Dopamine selectively increases information-seeking about potential losses

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INTRODUCTION

- Curiosity, commonly defined as the desire for knowledge, is a fundamental part of human nature. Such behaviour is integral to learning, social engagement and decision-making.
- Since the opportunity to receive information is encoded by regions rich in dopamine[1,2] it has been hypothesised that dopamine plays a critical role in information-seeking.
- **What is the effect of dopamine on information seeking?**

METHOD

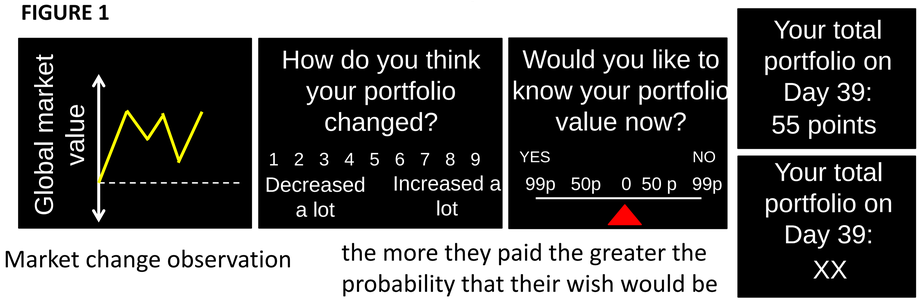
N=232 received either **placebo or L-DOPA**

Stock Market simulation task:

£5 (50 points) initial investment in 2 out of 5 companied which form the market

Example trial

FIGURE 1



Market change observation

the more they paid the greater the probability that their wish would be honoured

ANALYSIS

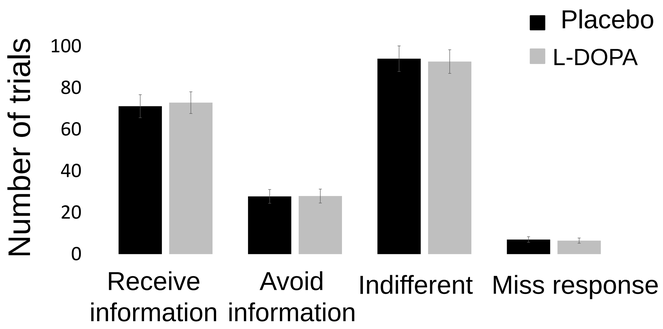
Signed market change → Market up (potential gain); Market down (potential loss) } **VALENCE**

Absolute market change → Big market change; Small market change

Willingness to pay (WTP): amount paid to receive information (coded positively) and to avoid information (coded negatively)

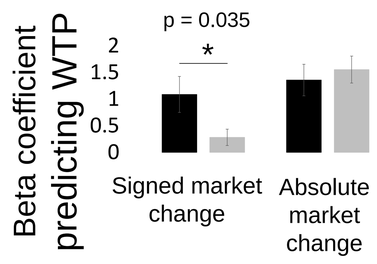
L-DOPA didn't alter general information-seeking

FIGURE 2

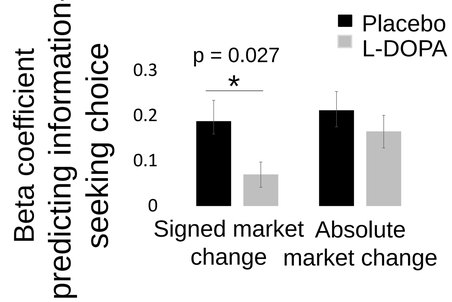


L-DOPA reduced the impact of valence on information seeking

FIGURE 3(A)



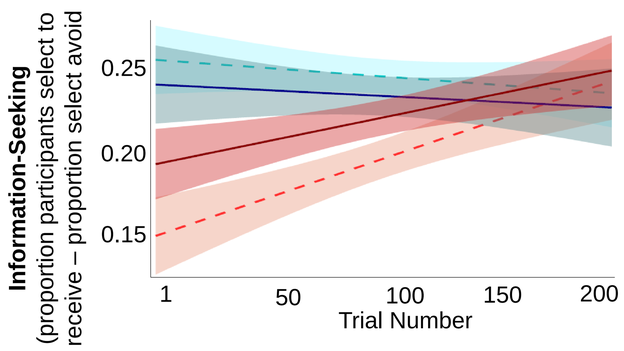
(B)



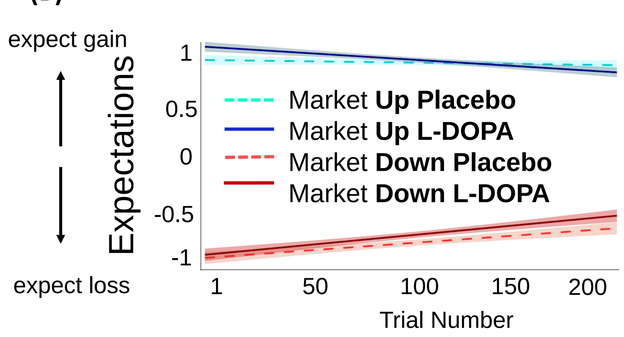
In the placebo group subjects were more willing to pay (A) and wanted info more (B) when the market was up (valence effect). Under L-DOPA subjects wanted information regardless of whether market was up or down.

L-DOPA selectively increases information-seeking about potential loss

FIGURE 4(A)



(B)



(B) Participants expectations were more positive under L-DOPA than placebo (p = 0.004).

(A) Participants selected information more often when the market was going up than down (p = 0.001). L-DOPA *selective increase information seeking when the market was going down* (p = 0.007) *,* with no change to information-seeking when the market was going up.

This result cannot be explained by expectations: even when controlling for expectations we still observed a selective increase in information-seeking under L-DOPA when the market was down.

CONCLUSIONS

Results show that **L-DOPA reduces the impact of valence on information seeking:** administration of L-DOPA increased information-seeking about potential losses without impacting information-seeking about potential gains.

IMPLICATIONS

- Patients with deficiency to the dopamine system may exhibit abnormal patterns of information-seeking, which may provide a marker of their condition.
- Drugs targeting dopamine function may alter patients' information-seeking behaviour affecting patients well-being.

1. Charpentier, C. J. et al. 2018, PNAS , 201800547. 2.Bromberg-Martin, E. S. et al. 2011, Nature neuroscience, 14(9), 1209.