 Contact: jimhartland@hotmail.com

Baumgartner (2008)

Oxytocin Shapes the Neural Circuitry of Trust and Trust Adaption in Human

This study is used to answer questions on:

Hormones (Oxytocin)
Brain scanning (fMRI)

Abstract

The researchers wanted to investigate the effect of oxytocin on trust. 49 participants (mean age 21.7) were recruited from Zurich universities. They were given either an oxytocin nasal spray or a placebo containing nothing. They then lay in an fMRI scanner and took part in a trust game against a human opponent and a risk game against a computer opponent. The researchers found that the oxytocin group were more trusting that the placebo group against human opponents. There were no differences between the groups against the computer opponent. There was also lower brain activity in the areas associated with risk and judging trustworthiness in the brains of the oxytocin participants. The experimenters concluded that oxytocin lowers an individual's ability to judge risk and causes them to be very trusting of other people, even if that trust is not justified. This behaviour only applies in human relationships where there is a social aspect.

Aim

- To test brain activity after administering the hormone oxytocin
- To test the level of trust in individuals after administering oxytocin

Method

Participants

49 male participants (mean age 21.7) were selected from different universities in Zurich, Switzerland. Only males were used as the effects of oxytocin vary greatly between male and females.

Method

Before beginning the experiment, the participants completed a questionnaire that measured their current mood and calmness to ensure there were in as 'normal' a state as possible.

The participants were assigned to either the oxytocin group or the placebo group. The participants did not know which group to which they had been assigned. The oxytocin group received a nasal spray containing high levels of oxytocin. The placebo group received an identical nasal spray but with the oxytocin removed.

After 50 minutes, the participant was placed into an fMRI scanner and asked to play a trust game. This involves an investor (always the participant) being given $12. They then decided to give the trustee (an anonymous human player) either $0, $4, $8 or $12. The trustee will receive triple the amount that the investor gives them (so they will receive $12, $24 or $36). The trustee then decides how much of the money to send back to the investor. The amount they send back is not tripled. After playing 6 rounds of the game, the participant was given feedback on their performance in the game. The experimenters ensured that the participant was betrayed (i.e. very little money given back to them) in 50% of their investments. The participant then completed another 6 rounds of the trust game (12 rounds in total) before finishing the activity. They were then given feedback at the end of the game.

The participants then engaged in a risk activity. This was identical to the trust game except the participants played against a computer which randomly chose the amount of money to return to the participant. This meant that in the risk activity there was no sense of social betrayal by a human being. The participants also received feedback after 6 rounds of the game and were informed that (again) they had lost money 50% of the time.

2 weeks after completing the experiment, the participants were given a questionnaire that measured their normal levels of trust to check there were no individuals who were exceptionally trusting.

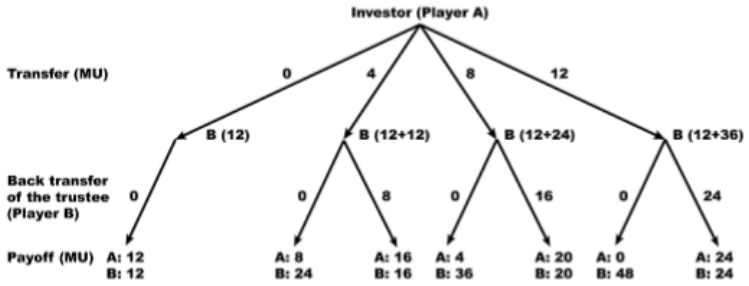

Figure 1. The Trust Game
At the beginning of each new trust period, investor and trustee receive an initial endowment of 12 money units (MUs). The investor then can decide to keep all MUs or to send 4, 8, or 12 MUs to the trustee. The experimenter triples the transferred money. The trustee then has the option of keeping the whole amount he received or sending back a payoff equalizing amount of money. For example, if the investor sends 8 MUs, the trustee receives 24 MUs, giving him in total 36 MUs (12 MUs own endowment + 24 MUs tripled transfer) while the investor has only 4 MUs at this stage of the game. Then the trustee can chose a back transfer of zero or a back transfer of 16 MUs. The experimenter does not triple the back transfer. Thus, if the trustee chooses a back transfer of zero MUs, he earns 36 MUs in the current period, while the investor only earns 4 MUs. If the trustee, however, chooses a back transfer of 16 MUs, both players end up with the same total amount of 20 MUs. In the risk game the investor faced the same investment opportunities as in the trust game, i.e., he could invest 0, 4, 8, or 12 MUs, and for every positive investment the computer chooses a zero investment return or a return equal to that which could be achieved in the trust game. The investment returns were drawn randomly from the probability distribution generated by the trustees' behavior in the trust game. Thus, investors in the trust and the risk game faced the same objective risk, but no social betrayal could occur in the risk game because no trustees were involved in the back transfers.

Results

Participants in the oxytocin group trusted their human opponents more than the participants in the placebo group during the trust game. Even though they were told that they were being betrayed 50% of the time, the oxytocin participants continued to give similar amounts of money to the trustee. This suggests that they trusted them to be fair, despite having the information that they were not. The placebo group, when they were informed that they were being betrayed 50% of the time, lowered the amount of money they invested. This suggests that they did not trust their opponents to be fair.

In the risk game, there was no difference in how the participants acted after they had been told they were being 'betrayed' 50% of the time.

The fMRI scans indicated that the participants in the oxytocin group showed lower levels of brain activation in the areas associated with danger and risk taking (the amygdala). They also showed lower activity in the areas associated with trust (the caudate nucleus). This suggests they were not assessing risk and reward during the game.

Conclusion

Oxytocin lowers an individual's ability to judge dangerous or risky situations. It also lowers an individual's ability to objectively discern if they should trust another person (thus it makes them much more trusting than people with lower oxytocin levels).

This is only true for dealing with humans. When dealing with non-human risks and trust, oxytocin does not appear to have any effect.

 Contact: jimhartland@hotmail.com

Evaluation

Generalisability

- 49 students are a reasonable number of participants, however as they are all students the sample is not greatly generalisable.
- The sample was limited to Swiss students.

Reliability

- The responses the participant received in both games was programmed to make each individual win or lose at the same level.
- fMRIs are a scientific and objective method of recording data.
- Both groups received the nasal injection to ensure this was not a confounding variable.

Application to life

- Knowing that high levels of oxytocin can cause individuals to be less risk-aware and more trusting can help explain why some people are often hurt in relationships.
- People with high oxytocin levels may not make objective decisions and may be more susceptible to being tricked or cheated if they involve other people.

Validity

- Lying in an fMRI scanner is not a natural experience for the participants.
- The participants were informed they were taking a hormone and that they were being tested on their decision-making but may well have guessed the aim of the study.

Ethics

- The participants were monitored to ensure there were no ill effects of the oxytocin.
- The participants were fully informed about the experiment beforehand.