Temperament and personality: the German version of the Adult Temperament Questionnaire (ATQ)

Temperament und Persönlichkeit: die deutsche Version des Erwachsenen-Temperament-Fragebogens (ATQ)

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Abstract

The psychobiological orientation inherent in temperament concepts permits a close tie between temperament and the rapidly proliferating research areas of neurosciences and behavioural genetics. Based on developmental and psychobiological studies, the Adult Temperament Questionnaire (ATQ) by Rothbart measures self-regulatory processes in addition to constitutionally based individual reactivity. The purpose of this paper is to validate a German version of the short form of the ATQ with 77 items. 213 psychosomatic inpatients and outpatients and 116 control subjects took part in this study. The study included standardized measures of personality and symptoms. The German version reliably measures the four dimensions negative affect, extraversion, orienting sensitivity and effortful control; subscales were moderately correlated. We found a consistent pattern of correlation to personality (NEO-FFI) and interpersonal problems (IIP), negative affect strongly correlated with neuroticism; effortful control correlated with conscientiousness, orienting sensitivity with openness, and extraversion correlated with the corresponding scale of the NEO-FFI. According to our hypothesis, negative affect was positively correlated with higher distress and physical complaints, while effortful control was negatively correlated with them. When negative affect and effortful control were combined, effortful control had a moderating effect on distress. Clinical and non-clinical samples differed significantly on all dimensions; the ATQ appears to be suitable for differentiating subgroups of patients according to self-regulation.

Keywords: temperament, personality, Adult Temperament Questionnaire, validation

Zusammenfassung

Die psychobiologische Orientierung von Temperamentkonzepten ermöglicht enge Verbindungen zu sich rasch entwickelnden Forschungsbereichen der Neurowissenschaften und Verhaltensgenetik. Auf der Grundlage von entwicklungs- und psychobiologischen Studien erfasst der Erwachsenen-Temperament-Fragebogen (ATQ) von Rothbart selbstregulatorische Prozesse zusätzlich zu konstitutioneller individueller Reaktivität. Ziel der Arbeit ist, die deutsche Version der Kurzform des ATQ mit 77 Items zu validieren. 213 ambulante und stationäre psychosomatische Patienten und 116 Vergleichspersonen nahmen an der Studie teil. Eingeschlossen wurden standardisierte Fragebögen zur Persönlichkeit, interpersonellen Beziehungen, körperlichen und psychischen Beschwerden. Die deutsche Version des ATQ erfasste die vier Dimensionen Negative Affektivität, Extraversion, Sensitivität für Reize und Willentliche Kontrolle zuverlässig; diese waren mäßig korreliert. Konsistente Muster von Korrelationen bestanden zu Persönlichkeit (NEO-FFI) und interpersonellen Problemen (IIP): Negative Affektivität korrelierte stark mit Neurotizismus, Willentliche Kontrolle mit Gewissenhaftigkeit, Sensitivität

gegenüber Reizen mit Offenheit und Extraversion mit der gleichnamigen Skala des NEO-FFI. Entsprechend unserer Hypothesen fand sich ein positiver Zusammenhang zwischen Distress und körperlichen Beschwerden zu negativer Affektivität, und negative Korrelationen zu willentlicher Kontrolle. In Kombination mit negativer Affektivität hatte willentliche Kontrolle einen moderierenden Effekt auf Distress. Klinische und nichtklinische Stichproben unterschieden sich deutlich auf allen Dimensionen; die Ergebnisse legen eine Differenzierung von Subgruppen definierter Patientenkollektive nach selbstregulativen Fähigkeiten nahe.

Schlüsselwörter: Temperament, Persönlichkeit, Erwachsenen-Temperament-Fragebogen, Validierung

Introduction

Temperament describes comprehensive, emotional and behavioral dispositions that are largely regarded to be biologically anchored and stable. Together with aspects of socialization, these dispositions ultimately contribute to personality, behavior, and even psychological disorders. The Greek-Roman typology describing characteristics of temperament in relation to bodily liquids and their proportions when mixed has had an enduring influence, above all on psychopathological developmental concepts [1].

The current renaissance of temperament concepts is likely linked to their psychobiological orientation that suggests connections to the rapidly proliferating research areas of behavioral genetics, neurosciences and developmental psychobiology. The observation of differential susceptibility to conditioning [2] underlies the concept of introversion and extraversion [3]. Accordingly, introverted individuals were more easily excitable and consequently preferred lower stimulation than extroverted whose cortices were less prone to excitement, thus leading them to prefer higher levels of stimulation. Gray defined personality in terms of three different systems of reactivity in relation to stimulus constellations [4]: (1) The Behavioral Inhibition System (BIS) comprises a network of the hippocampus, subiculum, septum and related structures. It reacts to conditioned stimuli for punishment or non-reward, to the unknown and to anxiety-provoking stimuli. Ongoing behavior is inhibited and attention to external stimulus is heightened. This system underlies negative affect, anxiety, sadness, and frustration. (2) The Behavioral Approach System (BAS) is based on the interplay between (basolateral, centromedial) central regions of the amygdala, the hypothalamus (ventromedial), the central gray matter and central somatic and motor regions of the brain stem. The BAS reacts to stimuli for reward and non-punishment. Behavior for approaching a goal is increased. It forms the foundation for positive affects (joy, enjoyment, satisfaction). (3) The less well differentiated fight-flight system is activated by unconditioned, aversive or threatening stimuli and triggers fight or flight behavior [5], [6]. It is assumed that the innate interplay of these systems is responsible for inter-individual differences in temperament [7].

In their model, Cloninger et al. define temperament as automatic and stable emotional reactions that are determined in part by genetic disposition [8]. Character, in contrast, covers self-concepts, goals, values, intentions, and meanings in life that are consciously accessible and influence intentions and attitudes. Cloninger associates implicit learning processes with temperament (conveyed through the limbic system and basal ganglia) and explicit learning, on the other hand, with character mediated through structures of the neocortex or hippocampus. The Temperament and Character Inventory (TCI) is increasingly implemented in clinical groups to measure temperament characteristics (e.g. personality disorders; [9]). The inventory includes four temperament scales (novelty seeking, harm avoidance, reward dependence, persistence) and three character scales (self-directedness, cooperativeness, self-transcendence). However, with 240 items, the questionnaire is very time-consuming; the distinction between temperament and character, explicit and implicit information processing, and their association with the brain structures mentioned above are not always clear.

Far-reaching consensus has been reached over the past years for the lexically and factor-analytically derived five-factor model for describing personality. In addition to the higher-order factors neuroticism and extraversion [3], it contains the dimensions conscientiousness, openness and agreeableness. McCrae et al. have recently described these higher-order personality characteristics along the lines of temperament as “endogenous dispositions that follow intrinsic paths of development essentially independent of environmental influences” [10]. They account for these initially surprising conclusions as follows: “Studies on heritability, limited parental influence, structural invariance across cultures and species, and temporal stability all point to the notion that personality traits are more expressions of human biology than products of life experience.” (p. 177). More recent studies on gene typing of defined collectives have shown, consistent with studies on twins and adopted children, that up to 50% of the variance in broadly defined personality traits (“The Big Five”) and temperament traits [8] are influenced by genetic features [11].

Rothbart and Bates ([12], p. 109) define temperament in an integrative concept as “constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation”. Temperament is regarded

as the result of biological evolution, as affective, motivational systems that are activated under circumstances of newness, sudden or intense stimulation or danger. In addition to the concept of reactivity to stimulation underlying most temperament models (characterized by features such as start, duration, and intensity of affective reactions, differences in excitability or tendency to overstimulation) Posner and Rothbart add the ability of self-regulation which helps modulate the reactivity [13]. This concept is founded above all on studies in developmental psychology and developmental biology and emanates from the domains of affects, activation and attention. With their Adult Temperament Questionnaire, ATQ, Rothbart's work group has presented a questionnaire that measures the temperament traits of negative affect, extraversion, orienting sensitivity, and effortful control [14]: *Negative affect* measures heightened sensitivity to a broad spectrum of negative stimuli; thus persons with heightened negative affect experience a broad span of negative affects such as fear, anxiety and sadness, depression and aggravation, and frustration [15]. *Effortful control* measures the ability to focus attention and shift to desired channels. This makes it possible, for instance, to perform an act even in the presence of strong avoidance tendencies. *Extraversion/surgency* measures sociability, pleasure from social interaction, enjoyment of intense stimulation, and positive emotionality. *Orienting sensitivity* (also called "cognitive sensitivity") measures the ability to be conscious of a neutral or emotional stimulation of low intensity from the surroundings, or a spontaneous idea not directly related to an association with the surrounding environment.

In neurobiological terms, the temperament concept [14] is based on the work of Gray [4], Posner [13] and Panksepp [16]. Accordingly, the authors regard the *behavior-inhibition system* [4] and the *rage-anger system* as underlying negative affect. *Extraversion* is based on the approach system [4] which is oriented to reward, active, seeks stimulation and is linked to positive affect. The dimension *orienting sensitivity* is based on Posner's theory of the posterior attention network [13]. This network serves to "orient" or focus attention on relevant places and serves to register new things. Structures involved here are the upper parietal lobe (effortful direction of attention) and the transition to the temporal cortex that enables attention to be pulled away from former objects (e.g. contra-lateral neglect after lesions). Even if the interplay is not yet fully understood, the colliculus superior (mid brain), thalamus (pulvinar) and frontal areas of the visual cortex coordinate the shift in attention and its attachment to a new object. The frontal attention network underlies *effortful control*. This aids in selecting competing or conflicting information or recognizing errors. The operative structures are the front part of the cingulate gyrus (anterior cingulate, AC), which is an interface between the cortex and limbic system, parts of the dorsolateral prefrontal cortex (working memory) and the basal ganglia.

Rothbart et al. [14] emphasize that the underlying psychobiological systems are not mature at birth, and therefore their development is influenced throughout maturity and by experience. For instance, a series of studies have shown that the maturity of attention functions takes place in well-defined stages. Thus, between the ages of 4-6 months an infant develops the ability to turn away its gaze and devote its attention to a new object. This also enables the inhibition of distress through distraction. At 12 months, the small child develops the ability to resolve conflicts between simultaneously active reaction tendencies, e.g. to reach beyond the field of vision. At 30 months it is able to solve spatial conflict tasks, and at 39-41 months it can actively inhibit reactions ("go/no-go tasks"). The performance on the tasks mentioned correlates with the corresponding parental assessment of the child's temperament, ability to delay reward and extent of brain structures (e.g. the volume of the right anterior cingulate). The validity of the ATQ was supported by correlations with the NEO-FFI. The authors assumed [14], [17] that fundamental temperament traits underlie global personality traits, as measured by the NEO-FFI. Hypotheses about the connections between the scales of the ATQ and the NEO-FFI were verified in college students. Thus effortful control can be regarded as an attention trait that underlies conscientiousness, while orienting sensitivity underlies openness. The inclination to distress is viewed as a central feature of neuroticism and a reward and incentive system as a core feature of extraversion.

The authors of the test showed that negative affect and effortful control are negatively correlated in children. They interpret this as possible evidence that better effortful control makes it possible to regulate negative affects. An initial clinical study on the Adult Temperament Questionnaire (ATQ) shows that patients with borderline personality disorders with high negative affect and low effortful control (compared to healthy controls) also have deficits in cognitive control (so-called attention network test). As predicted, there existed a negative correlation between effortful control and conflict resolution on the Attention Network Test [18], [19], [20], [21]. We found – albeit in a small sample – that obese patients with a binge eating disorder differed from those without binge eating in terms of higher negative affect and poorer cognitive control [22].

As the method appears promising for clinical application and has yet to be translated into German, this study presents the validation of a German version of the short form ATQ based on non-clinical and clinical samples, implementing standardized self-rating measures of personality, social relationships, psychological and physical complaints. We began with three hypotheses: (1) The pattern of correlation between the scales of the ATQ and the NEO-FFI reported by the authors of the test can be replicated in a healthy comparative sample and patients with psychological and psychosomatic disorders; (2) patients experiencing greater distress from symptoms also have higher negative affect; (3) patients differ substantially from controls in terms of higher negative affect and

lower effortful control; (4) effortful control moderates the connection between negative affect and distress.

Methods

Study participants

213 patients took part in the study (172 psychosomatic outpatients, 41 psychosomatic inpatients). The average age of the primarily female patients (69.5%) was 37.9 years (18-82 years). 41.8% were married, 43.2% single; 15% divorced, separated or widowed. 40.1% were employed full time, 18.9% part time; 7.1% were unemployed; altogether 34% were not employed (undergoing training, housewives, retired). The diagnoses included primarily affective disorders (ICD-10: F32-34), followed by adaptive disorders (F43: 26.8%); anxiety disorders (F41: 12.2%), somatoform (F45: 11.7%) and phobic disorders (F40: 5.6%). 15% had a personality disorder in addition.
The study included 116 comparative persons, predominantly (N=66) medical students and their relatives. At N=78 (67.2%), the proportion of women corresponded to that of the patient sample. The average age was 31.7 years (18-62 years).

Measurement procedures

The Adult Temperament Questionnaire (ATQ)

The short form of the ATQ with 77 items was translated into German and then independently translated back into English. Minor discrepancies between the two versions were discussed extensively and corrections were undertaken collaboratively by the two translators. The four scales, each containing 15 to 26 items, are comprised of 3 to 4 subscales each (see Table 1 and Table 2). The questions were presented as 7-scale Likert items with responses ranging from "not at all applicable" to "completely applicable". Mainly students and their relatives were recruited as the comparative sample. Since we were additionally interested in appropriateness for clinical groups, the questionnaire was also administered to 213 patients currently undergoing inpatient and outpatient psychosomatic-psychotherapeutic treatment.

Additional questionnaires

Due to the postulated congruence with the five-factor model of personality [4], we performed a validation using the NEO-FFI [23], the German version of the NEO Five-Factor Inventory by Costa and McCrae which was filled out by all study participants. The questionnaire method uses a factor analytic construct to provide a reliable measure of the underlying personality dimensions ("Big Five") *neuroticism* (e.g. nervous, anxious, sad, insecure), *extraversion* (sociable, active, talkative, jovial), *openness* for new experiences (curious, creative, imaginative), *agreeableness* (altruistic, compassionate, understanding) and *conscientiousness* (orderly, reliable, punctual, ambitious). The following questionnaires were only administered to patients: The *Symptom Check List* (SCL-90-R; [24]) is a standard instrument for measuring subjective impairment from psychological and physical symptoms, with 90 items on nine subscales (see Table 3). The global score (GSI) is a reliable measure of the current symptoms [25]. The *Giessen Complaint List* (GBB-24; [26]) is at present the best studied, age and sex-normed questionnaire in German for measuring general physical complaints [27]. The German version of the Inventory of Interpersonal Problems (IIP-D; [28]) measures self-perceived difficulties with other persons. It includes desired patterns difficult to achieve when dealing with other persons ("I find it hard to trust other people") and undesired patterns that individuals do "too often" ("I fight too much with others"). 64 items are grouped on 8 scales (8 items each): autocratic-dominant, quarrelsome-competitive, distant-cold, introverted-socially avoiding, insecure-submissive, exploitable-compliant, nurturing-friendly, expressive-importunate (see Table 3).

Statistics

We carried out the analysis using SPSS (version 10.0) with the usual parametric (AN(C)OVA, Pearson correlation) and non-parametric procedures. In order to test the influence of effortful control on the connection between negative affect and psychological distress, patients were divided according to the median split into groups of high or low negative affect and high or low effortful control. Sumscores of psychological, physical, and interpersonal distress were compared between the groups by analysis of variance.

Results

Internal consistency and correlations of the Adult Temperament Questionnaire (ATQ)

Table 1 shows the items of the short form ATQ and their scales and subscales. Table 2 shows the scales and subscales along with definitions of the scales and example items. The internal consistency of our sample was compared with the scores reported by the authors of the test.

Table 1: Scales and subscales of the Adult Temperament Questionnaire (ATQ)

	Translated items of the Adult Temperament Questionnaire (ATQ)	Scale	Subscale
1	Ich erschrecke mich leicht.	Negative affect	Fear
2R	Ich komme oft zu spät zu Verabredungen.	Effortful control	Activation control
3	Manchmal stimmen mich geringfügige Ereignisse sehr glücklich.	Extraversion	Positive affect
4	Ich finde laute Geräusche sehr irritierend.	Negative affect	Discomfort
5R	Es fällt mir oft schwer, zwischen zwei unterschiedlichen Aufgaben hin und her zu wechseln.	Effortful control	Attentional control
6R	Ich werde selten ärgerlich, wenn ich in der Schlange warten muss.	Negative affect	Frustration
7R	Ich würde laute Musik mit Lichtshow nicht genießen.	Extraversion	High intensity pleasure
8R	Ich mache oft Pläne, die ich nicht durchführe.	Effortful control	Activation control
9	Ich bin traurig, wenn ich mich von Freunden oder Verwandten verabschiedet habe.	Negative affect	Sadness
10R	Unscheinbare bildliche Details gewinnen kaum meine Aufmerksamkeit.	Orienting sensitivity	Neutral perceptual sensitivity
11	Auch wenn ich mich voller Energie fühle, kann ich gewöhnlich ohne große Schwierigkeiten ruhig sitzen, wenn es nötig ist.	Effortful control	Inhibitory control
12	Von hoch oben nach tief unten zu schauen, würde mich sehr unbehaglich machen.	Negative affect	Fear
13	Wenn ich Musik höre, bin ich mir gewöhnlich der feinen emotionalen Untertöne bewusst.	Orienting sensitivity	Affective perceptual sensitivity
14R	Ich würde keine Tätigkeit genießen, die geselligen Umgang mit der Öffentlichkeit erfordert.	Extraversion	Sociability
15	Ich kann eine Aufgabe weiter ausführen, auch wenn ich es lieber nicht täte.	Effortful control	Activation control
16R	Manchmal scheine ich nicht fähig zu sein, Freude an Ereignissen und Aktivitäten zu finden, die ich genießen sollte.	Extraversion	Positive affect
17	Ich finde es sehr ärgerlich, wenn ein Laden einen Gegenstand nicht vorrätig hat, den ich kaufen möchte.	Negative affect	Frustration
18	Ich bin für emotionale Aspekte von Gemälden und Bildern empfänglich.	Orienting sensitivity	Affective perceptual sensitivity
19	Ich rede gewöhnlich gerne viel.	Extraversion	Sociability
20R	Ich werde selten traurig, wenn ich einen traurigen Film anschaue.	Negative affect	Sadness
21	Ich bin mir oft des Zwitscherns von Vögeln in meiner Umgebung bewusst.	Orienting sensitivity	Neutral perceptual sensitivity
22	Ich fühle mich unbehaglich, wenn ich in kleinen Räumen oder in einem Aufzug eingeschlossen bin.	Negative affect	Fear
23	Wenn ich Musik höre, drehe ich gern die Lautstärke höher als andere Personen.	Extraversion	High intensity pleasure
24	Ich scheine Dinge manchmal intuitiv zu verstehen.	Orienting sensitivity	Associative sensitivity
25	Manchmal verursachen geringfügige Ereignisse bei mir das Gefühl intensiver Traurigkeit.	Negative affect	Sadness
26	Es fällt mir leicht, mein Lachen in Situationen zurückzuhalten, wenn es unpassend wäre.	Effortful control	Inhibitory control

(Continued)

Table 1: Scales and subscales of the Adult Temperament Questionnaire (ATQ)

27	Ich kann mich dazu bringen, an einer schwierigen Aufgabe zu arbeiten, auch wenn ich keine Lust habe, es zu versuchen.	Effortful control	Activation control
28	Ich habe selten Tage, an denen ich nicht wenigstens kurze Momente intensiver Freude empfinde.	Extraversion	Positive affect
29R	Ich werde leicht abgelenkt, wenn ich versuche mich zu konzentrieren.	Effortful control	Attentional control
30	Ich würde wahrscheinlich ein schnelles, blitzendes und lautstarkes Videospiel genießen.	Extraversion	High intensity pleasure
31	Immer wenn ich warten muss (z. B. im Wartezimmer), werde ich unruhig.	Negative affect	Frustration
32	Mir macht oft Licht zu schaffen, das zu hell ist.	Negative affect	Discomfort
33R	Ich bemerke selten die Augenfarbe von Personen.	Orienting sensitivity	Neutral perceptual sensitivity
34R	Ich werde selten traurig, wenn ich von einem unglücklichen Ereignis höre.	Negative affect	Sadness
35	Wenn ich unterbrochen oder abgelenkt werde, kann ich meistens meine Aufmerksamkeit wieder auf das richten, was ich zuvor getan habe.	Effortful control	Attentional control
36	Ich finde bestimmte Kratzgeräusche sehr irritierend.	Negative affect	Discomfort
37	Ich mag Gespräche, die mehrere Personen einschließen.	Extraversion	Sociability
38R	Ich bin gewöhnlich eine geduldige Person.	Negative affect	Frustration
39	Wenn ich mit geschlossenen Augen ruhe, sehe ich manchmal Bilder vor meinem inneren Auge.	Orienting sensitivity	Associative sensitivity
40R	Es fällt mir sehr schwer mich zu konzentrieren, wenn ich unglücklich bin.	Effortful control	Attentional control
41	Manchmal ist mein Kopf voller verschiedenartiger, lose verbundener Gedanken und Bilder.	Orienting sensitivity	Associative sensitivity
42	Grelle Farben machen mir manchmal zu schaffen.	Negative affect	Discomfort
43	Ich kann leicht widerstehen jemanden zu unterbrechen, selbst wenn ich erregt bin und eine Idee äußern möchte.	Effortful control	Inhibitory control
44R	Ich würde wahrscheinlich keine schnelle, wilde Karusselfahrt genießen.	Extraversion	High intensity pleasure
45	Manchmal fühle ich mich länger als eine Stunde traurig.	Negative affect	Sadness
46R	Geselligkeit in großer Runde macht mir selten Spaß.	Extraversion	Sociability
47	Wenn ich an etwas denke, was getan werden muss, mache ich mich gewöhnlich sofort an die Arbeit.	Effortful control	Activation control
48	Es ist leicht, mich frustriert oder irritiert fühlen zu lassen.	Negative affect	Frustration
49	Es ist einfach, eine glückliche Reaktion in mir wachzurufen.	Extraversion	Positive affect
50R	Wenn ich glücklich und aufgeregt über ein bevorstehendes Ereignis bin, fällt es mir schwer meine Aufmerksamkeit auf Aufgaben zu richten, die Konzentration erfordern.	Effortful control	Attentional control
51	Manchmal fühle ich Panik oder Erschrecken ohne offenkundigen Grund.	Negative affect	Fear
52	Ich bemerke oft milde Gerüche und Düfte.	Orienting sensitivity	Neutral perceptual sensitivity
53R	Es fällt mir oft schwer, meinem Verlangen nach Essen, Getränken, etc. zu widerstehen.	Effortful control	Inhibitory control

(Continued)

Table 1: Scales and subscales of the Adult Temperament Questionnaire (ATQ)

54	Farbige, blitzende Lichter stören mich.	Negative affect	Discomfort
55	Ich stelle gewöhnlich Dinge fertig, bevor sie tatsächlich fällig sind (z. B. Rechnungen bezahlen, Hausarbeit erledigen, etc.).	Effortful control	Activation control
56	Ich fühle mich oft traurig.	Negative affect	Sadness
57	Es ist mir oft bewusst, wie Farbe und Beleuchtung eines Zimmers meine Stimmung beeinflussen.	Orienting sensitivity	Affective perceptual sensitivity
58R	Ich bleibe gewöhnlich ruhig ohne frustriert zu werden, wenn Dinge für mich nicht glatt gehen.	Negative affect	Frustration
59	Laute Musik ist mir unangenehm.	Negative affect	Discomfort
60R	Wenn ich über etwas aufgeregt bin, fällt es mir gewöhnlich schwer, nicht sofort zu handeln, bevor ich die möglichen Folgen erwogen habe.	Effortful control	Inhibitory control
61	Laute Geräusche erschrecken mich manchmal.	Negative affect	Fear
62	Ich träume manchmal von lebhaften, detaillierten Schauplätzen, die anders sind als alles, was ich im Wachzustand erlebt habe.	Orienting sensitivity	Associative sensitivity
63R	Wenn ich einen begehrenswerten Gegenstand in einem Geschäft sehe, fällt es mir gewöhnlich sehr schwer, dem Kauf zu widerstehen.	Effortful control	Inhibitory control
64	Ich würde es genießen, eine Laserlichtshow mit vielen hellen, farbigen Blitzen anzuschauen.	Extraversion	High intensity pleasure
65	Wenn ich von einem unglücklichen Ereignis höre, fühle ich mich sofort traurig.	Negative affect	Sadness
66R	Wenn ich einen Film betrachte, bemerke ich gewöhnlich nicht, wie ein Schauplatz gestaltet wird, um die Stimmung zu vermitteln.	Orienting sensitivity	Affective perceptual sensitivity
67	Meistens mag ich meine Freizeit mit anderen Menschen zu verbringen.	Extraversion	Sociability
68R	Es macht mir keine Angst, wenn ich annehme, dass ich alleine bin und plötzlich entdecke, dass doch jemand in der Nähe ist.	Negative affect	Fear
69	Ich bin mir oft bewusst, wie das Wetter meine Stimmung zu beeinflussen scheint.	Orienting sensitivity	Affective perceptual sensitivity
70R	Es ist nicht leicht mich wirklich glücklich zu fühlen.	Extraversion	Positive affect
71R	Ich bin mir selten der Beschaffenheit der Dinge bewusst, die ich in der Hand taste.	Orienting sensitivity	Neutral perceptual sensitivity
72R	Wenn ich Angst habe, wie eine Situation ausgehen könnte, vermeide ich sie gewöhnlich anzupacken.	Effortful control	Activation control
73	Ich genieße vor allem Unterhaltungen, wenn ich Dinge sagen kann ohne zuerst nachzudenken.	Extraversion	High intensity pleasure
74	Ohne große Anstrengungen kommen mir manchmal kreative Ideen von selbst.	Orienting sensitivity	Associative sensitivity
75R	Wenn ich etwas Neues versuche, mache ich mir selten Gedanken über die Möglichkeit eines Fehlschlags.	Negative affect	Fear
76	Es fällt mir leicht, Vergnügen zu unterdrücken, das nicht angemessen wäre.	Effortful control	Inhibitory control
77R	Ich würde nicht das Gefühl genießen, das aufkommt, wenn ich so laut schreie, wie ich kann.	Extraversion	High intensity pleasure

R = Items reversed

Table 2: Reliability of the scales and subscales of the Adult Temperament Questionnaire (ATQ)

Scales	Subscales	α [1]	α_A [2]	Definition
Negative Affect (26) [3]		**.844** [4]	**.81**	
	Fear (7) [3]	.651	.64	Unpleasant affect associated with the anticipation of pain or distress.
	Frustration (6)	.523	.72	The amount of unpleasant affect related to the interruption of ongoing tasks and behavior or to the blocking of a desired goal.
	Sadness (7)	.736	.62	The amount of lowered mood that is related to object or person loss, disappointment, and exposure to suffering.
	Discomfort (6)	.818	.69	The amount of unpleasant affect resulting from the sensory qualities of stimulation, including irritation, pain, and discomfort resulting the intensity, rate, complexity of light, movement, sound, smell/taste, temperature, and texture.
Effortful control (19)		**.736** [5]	**.78**	
	Activation control *(7)*	.622	.69	The capacity to suppress negatively toned impulses and thereby resist the execution of inappropriate avoidance tendencies.
	Inhibitory control *(7)*	.487	.60	The capacity to suppress positively toned impulses and thereby resist the execution of inappropriate approach tendencies.
	Attentional control *(5)*	.634	.73	The ability to intentionally shift and focus attention in relation to task relevant stimuli and thoughts.
Extraversion (17)		**.740** [6]	**.75**	
	Sociability *(5)*	.679	.71	The pleasure about social interaction and the presence of others.
	High intensity pleasure *(7)*	.638	.68	The pleasure about situations with high intensity stimulation, rate, complexity, novelty and incongruence
	Positive affect (5)	.583	.62	Latency, threshold, intensity, duration and frequency for the experience of pleasure
Orienting sensitivity (15)		**.722** [7]	**.85**	
	Neutral perceptual sensitivity *(5)*	.452	.64	Notice stimulation with low intensity in the own body or in the environment
	Affective perceptual sensitivity *(5)*	.608	.79	Spontaneous emotional and aware cognitions combined with low intensity stimulation.
	Associative sensitivity *(5)*	.560	.67	Spontaneous cognition without a direct association to the environment.

[1] Cronbach's alpha for the total sample (N=323-326); [2] Cronbach's alpha of the test authors; [3] Number of items in parentheses; [4] Control group α=.806, patients α=.852; [5] Control group α=.762, patients α=.707; [6] Control group α=.695, patients α=.703; [7] Control group α=.734, patients α=.712

As the table shows, the scales were reliable. Cronbach alpha of the entire sample was between .72 and .84 and as such was good, comparable with the results of the authors of the test. Only the reliability of orienting sensitivity was somewhat lower than that found by the test authors. With regard to internal consistency, no systematic differences occurred between patients and students, therefore they are presented together.

Table 3: Intercorrelationen of the scales

			NA	EC	ES	OS	N	E	O	A	C
ATQ [1,2]	*Negative affect*	**NA**	-								
	Effortful control	**EC**	-.46 **	-							
	Extraversion	**ES**	-.46 **	.13 *	-						
	Orienting sensitivity	**OS**	.20 **	.04	.18 **	-					
NEOFFI [2,3]	*Neuroticism*	**N**	.70 **	-.55 **	-.42 **	.08	-				
	Extraversion	**E**	-.44 **	.27 **	.72 **	.17 **	-.48 **	-			
	Openess	**O**	.08	.00	.26 **	.65 **	-.03	.17 **	-		
	Agreeableness	**A**	-.14 *	.30 **	.11	-.01	-.26 **	.25 **	-.06	-	
	Conscientiousness	**C**	-.21 **	.58 **	.10	.09	-.29 **	.30 **	-.02	.25 **	-
SCL-90R [4,5]	*GSI*		.61 **	-.44 **	-.40 **	.03	.72 **	-.43 **	-.06	-.23 **	-.30 **
GBB [5,6]	*Fatigue*		.42 **	-.36 **	.-31 **	.10	.43 **	-.32 **	.05	-.15 *	-.26 **
	Gastrointestinal complaints		.20 **	-.26 **	-.13	-.02	.25 **	-.12	.00	-.08	-.19 **
	Musculosceletal complaints		.44 **	-.23 **	-.27 **	.12	.34 **	-.21 **	.02	-.14	-.04
	Cardiovascular complaints		.38 **	-.19 **	-.26 **	.05	.35 **	-.23 **	-.00	-.17 *	-.21 **
	Total complaints		.46 **	-.34 **	-.31 **	.09	.44 **	-.27 **	.04	-.17 *	-.20 **
IPP [5,7]	*Autocratic-dominant*		-.29 **	.05	.36 **	.02	-.34 **	.30 **	.07	-.26 **	.05
	Quarrelsome-competitive		-.19 **	-.01	-.01	-.14 *	-.17 *	-.12	-.04	-.43 **	.01
	Distant-cold		-.06	-.04	-.20 **	-.10	-.07	-.27 **	-.07	-.38 **	.05
	Introverted-socially avoiding		.22 **	-.10	-.49 **	-.20 **	.24 **	-.59 **	-.20 **	-.10	-.09
	Insecure-submissive		.27 **	-.07	-.24 **	-.03	.28 **	-.18 *	-.06	.30 **	-.12
	Exploitable-compliant		.01	-16 *	.06	.10	.01	.19 **	.02	.42 **	.05
	Nurturing-friendly		.12	.14 *	.13	.23 **	.10	.26 **	.15 *	.40 **	.10
	Expressive-importunate		-.09	-.14	.43 **	.16 *	-.08	.46 **	.15 *	.07	-.02
	Total		.63 **	-.37 **	-.39 **	.12	.63 **	-.35 **	.02	-.17 *	-.21 **

[1] N=323-326; [2] Patients and control group; [3] N=314-326; [4] N=201-209; [5] Patients; [6] N=187-205; [7] N=199-210; * p<.05; ** p<.01

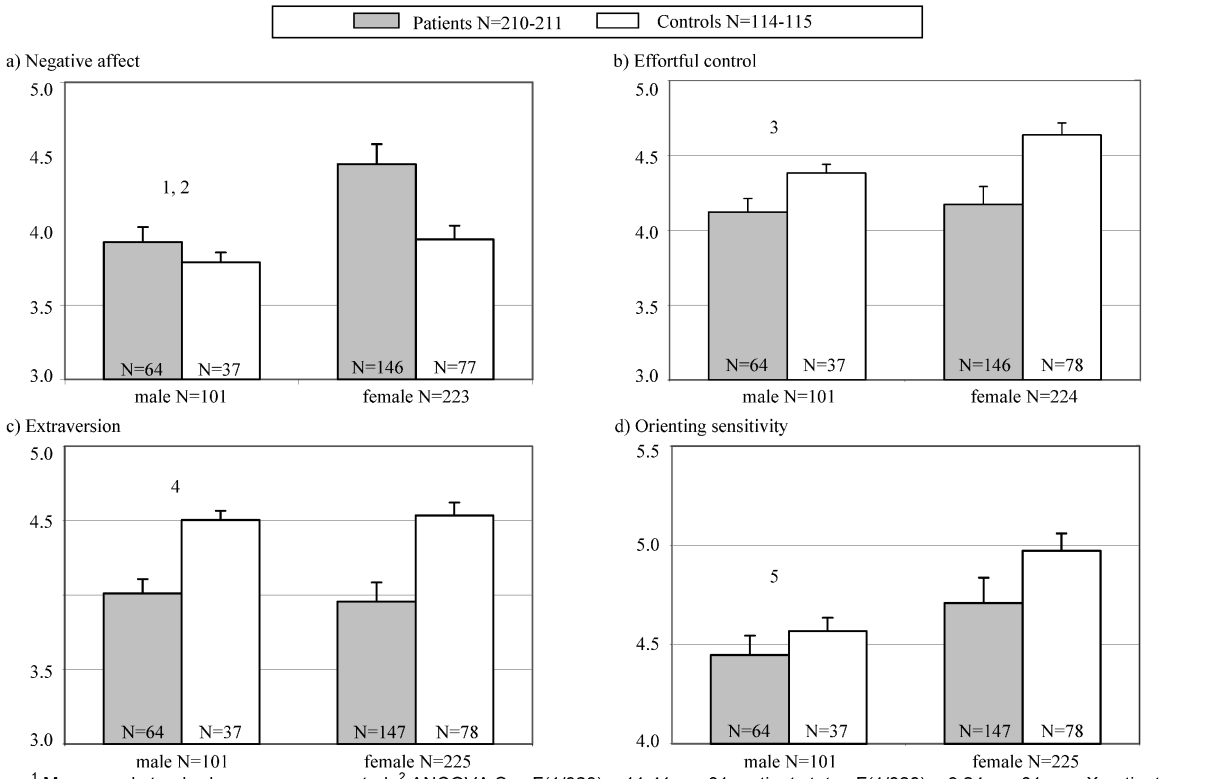
Table 3 shows the inter-correlations of the subscales of the ATQ and correlations with the NEO-FFI, the SCL-90R, GBB and IIP.

As the table shows, the inter-correlations of the scales were moderately high. *Negative affect* (NA) had a negative correlation to the same extent with *effortful control* as with *extraversion*; there was low correlation with *orienting sensitivity*. Significant but low correlation was found between *effortful control* (EC) and *extraversion* (ES) as well as between *extraversion* and *orienting sensitivity* (OS); *orienting sensitivity* and *effortful control* showed no correlation

In accordance with the findings of Rothbart et al. [14], *negative affect* correlated most strongly with neuroticism; there was also low negative correlation with extraversion, conscientiousness, and agreeableness. *Effortful control* (EC) had the strongest positive correlation with conscientiousness, followed by agreeableness and extraversion; there was a negative connection with neuroticism. *Extraversion* correlated most strongly with extraversion (NEO-FFI), less with openness; there was also a significant negative correlation with neuroticism. *Orienting sensitivity* correlated highly positively with openness and had a lower positive correlation with extraversion.

Negative affect was accompanied by high symptom pressure (GSI) and physical complaints (GBB); effortful control, in contrast, correlated negatively and highly significantly with all complaints measured. We found similar outcomes for *extraversion* (with the exception of gastric complaints). *Orienting sensitivity* did not correlate with complaints.

Interpersonal problems were reported equally as frequently with increased *negative affect*. This occurred above all in insecure and introverted, socially avoiding demeanor with overall distress from interpersonal difficulties; few had an autocratic and quarrelsome demeanor. *Effortful control* accompanied a nurturing and minimally exploitable demeanor and overall low level of interpersonal problems. Increased *extraversion* expressed itself with few overall problems, through greater expression, autocratic-dominant demeanor, and little introverted-avoiding, insecure or distant demeanor. *Orienting sensitivity* was accompanied by increased caring and expression, little social avoidance or quarrelsomeness.



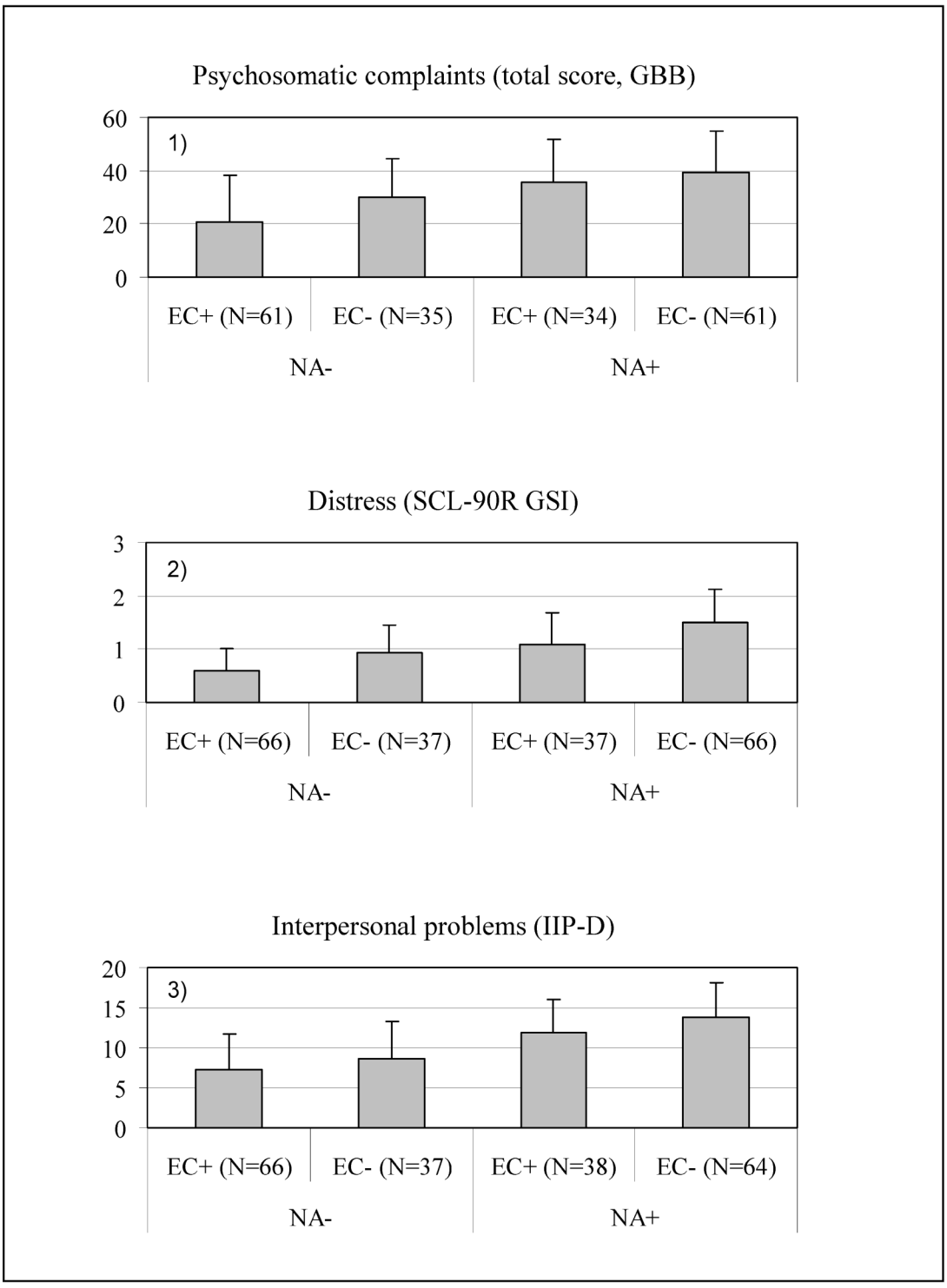
[1] Means and standard errors are presented; [2] ANCOVA Sex F(1/323) = 11.41, p<.01; patient status F(1/323) = 9.24, p<.01; sex X patient status F(1/323) = 3.29, p<.10; [3] sex F(1/324) = 2.88, p<.10; patient status F(1/325) = 15.12, p<.001; [4] patient status F(1/325) = 28.98, p<.001; [5] sex F(1/325) = 12.02, p<.01; patient status F(1/325) = 3.66, p<.10

Figure 1: Scales of the Adult Temperament Questionnaire (ATQ) depending on patient status (vs. controls) and sex

In addition, the following *factors* influencing the scores on the four scales were tested: patient status, sex, age. Figure 1(a-d) shows the influence of patient status and sex on the scores for the four subscales. Two-factorial analyses of variances were performed for sex and group status (patients vs. controls). Age was controlled as covariate; the means shown are age-corrected. As the figure shows, the patients had highly significant greater negative affect and lower effortful control and extraversion, also a tendency to reduced orienting sensitivity. Women reported significantly higher scores of negative affect and a tendency for greater orienting sensitivity as compared to men.

Relationship between distress, negative affect and effortful control

Starting from the hypothesis that effortful control moderates the connection between negative affect and distress, patients were divided along the median split into high and low negative affect and effortful control. We performed analyses of variances followed by a Scheffé test. The results (see Figure 2) showed that effortful control exerts a moderating effect: patients who complained most about distress had high negative affect and low effortful control, followed by high negative affect and high effortful control. Patients with lower distress had low negative affect but low effortful control. Patients with the lowest distress reported high effortful control and low negative affect. This was true for the psychological distress GSI (SCL-90R), physical complaints (GBB), and interpersonal problems (IIP).



1) ANOVA: F(3/190)=14.81, p<.001; Scheffé: NA-EC+ < NA+EC-, NA-EC+ < NA+EC+, NA-EC- < NA+EC-;
2) ANOVA: F(3/205)=32.25, p<.001; Scheffé: NA-EC+ < NA+EC-, NA-EC+ < NA-EC-, NA-EC+ < NA+EC+, NA-EC- < NA-EC+, NA-EC- < NA+EC-, NA+EC+ < NA+EC-;
3) ANOVA: F(3/204)=27.78, p<.001, Scheffé: NA-EC+ < NA+EC+, NA-EC+ < NA+EC-, NA-EC- < NA+EC+, NA-EC- < NA+EC-

Figure 2: Distress depending on negative affect and effortful control

Discussion

The Adult Temperament Questionnaire (ATQ) represents a promising, reliable, and valid questionnaire in German language that differentiates the four dimensions of temperament (*"negative affect"*, *"effortful control"*, *"extraversion"* and *"orienting sensitivity"*). The original four scales of the ATQ were replicated in the German translation.

The fact that a consistent pattern was found of correlations to personality traits and interpersonal problems speaks for the validity of the scales. Congruent to the findings of the test authors [14], negative affect corresponded most highly with neuroticism (NEO-FFI); we also found negative, low correlations to extraversion, conscientiousness, and agreeableness. Effortful control (EC) correlated most strongly positively with conscientiousness, followed by agreeableness and extraversion; a negative connection existed with neuroticism. Extraversion correlated most strongly with the corresponding scale on the NEO-FFI, less with openness; we also found a significant negative correlation to neuroticism. Orienting sensitivity correlated highly positively with openness; positively but low with extraversion (NEO-FFI).

In accordance with our hypothesis, negative affect accompanied high distress (GSI) and physical complaints (GBB); effortful control, on the other hand, was correlated highly significantly negative with all complaints measured. We found comparable outcomes for extraversion (with the exception of gastric complaints). No correlation existed between orienting sensitivity and complaints.

Negative affect accompanied interpersonal problems (IIP), above all an insecure and introverted demeanor but reduced autocratic and quarrelsome bearing. Effortful control occurred with few interpersonal problems, a caring and little exploitable demeanor. Increased extraversion expressed itself in few overall problems, higher expressivity, autocratic demeanor, but low interest, insecure or distant demeanor. Orienting sensitivity occurred with increased caring, expressivity, low interest and little quarrelsomeness.

As postulated, the most distinct correlations existed in our sample between negative affect and the two dimensions effortful control and extraversion. The other scales were largely independent of each other. A higher negative affect in women as compared to men might correspond to a generally higher rating by women of their symptoms. As expected, the scale scores of patients for negative affect were distinctly higher than those of the comparative group; their effortful control, on the other hand, was distinctly lower. This is in accord with the first clinical findings in borderline personality disorders [18], [19], [20], [21] and our findings in patients with obesity with psychological comorbidity [22].

When we combined negative affect and effortful control, we found, congruent to our hypothesis, effortful control to have a moderating effect: Patients with the greatest distress had high negative affect and low effortful control, followed by high negative affect and high effortful control. Patients with low distress scores had lower negative affect, but lower effortful control. Patients reporting the lowest distress had high effortful control and low negative affect. This was true for psychological distress GSI (SCL-90R), physical complaints (GBB) and interpersonal problems (IIP). These findings speak for the validity of the model which aims to measure both reactive and regulative dimensions of temperament.

The traits of the "Big Five" have frequently been criticized because they lack a dynamic perspective [29]. Temperament concepts describe functional models of differential reactivity and responsiveness to internal and external stimuli. Individual differences in the reaction of basal psychobiological functions, for instance appetitive (BAS) or defensive systems (e.g. BIS) are linked to physiological systems and functions (neural networks, transmitter systems, etc.). These concepts are augmented in the temperament model presented here by self-regulative systems tied to attention functions that are well characterized in the neuro-sciences. Thus, effortful control, for instance, possesses the ability to inhibit prepotent positive (extraversion) and negative (negative affect) reactions and execute sub-dominant reaction tendencies, while orienting sensitivity facilitates perception of peripheral stimuli that have emotional relevance. Therefore, reactive and effortful features of attention processes can be related dynamically to the activation or suppression of positive and negative emotionality. Numerous examples in the scientific literature also speak for the negative correlation between negative affect and effortful control, as has been shown, for instance, in the STROOP test for emotions where negative semantic information can impair executive processes; attention disorders have been described as disturbances of anxiety disorders and depression [15].

In the present cross-sectional study, attention functions were not measured independently in the psychological screening. Due to the heterogeneity of the sample, specific subgroups (e.g. borderline personality disorders) cannot be reliably separated. Nevertheless, our findings on the interaction between effortful control and negative affect suggest that future, prospective studies – analogue to Posner et al. [18], [19], [20], [21] – could more clearly characterize subgroups in the Adult Temperament Questionnaire along diagnostic categories reflecting self-regulative functions and potential prognostic factors.

Notes

Conflicts of interest: none declared.

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References

1. Akiskal HS, Brieger P, Mundt C, Angst J, Marneros A. Temperament und affektive Störungen. Die TEMPS-A-Skala als Konvergenz europäischer und US-amerikanischer Konzepte. Nervenarzt. 2002;73:262-71.
2. Pavlov IP. General types of animal and human higher nervous activity. Selected works. Moscow: Foreign Language Publishing House; (Original work published 1935) 1955.
3. Eysenck HJ, Eysenck M. Personality and individual differences. A natural science approach. New York, London: Plenum; 1985.
4. Gray JA. Neural systems, emotion and personality. In: Madden J, ed. Neurobiology of learning, emotion and affect. New York: Raven; 1991. p. 273-306.
5. Hartig J, Moosbrugger H. Die "ARES-Skalen" zur Erfassung der individuellen BIS- und BAS-Sensitivität. Zeitschrift für Differentielle und Diagnostische Psychologie. 2003;24:293-310.
6. Reuter M, Stark R, Hennig J, Walter B, Kirsch P, Schienle A, Vaitl D. Personality and emotion: test of Gray's personality theory by means of an fMRI study. Behav Neurosci. 2004;118:462-9.
7. Rothbart MK. Biological processes in temperament. In: Kohnstamm GA, Bates JE, Rothbart MK, eds. Temperament in Childhood. Chichester: John Wiley and Sons Ltd; 1989.
8. Cloninger CR, Prybeck TR, Svrakic DM, Wetzel RD. Temperament- und Charakter-Inventar (TCI). Frankfurt a. M.: Swets Test Services; 1999.
9. Svrakic DM, Draganic S, Hill K, Bayon C, Przybeck TR, Cloninger CR. Temperament, character, and personality disorders: etiologic, diagnostic, treatment issues. Acta Psychiatr Scand. 2002;106:189-95.
10. McCrae RR, Costa PT, Ostendorf F, Angleitner A, Hrebickova M, Avia MD, Sanz J, Sánches- Bernardos ML, Kusdil ME, Woodfield R, Saunders PR, Smith PB. Nature over nurture: temperament, personality, and life span development. J Pers Soc Psychol. 2000; 78:173-186.
11. Faller H. Verhaltensgenetik. Was bringt die Genetik für das Verständnis der Entwicklung von Persönlichkeitseigenschaften und psychischen Störungen? Psychotherapeut. 2003;48:80-92.
12. Rothbart MK, Bates JE. Temperament. In: Damon W, series Ed, Eisenberg N, vol. ed. Handbook of child psychology. Vol. 3. Social, emotional and personality development. (5th ed.). New York: Wiley; 1998. p. 105-76.
13. Posner MI, Rothbart MK. Developing mechanisms of self-regulation. Dev Psychopathol. 2000;12:427-41.
14. Rothbart MK, Ahadi SA, Evans DE. Temperament and personality: Origins and outcomes. J Pers Soc Psychol. 2000;78:122-35.
15. Clark LA, Watson D, Mineka S. Temperament, personality, and the mood and anxiety disorders. J Abnorm Psychol. 1994;103:103-16.
16. Panksepp J. Affective neuroscience. New York, Oxford: Oxford University Press; 1998.
17. Derryberry D, Reed MA, Pilketon-Taylor C. Temperament and coping: advantages of an individual differences perspective. Dev Psychopathol. 2003;15:1049-66.
18. Posner MI, Rothbart MK, Vizueta N, Levy KN, Evans DE, Thomas KM, Clarkin JF. Attentional mechanisms of borderline personality disorder. Proc Natl Acad Sci USA. 2002;99:16366-70.
19. Posner MI, Rothbart MK, Vizueta N, Thomas KM, Levy KN, Fossella J, Silbersweig D, Stern E, Clarkin J, Kernberg O. An approach to the psychobiology of personality disorders. Dev Psychopathol. 2003;15:1093-1106.
20. Clarkin, JF, Posner M. Defining the mechanisms of borderline personality disorder. Psychopathology. 2005;38:56-63.
21. Fertuck EA, Lenzenweger MF, Clarkin JF. The association between attentional and executive controls in the expression of borderline personality disorder features: a preliminary study. Psychopathology. 2005;38:75-81.
22. Beutel ME, Klockenbrink P, Wiltink J, Dietrich S, Thiede R, Fan J, Posner MI. Aufmerksamkeit und exekutive Funktionen bei Patienten mit Adipositas per magna - eine kontrollierte Studie mit dem Aufmerksamkeitsnetzwerktest (ANT). Nervenarzt. In press.
23. Borkenau P, Ostendorf F. NEO-Fünf-Faktoren Inventar (NEO-FFI) nach Costa und McCrae. Handanweisung. Göttingen: Hogrefe-Verlag; 1993.
24. Franke G. SCL-90-R: Die Symptom-Checkliste von Derogatis - Deutsche Version - Manual. Göttingen: Beltz Test; 1995.
25. Hessel A, Schumacher J, Geyer M, Brähler E. Symptom-Checkliste SCL-90-R: Testtheoretische Überprüfung und Normierung an einer bevölkerungsrepräsentativen Stichprobe. Diagnostica. 2001;47:27-39.
26. Brähler E, Scheer JW. Der Gießener Beschwerdebogen (GBB). Handbuch (2. Auflage). Bern: Huber; 1995.
27. Brähler E, Schumacher J, Brähler C. Erste gesamtdeutsche Normierung der Kurzform des Gießener Beschwerdebogens GBB-24. Psychother, Psychosom, Med Psychol. 2000;50:14-21.
28. Horowitz LM, Strauß B, Kordy H. Inventar zur Erfassung Interpersonaler Probleme - Deutsche Version (IIP-D). Weinheim: Beltz Test; 1994.
29. Block J. A contrarian view of the Five-factor approach to personality description. Psychol Bull. 1995;117:187-215.

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