An Investigation into Risk-Taking as a Potential Phenotype for Bipolar Disorder

Heike Anderson-Schmidt1, Linda Gebel1, Thomas G. Schulze1, Andreas Glöckner2

1Section of Psychiatric Genetics, Department of Psychiatry and Psychotherapy, University Medical Centre Goettingen, Germany
2Section of Psychological Assessment, Judgment and Decision Making, Georg-Elias-Müller Institute for Psychology, Georg-August-University Goettingen, Germany

Background

Impaired decision-making is often seen in patients with bipolar disorder (BD) and increased risk-taking behaviour (e.g. driving too fast, gambling, going on spending sprees, engaging in unprotected sex) is listed among the diagnostic criteria for mania (APA, 2000). Despite the fact that this type of behaviour can have dire consequences for both patients and their families, surprisingly little research has been carried out in this field. Chandler et al. (2009) and Christodoulou et al. (2006) reported altered risk-aversion and risk-seeking behaviour in decision-making tasks in patients with BD compared to healthy controls (HC). This change appears to be irrespective of clinical state (Adida et al., 2011), thus fulfilling one of the criteria for an endophenotype. There is actually some evidence from genetic studies (Hidiruglu et al., 2013) to suggest that risk-taking behaviour may be a useful endophenotype to study in BD. However, most studies only focus on one aspect of decision-making and do not reflect real-life situations. The aim of this study was therefore to investigate different aspects of real-life decision-making (risk aversion, loss aversion and sensitivity towards probabilities) in patients with BD and to compare them to HC on the basis of Cumulative Prospect Theory (Tversky & Kahneman, 1992). Furthermore, we examined whether risk-taking behaviour in BD patients is different in a medical than a financial scenario.

Method

Participants:

26 BD patients (9 males, \( \bar{x} = 45.92, SD = 14.05 \)) and 25 HC (10 males, \( \bar{x} = 45.36, SD = 13.53 \)) were recruited as part of an ongoing large-scale longitudinal genetic study carried out by the KFO 241 in Goettingen (www.pzng.de). Informed written consent was obtained prior to study participation from all participants. Patient diagnoses were established using the Structured Clinical Interview for the DSM-IV-TR Axis 1 Disorders (SCID-I, Wittchen et al., 1996). Current psychopathology was assessed on the day of testing.

Materials:

This study measured several aspects of decision making:

1. Risk-aversion:
   - 10 risky versus safe lottery options using the Holt-Laury Scale for Risk Aversion (Holt & Laury, 2002)
2. Loss-Aversion:
   - 10 coin tosses using an adapted version of the Gächter-Johnson-Hermann Scale for Loss Aversion (Gächter et al., 2010)
3. Sensitivity towards different probabilities based on subjective utilities in different contexts:
   - Monetary context
   - Medical context (fictitious medication, only in the BD group)

Discussion

In contrast to previous studies (Chandler et al., 2009; Adida et al., 2011), we did not find increased risk-taking behaviour in patients with BD in terms of risk aversion and loss aversion. Decision-making behaviour in patients appeared to be independent of current clinical state. However, patients were found to be more risk-seeking when it came to choosing a fictitious medication that could bring about complete health or avoiding side-effects even if there was a slight chance of deterioration. These results imply that patients may be more willing to comply with medication if they were given more information and particularly if it was their medical than financial scenarios.

Results

There were no significant differences between HC and BD groups on measures of risk or loss aversion (see Figure 1).

Figure 1: Comparison of parameters for risk aversion (\( \alpha \)) and loss aversion (\( \lambda \)) for the patient (BD) and control (HC) groups.

Furthermore, the two groups did not differ with regards to sensitivity towards probabilities (see Figure 2).

Figure 2: Comparison of parameters for sensitivity towards probabilities (\( w \)) for the patient (BD) and control (HC) groups using lotteries.

For BD patients, clinical state did not appear to influence the aspect of decision-making (all \( p > 0.05 \)). However, there was a significant context-specific difference in risk-taking behaviour in the BD group; patients were more willing to take risks in the medical than financial scenarios (see Figure 3). BDs' responses to medications tended to be more rational in that they appeared more sensitive to probabilities compared to choices between lottery gambles. As can be seen in Figure 3, the curve for medication is closer to the diagonal (which represents rational weighting). When the HC group was included in the analysis (who only completed the matching task for the monetary gambles), the difference in probability weighting between medication and gambles reached conventional significance levels (\( p < 0.05 \)).

Figure 3: Sensitivity to probabilities for monetary gambles and medications.

References


Acknowledgements

This work is supported by the Deutsche Forschungsgemeinschaft (DFG) via the Clinical Research Group 241 ‘Genotype-phenotype relationships and neurobiology of the longitudinal course of psychosis’ (http://www.kfo241.de; grant number WP1 (SCHU 1603/5-1).

Disclosure

The authors declare no conflict of interest.

Corresponding Author

Dr. Heike Anderson-Schmidt
CRG 241 / Psychiatric Genetics, University Medical Center Göttingen
heike.anderson-schmidt@med.uni-goettingen.de