**Correlations and mediation analysis**

We included gender, age, and education history as covariates to verify further the stability of the results. Correlation analysis was applied between clinical variables (i.e., IAT and UCLA scores) and the 3 amygdalar-subdivision-based effective connections surviving Bonferroni correction (*p = 0.008* [*0.05/6*]) for multiple comparisons. Negative correlations with IAT scores were found in the effective connections from the left pACC (*r = -0.236, p < 0.001*) and the right mPFC (*r = -0.304, p < 0.001*) to the left LBA, while the effective connection from the left MFG to the right SFA (*r = 0.289, p < 0.001*) was positively associated with IAT scores. In addition, only a negative correlation between UCLA scores and the effective connection from the left pACC to the left LBA (*r = -0.211, p = 0.001*) was found.

This mediation analysis also showed that the effective connection from the left pACC to the left LBA [*0.0010, 0.0462*] was a significant mediator in the relationship between addiction severity and loneliness (see Figure S1). No other mediation effects were detected.

*Insert Fig.S1 here*

**Figure legends**

**Fig.S1 Correlation and mediation analysis using gender, age, and education history as covariates**

Plots A and B show that effective connectivity from the left pACC to the LBA is negatively associated with both the IAT and UCLA scores. Plot C shows that the effective connectivity from the left pACC to the LBA significantly mediates the relationship between the IAT scores and the UCLA loneliness scores [*0.0010, 0.0462]*.