The impact of anxiety on postural control

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Supplementary materials

Additional Methods

During the inhalation conditions live HR was acquired for the duration of the inhalation period to closely monitor a participant health state. Via a wireless Photoplethysmogram (PPG) transmitter with Photoplethysmogram transducer placed on the left index finger, at 2000 Hz sampling frequency and 16-bit resolution. Automatic rate calculations for HR were used, with the pre-set 'HR (for humans)' being used, with a positive signal peak detect, baseline window width set to 100 ms, a noised rejection of 5% and min (50bpm) and max (250bpm) set.

Data Analysis of additional measures

The steps taken to pre-process the HR data from BIOPAC and to reduce any unwanted signals were as follows: HR data was resampled to 100 Hz, and an infinite impulse response low and High band pass filter was applied, with low frequency cut-off fixed at 0.5 Hz and high at 10 Hz, Q = 0.70700. Then for each balance period, data was averaged based on the HR rate calculated from automated BIOPAC function, from the 30 second prior to the end marker of a balance period.

Due to unreliable data for the BIOPAC HR data (zero bpm recorded, which was likely due to macro-motion artifacts due to the low intensity motion of moving from seated position to standing on the force plate; Fine et al., 2021; Pietilä et al., 2018) this data was not used in analysis for the purposes of this publication.

Fine, J., Branan, K. L., Rodriguez, A. J., Boonya-Ananta, T., Ajmal, Ramella-Roman, J. C., McShane, M. J., & Cote, G. L. (2021). Sources of Inaccuracy in Photoplethysmography for Continuous Cardiovascular Monitoring. *Biosensors (Basel)*, *11*(4). https://doi.org/10.3390/bios11040126

Pietilä, J., Mehrang, S., Tolonen, J., Helander, E., Jimison, H., Pavel, M., & Korhonen, I. (2018, 2018//). Evaluation of the accuracy and reliability for photoplethysmography based heart rate and beat-to-beat detection during daily activities. EMBEC & NBC 2017, Singapore.

Supplemental Data Analysis

The PANAS results showed that for the negative affect scales there was an interaction between *inhalation time* and *inhalation type*, $F(1,9) = 25.71$, $MSE = .40$, $p < .001$, $\eta_p^2 = 0.74$. Bonferroni-corrected pairwise comparisons revealed that there was a significantly higher negative affect experienced in pre-inhalation period for Air condition compared to the CO_2 condition, $p < 0.05$ (see table 2 in main document for means). Importantly, there was a significantly higher negative affect reported in the post-inhalation period for CO_2 condition compared to the Air condition, $p = 0.001$. Additionally, when comparing negative affect between time points for each inhalation condition, the CO_2 condition showed a significant increase in negative affect, $p < 0.01$. While the Air condition showed no change between pre- and post-inhalation periods, $p > 0.05$ (see table 2. In main document for all means and standard deviations of self-report data). There was a main effect of *inhalation type* for PANAS negative affect, $F(1,9) = 5.625$, $MSE = 0.10$, $p < .05$, $\eta_p^2 = 0.39$. There was no main effect of *inhalation time* period, $F(1,9) = 3.188$, $p > 0.05$.

There was a main effect of *inhalation time on* PANAS results for positive affect, $F(1,9) = 8.22$, $MSE = 1.02$, $p < 0.01$, $\eta_p^2 = 0.48$ suggesting less positive affect after inhalation was completed. There was also a main effect of *inhalation type* for positive affect, $F(1,9) = 9.274$, $MSE = 0.58$, $p < 0.01$, $\eta_p^2 = 0.51$, suggesting less positive affect as part of the CO_2 inhalation type. There was no interaction between the factors, $p > 0.05$.

For the GAD-7 there was no main effect of *inhalation time* or *inhalation type*, $p > .05$. While there was a significant interaction, $F(1,9) = 4.72$, $MSE = 8.349$, $p < 0.05$, $\eta_p^2 = 0.34$, however, none of the planned Bonferroni-corrected pairwise comparisons show a significant result in the expected direction, suggesting very little difference in anxiety type symptoms during the experimental conditions.

Table 1. Means and Standard deviations of balance data at different time point and different inhalation condition.

		Air Inhalation				CO_2 Inhalation			
		Balance measurement point				Balance measurement point			
Balance measure		5min	10min	15min	post	5min	10min	15min	post
Sway (A-P)	Mean	-0.0015	0.0000	-0.0018	-0.0012	-0.0042	-0.0084	-0.0015	0.0002
	SD	0.014	0.009	0.010	0.006	0.007	0.011	0.010	0.007
Sway (M-L)	Mean	-0.0001	0.0055	0.0043	0.0032	0.0024	0.0036	-0.0024	0.0091
	SD	0.014	0.017	0.027	0.018	0.010	0.015	0.009	0.020
Sway (Total)	Mean	0.5526	0.5435	0.5453	0.5273	0.6519	0.7051	0.7552	0.6166
	SD	0.090	0.091	0.102	0.087	0.169	0.204	0.275	0.138
LyE - x-axis	Mean	0.3640	0.4180	0.3760	0.4300	0.4370	0.4560	0.4730	0.3918
	SD	0.040	0.065	0.043	0.080	0.079	0.074	0.087	0.043
LyE - y-axis	Mean	0.3932	0.4031	0.4151	0.4236	0.4432	0.4654	0.4882	0.4097
	SD	0.091	0.112	0.113	0.095	0.108	0.105	0.102	0.101