Low affective temperament consistency during development: Results from a large retrospective study☆

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ABSTRACT

Background: Temperament is still regarded as a stable part of personality, an “endophenotype” developed early in life. However, how frequently temperament traits can change throughout life is not clear. The aim of this study was to investigate affective temperament changes from late childhood to adolescence and from late adolescence to adulthood.

Methods: We used data from a cross-sectional web-based survey collected from the Brazilian Internet Study on Temperament and Psychopathology. We used the Affective and Emotional Composite Temperament Scale questionnaire to assess temperament at time of participation, and at age of 10–12 and 18 years, retrospectively, dividing affective temperaments into four major groups: internalized, externalized, stable and unstable. The final sample consisted of 36,255 participants from 24 to 40 years of age (71.9% women).

Results: Most of the sample (66.2%) changed to a different affective temperament group at adulthood. We found a significant decrease in internalized temperaments from 10–12 to 18 years of age (34.5% to 25.0% in women and 31.8% to 26.7% in men), parallel with an increase of externalized temperaments (14.1% to 20.3% in women and 17.3% to 19.6% in men). From 18 years of age to adult life, stable temperaments decreased slightly in frequency (37.9% to 32.5% in women and 38.6% to 36.8% in men), while unstable types increased (16.9% to 24.0% in women and 15.3% to 18.4% in men).

Limitations: The retrospective design and self-reported evaluation may bias self-perception.

Conclusions: Affective temperaments often change over time, contrary to the classic view of temperament as a consistent phenotype.

1. Introduction

Temperament is considered the emotional expression and behavioral style apparent at early childhood and a framework predicting latter personality traits (Mcadams and Olson, 2010). Moreover, temperament traits are conceptualized as behavioral derivatives of primary emotions that have neurochemical correlates (Lara and Akiskal, 2006). In this view, temperament has a genetic background and transcends culture—it should not change, unless it did so toward maturation throughout the lifespan (Gonda et al., 2011, 2006; Mcadams and Olson, 2010). Even though there is a growing consensus that behavioral traits develop epigenetically, temperament is still understood as a stable dimension of the personality, an “endophenotype” developed early in life (Svrakic and Cloninger, 2010). Lara et al. have proposed the Affective and Emotional Composite Temperament (AFECT) model, which is an integration of specific temperament dimensions (emotional temperament) and synthetic constructs (affective temperament) in a single temperament model, with clinical, neurobiological and treatment implications for psychiatric disorders. Components of activation—volition, desire and anger, inhibition, control, sensitivity and coping interact in a system named as emotional temperament. The various configurations of these emotional dimensions produce twelve categorical affective temperaments or types, which are divided into four major groups: internalized (depressive, anxious, apathetic), unstable (cyclothymic, dysphoric, volatile), stable (obsessive, euthymic, hyperthymic) and externalized (irritable, disinhibited, euphoric) (Lara et al., 2012).

Nevertheless, further studies have shown that temperament is not as stable as it was originally believed to be (Josefsson et al., 2013; Kandler et al., 2013; Laceulle et al., 2012). The TRAILS study, a large prospective cohort study of Dutch adolescents, showed that being exposed to stressful events was related to change in all temperament traits.

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analyzed—the more stressful the events, the stronger the deviation from normative temperament change during adolescence. The study also showed that temperament change not directed toward maturation was predictive of differences in the risk for mental disorders. Furthermore, other authors argue that temperament traits can be modulated by neuropsychiatric drugs or even by environmental influences such as psychotherapy, social support or aerobic exercise (Lara and Akiskal, 2006). This view suggests temperament may be influenced by neuroplasticity changes and may not be as stable as previously conceived.

Based on the hypothesis that temperament is a relatively stable dimension, the aim of this study was to investigate major temperament changes throughout life. To this end, we evaluated the self-reported affective temperaments in late childhood and late adolescence, assessed retrospectively, and adulthood from a large web-based study conducted in Brazil (Lara et al., 2012).

2. Methods

2.1. Study design

We used a cross-sectional web-based survey collected from the Brazilian Internet Study on Temperament and Psychopathology (BRAINSTEP) to investigate temperament course and possible changes throughout life. This study evaluates the affective temperament at late childhood, late adolescence and adult life. Temperament at the time of participation was assessed by the Affective and Emotional Composite Temperament Scale (AFECTS) questionnaire, and temperament at age of 12 and 18 was retrospectively assessed by participants’ self-report according to the AFECTS categorical temperament.

2.2. Data collection

BRAINSTEP is an advertisement-free website (www.temperamento.com.br) in which participants become part of an anonymous and confidential web-based survey by answering questions concerning personal information and temperament characteristics. The quality of the protocol is ensured through several validity questions throughout the survey.

2.3. Sample

Only subjects between the ages of 24 and 40 were included. The lower age limit was used as a cutoff point for maturation of the prefrontal cortex, which is thought to modulate activity in subcortical structures, including limbic areas that likely give rise to the ability to take charge of inhibitory control over emotions, one of the most centrally defining characteristics of healthy psychological development (Marsh et al., 2008). The upper limit was chosen as a way to diminish memory bias. Participants with incorrect answers in the validity questions (e.g. Please mark the alternative “sometimes” in this question) were excluded. From the initial sample, 19.3% of participants were excluded. The final sample consisted of 36,255 participants.

Electronic informed consent was obtained from participants before the beginning of the survey to fulfill requirements of the Brazilian legislation (Resolution 196/1996) and the Code of Ethics of the World Medical Association (Declaration of Helsinki). Participation was voluntary and subjects could quit at any moment. The Institutional Review Board from Pontifical Catholic University of Rio Grande do Sul approved the study protocol.

2.4. Measures

All participants provided basic socio-demographic data, which included gender, age, ethnicity, education level, marital status, religious affiliation and occupation. For practical quantification and classification of affective temperaments, we used the Affective and Emotional Composite Temperament Scale (AFECTS), a validated self-report instrument (Lara et al., 2012). This instrument was used before in previous published studies with large sample sizes, and is one of few instruments to assess temperament validated to Brazilian Portuguese.

The Affective and Emotional Composite Temperament (AFECT) model conceives emotional temperament as a system that operates with independent, but interacting components of activation, inhibition, control, sensitivity and coping. The various configurations of these emotional and cognitive characteristics generate 12 categorical affective temperaments or types, which are divided into 4 major groups of temperament—the IUSE groups: Internalized (depressive, avoidant, apathetic), Unstable (cyclothymic, dysphoric, volatile), Stable (obsessive, euthymic, hyperthymic) and Externalized (irritable, disinhibited, euphoric) (Lara et al., 2012). See the descriptions of each of the 12 temperaments in the supplementary material (Table 1).

2.4.1. Temperament in current adult life

The affective section of the AFECTS instrument evaluates this construct qualitatively. A short description of the twelve affective temperaments was presented and the volunteers were asked to select the profile that better described them at the time of participation.

2.4.2. Temperament at late childhood and late adolescence

Temperament at 10–12 years (late childhood) and 18 years (late adolescence) was assessed with the following questions: “Choose the description that most closely matches your profile when you were between 10 and 12 years old.” and “Choose the description that most closely matches your profile when you were 18 years old.” Again, a short descriptive version of the 12 temperaments was presented as in item 4.1.

2.4.3. Temperament change

Temperament change was defined as a mismatch between any of the assessed temperaments (late childhood, late adolescence and current temperament) was found. We analyzed temperament change using the 4 major IUSE groups (internalized, unstable, stable and externalized) and the 12 affective temperaments, separately.

2.5. Statistical analysis

Differences in the frequencies of affective temperament between age groups (late childhood, late adolescence and adulthood) were analyzed using the Chi-square test. Odds ratios (ORs) and 95% confidence intervals (95%CIs) were calculated to analyze associations between socio-demographic data and temperament change. The Statistical Package for the Social Sciences (SPSS Inc, Chicago, IL), version 20.0 for Windows was used. Given the large sample, we considered as statistically significant P values < 0.01.

3. Results

The mean age of our sample was 30.2 years old, 71.9% were women, most participants considered themselves to be Caucasian (71.7%), 58.5% had a University degree and 70.2% were employed. Considering the IUSE groups, most of the sample (65.2% of men and 66.6% of women) reported temperament change at least once from late childhood to the time of participation. We did not find any significant association between the socio-demographic data and temperament change.

Fig. 1 shows the distribution of the four major groups of temperament throughout lifetime separated by sex. We found differences regarding all IUSE temperament frequencies between sexes in the three age groups analyzed ($X^2= 23.203–108.755$, df = 3, $P = <0.001$). Furthermore, the frequency of internalized temperaments decreased from late childhood to late adolescence (34.5%–24.9% in women and
31.9%–26.6% in men), while an increase of externalized temperaments occurred (14.2%–20.3% in women and 17.3%–19.6% in men). From late adolescence to adult life, stable temperaments decreased slightly in frequency while unstable types increased in females (16.9%–22.3%). Yet, the stable type was the most common temperament group in adulthood (32.5%).

Our results showed that IUSE temperaments tend to change over time, except for the Stable temperament group, which presented a tendency for constancy between late childhood and late adolescence. In the other age intervals (late childhood to adulthood and late adolescence to adulthood), participants in the Stable temperament group changed more often to either internalized or externalized types. As an overall pattern for all intervals, subjects who identified with Internalized or Externalized temperaments presented higher rates of migration to the Stable temperament group and lower rates of transitioning to an opposite group of temperament (e.g., internalized to externalized). For subjects with an unstable temperament, we found no consistency in changing into a specific temperament type or remaining in the unstable temperament range in all age intervals. Temperament change and stability patterns for the four major groups of temperament (IUSE) at three different periods are shown in Fig. 1.

Regarding the 12 temperament types, 86% (n = 31,179) of the sample changed to a different category at adulthood. All 12 affective temperaments frequencies presented change between late childhood and adult life. The obsessive trait presented the highest rate (24.7%) of persistence. The migration patterns, from late childhood to adulthood, for each of the 12 affective temperaments are represented in Table 1.

### Table 1

<table>
<thead>
<tr>
<th>Childhood Temperament [current]</th>
<th>depr</th>
<th>avoid</th>
<th>apat</th>
<th>cyclot</th>
<th>dysph</th>
<th>volat</th>
<th>obses</th>
<th>euth</th>
<th>hyper</th>
<th>irrit</th>
<th>disinh</th>
<th>euph</th>
</tr>
</thead>
<tbody>
<tr>
<td>depressive</td>
<td>15.0</td>
<td>12.6</td>
<td>4.2</td>
<td>16.3</td>
<td>3.9</td>
<td>4.0</td>
<td>14.1</td>
<td>7.8</td>
<td>4.9</td>
<td>7.5</td>
<td>3.6</td>
<td>6.0</td>
</tr>
<tr>
<td>avoidant</td>
<td>9.9</td>
<td>16.5</td>
<td>2.5</td>
<td>11.7</td>
<td>3.4</td>
<td>2.9</td>
<td>17.9</td>
<td>12.1</td>
<td>6.2</td>
<td>6.9</td>
<td>3.9</td>
<td>6.1</td>
</tr>
<tr>
<td>apathetic</td>
<td>10.6</td>
<td>11.9</td>
<td>7.0</td>
<td>13.4</td>
<td>3.1</td>
<td>5.9</td>
<td>10.1</td>
<td>12.7</td>
<td>6.4</td>
<td>6.7</td>
<td>5.6</td>
<td>6.6</td>
</tr>
<tr>
<td>cyclothymic</td>
<td>11.4</td>
<td>10.7</td>
<td>3.0</td>
<td>20.1</td>
<td>4.3</td>
<td>4.3</td>
<td>12.9</td>
<td>6.1</td>
<td>5.8</td>
<td>8.7</td>
<td>3.8</td>
<td>8.9</td>
</tr>
<tr>
<td>dysphoric</td>
<td>5.8</td>
<td>10.7</td>
<td>2.6</td>
<td>17.3</td>
<td>5.7</td>
<td>3.4</td>
<td>15.0</td>
<td>7.0</td>
<td>7.2</td>
<td>10.0</td>
<td>4.4</td>
<td>11.1</td>
</tr>
<tr>
<td>volatile</td>
<td>5.4</td>
<td>8.4</td>
<td>4.8</td>
<td>15.1</td>
<td>4.1</td>
<td>8.3</td>
<td>7.6</td>
<td>7.5</td>
<td>7.6</td>
<td>7.4</td>
<td>9.2</td>
<td>14.6</td>
</tr>
<tr>
<td>obsessive</td>
<td>8.6</td>
<td>11.9</td>
<td>2.0</td>
<td>11.5</td>
<td>3.2</td>
<td>3.1</td>
<td>24.7</td>
<td>8.7</td>
<td>7.9</td>
<td>7.1</td>
<td>4.6</td>
<td>6.5</td>
</tr>
<tr>
<td>euthymic</td>
<td>8.8</td>
<td>13.0</td>
<td>3.9</td>
<td>11.2</td>
<td>3.4</td>
<td>2.6</td>
<td>13.1</td>
<td>17.5</td>
<td>9.2</td>
<td>7.6</td>
<td>4.3</td>
<td>5.4</td>
</tr>
<tr>
<td>hyperthymic</td>
<td>5.5</td>
<td>10.3</td>
<td>2.2</td>
<td>12.5</td>
<td>3.2</td>
<td>3.0</td>
<td>14.6</td>
<td>13.1</td>
<td>12.2</td>
<td>7.3</td>
<td>5.9</td>
<td>10.2</td>
</tr>
<tr>
<td>irritable</td>
<td>5.4</td>
<td>10.0</td>
<td>1.7</td>
<td>15.1</td>
<td>3.7</td>
<td>2.7</td>
<td>17.0</td>
<td>10.1</td>
<td>8.9</td>
<td>12.6</td>
<td>4.3</td>
<td>8.6</td>
</tr>
<tr>
<td>disinhibited</td>
<td>4.5</td>
<td>8.1</td>
<td>2.8</td>
<td>13.8</td>
<td>3.8</td>
<td>4.9</td>
<td>11.2</td>
<td>11.9</td>
<td>9.7</td>
<td>8.4</td>
<td>7.8</td>
<td>13.2</td>
</tr>
<tr>
<td>euphoric</td>
<td>5.5</td>
<td>6.7</td>
<td>2.0</td>
<td>15.5</td>
<td>3.7</td>
<td>4.9</td>
<td>9.1</td>
<td>7.3</td>
<td>12.1</td>
<td>9.1</td>
<td>7.6</td>
<td>16.5</td>
</tr>
</tbody>
</table>

The values are shown as percentages (%). Percentages were rounded and table cells were colored in a scale of lower and higher values. Abbreviations: depr-depressive; avoid-avoidant; apat-apathetic; cyclot-cyclothymic; dysp-dysphoric; volat-volatile; obses-obsessive; eut-euthymic; hypert-hypertensive; irrit-irritable; disinh-disinhibited; euph-euphoric.
of development than its alternatives. We did not have the assessment of emotional aspects of temperament in earlier ages (childhood and adolescence), it could be useful to evaluate micro-changes of temperament during lifespan. Regarding the instrument used to assess temperament: (1) as a self-report, the emotional status of the participant at the time of response can influence it; (2) we used a single-item measure (just one question with 12 answers); (3) it was applied in a completely uncontrolled environment. Finally, we stress that, despite their great relevance in modulating temperamental and psychological traits, environmental factors (especially those experienced during childhood and adolescence) and the presence of psychiatric disorders (including personality disorders) cannot be ruled out in the participants. Although this is the first attempt to address temperament course using the AFECTS model, our findings of the predominance of change is in line with studies using different models, such as the Five-factor Model, as noted by Harris et al. (2016). Nevertheless, given the methodological limitations described before, our results should be interpreted with caution and as a first step to consider the notion that there is a trend of instability on temperament during lifespan.

In conclusion, our retrospective study using a large internet sample and a categorical approach suggests that affective temperaments are quite inconsistent over time, contrary to the classic concept of temperament. Although our research presents interesting findings regarding temperament and its course throughout lifespan, further longitudinal studies may contribute to determine possible causes and risk factors (e.g., substance use, trauma, genetics, etc.) for these changes in temperament.

Conflicts of interest

None.
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Contributors

D.R. Lara and R.M.F. de Araújo designed the study and wrote the protocol. R. Zorzetti managed the literature searches and analyses. R. M. F de Araújo undertook the statistical analysis, and R. Zorzetti and L. D. Pereira wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2019.01.034.

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