

## Risk Taking Behaviour of Investors with Attention Deficit Hyperactivity Disorder and Bipolar

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### Abstract

Among main individual differences of the investors, risk taking tendency stands out. The risk taking behavior of investors with attention deficit hyperactivity disorder and bipolar disorder are surveyed with this research. Risk taking behavior can be measured with financial methods. In this study, beta is used as the metric of risk taking behavior. Turkish and Greek investors participated for this research which is performed with 187 participants. Stock exchange simulation is used to form collect the data. The results are compared to each other by using independent t-test, one way analysis of variance, Mann Whitney U and Kruskal Wallis tests. The healthy controls are compared to controls with bipolar and ADHD in each country, different results appeared in each country.

**Keywords:** Adhd; Bipolar; Risk taking behavior

### Introduction

The main assumption and the backbone of the first economy and finance theories was the rationality [1]. On the other hand human beings are not always rational and they affect the financial markets. Almost every component of economy and finance is related with humans. The human decisions do not have perfect rationality. The reasons that affect the rationality are surveyed with behavioral finance Neurological disorder.

Behavioral finance makes no diversification among the investors. Tversky ve Kahneman [2] researched the reasons of the irrational investor behaviors. It is seen that the investors has peculiar characteristics such as beliefs, besides their emotions and thoughts, and these characteristics make it difficult to make any predictions [3]. In this way, neurological disorders are not taken into consideration. It is observed that brain injuries might be the reason of irrationality, but it was not possible to evaluate neurological disorders as a reason of irrationality. Because healthy humans are not also perfectly rational and there are successful financiers with neurological disorders. For example, Cameron Herald, Founder of Back pocket COO, claims that being bipolar is an advantage on his business [4]. The neurological disorders can be an advantage or a disadvantage, on the other hand without any evidence, it is not possible to make such a judgment.

Neurofinance concerned with the neurological structure of the investors. It is aimed to map these structures according to the science of finance. Neurofinance does not take the points of being rational or irrational. The focal point of neurofinance appeared to be the financial decisions, and the reflections of these financial decisions to the brain [5]. The differences which arise because of neurological disorders are observed with the frame of neurofinance. It is still not clearly known whether the investors with neurological disorders act different than the other investors.

Risk taking tendency accepted to be the main difference between the investors and became an inevitable component of the financial theories for a while. It is true that each investor has a different tendency of risk taking. On the other hand the investors cannot be classified according to this variable. Neurofinance tried to classify With this study it is observed comparing to the normal controls whether the investors with attention deficit hyperactivity disorder and bipolar disorder have different tendencies of risk taking or not.

### Bipolar Disorder and Attention Deficit Hyperactivity Disorder

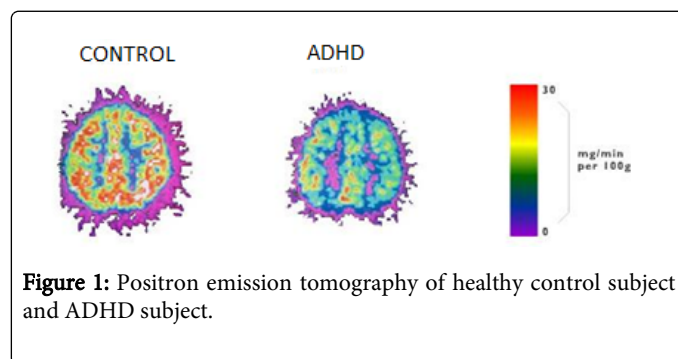
Bipolar disorder is also known as the manic-depressive disorder and it is observed together with a depression period which comes before the manic attack. The depression period might be intense, successful suicide rate is discovered to be 15% according to the surveyed patient data of a case study [6].

The point avoiding harm is higher comparing to the points of the healthy control subjects [7]. The people with a damaged amygdala are observed and it is seen that they cannot protect themselves with rational behaviors and perceive the dangers [8]. This is an evidence of that people with bipolar disorder have no problem on their amygdala functions. The people with bipolar disorder are accepted just like they do not differ from the healthy subjects on the tendency of risk taking [9,10]. They have the same success on dealing with high stress levels [11].

Attention deficit hyperactivity disorder is a hereditary disorder and high psychopathy rate of the family members is accepted to have significant impact on the development process [12]. Adult people with ADHD may have behaviors, which can cause a social issue, such as risky driving, changing jobs frequently, failure at the university, difficulty on concentration, difficulty on listening, talking too much, being untidy while working, not being able to respond the requirements of the managers, losing personal belongings, difficulty on remembering, being vigorous, not feeling peaceful and becoming

angry easily [10,13]. Bipolarize might be similar with ADHD but it has different features too.

When the similar features are observed, it is possible to see that people with ADHD talking too much and people with bipolar disorder talking more than average and it is possible to see that people with ADHD working messy, most probably without a plan and people with bipolar disorder changing the plans easily. When the different features are observed it is possible to see that people with ADHD being forgetful during daily activities, having difficulty on waiting on the line and being organized, losing things, avoiding mental difficulties, lack of attention and people with bipolar disorder having mega lo mania, taking action to reach the target, decrease on the need of sleep, tendency to bad habits [13].



The people with ADHD have lower brain metabolism [14]. Figure 1 shows the positron emission topographies of the healthy control subjects and ADHD subjects. Bipolar subjects and ADHD subjects are diversified into different groups, but bipolar subjects have comorbidity with ADHD, with a rate of 9% [15]. Any comorbidity is not explored during this study.

## Methodology

105 participants assisted this research which is made to survey the risk taking behaviour in Turkey. The participants have joined a

Gender	Number	Percent (%)
Male	66	35.3
Female	121	64.7
Nationality		
Turkish	83	44.4
Greek	59	31.6
Turkish disorder	22	11.8
Greek disorder	23	12.3
Income		
300-999	16	8.6
1000-1999	79	42.2
2000-2999	58	31
3000-3999	20	10.7
4000+	14	7.5

simulation in separate groups at various times. The beta values of the companies are shown as a metric of risk to the participants and the average value of the prepared portfolio is taken as the dependent variable. During the simulation, it is mentioned that the participants will gain a share of return, if they can earn over a certain level. The virtual budgets of the participants were TRY 10,000.

The participants sent their “buy” and “sell” orders by e-mail. The participants had a portfolio with 5 common shares and they had the ability to decide the weight of each common share. The betas of these common shares are weighted not only with the amounts, but also with the holding time slot, to find the average beta of the portfolio. The weight of time was 50% and the weight of amount was also 50%.

There were 17 participants with ADHD and 5 participants with bipolar disorder. All of them have taken place at the same group. The group which is formed with 22 ADHD and bipolar subjects is compared to another group which is formed with 83 healthy subjects which had the same simulation. The participants mentioned that they trade on stock exchange regularly. Aftermath the results of these two groups are compared to each other. In this way the research is made with 105 participants totally.

The same research is repeated in Greece. A simulation with 59 Greek investors is made. These people were the healthy control subjects and another patient group was formed. The results were compared again to the results of people with ADHD and bipolar disorder and the participants with ADHD and bipolar disorder are taken as one group. This group includes 23 people and they are distributed like 9 bipolar subjects and 14 ADHD subjects. Total numbers of Greek participants were 82, with 59 healthy control subjects and 23 other subjects. The frequency tables of the participants are shown on Table 1.

Age		
18-20	23	8.6
21-25	114	42.2
26-30	26	31
31-35	11	10.7
35+	13	7.5

**Table 1:** Frequency table.

Turkish investors chose their common stocks from BIST and Greek investors chose their common stocks from ASE to prepare their portfolio. The virtual budgets of the Greek participants were €10,000. The common stocks are shown together with their beta values and it is explained that the beta values show the risk of these common stocks.

Turkish healthy control subjects are compared to the other subjects of Turkish group by using independent sample t-test. It is seen that the group of bipolar and ADHD subjects had a lower mean. But according to the test results there is no significant difference between the risk taking tendency of these groups at 5% significance level (APPEX 1).

Greek healthy control subjects are compared to the other subjects of Greek group by using independent sample t-test. This time the mean of the bipolar and ADHD group was higher. This difference was significant at 5% significance level according to independent sample t test results (APPEX 2).

The risk taking tendency of healthy Greek investors is compared to healthy Turkish investors. The mean of healthy Greek investors is more than healthy Turkish investors. But this difference is not significant at 5% level of significance according to independent sample t test results (APPEX 3).

The differences between the groups are evaluated with one way analysis of variance test and the difference appeared to be significant at 5% level of significance (APPEX 4). According to Turkey test results the relationship between Greek disorder group and the others is significant, but any other relationships between the groups are not significant (APPEX 5).

Beta is accepted to be the metric for the measurement of risk taking behavior. On the other hand this metric can measure the risk preference during making an investment. There are also many other different types of risk. For this reason, it is also possible to accept the data to be non-parametric. Therefore Mann Whitney U test and Kruskal Wallis test can also be used. After the Mann Whitney U test it is seen that there is no significant difference between the risk taking tendency of Turkish healthy controls and the other Turkish controls at 5% significance level (APPEX 6), but it is seen that the difference between the risk tendency of Greek healthy controls and the other Greek controls was significant at 5% significance level (APPEX 7). The risk tendency between healthy Greek investors and healthy Turkish investors is not significant at 5% level of significance according to Mann Whitney U test results (APPEX 8). According to Kruskal Wallis test, differences between the groups are significant at 5% level of significance (APPEX 9). The difference between the risk tendency of Greek investors with disorders and Turkish investors with disorders is analyzed with Mann Whitney U test and it is seen that they are significant at 5% level of significance (APPEX 10).

## Conclusion

During the simulation in Turkey, the participants with ADHD and bipolar disorder mentioned that they are affected from their environment and the other people too much. This feedback is confirmed by all the other participants in that group. This feedback is accepted as a constraint. This constraint can be removed by making this research in a different environment with different people. The research is repeated in Greece. The Greek participants with ADHD and bipolar disorder confirmed the same feedback and they added that they are affected by the approach of the people they are connecting with, more than the environment.

The risk perception of the ADHD and bipolar subjects seems like the same with the healthy control subjects. On the other hand they can be affected by the environment. There is no certain proof of that they are affected from the environment or not. The emotional structures of the ADHD and bipolar subjects were very different comparing to one country to another. In Turkey, some part of the group, 82% of them (18 people) mentioned that sometimes they feel like they have no confidence and the rest of the group admitted that they have a lack of confidence. All of them also accepted that they feel anxiety at least once a day. The ADHD and bipolar subjects of Greece mentioned that they sometimes feel anxiety and lack of confidence. On the other hand none of them described that as a daily happening and 3 bipolar subjects and 4 ADHD subjects claimed that they usually feel self-confident.

The results of the study show that the risk perception changes from one country to another. This situation might be related with heredity, but also it might be related with the environment. The people who have more sensitivity on the environment might respond more to the environment and the perception of risk might get affected more. The statistical results have shown that there is no significant difference between the risk tendency of the ADHD and bipolar subjects and healthy subjects in Turkey and the ADHD and bipolar subjects have more tendency of risk-taking comparing to the healthy subjects in Greece. With some future studies, these results can be evaluated again and they may have more significant meanings when feeded with true findings.

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