Metacognitive impairments extend perceptual decision making weaknesses in compulsivity

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Supplementary Information

Content:

Table S1. HDDM model comparison. Model comparison revealed an improved fit for models that allow the orientation of the stimuli to modulate drift rate (‘orientation→drift’). Additionally, models that included the group membership improved model fit. This was especially so when the group factor interacted with the orientation effect on the drift rate (orientation*group→drift). Best fitting model highlighted in bold.

model	**DIC**
basic model	3670
orientation→drift	3524
orientation+group→drift	3523
orientation*group→drift	**3517**
orientation→drift, group→threshold	3524
orientation*group→drift, group→threshold	3519

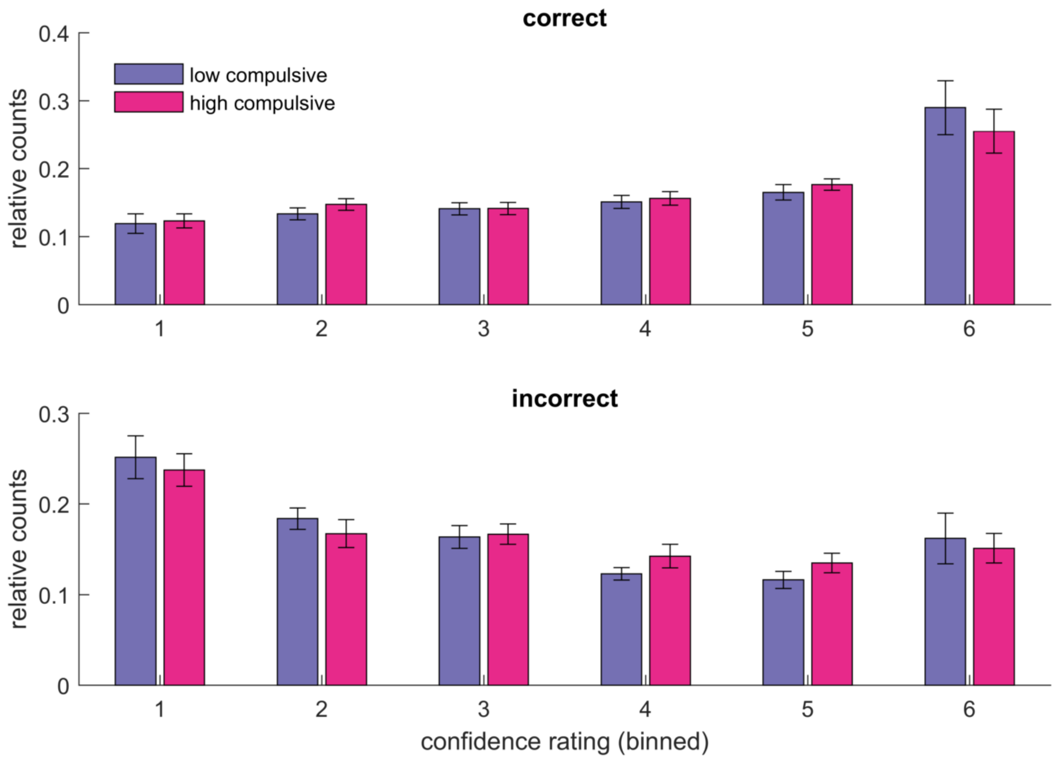

Figure S1. Binned confidence ratings. Deriving metacognitive measures without using a computational model is difficult, because these confidence ratings are inherently subject to a range of distortions, including rating and perceptual performance biases. However, to approximate the model-based results that we found in our main analysis, we used linear regressions to predict the relationship between perceptual performance (correct vs incorrect) and binned confidence rating (left: lowest confidence, right: highest confidence). We used a summary statistics approach to estimate the slope of how often a particular confidence was expressed, given true performance. These slopes were independently estimated for correct and incorrect trials, and the difference of these slopes were then compared between the groups. Such a measure is a rough indicator for how much a participant distinguishes between correct and incorrect decision and can only be used as a model-free approximation for metacognitive performance. Indeed, we found a positive slope for correct decisions (low compulsives: $z(196)=3.40$, $p<.001$; high compulsives: $z(167)=3.55$, $p<.001$) and a negative slope for incorrect decisions (low compulsives: $z(41)=-2.39$, $p=.017$; high compulsives: $z(24)=-2.68$, $p=.007$) for both groups. A group comparison showed that high compulsive participants show (at a trend level significance) less distinction in the slopes between correct and incorrect trials in terms of confidence ratings (slope difference: low compulsives: 0.05 ± 0.02; high compulsives: 0.04 ± 0.03; $z(456)=1.91$, $p=0.056$). This finding supports the main analysis of a lower metacognitive efficiency in high compulsive participants.

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Conflict of interest for NSPN members:

E.T.B. is employed half-time by the University of Cambridge and half-time by GlaxoSmithKline and holds stock in GlaxoSmithKline.