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# Do bipolar subjects' responses to personality questionnaires lack reliability? Evidence from the PsyCoLaus study

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**Do bipolar subjects' responses to personality questionnaires lack reliability?**

**Evidence from the PsyCoLaus study**


## Abstract

Differences in personality scores between subjects with and without mood disorders might result from response bias rather than specific personality traits per se. The aim of this study was to compare subjects with bipolar disorders (BPD) to non-bipolar subjects in terms of response quality to the NEO-FFI. Using data from the population-based cohort study PsyCoLaus, subjects were compared in terms of responses to the NEO-FFI, and indices of response quality were calculated. Hierarchical regression analyses were performed and controlled for sociodemographic factors, depressive episodes, dysthymia, anxiety disorders and substance use disorders. Consistent with the literature, subjects with BPD had higher scores in neuroticism and openness, and lower scores in conscientiousness. However, significant differences were measured for response reliability and validity. In particular, the indices of response quality including response reliability were lower in subjects with BPD suggesting that bipolar subjects might have more difficulty in providing consistent answers throughout questionnaires. However, regression models resulted in small associations between mania/hypomania and response quality, and showed that differences in response quality were mainly attributable to correlates of BPD instead of the presence of mania/hypomania itself. The current findings suggest that bipolar subjects' responses to personality questionnaires are biased, making them less reliable.



**Key words**: bipolar disorder; functional method; response reliability; response validity; personality, self-rated questionnaires.

## 1. Introduction

For the last 30 years, the association between personality and mood disorders has become a major topic for psychiatric research. For instance, in their meta-analysis, Kotov and colleagues (2010) included about 80 studies published from 1980 to 2007 measuring the association between the "big" five personality factors and unipolar depression. Concerning bipolar disorders (BPD), several studies have so far highlighted specificities in personality features (Clayton et al., 1994; Bagby et al., 1996; Bagby et al., 1997; Lozano and Johnson, 2001; Rottig et al., 2007; Quilty et al., 2009; Almeida et al., 2011; Kim et al., 2011; Barnett et al., 2011; Antypa and Serretti, 2014). Yet, most of these studies have compared bipolar patients to other clinical groups, in particular to subjects suffering from major depressive disorders (Bagby et al., 1996; Bagby et al., 1997) or different bipolar subtypes (Kim et al., 2012) instead of comparing them to control subjects. Nonetheless, some differences between bipolar subjects and normative samples can be highlighted: in particular, subjects with BPD tend to have much higher scores in neuroticism, lower scores in extraversion, higher score in openness, lower scores in agreeableness and much lower scores in conscientiousness (Lozano and Johnson, 2001; Du et al., 2002; Rottig et al., 2007; Antypa and Serretti, 2014).

Some authors made the hypothesis that differences in personality scores mainly reflect differences in response style resulting from patients' cognitive symptoms of mental disorders. Studies testing this hypothesis are scarce, and hardly any have focused on subjects with BPD. Yet, evidence of the association between personality features and cognitive symptoms has been provided in subjects with other disorders, particularly schizophrenia and unipolar depression. For instance, Gurrera et al. (2014) stated that differences in personality ratings are related to the number of cognitive deficits and symptoms of schizophrenia, while other studies highlighted that those differences are specifically related to positive symptoms and affective discomfort (Lysaker et al., 1999; Bell et al., 2007). Furthermore, Hesse and

colleagues (2015) recently provided evidence for the scar model of neurocognitive impairments in schizophrenic patients which affected their self-description. In addition, Boulanger et al. (2013) highlighted differences in response quality between patients with schizophrenia and healthy subjects, sustaining that schizophrenia was associated with less reliable responses to self-rated questionnaires.

Regarding BPD and even unipolar depression, different studies highlighted the impact of depressive mood and minor symptoms on self-rated personality measures (Kendell and DiScipio, 1968; Wasek and Endicott, 1983; Sauer et al., 1997). Moreover, it was shown that personality features (i.e. neuroticism and extraversion) are changed by depression, but also by antidepressant medication (Du et al., 2002). On the other hand, Costa, Bagby, Herbst and McCrae (2005) provided evidence for the stability of self-rated measures during and after acute depressive episodes; and therefore their finding questions whether acute episodes of affective disorders stably change response style to personality tests corresponding to a scar effect of depression on response styles to personality measures.

Regarding BPD in particular, bipolar-related sustained attention-deficits are known to persist even years after remission (Clark et al., 2002). So far, research has not yet investigated whether the ability of patients with BPD to provide reliable and valid answers to self-administered questionnaires is affected. One hypothesis is that consistent differences in personality scores might result from response bias induced by BDP-related cognitive differences rather than specific personality traits of bipolar subjects per se. Before this question can be answered, it is necessary to determine whether these potential differences in response quality among bipolar subjects can be highlighted. Therefore, this paper aims to answer the following question: are personality ratings of bipolar subjects comparable to those of non-bipolar subjects in terms of response quality? This study uses a new psychometric

method developed by our group which focuses on coherence and reliability in entire sets of responses: namely the *functional method* (Dupuis et al., 2015).

## 2. Methods

### *2.1. Study design*

The present study is based on data from the Swiss cohort CoLaus|PsyCoLaus (Firmann et al., 2008; Preisig et al., 2009), a longitudinal study conducted in the Swiss city of Lausanne. The CoLaus study assessed cardiovascular risk factors and collected DNA and plasma samples for the study of genetic biomarkers. The baseline recruitment and medical assessment of the CoLaus sample, which was completed between 2003 and 2006, has already been described in detail (Firmann et al., 2008). CoLaus was completed with a psychiatric assessment (PsyCoLaus) conducted after an interval of approximately one year (Preisig et al., 2009). Five years later, a follow-up investigation with the same measures to those administered at baseline was conducted. During the psychiatric part, participants were asked to complete a self-rated battery at home which comprised a set of personality questionnaires. Participants were volunteers; only transportation costs to the sites where the investigations took place were reimbursed.

### *2.2. Measures*

At baseline, information on Axis-1 mental disorders was collected using the Diagnostic Interview for Genetic Studies (DIGS) (Nurnberger et al., 1994; Preisig et al., 1999). The DIGS is a reliable and extensively validated semi-structured interview which elicits information on specific symptoms for the major mental disorders depicted in the DSM-IV-TR (American Psychiatric Association, 2000). The French version of the DIGS revealed excellent inter-rater and adequate test-retest reliability for the major mood disorders (Preisig et al., 1999) and for substance use disorders (Berney et al., 2002). The DIGS also showed good inter-informant agreement with the family history method regarding the diagnosis of BPD

(Vandeleur et al., 2015). The DIGS was completed with the posttraumatic stress disorder (PTSD) and generalized anxiety disorder (GAD) sections of the French version (Leboyer et al., 1991) of the Schedule for Affective Disorders and Schizophrenia - Lifetime and Anxiety disorder version (SADS-LA) (Endicott and Spitzer, 1978). Moreover, the brief phobia chapter of the DIGS was replaced by the corresponding more extensive chapters of the SADS-LA which allows for the recording of detailed information related to agoraphobia with or without panic attacks, social and specific phobias. The French translation of the SADS-LA (Leboyer et al., 1991) revealed excellent inter-rater and fair to good test-retest reliability for anxiety disorders. The DIGS also elicits information on a series of sociodemographic factors. The diagnostic interviews were performed by Master's level psychologists who had undergone a one to two-month training period. A shortened DIGS interview covering any new occurrence of mental disorders or episodes since the baseline evaluation was administered at the follow-up assessment.

In addition, participants completed the French version of the NEO Five-Factor Inventory (NEO-FFI) (Rolland et al., 1998; Aluja et al., 2005) at the follow-up assessment. Different indices of response quality to the NEO-FFI were calculated using Gendre's functional method (detailed below).

*2.3. Participants*

From a total of 3,719 subjects who participated in the psychiatric arm (PsyCoLaus) of the study between 2003 and 2008, a total 2,848 (76.6%) participated in the follow-up investigation between 2010 and 2013 (from the 871 remaining, 55 were deceased and 20 refused to participate in the follow-up, while 796 were unavailable for the follow-up due to having moved away or not being reachable). From the 2,848 who completed both the baseline and follow-up interviews of the PsyCoLaus study, 1,981 (69.6%) sent back the questionnaires. This study sample consists of those 1,981 subjects.

*2.4. Statistical analyses*

2.4.1. Response quality

Prior to statistical analyses, the application of the functional method required data transformation in order to calculate indices of response quality. Those indices have in common that they are correlations, which make them easily understandable in the analysis of whether one is providing valid and interpretable responses to a questionnaire. Furthermore, since the calculation of these indices requires a mathematical procedure that constrains factor independence, the resulting factors do not necessarily have psychological meaning. However, the functional method can also be used to calculate the indices of response quality only as a means to decide whether factor scores classically calculated are valid and interpretable.

Our group (2015) provided a detailed description of the functional method and its specific benefits. Briefly, the functional method relies on the creation of a measurement space in which responses to items, factor scores, individual response strategies to a whole questionnaire, and other measures can be compared. Such a measurement space is obtained by successive iterations of principal component analysis (PCA). PCA is a data reduction technique in which a set of variables is summarized by a number of independent components that are linear combinations of the initial variables and that explain the largest parts of variance in the entire set of variables. Apart from summarizing information from a large set of variables, such a statistical technique is also used to provide multiple regression models in which predictors are strictly independent (i.e. principal component regressions). Moreover, PCA assumes no degree of error in measuring variables, and can be thus reiterated without introducing new forms of error, which is not the case of other data reduction approaches (Zedeck, 2014). The first PCA is conducted on the responses to the items, in the usual way; although other types of factor analysis can be used instead at this step of the procedure. The second step consists of performing PCA on the resulting loading matrix; the number of

extracted components must be constrained to be the same as those resulting from the first PCA. The last step consists of iterating successive PCAs on extracted factor scores. This procedure results in the creation of a loading matrix called “matrix of item characteristics” where lines are the vectorial expression of the items in a same orthonormal and hyperspheric space. The aim of the successive PCA iterations is to warrant that factors are strictly independent and that item coordinates are expressed in the same standard metric. For this study, the PCAs were reiterated 10 times and followed by Varimax rotations to ensure that both conditions were met.

Then, functional factor scores can be calculated by establishing the correlations between responses to items on a Likert-type scale and each column of item characteristics. Response strategy is thus defined as the vector where coordinates are the correlations between responses and item characteristics. Four specific functional indices of response quality can be calculated for a response strategy:

- *Response coherence* indicates how coherent an entire set of responses is. It consists of the norm of the vector of strategy, that is to say in mathematical terms the square root of the sum of correlations. Moreover, because factor independence is warranted by design, response coherence is a multiple correlation index that indicates how predictable the response strategy is.
- *Response reliability* is an application of the bisection method on sets of responses. It consists of the correlation between two vectors of strategy to the two halves of a test, which indicates how stable and reliable one’s response strategy is throughout the entire questionnaire.
- *Response positivity* and *response negativity* measure the extent to which positive (or negative) and desirable (or undesirable) aspects of personality features have been chosen. Both response positivity and negativity result from the sum of the product of

the general vector of strategy and a vector of strategy specific to positive or negative content. For this study, items from the NEO-FFI were considered as positive when the mean score was higher than 2.5 on a Likert-type scale, and as negative when the mean score was below 1.5. Items with scores between 1.5 and 2.5 were considered as neutral and were not used in these calculations.

The main quality of these indices is that they measure response strategy to the entire questionnaire. Moreover, two other indices that can be calculated independently from the functional method have been proposed:

- *Response modality* is an index that measures how often the most frequently given answers were chosen by the respondent. In mathematical terms, modality consists of Cohen's weighted kappa coefficient to measure how many answers given are the item modal answers.
- *Response normativity* indicates the extent to which an entire set of responses fits general response tendencies. Mathematically, response normativity is the correlation between responses and the mean scores on each item.

A lack of response reliability is the most detrimental issue that can be highlighted by analysing response strategy (Dupuis et al., 2015). Indeed, null values in response reliability indicate random responding, which totally invalidates test results. In contrast, despite the fact that low values in response coherence, modality, normativity, positivity and negativity may reflect different types of unusual response patterns, test results might still be interpretable and truly reflect the personality traits of respondents.

2.4.2. Mean differences between bipolar and non-bipolar subjects

Analyses first consisted of group comparisons using t-tests. Subjects with manic/hypomanic episodes during lifetime were compared to the control group in terms of the Big Five scores as well as in terms of response quality. Subjects with antecedents of manic episodes were

assumed to have more difficulty in providing both reliable and coherent responses; thus, the t-tests were one-tailed. Standardized mean differences were expressed in the form of Hedges' g (1982). Hedges' g is an unbiased form of Cohen's d that is more accurate, especially when there are important differences in variance between groups. Yet, it measures mean differences in the same metric as Cohen's d: d or g values around 0.20 indicate small effects, values around 0.50 indicate medium effects, and values of 0.80 or higher indicate large effects (Cohen, 1992).

2.4.3. Associations between mood, anxiety and substance use disorders and response quality to the NEO-FFI

Three-step hierarchical multiple regression analyses assessing the relations between the different indices of response quality to the NEO-FFI and socio-demographic variables and psychopathology were conducted. The presence of five main types of disorders/episodes during lifetime was taken into account: manic/hypomanic episodes, major depressive episodes, dysthymic episodes, anxiety disorders (i.e. separation anxiety, obsessive-compulsive disorders, phobias, social anxiety disorders, general anxiety disorders, panic attacks and agoraphobia, and post-traumatic stress disorders) and substance use disorders (alcohol, cannabis or illicit drug abuse or dependence).

Concerning sociodemographic characteristics, four variables were taken into account: age, sex (female = 1, male = 0), mother tongue (French = 1, others = 0) and socioeconomic status (SES) using the Hollinghead's index (Hollingshead, 1975). Age and SES were based on the information at follow-up. In a first step, the sociodemographic characteristics were entered into the models; in the second step, the presence of major depressive episodes, dysthymic episodes, anxiety disorders and substance use disorders over lifetime was entered into the regression models; in a third step, the presence of mania/hypomania during lifetime was

entered into the models. The regression analyses were two-tailed, with $\alpha = 5\%$. Analyses were performed using SPSS 21.

## 3. Results

### *3.1. Sample characteristics*

Participants were 57.41 ± 8.77 years of age. Sixty-nine percent were French-speaking and 57.5% were women. From the 1,981 participants, 46 (2.3%) subjects had episodes of mania/hypomania during lifetime, 994 (50.2%) had episodes of major depression 102 (5.1%) had dysthymia, 815 (41.1%) had at least one anxiety disorder, and 287 (14.5%) had a substance use disorder. Nine subjects were excluded from the regression analyses due to missing information regarding SES (i.e. 2 subjects) or at least one diagnosis (i.e. 7 subjects). Sociodemographic characteristics by psychiatric status are presented in table 1.

Two significant differences between bipolar and non-bipolar subjects were found in terms of the prevalence of other disorders. Namely, bipolar subjects were more likely to suffer from anxiety disorders (OR=2.74, $p<0.001$) and substance use disorders (OR=2.13, $p<0.05$) during lifetime.

### *3.2. Mean differences for personality dimensions and response quality between bipolar and non-bipolar subjects*

Concerning differences between bipolar and non-bipolar subjects, significant differences were found for three Big Five dimensions, namely neuroticism, openness and conscientiousness. As reported in Table 2, the non-bipolar group had a lower score for neuroticism ($g=0.64$, $p<0.001$) and reported being less open ($g=0.47$, $p<0.01$) and more conscientious ($g=0.49$, $p<0.001$) than the bipolar subjects. Regarding functional control indices, significant differences were measured for each index, except for response coherence. Hedges' g of 0.42 and 0.45 were measured for response reliability and modality, respectively, while effect sizes ranging from 0.52 to 0.63 were measured for normativity, positivity and negativity.

*3.3. Associations between mood, anxiety or substance use disorders and response quality to the NEO-FFI*

The different hierarchical regression models are summarized in Table 3. Concerning sociodemographic characteristics (*i.e.* the first step), consistently, no significant associations were measured between age and the different indices of response quality. On the other hand, sex was significantly associated with each index of response quality (i.e. the indices were higher in women), except with response modality. Regarding the second step, no significant association was found between dysthymia and response quality, while consistent negative associations were measured between response quality and the presence of major depressive episodes and anxiety disorders, explaining 1.5% to 5.3% of the variance of the indices. Significant associations were also found between the presence of substance use disorders and response coherence, normativity, positivity and negativity. At the third step, no association was measured between the presence of mania/hypomania over lifetime and response coherence. In contrast, significant associations were found between mania/hypomania and the other indices. Mania/hypomania explained 0.3% to 0.6% of the variance in response quality. The highest associations measured concern response normativity ($\beta$=-0.08, $p<0.001$), positivity ($\beta$=-0.07, $p<0.001$) and negativity ($\beta$=0.07, $p<0.001$).

**4. Discussion**

The aim of this study was to investigate the potential differences in response quality to the NEO-FFI between subjects with BPD during lifetime and non-bipolar subjects. The first results to be discussed concern differences in the Big Five scores. Indeed, significant important differences were measured; namely, bipolar subjects were much more neurotic, more open but less conscientious than non-bipolar subjects. These results are consistent with those of previous research (Lozano and Johnson, 2001; Du et al., 2002; Rottig et al., 2007; Kim et al., 2011; Jabben et al., 2012; Antypa and Serretti, 2014).

The findings regarding response styles indicated that bipolar subjects provided less desirable (*i.e.* response positivity) and more undesirable answers (*i.e.* response negativity) than non-bipolar subjects. This was predictable, given the fact that they reported more Neuroticism, which is strongly and negatively associated with responses pertaining to social desirability (Birkeland et al., 2006). Moreover, bipolar subjects provided fewer modal and normative answers than non-bipolar subjects, which could be attributable to increased neuroticism as well. The most interesting findings concern response reliability. Regarding response reliability, a standardized mean difference of 0.42 was measured, which can be considered to be a medium effect (Cohen, 1992). Furthermore, since this index is a split-half correlation, its values can also be transformed into determination coefficients to express their difference in terms of the part of explained variance. Thus, the square of the response reliability is 72.3% for non-bipolar subjects and 59.3% for bipolar subjects. In other words, this implies that around 13% of the variance of response reliability among bipolar subjects is determined by additional sources of error. Such differences in response quality are not negligible.

However, when controlling for sociodemographic factors and other mental disorders, only small associations resulted from the hierarchical regression analyses. Indeed, most of the part of the variance in response quality was explained by control variables such as sex, mother tongue and SES, or by the presence of other psychopathology, in particular the presence of depressive or dysthymic episodes, anxiety disorders and substance use disorders during lifetime. Such results indicate that, although bipolar subjects had lower values in response quality, the differences in quality are not attributable to the presence of mania/hypomania alone. Nevertheless, those differences could be explained by certain correlates of BPD, by the presence of anxiety disorders and substance use disorders in particular. Indeed, the high prevalence of psychiatric comorbidities in bipolar subjects is well known (Asaad et al., 2014; Maremmani et al., 2015; Feingold et al., 2015; Gibbs et al., 2015).

The conclusions are that, although the presence of episodes of mania/hypomania during lifetime only explains small differences in response quality to the NEO-FFI, bipolar subjects, who have higher rates of anxiety disorders and also higher rates of substance use disorders, differ from non-bipolar subjects regarding indices of response quality, making their responses less reliable and even less valid. Given the lower validity of responses to the NEO-FFI among the bipolar subjects, the use of self-administered questionnaires to assess personality dimensions among bipolar subjects should be seriously questioned. Moreover, further research is recommended to examine the relation between BPD and response quality to any other self-rated psychological instruments including those that do not measures personality.

A first limitation that requires to be mentioned is the fact that a lot of symptoms of mood disorders (especially BPD) and personality disorders tend to overlap, making the possible role of mood disorders in responding less clear. This is why strict definitions of diagnoses were used instead of separate symptoms. In addition, the direct effect of BPD on response quality was eventually small, meaning that the role of common symptoms of personality disorders can only be as small. The other limitations of this study are the small size of the clinical group and the generalizability of the findings. Indeed, as BPD has a low prevalence in community samples, the sample was small. Despite this, our results showed differences that reached statistical significance between the bipolar and non-bipolar subjects, suggesting that there was enough power to detect differences. However, our results may not be generalizable to bipolar subjects recruited in clinical studies. The use of larger samples of bipolar subjects would also enable assessment according to the subtypes of the disorder. Therefore, further research using larger samples of bipolar subjects is needed to further determine whether these subjects, also classified in function of the specific subtypes of the disorder, would differ regarding their qualitative responses to personality questionnaires such as the NEO-FFI.

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**Conflicts of interest**

None.

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**Table 1**

**Sociodemographic characteristics and comorbid psychopathology by bipolar status**

| | Non-bipolar subjects (n=1,935) | | Bipolar subjects (n=46) | | $\chi^2$ |
|---|---|---|---|---|---|
| **Age M (SD)** | 57.42 | (8.78) | 56.66 | (8.70) | |
| **Sex N (%)** | | | | | |
| Female | 1,113 | (57.5%) | 26 | (56.5%) | 0.02 |
| Male | 822 | (42.5%) | 20 | (43.5%) | |
| **Mother tongue N (%)** | | | | | |
| French | 1,333 | (68.9%) | 30 | (65.2%) | 0.28 |
| Others | 602 | (31.1%) | 16 | (34.8%) | |
| **Socioeconomic status M (SD)**[b] | 3.55 | (1.18) | 3.43 | (1.34) | |
| **Major depressive episodes N (%)** | | | | | |
| Present | 973 | (50.3%) | 21 | (45.7%) | 0.39 |
| Absent | 960 | (49.8%) | 25 | (54.3%) | |
| **Dysthymic episodes N (%)** | | | | | |
| Present | 102 | (5.3%) | 0 | (0%) | 2.56 |
| Absent | 1,832 | (94.7%) | 46 | (100%) | |
| Unknown[a] | 1 | (0.05%) | 0 | (0%) | |
| **Anxiety disorders N (%)** | | | | | |
| Present | 785 | (41.1%) | 30 | (65.2%) | 11.17** |
| Absent | 1,145 | (58.6%) | 16 | (34.8%) | |
| Unknown[a] | 5 | (0.3%) | 0 | (0%) | |
| **Substance use disorders N (%)** | | | | | |
| Present | 275 | (14.2%) | 12 | (26.1%) | 5.08* |
| Absent | 1,656 | (85.5%) | 34 | (73.9%) | |
| Unknown[a] | 4 | (0.2%) | 0 | (0%) | |

* $p < 0.05$; ** $p < 0.01$

[a] This category was not taken into account for $\chi^2$ tests

[b] A mean of 3 corresponds to middle class SES (Hollingshead, 1975)

**Table 2**

**Differences between non-bipolar and bipolar subjects regarding personality dimensions and response quality**

| | Non-bipolar subjects (n=1,935) | | Bipolar subjects (n=46) | | |
|---|---|---|---|---|---|
| | **M** | **SD** | **M** | **SD** | **g** |
| **Personality** | | | | | |
| Neuroticism | 17.98 | 7.68 | 22.94 | 9.53 | 0.64*** |
| Extraversion | 27.94 | 6.23 | 26.46 | 7.70 | 0.24 |
| Openness | 29.76 | 6.03 | 32.61 | 5.72 | 0.47** |
| Agreeableness | 33.43 | 5.18 | 33.65 | 6.29 | 0.04 |
| Conscientiousness | 34.94 | 5.76 | 32.11 | 6.75 | 0.49*** |
| **Response quality** | | | | | |
| Coherence | 0.71 | 0.12 | 0.68 | 0.15 | 0.25 |
| Reliability | 0.85 | 0.19 | 0.77 | 0.24 | 0.42* |
| Modality | -0.16 | 0.27 | -0.28 | 0.22 | 0.45*** |
| Normativity | 0.62 | 0.19 | 0.50 | 0.24 | 0.63*** |
| Positivity | 0.80 | 0.21 | 0.69 | 0.27 | 0.52** |
| Negativity | -0.80 | 0.23 | -0.67 | 0.31 | 0.56** |

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

**Table 3**

**Hierarchical multiple regression analyses between indices of response quality and sociodemographic characteristics, mania/hypomania and other non-bipolar psychopathology during lifetime (N=1,972)**

| Variable | *Coherence* | | *Reliability* | | *Modality* | | *Normativity* | | *Positivity* | | *Negativity* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\Delta R^2$ | $\beta$ | $\Delta R^2$ | $\beta$ | $\Delta R^2$ | $\beta$ | $\Delta R^2$ | $\beta$ | $\Delta R^2$ | $\beta$ | $\Delta R^2$ | $\beta$ |
| Step 1 | 0.044*** | | 0.018*** | | 0.001 | | 0.024*** | | 0.015*** | | 0.007* | |
| Age | | -0.02 | | -0.03 | | 0.002 | | 0.01 | | 0.01 | | -0.03 |
| Sex | | 0.13*** | | 0.07** | | -0.003 | | 0.11*** | | 0.12*** | | -0.06** |
| Mother tongue | | 0.08*** | | 0.04 | | 0.01 | | 0.06* | | 0.01 | | -0.01 |
| Socioeconomic status | | 0.16*** | | 0.11*** | | 0.03 | | 0.10*** | | 0.01 | | -0.05* |
| Step 2 | 0.026*** | | 0.009** | | 0.015*** | | 0.063*** | | 0.035*** | | 0.060*** | |
| Major depressive episodes | | -0.12*** | | -0.04 | | -0.08** | | -0.17*** | | -0.10*** | | 0.16*** |
| Dysthymic episodes | | -0.04 | | -0.01 | | -0.01 | | -0.04 | | -0.02 | | 0.03 |
| Anxiety disorders | | -0.07** | | -0.07** | | -0.08** | | -0.12*** | | -0.11*** | | 0.13*** |
| Substance use disorders | | -0.06** | | -0.02 | | -0.03 | | -0.10*** | | -0.10*** | | 0.09*** |
| Step 3 | 0.001 | | 0.003* | | 0.004*** | | 0.006** | | 0.004** | | 0.005** | |
| Mania/hypomania | | -0.03 | | -0.06* | | -0.06** | | -0.08*** | | -0.07** | | 0.07** |
| Total $R^2$ | 0.072*** | | 0.030*** | | 0.020** | | 0.093*** | | 0.055*** | | 0.072*** | |

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$