



## Review article

# A meta-analysis of temperament and character dimensions in patients with mood disorders: Comparison to healthy controls and unaffected siblings



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## ARTICLE INFO

## Article history:

Received 16 October 2015

Accepted 30 December 2015

Available online 1 January 2016

## Keywords:

Temperament

Character

Depression

Mood disorders

Bipolar Disorder

Trait

State

## ABSTRACT

**Background:** Cloninger's psychobiological model of personality has been extensively applied to subjects affected by mood disorders (MOOD). However, most studies are widely heterogeneous in terms of sample size, methods of assessment, and selection of participants.

**Methods:** We conducted a systematic review of literature and a random effects meta-analysis of studies comparing at least two of the following groups: (a) adults with a primary MOOD diagnosis (Bipolar Disorder (BP) or major depressive disorder (MDD)), (b) their unaffected siblings (SIB) or (c) healthy subjects (HS), and reporting quantitative results from the Tridimensional Personality Questionnaire (TPQ) or the Temperament and Character Inventory (TCI).

Subgroup, sensitivity and meta-regression analyses were also conducted.

**Results:** High Harm Avoidance and low Self-Directedness were consistently associated with MOOD and SIB samples. BP was characterized by higher scores in Novelty Seeking and Self-Transcendence than HS, SIB and MDD. Age seemed to have a negative effect on Novelty Seeking and a positive effect on Harm Avoidance, Cooperativeness and Self-Transcendence. An euthymic mood state was associated with reduced Harm Avoidance, but increased Reward Dependence, Self-Directedness and Cooperativeness.

**Limitations:** The quality of the included studies varied and was relatively low. Moreover, publication bias and heterogeneity in the distribution of effect sizes may also have limited our results.

**Conclusion:** High Harm Avoidance and Low Self-Directedness may be trait markers for MOOD in general, while high Novelty Seeking and high Self-Transcendence may be specific to BP. Future studies are needed to disentangle the state-trait effect of each personality dimension.

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## 1. Introduction

In the early 1990s, the group of C. Robert Cloninger developed a psychobiological model of personality, which has produced a large body of work and inspired many researchers. It was conceived as a dimensional and two-tiered model, accounting for both normal and abnormal variations in two major components of personality: Temperament and Character (Cloninger, 1994a, 1994b; Cloninger and Svrakic, 1997; Cloninger et al. 1993).

Temperament is regarded as the emotional core of personality. It includes four largely independent dimensions: (1) Novelty Seeking (NS), representing behavioural activation in response to novelty and signals of reward or relief of punishment; (2) Harm Avoidance (HA), referring to behavioural inhibition in response to signals of punishment or non-reward; (3) Reward Dependence (RD), reflecting the maintenance of socially rewarded behaviour; and (4) Persistence (P), describing the maintenance of behaviour despite only intermittent reinforcement.

Character, on the other hand, is defined in terms of individual differences in self-concepts that develop across the lifespan in response to socio-cultural influences. It includes three dimensions: (1) Self Directedness (SD), which is the ability to regulate and adapt behaviour to the demands of a situation in order to achieve personally chosen goals; (2) Cooperativeness (C), which expresses the degree to which a person is generally helpful and agreeable in his/her relations with others; and (4) Self Transcendence (ST), which is associated to the ability to recall the past and imagine the future in developing one's life narrative, as well as to experience an unity with nature and to develop spiritual values.

Cloninger's model and the corresponding instruments of evaluation, the Tridimensional Personality Questionnaire (TPQ) and the Temperament and Character Inventory (TCI), have been widely applied to subjects affected by mood disorders (MOOD). However, studies comparing temperament and character dimensions between MOOD patients and healthy subjects (HS) have yielded contradictory results. Most studies have reported a higher HA in MOOD in general (Engstrom et al., 2004; Nowakowska et al., 2005; Osher et al., 1996; Young et al., 1995; Zaninotto et al., 2015), while Bipolar Disorder (BP) seems to be characterized by higher scores in NS (Nowakowska et al., 2005; Young et al., 1995), RD (Osher et al., 1996) and ST (Nowakowska et al., 2005; Zaninotto et al., 2015).

A recent meta-analysis (Miettunen and Raevuori, 2012) of temperament in axis I disorders confirmed higher HA in both unipolar and bipolar MOOD (with higher scores in unipolar subjects), and lower NS and RD in Major Depressive Disorder (MDD). However, the study was limited by some methodological problems, including the absence of quality assessment procedures and meta-regression analyses.

Indeed, some temperament and character dimensions may be influenced by demographic variables (Chen et al., 2013; Cloninger, 1994a; Cloninger et al., 1993; Gutierrez-Zotes et al., 2004; Hansenne et al., 2005; Mikolajczyk et al., 2008; Pelissolo and Lepine, 2000), symptom severity (Hirschfeld et al., 1983; Peselow et al.,

1995), or number of lifetime mood episodes (Dunayevich et al., 1996; Hirschfeld et al., 1989; Zaninotto et al., 2015). Those variables should therefore be included as moderating factors when studying personality traits in MOOD patients. Finally, a meta-analysis should also include sibling studies since those may help disentangle the "state-trait" effect and determine whether there is a specific vulnerability pattern to developing affective disorders (Farmer et al., 2003).

### 1.1. Aims of the study

To fill these gaps, the present study aimed to review and examine in detail the current literature about the application of Cloninger's model of personality in affective disorders. The purpose was to detect potential differences in temperament and character dimensions among three groups of individuals: (a) MOOD subjects, including BP, both type I and II, and MDD; (b) healthy subjects (HS); and (c) unaffected siblings (SIB) of MOOD patients.

## 2. Materials and methods

### 2.1. Search strategy and selection of studies

An electronic literature search was performed to find published studies exploring Cloninger's temperament and character dimensions in MOOD patients. PubMed, SCOPUS, PsychINFO, and EM-BASE databases were scanned for articles written in English and published in peer-reviewed journals until July, 1st 2015.

Any combination of the keywords: "temperament" (OR "character" OR "TCI" OR "Tridimensional Personality Questionnaire" OR "TPQ") AND "mood disorder" (OR "affective disorder" OR "depression" OR "major depression" OR "depressive disorder" OR "bipolar disorder" OR "bipolar" OR "mania") was used to detect potentially eligible papers. The first part of the search key was also replaced with keywords describing the seven temperament and character dimensions ("Novelty Seeking" OR "Harm Avoidance" OR "Reward Dependence" OR "Persistence" OR "Self-directedness" OR "Cooperativeness" OR "Self-Transcendence"). References from retrieved papers and from relevant reviews and meta-analyses on similar topics (i.e. (Miettunen and Raevuori, 2012)) were also screened to identify additional studies. The list of the evaluated articles is available from the authors.

Cross-sectional or longitudinal studies including at least two of the above cited groups (MOOD, HS and SIB) were eligible for inclusion. Additional inclusion criteria were: (1) age over 17 years; (2) primary diagnosis of MOOD, allowing for relevant co-morbid axis I or axis II disorders (as long as there was no condition potentially affecting the reliability of personality assessment - i.e., cognitive impairment or acute substance intoxication); (3) use of Diagnostic and Statistical Manual of Mental Disorders (DSM), International Classification of Diseases (ICD) or Research Diagnostic

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