.5] | 3.5 [3.1] | 5.2 [4.4] | <.001 |  | 3.8 [3.1] | 3.1 [3.1] | <.001 |  | 6.2 [4.7] | 4.0 [3.8] | <.001 |  | 4.4 [3.7] | 4.0 [3.4] | 5.8 [4.3] | <.001 |  | 4.4 [3.4] | 3.5 [3.4] | <.001 |  | 7.0 [4.5] | 4.5 [3.6] | <.001 |  | <.001 |
| Childhood Maltreatment |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Any CM - yes [%] |  | 768 [22.3] | 0 | 768 |  |  | 0 [0%] | 0 [0%] |  |  | 417 [54.3] | 351 [45.7] |  |  | 183 [23.0] | 0 [0%] | 183 |  |  | 0 [0%] | 0 [0%] |  |  | 99 [54.1] | 84 [45.9] |  |  | .704 |
| Any Neglect - yes [%] |  | 672 [19.5] | 0 | 672 [87.5] |  |  | 0 [0.0] | 0 [0.0] |  |  | 349 [83.7] | 323 [92.0] | .001 |  | 155 [19.4] | 0 | 155 [84.7] |  |  | 0 [0.0] | 0 [0.0] |  |  | 77 [77.8] | 78 [92.9] | .005 |  | .938 |
| Any Abuse - yes [%] |  | 259 [7.5] | 0 | 259 [33.7] |  |  | 0 [0.0] | 0 [0.0] |  |  | 185 [44.4] | 74 [21.1] | <.001 |  | 64 [8.0] | 0 | 64 [35.0] |  |  | 0 [0.0] | 0 [0.0] |  |  | 53 [53.5] | 11 [13.1] | <.001 |  | .645 |
| Sum-Score M[SD] |  | 34.1 [9.2] | 30.8 [3.6] | 46.7 [12.3] | <.001 |  | 30.5 [3.6] | 31.0 [3.6] | <.001 |  | 48.0 [13.8] | 45.3 [10.0] | .003 |  | 34.3 [8.5] | 31.0 [3.6] | 45.7 [10.7] | <.001 |  | 30.9 [3.7] | 31.2 [3.5] | .275 |  | 47.0 [12.9] | 44.3 [7.3] | .094 |  | .712 |
| Physical neglect - yes [%] |  | 530 [15.4] | 0 | 530 [69.0] |  |  | 0 [0.0] | 0 [0.0] |  |  | 268 [64.3] | 262 [74.6] | .005 |  | 114 [14.3] | 0 | 114 [62.3] |  |  | 0 [0.0] | 0 [0.0] |  |  | 58 [58.6] | 56 [66.7] | .263 |  | .417 |
| Physical abuse - yes [%] |  | 135 [3.9] | 0 | 135 [17.6] |  |  | 0 [0.0] | 0 [0.0] |  |  | 80 [19.2] | 55 [15.7] | .200 |  | 32 [4.0] | 0 | 32 [17.5] |  |  | 0 [0.0] | 0 [0.0] |  |  | 25 [25.3] | 7 [8.3] | .002 |  | .901 |
| Emotional neglect - yes [%] |  | 385 [11.2] | 0 | 385 [50.1] |  |  | 0 [0.0] | 0 [0.0] |  |  | 209 [50.1] | 176 [50.1] | .863 |  | 95 [11.9] | 0 | 95 [51.9] |  |  | 0 [0.0] | 0 [0.0] |  |  | 49 [49.5] | 46 [54.8] | .672 |  | .557 |
| Emotional abuse - yes [%] |  | 138 [4.0] | 0 | 138 [18.0] |  |  | 0 [0.0] | 0 [0.0] |  |  | 106 [25.4] | 32 [9.1] | <.001 |  | 30 [3.8] | 0 | 30 [16.4] |  |  | 0 [0.0] | 0 [0.0] |  |  | 25 [25.3] | 5 [6.0] | <.001 |  | .744 |
| Sexual abuse - yes [%] |  | 98 [2.9] | 0 | 98 [12.8] |  |  | 0 [0.0] | 0 [0.0] |  |  | 85 [20.4] | 13 [3.7] | <.001 |  | 27 [3.4] | 0 | 27 [14.8] |  |  | 0 [0.0] | 0 [0.0] |  |  | 25 [25.3] | 2 [2.4] | <.001 |  | .422 |
| *Notes*: M, mean; Mdn, median; usHRV, HRV derived from 10-second ECG, HRV; HRV, heart rate variability derived from polysomnography before falling asleep [5-min]; trait-like HRV, averaged usHRV and HRV; HR, Heart rate; BPM, beats per minute; logRMSSD, logarithmized Root mean square of successive differences between heartbeats; TCAs, Tricyclic antidepressants; PHQ-9, Patient health questionnaire; CM, Childhood Maltreatment; EQ\_IN, Equivalized Disposable Income; SDNN, standard deviation of the NN interval; HF-HRV, High-Frequency HRV; LF-HRV, Low-Frequency HRV. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Table S1 – Sample Characteristics Stratified for Sex**

**Table S2 – Association of Childhood Maltreatment with Heart Rate Variability**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Any CM** | |  | **Neglect** | |  | **Abuse** | |
| **Regression Model** | **Sample** | **HRV** |  | **β [95% CI]** | ***p*-value** |  | **β [95% CI]** | ***pFDR*** |  | **β [95% CI]** | ***pFDR*** |
| Unadjusted | Complete Sample | usHRV |  | -0.20  [-0.28, -0.12] | 1.2e-06 |  | -0.27  [-0.35, -0.18] | 1.9e-09 |  | 0.01  [-0.12, 0.14] | 1 |
|  | PSG-subsample | trait-like HRV |  | -0.33  [-0.49, -0.16] | 1.1e-04 |  | -0.36  [-0.53, -0.18] | 1.8e-04 |  | 0.01  [-0.24, 0.27] | 1 |
|  |  | HRV |  | -0.25  [-0.41, -0.08] | .003 |  | -0.27  [-0.45, -0.10] | .007 |  | -0.01  [-0.27, 0.24] | 1 |
|  |  | usHRV |  | -0.32  [-0.48, -0.16] | 1.3e-04 |  | -0.36  [-0.53, -0.18] | 2.1e-04 |  | 0.03  [-0.22, 0.29] | 1 |
| Base Model | Complete Sample | usHRV |  | -0.09  [-0.16, -0.02] | .015 |  | -0.12  [-0.19, -0.04] | .008 |  | -0.10  [-0.22, 0.01] | .110 |
|  | PSG-subsample | trait-like HRV |  | -0.27  [-0.41, -0.12] | 2.4e-04 |  | -0.25  [-0.40, -0.10] | .004 |  | -0.20  [-0.43, 0.02] | .115 |
|  |  | HRV |  | -0.09  [-0.16, -0.02] | .015 |  | -0.17  [-0.33, -0.01] | .114 |  | -0.16  [-0.40, 0.08] | .278 |
|  |  | usHRV |  | -0.268  [-0.41, -0.12] | 3.2e-04 |  | -0.25  [-0.41, -0.10] | .004 |  | -0.17  [-0.41, 0.06] | .219 |
| Base Model + BMI | Complete Sample | usHRV |  | -0.08  [-0.15, -0.01] | .025 |  | -0.11  [-0.18, -0.03] | .008 |  | -0.09  [-0.20, 0.03] | .110 |
|  | PSG-subsample | trait-like HRV |  | -0.26  [-0.40, -0.12] | 3.5e-04 |  | -0.24  [-0.39, -0.09] | .004 |  | -0.18  [-0.41, 0.04] | .115 |
|  |  | HRV |  | -0.18  [-0.33, -0.03] | .020 |  | -0.16  [-0.32, -0.01] | .114 |  | -0.14  [-0.38, 0.09] | .278 |
|  |  | usHRV |  | -0.26  [-0.41, -0.12] | 4.3e-04 |  | -0.25  [-0.40, -0.09] | .004 |  | -0.16  [-0.39, 0.08] | .219 |
| Base Model + Lifestyle Factors | Complete Sample | usHRV |  | -0.09  [-0.16, -0.01] | .019 |  | -0.11  [-0.19, -0.04] | .013 |  | -0.10  [-0.22, 0.01] | .191 |
|  | PSG-subsample | trait-like HRV |  | -0.26  [-0.40, -0.12] | 3.7e-04 |  | -0.24  [-0.39, -0.09] | .005 |  | -0.20  [-0.43, 0.03] | .164 |
|  |  | HRV |  | -0.19  [-0.34, -0.04] | .013 |  | -0.17  [-0.33, -0.01] | .130 |  | -0.17  [-0.41, 0.07] | .359 |
|  |  | usHRV |  | -0.26  [-0.40, -0.11] | 7.2e-04 |  | -0.24  [-0.40, -0.08] | .005 |  | -0.16  [-0.40, 0.07] | .279 |
| Base Model + Socioeconomic Factors | Complete Sample | usHRV |  | -0.08  [-0.16, -0.01] | .028 |  | -0.11  [-0.19, -0.03] | .013 |  | -0.10  [-0.22, 0.01] | .120 |
|  | PSG-subsample | trait-like HRV |  | -0.26  [-0.41, -0.12] | 4.5e-04 |  | -0.24  [-0.39, -0.08] | .006 |  | -0.20  [-0.43, 0.03] | .123 |
|  |  | HRV |  | -0.16  [-0.32, -0.01] | .037 |  | -0.14  [-0.30, 0.03] | .096 |  | -0.13  [-0.38, 0.11] | .237 |
|  |  | usHRV |  | -0.29  [-0.44, -0.13] | 2.3e-04 |  | -0.27  [-0.43, -0.11] | .008 |  | -0.19  [-0.43, 0.05] | .261 |
| Base Model + Depressive Symptoms | Complete Sample | usHRV |  | -0.09  [-0.16, -0.01] | .019 |  | -0.12  [-0.19, -0.04] | .018 |  | -0.09  [-0.21, 0.02] | .132 |
|  | PSG-subsample | trait-like HRV |  | -0.25  [-0.40, -0.11] | 7.4e-04 |  | -0.24  [-0.39, -0.09] | .009 |  | -0.155  [-0.39, 0.08] | .142 |
|  |  | HRV |  | -0.16  [-0.31, -0.002] | .047 |  | -0.15  [-0.31, 0.01] | .295 |  | -0.09  [-0.33, 0.16] | .414 |
|  |  | usHRV |  | -0.27  [-0.42, -0.12] | 4.0e-04 |  | -0.26  [-0.42, -0.10] | .003 |  | -0.16  [-0.40 0.08] | .179 |
| Fully Adjusted | Complete Sample | usHRV |  | -0.08  [-0.15, -0.001] | .047 |  | -0.11  [-0.19, -0.03] | .009 |  | -0.08  [-0.20, 0.04] | .174 |
|  | PSG-subsample | trait-like HRV |  | -0.25  [-0.40, -0.10] | .001 |  | -0.24  [-0.39, -0.08] | .007 |  | -0.14  [-0.38, 0.10] | .291 |
|  |  | HRV |  | -0.16,  [-0.32, -0.003] | .046 |  | -0.15  [-0.31, 0.01] | .197 |  | -0.09  [-0.34, 0.16] | .713 |
|  |  | usHRV |  | -0.27  [-0.42, -0.11] | 6.7e-04 |  | -0.26  [-0.42, -0.10] | .004 |  | -0.14  [-0.40, 0.10] | .303 |

*Notes*: Base model adjusted for age, sex, antihypertensive, and psychopharmacological medication (tricyclic antidepressants and clozapine), the interaction of sex with age and daytime in the case of usHRV and HRV; BMI, body mass index; Lifestyle factors included smoking status (never, former, current), regular physical activity (less/at least 1 hour per week), alcohol consumption (in g/d) and its interaction with sex; Socioeconomic factors included education and equivalized disposable income; Depressive symptoms were assessed using the total-score of the PHQ-9 questionnaire; CI, confidence interval; FDR, false discovery rate to adjust for multiple testing; usHRV, HRV derived from 10-second ECG; HRV, HRV derived from 5 minutes of rest before falling asleep; trait-like HRV, HRV based on the average of usHRV and HRV.

**Table S3 – Association of Childhood Maltreatment with Heart Rate**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Any CM** | |  | **Neglect** | |  | **Abuse** | |
| **Regression Model** | **Sample** | **HR** |  | **β [95% CI]** | ***p*-value** |  | **β [95% CI]** | ***pFDR*** |  | **β [95% CI]** | ***pFDR*** |
| Unadjusted | Complete Sample | 10-s HR |  | 0.02  [-0.06, 0.10] | .657 |  | 0.03  [-0.05, 0.12] | 1 |  | -0.01  [-0.14, 0.12] | 1 |
|  | PSG-subsample | HR avg. |  | 0.15  [-0.02, 0.31] | .085 |  | 0.10  [-0.07, 0.28] | .399 |  | 0.15  [-0.11, 0.40] | .399 |
|  |  | 5-min HR |  | 0.13  [-0.03, 0.30] | .111 |  | 0.10  [-0.08, 0.27] | .423 |  | 0.16  [-0.10, 0.42] | .423 |
|  |  | 10-s HR |  | 0.12  [-0.04, 0.29] | .144 |  | 0.08  [-0.09, 0.26] | .677 |  | 0.10  [-0.16, 0.35] | .677 |
| Base Model | Complete Sample | 10-s HR |  | 0.02  [-0.06, 0.10] | .697 |  | 0.04  [-0.04, 0.13] | .554 |  | -0.06  [-0.19, 0.07] | .554 |
|  | PSG-subsample | HR avg. |  | 0.12  [-0.05, 0.29] | .153 |  | 0.09  [-0.08, 0.27] | .885 |  | 0.03  [-0.23, 0.29] | 1 |
|  |  | 5-min HR |  | 0.10  [-0.06, 0.27] | .223 |  | 0.09  [-0.09, 0.26] | .972 |  | 0.01  [-0.25, 0.27] | 1 |
|  |  | 10-s HR |  | 0.10  [-0.05, 0.26] | .252 |  | 0.07  [-0.11, 0.25] | 1 |  | 0.02  [-0.24, 0.29] | 1 |
| Base Model + BMI | Complete Sample | 10-s HR |  | -0.001  [-0.08, 0.08] | .982 |  | 0.03  [-0.06, 0.11] | .810 |  | -0.09  [-0.21, 0.04] | .567 |
|  | PSG-subsample | HR avg. |  | 0.11  [-0.06, 0.27] | .199 |  | 0.08  [-0.09, 0.26] | 1 |  | -0.003  [-0.26, 0.26] | 1 |
|  |  | 5-min HR |  | 0.09  [-0.07, 0.25] | .281 |  | 0.08  [-0.09, 0.25] | 1 |  | -0.03  [-0.28, 0.231] | 1 |
|  |  | 10-s HR |  | 0.09  [-0.08, 0.25] | .294 |  | 0.06  [-0.12, 0.24] | 1 |  | 0.002  [-0.26, 0.27] | 1 |
| Base Model + Lifestyle Factors | Complete Sample | 10-s HR |  | 0.01  [-0.07, 0.09] | .888 |  | 0.03  [-0.05, 0.12] | .654 |  | -0.07  [-0.20, 0.06] | .654 |
|  | PSG-subsample | HR avg. |  | 0.10  [-0.07, 0.27] | .234 |  | 0.09  [-0.08, 0.27] | .909 |  | -0.002  [-0.27, 0.26] | 1 |
|  |  | 5-min HR |  | 0.08  [-0.08, 0.24] | .329 |  | 0.086  [-0.09, 0.26] | .981 |  | -0.02  [-0.28, 0.23] | 1 |
|  |  | 10-s HR |  | 0.08  [-0.08, 0.25] | .322 |  | 0.07  [-0.110 0.25] | 1 |  | 2.1e-06  [-0.27, 0.27] | 1 |
| Base Model + Socioeconomic Factors | Complete Sample | 10-s HR |  | -0.01  [-0.10, 0.07] | .738 |  | 0.01  [-0.08, 0.10] | 1 |  | -0.07  [-0.20, 0.06] | .783 |
|  | PSG-subsample | HR avg. |  | 0.09  [-0.08, 0.25] | .322 |  | 0.06  [-0.12, 0.24] | 1 |  | -0.02  [-0.29, 0.25] | 1 |
|  |  | 5-min HR |  | 0.07  [-0.10, 0.24,] | .411 |  | 0.06  [-0.12, 0.24] | .990 |  | -0.06  [-0.33, 0.21] | .990 |
|  |  | 10-s HR |  | 0.07  [-0.10, 0.24] | .401 |  | 0.04  [-0.140 0.23] | 1 |  | 0.01  [-0.27, 0.28] | 1 |
| Base Model + Depressive Symptoms | Complete Sample | 10-s HR |  | 0.01  [-0.07, 0.09] | .763 |  | 0.04  [-0.05, 0.12] | .575 |  | -0.07  [-0.20, 0.06] | .575 |
|  | PSG-subsample | HR avg. |  | 0.11  [-0.06, 0.28] | .213 |  | 0.08  [-0.10, 0.26] | 1 |  | -0.001  [-0.27, 0.27] | 1 |
|  |  | 5-min HR |  | 0.09  [-0.08, 0.25] | .320 |  | 0.07  [-0.11, 0.25] | 1 |  | -0.02  [-0.29, 0.25] | 1 |
|  |  | 10-s HR |  | 0.09  [-0.08, 0.26] | .291 |  | 0.06  [-0.12, 0.24] | 1 |  | -0.002  [-0.28, 0.27] | 1 |
| Fully Adjusted | Complete Sample | 10-s HR |  | -0.02  [-0.10, 0.06] | .661 |  | 0.01  [-0.08, 0.10] | 1 |  | -0.09  [-0.22, 0.04] | .516 |
|  | PSG-subsample | HR avg. |  | 0.08  [-0.09, 0.25] | .337 |  | 0.07  [-0.11, 0.25] | 1 |  | -0.05  [-0.32, 0.23] | 1 |
|  |  | 5-min HR |  | 0.07  [-0.09, 0.24] | .379 |  | 0.07  [-0.10, 0.25] | .894 |  | -0.07  [-0.34, 0.20] | .894 |
|  |  | 10-s HR |  | 0.07  [-0.11, 0.24] | .456 |  | 0.05  [-0.14, 0.23] | 1 |  | -0.03  [-0.31, 0.25] | 1 |

*Notes*: Base model adjusted for age, sex, antihypertensive, and psychopharmacological medication (tricyclic antidepressants and clozapine), the interaction of sex with age and daytime in the case of usHRV and HRV; BMI, body mass index; Lifestyle factors included smoking status (never, former, current), regular physical activity (less/at least 1 hour per week), alcohol consumption (in g/d) and its interaction with sex; Socioeconomic factors included education and equivalized disposable income; Depressive symptoms were assessed using the total-score of the PHQ-9 questionnaire; HR, Heart rate; CI, confidence interval; FDR, false discovery rate to adjust for multiple testing; 10-s HR, HR derived from 10-second ECG; 5-min HR, HR derived from 5 minutes of rest before falling asleep; HR avg., HR based on the average of 10-s HR and 5-min HR.

**Table S4 - Association of Childhood Maltreatment with SDNN**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Any CM** | |  | **Neglect** | | |  | | **Abuse** | |
| **Regression Model** | **Sample** | **SDNN** |  | **β [95% CI]** | ***p*-value** |  | **β [95% CI]** | ***pFDR*** |  | | **β [95% CI]** | | ***pFDR*** |
| Unadjusted | PSG-subsample | 5min |  | -0.15  [-0.32 0.01] | .070 |  | -0.13  [-0.3 0.05] | .465 |  | | -0.06  [-0.31 0.20] | | .977 |
| Base Model | PSG-subsample | 5min |  | -0.08 [-0.24 0.07] | .287 |  | -0.04  [-0.2 0.13] | 1 |  | | -0.14  [-0.38 0.11] | | .837 |
| Base Model + BMI | PSG-subsample | 5min |  | -0.07  [-0.23 0.08] | .346 |  | -0.03  [-0.19 0.14] | 1 |  | | -0.11  [-0.35 0.13] | | 1 |
| Base Model + Lifestyle Factors | PSG-subsample | 5min |  | -0.09  [-0.25 0.06] | .235 |  | -0.05  [-0.21 0.12] | .888 |  | | -0.15  [-0.4 0.09] | | .672 |
| Base Model + Socioeconomic Factors | PSG-subsample | 5min |  | -0.05  [-0.21 0.11] | .559 |  | 0.02  [-0.15 0.19] | 1 |  | | -0.10  [-0.35 0.15] | | 1 |
| Base Model + Depressive Symptoms | PSG-subsample | 5min |  | -0.07  [-0.22 0.09] | .420 |  | -0.03  [-0.2 0.14] | 1 |  | | -0.09  [-0.35 0.16] | | 1 |
| Fully Adjusted | PSG-subsample | 5min |  | -0.05  [-0.21 0.11] | .508 |  | -0.01  [-0.18 0.16] | 1 |  | | -0.08  [-0.33 0.18] | | 1 |

*Notes*: Base model adjusted for age, sex, antihypertensive, and psychopharmacological medication (tricyclic antidepressants and clozapine), the interaction of sex with age and daytime in the case of usHRV and HRV; BMI, body mass index; Lifestyle factors included smoking status (never, former, current), regular physical activity (less/at least 1 hour per week), alcohol consumption (in g/d) and its interaction with sex; Socioeconomic factors included education and equivalized disposable income; Depressive symptoms were assessed using the total-score of the PHQ-9 questionnaire; CI, confidence interval; FDR, false discovery rate to adjust for multiple testing; 5min, derived from 5 minutes of rest before falling asleep; SDNN, standard deviation of NN intervals.

**Table S5 - Association of Childhood Maltreatment with HF-HRV**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Any CM** | |  | **Neglect** | |  | **Abuse** | |
| **Regression Model** | **Sample** | **HF-HRV** |  | **β [95% CI]** | ***p*-value** |  | **β [95% CI]** | ***pFDR*** |  | **β [95% CI]** | ***pFDR*** |
| Unadjusted | PSG-subsample | 5min |  | -0.13  [-0.30 0.04] | .122 |  | -0.21  [-0.39 -0.04] | .054 |  | 0.16  [-0.10 0.41] | .336 |
| Base Model | PSG-subsample | 5min |  | -0.13  [-0.29 0.03] | .106 |  | -0.18  [-0.34 -0.01] | .130 |  | -0.03  [-0.28 0.23] | 1 |
| Base Model +  BMI | PSG-subsample | 5min |  | -0.13  [-0.29 0.03] | .1 |  | -0.18  [-0.35 -0.01] | .125 |  | -0.03  [-0.29 0.22] | 1 |
| Base Model +  Lifestyle Factors | PSG-subsample | 5min |  | -0.13  [-0.29 0.03] | .115 |  | -0.18  [-0.35 -0.004] | .133 |  | -0.02  [-0.28 0.24] | 1 |
| Base Model + Socioeconomic Factors | PSG-subsample | 5min |  | -0.16  [-0.33 0.003] | .054 |  | -0.22  [-0.40 -0.05] | .042 |  | -0.04  [-0.30 0.22] | 1 |
| Base Model + Depressive Symptoms | PSG-subsample | 5min |  | -0.10  [-0.27 0.06] | .211 |  | -0.15  [-0.33 0.01] | .239 |  | 0.04  [-0.22 0.30] | 1 |
| Fully Adjusted | PSG-subsample | 5min |  | -0.14  [-0.31 0.03] | .109 |  | -0.2 0 [-0.38 -0.03] | .078 |  | 0.02  [-0.25 0.29] | 1 |

*Notes*: Base model adjusted for age, sex, antihypertensive, and psychopharmacological medication (tricyclic antidepressants and clozapine), the interaction of sex with age and daytime in the case of usHRV and HRV; BMI, body mass index; Lifestyle factors included smoking status (never, former, current), regular physical activity (less/at least 1 hour per week), alcohol consumption (in g/d) and its interaction with sex; Socioeconomic factors included education and equivalized disposable income; Depressive symptoms were assessed using the total-score of the PHQ-9 questionnaire; CI, confidence interval; FDR, false discovery rate to adjust for multiple testing; 5min, derived from 5 minutes of rest before falling asleep; HF-HRV, high frequency heart-rate variability.

**Table S6 - Association of Childhood Maltreatment with LF-HRV**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Any CM** | |  | **Neglect** | |  | **Abuse** | |
| **Regression Model** | **Sample** | **LF-HRV** |  | **β [95% CI]** | ***p*-value** |  | **β [95% CI]** | ***pFDR*** |  | **β [95% CI]** | ***pFDR*** |
| Unadjusted | PSG-subsample | 5min |  | -0.17  [-0.34 -0.01] | .039 |  | -0.17  [-0.35 0.003] | .161 |  | -0.03  [-0.29 0.22] | 1 |
| Base Model | PSG-subsample | 5min |  | -0.14  [-0.30 0.03] | .099 |  | -0.14  [-0.32 0.031] | .318 |  | 0.04  [-0.23 0.30] | 1 |
| Base Model + BMI | PSG-subsample | 5min |  | -0.14  [-0.3 0.03] | .096 |  | -0.15  [-0.32 0.03] | .312 |  | 0.03  [-0.23 0.29] | 1 |
| Base Model + Lifestyle Factors | PSG-subsample | 5min |  | -0.12  [-0.29 0.05] | .156 |  | -0.12  [-0.3 0.05] | .504 |  | 0.06  [-0.20 0.33] | .957 |
| Base Model + Socioeconomic Factors | PSG-subsample | 5min |  | -0.20  [-0.37 -0.03] | .024 |  | -0.21  [-0.39 -0.03] | .076 |  | -0.02  [-0.29 0.25] | 1 |
| Base Model + Depressive Symptoms | PSG-subsample | 5min |  | -0.13  [-0.3 0.04] | .120 |  | -0.14  [-0.31 0.04] | .393 |  | 0.06  [-0.21 0.33] | 1 |
| Fully Adjusted | PSG-subsample | 5min |  | -0.17  [-0.34 0.01] | .058 |  | -0.18  [-0.37 0.003] | .161 |  | 0.05  [-0.23 0.32] | 1 |

*Notes*: Base model adjusted for age, sex, antihypertensive, and psychopharmacological medication (tricyclic antidepressants and clozapine), the interaction of sex with age and daytime in the case of usHRV and HRV; BMI, body mass index; Lifestyle factors included smoking status (never, former, current), regular physical activity (less/at least 1 hour per week), alcohol consumption (in g/d) and its interaction with sex; Socioeconomic factors included education and equivalized disposable income; Depressive symptoms were assessed using the total-score of the PHQ-9 questionnaire; CI, confidence interval; FDR, false discovery rate to adjust for multiple testing; 5min, derived from 5 minutes of rest before falling asleep; LF-HRV, low frequency heart-rate variability.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Any CM** | | |  | **Neglect** | | |  | **Abuse** | | |
|  |  |  |  | **Any CM** | **Age** | **Any CM \*Age** |  | **Neglect** | **Age** | **Neglect \*Age** |  | **Abuse** | **Age** | **Abuse \*Age** |
| **Regression Model** | **Sample** | **HRV** |  | ***p*** | ***p*** | ***p*** |  | ***pFDR*** | ***pFDR*** | ***pFDR*** |  | ***pFDR*** | ***pFDR*** | ***pFDR*** |
| Unadjusted | Complete Sample | usHRV |  | 1.2e-06 |  |  |  | 1.9e-09 |  |  |  | 1 |  |  |
|  | PSG-subsample | trait-like HRV |  | 1.1e-04 |  |  |  | 1.8e-04 |  |  |  | 1 |  |  |
|  |  | HRV |  | .003 |  |  |  | .007 |  |  |  | 1 |  |  |
|  |  | usHRV |  | 1.3e-04 |  |  |  | 2.1e-04 |  |  |  | 1 |  |  |
| CTQ\*Age | Complete Sample | usHRV |  | .125 | 2.4e-164 | .829 |  | .041 | 3.5e-163 | .639 |  | .230 | 8.5e-169 | .093 |
|  | PSG-subsample | trait-like HRV |  | .653 | 9.0e-51 | .065 |  | 1 | 9.8e-50 | .357 |  | .597 | 8.5e-51 | .357 |
|  |  | HRV |  | .132 | 3.3e-34 | .013 |  | .354 | 1.7e-33 | .120 |  | .336 | 3.4e-34 | .120 |
|  |  | usHRV |  | .588 | 1.6e-40 | .244 |  | .632 | 1.3e-39 | .812 |  | .632 | 2.4e-40 | .812 |
| Base Model | Complete Sample | usHRV |  | .163 | 1.3e-136 | .739 |  | .065 | 3.5e-136 | .618 |  | .327 | 6.4e-140 | .104 |
|  | PSG-subsample | trait-like HRV |  | .559 | 4.9e-42 | .029 |  | 1 | 8.8e-41 | .321 |  | .393 | 2.1e-42 | .099 |
|  |  | HRV |  | .134 | 1.5e-29 | .018 |  | .383 | 8.4e-29 | .116 |  | .253 | 6.2e-30 | .116 |
|  |  | usHRV |  | .750 | 3.1e-32 | .064 |  | .542 | 3.9e-31 | .576 |  | .542 | 3.1e-32 | .251 |
| Base Model + BMI | Complete Sample | usHRV |  | .221 | 7.3e-125 | .774 |  | .095 | 1.5e-124 | .695 |  | .276 | 1.5e-127 | .121 |
|  | PSG-subsample | trait-like HRV |  | .395 | 3.8e-37 | .014 |  | 1 | 6.6e-36 | .267 |  | .257 | 2.6e-37 | .054 |
|  |  | HRV |  | .084 | 1.5e-25 | .010 |  | .324 | 8.2e-25 | .097 |  | .171 | 9.1e-26 | .083 |
|  |  | usHRV |  | .906 | 1.0e-28 | .041 |  | .608 | 1.2e-27 | .528 |  | .608 | 1.5e-28 | .152 |
| Base Model + Lifestyle Factors | Complete Sample | usHRV |  | .165 | 1.2e-130 | .820 |  | .077 | 2.9e-130 | .711 |  | .348 | 3.9e-134 | .098 |
|  | PSG-subsample | trait-like HRV |  | .490 | 8.0e-43 | .024 |  | 1 | 1.0e-41 | .332 |  | .369 | 2.9e-43 | .081 |
|  |  | HRV |  | .087 | 3.0e-33 | .007 |  | .306 | 1.7e-32 | .072 |  | .189 | 1.2e-33 | .068 |
|  |  | usHRV |  | .740 | 5.6e-30 | .068 |  | .519 | 4.4e-29 | .606 |  | .519 | 5.0e-30 | .287 |
| Base Model + Socioeconomic Factors | Complete Sample | usHRV |  | .334 | 2.9e-132 | .590 |  | .238 | 6.5e-132 | .651 |  | .317 | 1.1e-135 | .136 |
|  | PSG-subsample | trait-like HRV |  | .261 | 8.0e-40 | .004 |  | .741 | 1.3e-38 | .084 |  | .327 | 1.8e-40 | .073 |
|  |  | HRV |  | .038 | 1.1e-29 | .004 |  | .147 | 5.3e-29 | .054 |  | .147 | 3.7e-30 | .095 |
|  |  | usHRV |  | 1 | 3.1e-29 | .009 |  | .902 | 3.9e-28 | .170 |  | .708 | 1.4e-29 | .108 |
| Base Model + Depressive Symptoms | Complete Sample | usHRV |  | .146 | 6.0e-136 | .700 |  | .055 | 1.9e-135 | .581 |  | .309 | 1.2e-139 | .131 |
|  | PSG-subsample | trait-like HRV |  | .533 | 1.1e-41 | .030 |  | 1 | 1.5e-40 | .296 |  | .474 | 3.8e-42 | .149 |
|  |  | HRV |  | .104 | 9.1e-30 | .020 |  | .275 | 4.2e-29 | .115 |  | .266 | 4.3e-30 | .115 |
|  |  | usHRV |  | .696 | 2.3e-31 | .059 |  | .614 | 2.65e-30 | .584 |  | .614 | 1.4e-31 | .265 |
| Fully Adjusted | Complete Sample | usHRV |  | .313 | 1.5e-114 | .679 |  | .226 | 4.0e-114 | .755 |  | .300 | 1.0e-117 | .227 |
|  | PSG-subsample | trait-like HRV |  | .140 | 3.5e-35 | .001 |  | .572 | 5.2e-34 | .054 |  | .276 | 1.5e-35 | .036 |
|  |  | HRV |  | .012 | 1.2e-28 | .001 |  | .102 | 6.6e-28 | .014 |  | .109 | 8.0e-29 | .070 |
|  |  | usHRV |  | .874 | 2.3e-23 | .005 |  | .948 | 2.1e-22 | .164 |  | .759 | 1.5e-23 | .059 |

**Table S7 – Interaction of Age with Childhood Maltreatment**

*Notes*: Base model adjusted for age, sex, antihypertensive, and psychopharmacological medication (tricyclic antidepressants and clozapine), the interaction of sex with age and daytime in the case of usHRV and HRV; BMI, body mass index; Lifestyle factors included smoking status (never, former, current), regular physical activity (less/at least 1 hour per week), alcohol consumption (in g/d) and its interaction with sex; Socioeconomic factors included education and equivalized disposable income; Depressive symptoms were assessed using the total score of the PHQ-9 questionnaire; HR, Heart rate; FDR, false discovery rate to adjust for multiple testing; usHRV, HRV derived from 10-second ECG; HRV, HRV derived from 5 minutes of rest before falling asleep; trait-like HRV, HRV based on the average of usHRV and HRV.

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| **Figure S1.** Predicted HRV (z-transformed logRMSSD) as a function of age and exposure to neglect during childhood in the complete sample (A) and the PSG-subsample (B), both based on the fully adjusted model. |

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| C:\Projekte_SSD\12 - Marian\HRV_CTQ\ABUSE_cowplot_TRAUMA_FULLadjusted_age_NOT_scaled_scatter_logRMSSD.png |
| **Figure S2.** Predicted HRV (z-transformed logRMSSD) as a function of age and exposure to abuse during childhood in the complete sample (A) and the PSG-subsample (B), both based on the fully adjusted model. |

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