Supplementary Material

# Personality, working memory and learning performance

Previous studies have identified obesity-related personality characteristics and potential working memory deficits that may mediate alterations in reinforcement-based learning processes (Aberg, Doell, & Schwartz, 2016; Collins & Frank, 2012; Coppin, Nolan-Poupart, Jones-Gotman, & Small, 2014; Dietrich, Federbusch, Grellmann, Villringer, & Horstmann, 2014; Kim, Yoon, Kim, & Hamann, 2014; Simon et al., 2010; Zhang, Manson, Schiller, & Levy, 2014). Thus, we aimed to investigate if group differences in PIL learning performance were mediated by differences in working memory capacity, impulsivity, reward and punishment sensitivity, or susceptibility of eating behaviour to environmental cues.

We found evidence for significant group differences between normal-weight and obese participants in punishment sensitivity (BIS/BAS-BIS) and susceptibility of eating behaviour to environmental cues (TFEQ disinhibition), but none of the other personality or working memory variables (Table 1). We thus added the main effects of BIS/BAS-BIS and TFEQ disinhibition into separate GEE models that additionally included all main and interaction effects of the predictors valence (reward, punishment), action (go, nogo), group (normal-weight, obese), and sex (male, female). We found no evidence for a mediating effect of BIS/BAS-BIS [main effect of BIS/BAS-BIS: Wald Χ2 = 0.165, p = .685] and TFEQ disinhibition [main effect of TFEQ-Disinhibition: Wald Χ2 = 0.374, p = .541], suggesting that obesity-related alterations in learning performance were unrelated to group differences in personality.

Further, we tested if personality and working memory characteristics that did not differ between groups, exhibited a general influence on learning performance. We similarly added the main effects of BIS-15, BIS/BAS-BAS and working memory scores into separate GEE models that additionally included all main and interaction effects of the predictors valence (reward, punishment), action (go, nogo), group (normal-weight, obese), and sex (male, female). Again, there was no evidence for a significant effect of personality or working memory capacity on learning performance [main effect of BIS-15 total score: Wald Χ2 = 0.629, p = .428; main effect of BIS/BAS-BAS: Wald Χ2 = 2.716, p = .099; main effect of digit span working memory score forward+backward: Wald Χ2 = 0.613, p = .434].

# Supplementary Figure 1



**Figure S1. Single subject MAPs for all reinforcement learning model parameters.** Single subject MAPs were derived from the reinforcement learning model. Each circle represents the parameter estimate of one individual.

# Supplementary Figure 2



**Figure S2.** Cumulative means of observed and simulated behavior across trials in obese and normal-weight participants. Parameters for the simulation were derived from the reinforcement learning model.

# References

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