

Cronfa - Swansea University Open Access Repository

This is an author produced version of a paper published in :
The World Journal of Biological Psychiatry

Cronfa URL for this paper:
<http://cronfa.swan.ac.uk/Record/cronfa27608>

Paper:

Kemp, A. (2015). Distinguishing bipolar from unipolar disorders on the basis of heart rate variability. *The World Journal of Biological Psychiatry*, 1-2.

<http://dx.doi.org/10.3109/15622975.2015.1073857>

This article is brought to you by Swansea University. Any person downloading material is agreeing to abide by the terms of the repository licence. Authors are personally responsible for adhering to publisher restrictions or conditions. When uploading content they are required to comply with their publisher agreement and the SHERPA RoMEO database to judge whether or not it is copyright safe to add this version of the paper to this repository.

<http://www.swansea.ac.uk/iss/researchsupport/cronfa-support/>

The official published article is available online at:
<http://dx.doi.org/10.3109/15622975.2015.1073857>

Number of words: 493

Number of Table: 0

Number of Figures: 0

Distinguishing bipolar from unipolar disorders on the basis of heart rate variability

Andrew H. Kemp

School of Psychology, University of Sydney

Discipline of Psychiatry, University of Sydney

*Corresponding author: Andrew H. Kemp, School of Psychology, University of Sydney, Griffith Taylor Building (A19), Sydney, NSW 2006, Australia. T: +61 2 9351 2222, F: +61 2 9351 2603, E-mail address: andrew.kemp@sydney.edu.au; andrehaddonkemp@gmail.com

To the Editor,

Heart rate variability (HRV) provides an important marker of vagal function that may underpin established links between mental and physical health (Kemp and Quintana 2013). For this reason I was interested to read the recent article by Hsin-an Chang and colleagues (Chang et al. 2015) on the differences in HRV between patients with bipolar II (BP II) depression and unipolar major depressive disorder, relative to healthy controls. While this study has a number of strengths – including a large sample size and attention to confounding variables – I strongly disagree with their conclusion that “HRV may aid in differential diagnosis” on the basis of the presented data.

Firstly, Chang concludes that patients with BP II display sympathetic nervous system activation (SNS) (indexed by higher LF/HF ratio) and reciprocal vagal impairment, while those with UD only display vagal impairment. However, these conclusions are unwarranted, because measures of HRV – including the LF-HRV component – are determined primarily by the parasympathetic system (see Reyes Del Paso et al. 2013 for discussion). The extent to which HRV taps into the sympathetic nervous system has been a topic of considerable debate over recent years (see also Goldstein et al. 2011 for review). Regardless, it is most unlikely that the LF/HF ratio extracted from resting-state conditions will reflect sympathovagal balance.

Secondly, the authors did not refer to several recent studies of ours, which make an important contribution to the discussion over the impact of UD on HRV, the impact of confounding variables, and disorder heterogeneity. Last year we published one of the largest studies to date that controlled for confounders using an under-used propensity score matching (PSM) technique (Kemp, Brunoni, et al. 2014). We reported that patients with generalized anxiety disorder, but not major depression disorder (MDD), display robust decreases in HRV after PSM. However, in a follow-up study (Kemp, Quintana, et al. 2014) on an independent cohort, we reported that MDD patients with

melancholia – but not those with non-melancholia – display HRV decreases relative to controls, findings associated with a moderate effect size. It is relevant here that the large UD group in Chang's study was comprised of 130 patients with melancholic features, yet the extent to which these participants differ from those with BP II was not examined in their study.

In conclusion, while I commend the authors' contribution to this important field of research, I remain unconvinced by the argument that BP II differs from UD on HRV measures. The LF/HF ratio is unlikely to be a measure of SNS activity during resting-state conditions and I query the extent to which groups would differ on other HRV measures if a more homogeneous group of UD patients – such as those with melancholic features – were to be compared with BP II patients. Finally, this letter provides an important opportunity to flag the problems associated with null hypothesis significance testing and the need for 'the new statistics' (Cumming 2014) to be integrated into HRV studies when examining the extent and clinical relevance of observed differences across psychiatric disorders.

Acknowledgements: None

Statement of interest: None to declare

References:

- Chang H-A, Chang C-C, Kuo TBJ, Huang S-Y. 2015 Mar 24. Distinguishing bipolar II depression from unipolar major depressive disorder: Differences in heart rate variability. *World J. of Biol. Psychiatry*:1–10. DOI: 10.3109/15622975.2015.1017606
- Cumming G. 2014. The new statistics: why and how. *Psychological science : a journal of the American Psychological Society / APS* 25:7–29. DOI: 10.1177/0956797613504966

Goldstein DS, Benth O, Park M-Y, Sharabi Y. 2011. Low-frequency power of heart rate variability is not a measure of cardiac sympathetic tone but may be a measure of modulation of cardiac autonomic outflows by baroreflexes. *Experimental Physiology* 96:1255–1261. DOI: 10.1113/expphysiol.2010.056259

Kemp AH, Brunoni AR, Santos IS, Nunes MA, Dantas EM, Carvalho de Figueiredo R, Pereira AC, Ribeiro ALP, Mill JG, Andreão RV, et al. 2014. Effects of depression, anxiety, comorbidity, and antidepressants on resting-state heart rate and its variability: an ELSA-Brasil cohort baseline study. *American Journal of Psychiatry* 171:1328–1334. DOI: 10.1176/appi.ajp.2014.13121605

Kemp AH, Quintana DS. 2013. The relationship between mental and physical health: insights from the study of heart rate variability. *Int J Psychophysiol* 89:288–296. DOI: 10.1016/j.ijpsycho.2013.06.018

Kemp AH, Quintana DS, Quinn CR, Hopkinson P, Harris AWF. 2014. Major depressive disorder with melancholia displays robust alterations in resting state heart rate and its variability: implications for future morbidity and mortality. *Frontiers in Psychology* 5:1387. DOI: 10.3389/fpsyg.2014.01387

Reyes Del Paso GA, Langewitz W, Mulder LJM, Roon A, Duschek S. 2013. The utility of low frequency heart rate variability as an index of sympathetic cardiac tone: A review with emphasis on a reanalysis of previous studies. *Psychophysiology* 50:477–487. DOI: 10.1111/psyp.12027