A Logistic Regression Model Representing the Genetic Landscape Differences Between Bipolar Disorder 1 and Bipolar Disorder 2

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Bipolar Disorder is a mental health condition characterized by its traits of mood swings/manic episodes. It consists of two varieties, Bipolar One and Bipolar Two, One displaying full Manic Episodes and more severe traits and Two displaying less severe characteristics. The problem is no mathematical landscape has been formed between the two BDs regarding its genetic similarities or differences. I hypothesized that by creating an analysis of their respective Linkage Disequilibrium (LD) patterns, using a Logistic Regression Model of the LD patterns for BD1 and BD2, would have indicated that there is a significant mathematical difference between the genetic inheritability between these two disorders. 21 of the highest LD patterns ($p< 1x10-5$) for BD1 (15) and BD2 (6) from the GWAS were recorded into an EXCEL spreadsheet. (GWAS, 2022). These patterns were then utilized into the NCSS statistical software to determine the logistic regression equation and probabilities (NCSS 2021). After analyzing the 21 LD's for both Bipolar Disorders in a mathematical format, the Logistic Regression equation had $R2=.94$ and $p<.01$, correctly determining if the LD's are either BD1 or BD2 100% successfully. I concluded that there is a separation of variants between the two bipolar diseases. This supported my hypothesis proving a mathematical difference between the two Bipolar Disorders and their genetic inheritability, through the usage of the Logistic Regression equation. Errors include that only six case studies involving BD2 LD's have been reported in the literature, reducing the resources available and the usage of the known differences between Bipolar one and two.

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