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# TEMPERAMENT AND GENERATIVITY DURING THE LIFE SPAN

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Abstract: This review aimed to collect and discuss a variety of studies that utilized the Temperament and Chatacter Inventory (TCI), an instrument developed by Cloninger in 1993, based on his psychobiological model of temperament and character. Searching on PubMed, 26 from 828 researches has been selected on the basis of four criteria: (a) articles published in English between 1993 and 2013 and identified as empirical or longitudinal studies; (b) reaserches conducted in non pathological sample; (c) measuring temperamental traits or dimensions with the TCI; (d) regarding relevant topics to generativity. Implication for Temperament and character of couples and about the transmission of temperament from parents to children are pointed out. In conclusion it can be said that TCI is a valid instrument that can describe and predict couples relationship and child temperament and character, until the late adulthood.

Keywords: Temperament, TCI, Generativity.

### 1. INTRODUCTION

# A psychobiological model of Temperament and Character

In 1993 Cloninger described a psychobiological model of the structure and development of personality that deals with the dimensions of both temperament and character. Previous research has found four dimensions of temperament: Novelty Seeking, Harm Avoidance, Reward Dependence, and Persistence, which are "independently heritable, manifest early in life, and involve preconceptual biases in perceptual memory formation" (Cloninger, 1993). For the first time, the author described also three dimensions of character that mature in adulthood and influence personal and social effectiveness due to the insight learning about selfconcepts. Self-concepts vary according to the extent to which a person identifies the self as (1) an autonomous individual (Self Acceptance), (2) an integral part of humanity (Social Acceptance), and (3) an integral part of the universe as a whole (Spiritual Acceptance). Each aspect of self-concept corresponds to one of three character dimensions called Self-directedness, Cooperativeness, and Self-transcendence, respectively. Cloninger also defined the conceptual background and development of a self-report measure of these dimensions: the Temperament and Character Inventory (Cloninger, 1993).

# The Temperament and Character Inventory

The Temperament and Character Inventory (TCI) is a 226-item, self-administered, true/false questionnaire developed by Cloninger to assess seven dimensions of personality (Cloninger *et al.*, 1993, 1994). These dimensions reflect his psychobiological model of temperament and character. The four temperament dimensions are supposed to be highly heritable, stable throughout life, and underlined by specific neurotransmission systems.

- Novelty Seeking (NS) is defined as a hereditary tendency to respond actively to novel stimuli, with frequent exploratory activity in response to novelty or impulsive decision-making.
- A Harm avoidance (HA) is viewed as a heritable bias in the inhibition of behaviors, such as pessimistic worry, passive dependent behaviors, or rapid fatigability.
- A Reward dependence (RD) is defined as a heritable bias in the maintenance or continuation of ongoing behaviors, and is manifest as sentimentality and social attachment or dependence.

A Persistence (P) is defined as a hereditary tendency to perseverance despite frustration and fatigue.

The three character types, which reflect individual differences in goals, values, and self-conscious emotions, are influenced by social learning and are hypothesized to be less developed in immature personality and in personality disorder.

- ▲ Self-directedness (SD) refers to self-determination and 'willpower', to self-esteem, and to the ability of an individual to control, regulate and adapt his behavior in accord with personal goals and values.
- ▲ Cooperativeness (C) refers to individual differences in identification with and acceptance of other people agreeability, compassion and empathy.
- ▲ *Self-transcendence* (ST) refers to spiritual maturity, transpersonal identification, and self-forgetfulness.

The personality dimensions along with the traits for high and low scorers are shown in Tables 1 (Kluger; 1999).

**Table 1:** A comparison of the Temperament and Character Traits for high and low scorers (Kluger; 1999).

Personality dimensions	High scores	Low scores
	Temperament	
Harm Avoidance	worring and pessimistic fearful and doubtful shy fatigable	relaxed and optimistic bold and confident outgoing vigorous
Novelty Seeking	exploratory and curious impulsive extravagant and enthusiastic disorderly	indifferent refelective frugal and detatched orderly and regimented
Reward Dependent	sentimental and warm dedicated and attached dependent	pratical and detatched withdrawn and detatched independent
Persistent	industrious and diligent	inactive and indolent

	hard working ambitious and overachiever perseverant and perfectionist	gives up easily modest and underachiever quitting and pragmatist		
Character				
Self-Directedness	mature and strong responsible and reliable purposeful resourceful and effective self-accepted	immature and fragile blaming and unreliable purposeless inert and effectiveness self-striving		
Co-operativeness	habits congruent with long term goals socially tolerant empathic helpful compassionate and constructive ethical and principted	habits incongruent with long term goals socially intolerant critical unhealpful revengeful and distructive opportunist		
Self-Trascendence	wise and patient creative and self forgetful united to universe	impatient unimaginative and self conscious pride and lack of humility		

The intensity of each trait and characteristic allows the combinations of these factors. Different profiles correspond to particular personality characteristics, e.g. obsessive-compulsive, passive-dependent, cyclotimic etc. Whether a person has a mature Personality or a Personality Disorder is determined by a combination of *Cooperativeness* and *Self-directedness* on the TCI. "A mature personality is defined in the upper third of the scales for these two dimensions (or the total falls in the upper third), while Personality Disorders have in common a rating in the lowest third (or their total falls in the lowest third) on these same two dimensions" (Hansenne, 2011). As it is well known, all dimensions of personality interact with each other: personality categorisation can be obtained by combining different dimensions of temperament and character. This classification and

description of multidimensional profiles is known as "configural analysis". In the Cloninger model, personality disorders can be described using differing combinations of the following three characteristics: *Harm Avoidance, Novelty Seeking* and *Reward Dependence*. The personality types associated with these characteristic clusters are shown in Table 2. Table 3, in addiction, reports some sample items from the Temperament and Character Inventory, developed by Hansenne (2001).

**Table 2:** Personality categories associated with combination of characteristic (Kluger; 1999).

Personality Disorders	Novelty seeking	Harm avoidance	Reward dependence
Antisocial	High	Low	Low
Histrionic	High	Low	High
Passive-aggressive	High	High	High
Explosive	High	High	Low
Obsessional	Low	High	Low
Schizoid	Low	Low	Low
Cyclotimic	Low	Low	High
Passive-dependent	Low	High	High

**Table 3:** Sample questions from the Temperament and Chatracter Inventory (Hansenne; 2001).

TCI Dimensions	Questions
Novelty Seeking	I like to explore new ways to do things When nothing new is happening I usually start looking for something that is thrilling or exciting
Harm Avoidance	I often feel tense and worried in unfamiliar situations, even when others feel there is little to worry about

I have less energy and get tired more quickly than most people Reward I like to please other people as much as I can I would like to have warm and close friend with me Dependence most of the time Persistence I am usually so determined that I continued to work long after other people have given up I am more a perfectionist that most people Self-Directedness I usually am free to choose what will I do My behaviors is strongly guided by certain goals that I have set for my life It is usually easy for me to like people who have Cooperativeness different values from me I like to be of services of others Self.Trascendence I believe that I have experienced extra-sensory perception myself I often feel like I am a part of the spiritual force on

wich all life depends

#### Method of the search

Many databases are available for literature searches, including Psyc-INFO, Web of Science, and PubMed. The latter comprises more than 22 million citations for biomedical literature from MEDLINE, life science journals and on line books. It includes the most comprehensive coverage of psychological, psychiatric, and educational journals; english abstracts and edited atricles. PubMed allows users to limit the search to samples of specific age groups and humans, and specific periods. A computerized literature search of the terms "Temperament and Character Inventory" has been conducted, without including other terms that would have biased the search. Search limits restricted the results to: (a) articles published in English between 1993 and 2013 and identified as empirical or longitudinal studies; (b) researches conducted in non pathological sample; (c) measuring temperamental traits or dimensions with the TCI; (d) regarding relevant topics to generativity.

The search, based on these criteria, resulted in 828 abstracts. Abstracts were screened and excluded if they were genethic or neuroimaging studies. Abstracts did not always provide information pertaining to these inclusion criteria. In such cases, the articles were included to be reviewed in the next stage of the study. Upon screening of the 828 citations from the original search, 98 either met the aforementioned inclusion criteria or could not be excluded based on the content of the abstract. Following this second stage in the screening process, 26 articles provided relevant and potentially eligible information for coding.

### **Results**

# Gender differences in Temperament

The first topic that has to be discussed regarding the relationship between temperament and generativity is the difference of temperament and character due to gender. Else-Quest (2006) argued that "the question of gender differences in temperament is arguably one of the most fundamental questions in gender differences research in the areas of personality and social behavior". Temperament, infact, reflects biologically based emotional and behavioral consistencies that appear early in life and predict, in conjunction with other factors, patterns and outcomes in numerous other domains such as psychopathology and personality.

Temperament theories have espoused various views about potential gender differences in temperament, but the testing of these views has been

inconclusive. Do male and female differ in the mean levels of their temperament? If so, what is the magnitude of these differences? Do male and female differ in their variability in temperament?

Miettunen et al. (2007), aimed to answer these questions. The authors used meta-analytic methods to estimate sex differences in temperament dimensions, the effect of mean age of the sample and possible differences due to the location of the study. Studies on healthy populations with a minimum sample size of 100, were systematically collected. The search resulted in 32 eligible studies, mainly consisting of national validation of the Cloninger's TCI in different continents. The most of studies has been conducted in Europe, North America and Asia, and in some Mediterranean Nation. Comparing this studies, Miettunen concluded that women scored higher in Reward Dependence and Harm Avoidance. There were no differences in Novelty Seeking or in Persistence. The sex difference in Reward Dependence was significantly smaller in Asian studies. This study was the first one to pool studies on sex differences in Cloninger's temperament dimensions. Women scored consistently higher in Harm Avoidance in the studies included. Together with similar sex difference found in related traits (eg, depression), this finding supports the validity of this temperament dimension and its gender sensivity (Miettunen; 2007).

### Temperament and interpersonal relationships

Temperament seems to be related to a variety of psychological variables implicated in human relationships since it is largely demonstrated that there is a strength connection between Temperament and Attachment (Goldsmith, 1994; Manglesdorf, 1999; Zeanah, 2004). In literature the TCI has been correlated to Interpersonal Sensivity (Otani, 2008), Empathy (Hansen, 2011) and Alexithymia (Lee, 2010).

**Temperament and Interpersonal Sensivity.** The relationship of Interpersonal Sensivity measured by the Interpersonal Sensitivity Measure (IPSM) with the 7 dimensions of the Temperament and Character Inventory was studied in 481 healthy subjects by Otani *et al.* (2008). The statistical analysis showed that the Interpersonal Sensivity scores were correlated with the scores of 5 dimensions of the TCI, and the correlations were especially strong with low *Self-directedness* and high *Harm Avoidance*. In the principal component analysis of the Interpersonal Sensivity combined with the TCI dimensions, the Interpersonal Sensivity formed a group with *Self-directedness* and *Harm Avoidance*.

Temperament and Empathy. In the study of Hansen *et al.* (2011) Temperament, Sustained Attention and Empathy has been measured. Women with an optimal Sustained Attention (Inhibitory Control Proficiency) showed higher scores on the Temperament and Character Inventory *Cooperativeness* and a higher Empathy Quotient. In man good performance on the inhibitory task predicted lower scores on *Cooperativeness* and was unrelated to the Empathy Quotient. In both studies, women outperformed men on the Sustained Attention to Response Task. The women result may reflect how individual differences in elemental neuro-cognitive operations such as inhibitory control influence more complex functions such as social cognition, in wich temperament is involved

**Temperament and Alexithymia.** To assess the pathway from personality to Alexithymia through mood and Anxiety as mediators, Lee *et al.* (2010) tested three hundred thirty-four subjects (130 male). The authors, trought a schematic model for the pathway analysis from Temperament and Character Inventory (TCI) to TAS-20 scores, found that low *Reward Dependence*, low *Self-directedness*, and high *Cooperativeness* had paths to TAS-20 total. Specifically:

△ On Factor 1 (Difficulty in describing feelings) low *Reward Dependence*, low *Self-directedness*, and high *Self-transcendence* had direct effects.

A On Factor 2 (Difficulty in identifying feelings) low *Novelty Seeking*, high *Harm Avoidance*, low *Reward Dependence*, low *Self-directedness*, and high *Cooperativeness* had direct effects.

▲ On Factor 3 (Externally-Oriented Thinking, that measure the tendency of individuals to focus their attention externally) low *Reward Dependence* and *Self-directedness* had direct effects.

Current results suggest that Alexithymia is affected by the personality.

### **Temperament in couple relationship**

A close couple relationship provides an ideal opportunity for each partner to meet many of their essential emotional needs. It is fundamental for couples to balance the "I" and "We" by maintaining their own individuality and their closeness. On of the aspects that can lead this equilibrium is a good knowledge of the partner. Brändstrjöm et al. (2011), to study this aspect asked to a cohort of 136 Swedish spouse pairs to rate hemselves and each other with the Temperament and Character Inventory. The design allowed evaluation of the similarity between husbands and wives across the seven dimensions measured by the TCI. The author found that agreement was slightly higher for the Temperament dimensions than for the Character dimensions. Correlations between spouses in self-reports were very low for Temperament, with only *Harm Avoidance* having a statistically significant correlation. On the other hand, all three Character dimensions were significantly correlated. These results support the conceptualization of Temperament and Character as separate components of personality. The data allowed assessment of the reliability of ratings by self- vs. spouse reports. Measuring the personality of spouse pairs with the TCI, leads to conclude that partners can more easily have a good knowledge of the spouse caracter rather than spouse temperament.

Sometimes in couple an overly connected relationship that has an extreme amount of closeness is not ideal. In these relationships, members have too much togetherness, demand loyalty, are too dependent on one another, and have little private time or space. The needs of the relationship often come before the needs of the individuals, and it may be difficult for some couple relationships to accept people outside of the family in interpersonal relationships with others. It is normal for couple relationships to shift back and forth between togetherness and separateness depending on what is happening in the relationship, with each member developing both dependence on the relationship and some independence from it.

A rarely studied condition, despite not being rare and causing suffering, is Pathological love. The PL is a behavior characterized by providing repetitive and uncontrolled care and attention to the partner in a romantic relationship. Sophia et al. (2009) aimed at investigating impulsivity, personality, and characteristics related to the romantic relationship. Eightynine individuals (50 with PL; 39 individuals with no psychiatric disorder) were compared regarding impulsivity, personality, type of attachment, satisfaction with romantic relationship, and love style. The profile of individuals with PL is characterized by high impulsivity: their Temperament showed high levels of Novelty Seeking, Harm Avoidance, and Reward Dependence compared to healthy subjects. Their character is marked by reduced levels of Self-directedness and high levels of Self-transcendence, that is a more unconventional and hold sense of communion with a wider reality. Pathological lover show low satisfaction with the relationship, Mania and Agape love styles and an anxious-ambivalent type of attachment. Love styles are modus operandi of how people love, originally developed by John Lee (1973,1988). He identified six basic love styles - also known as "colours" of love - that people use in their interpersonal relationships: Mania. It is also known as the troubled love. This love is characterized by jealousy and dependence, great intensity, some intimacy and many psychological symptoms related to relationship. Agape. Is the love of altruism, of giving without asking anything in return and of sacrificing oneself for one's partner. Many would consider it to be the purest form of love. In conclusion, the combination between temperament and character in this type of couple encumber a functional and mature relationship between partners.

# Temperament in the delicate phase of pregnancy

Pregnancy presents a woman with emotional and psychological changes. Pregnant women have different psychological experiences and emotional needs than nonpregnant women. They differ from the nonpregnant women on some fundamental dimensions of personality. These differences included a stronger introverted, inward personality orientation, and a lower level of self-acceptance and independence (Bailey, 1986). Besides the bodily changes, there are disruptions in basic physiological processes that affect sleep, the appetite, and digestion. Hormonal surges can affect the mood, the ability to think and to remember. There are also intensely ambivalent emotions and fantasies about the process of labor and delivery (Gould, 1999).

Several studies assessed the relationship between depression and dimensions of temperament/character using the Cloninger's model of personality and the TCI-R. The aim of Andriola et al. (2011) was to clarify the relation between depression and personality in men and women who are expecting a baby. The Temperamentand Character Inventory-Revised Form and the Beck Depression Inventory were administered to 65 pregnant women and 37 husbands during the last quarter of pregnancy. Statistical analysis showed that pregnant women had higher levels of Depression, Reward Dependence, and Self-transcendence than the expectant fathers. Hierarchical Multiple Regression Analysis in the pregnant women group showed that Harm Avoidance and Self-directedness were significant predictors of the level of depression. In the expectant fathers, only Selfdirectedness was a significant predictor of depression. Low TCI-R Selfdirectedness is a strong predictor of depression in expectant parents during pregnancy regardless of gender, and high TCI-R Harm Avoidance is an additional predictor of depression in expectant mothers.

Massey et al. (2010) examined self-worth, depression, anxiety, and Novelty Seeking in the context of substance use cessation during pregnancy in a sample of women with a high prevalence of substance abuse. Pregnancy is a time of relative urgency and opportunity for the treatment of substance use disorders in women, yet little is known about modifiable factors that contribute to successful abstinence. Subjects were 448 birth mothers who participated in a prospective adoption study. Discontinuation rates were: tobacco 22.2%, alcohol 64.7%, marijuana 77.2%, and other drugs, 73.7-100%. Depression, anxiety, and Novelty Seeking were lower among women who discontinued substance use, compared to those who did not. Self-worth was higher in women who discontinued substance use. Among 110 polysubstance users, the number of substances discontinued during pregnancy was correlated with depression, anxiety, and self-worth in the hypothesized direction. Thius result demonstrate non only the benefits of substance use cessation during pregnancy, but also the effects in terms of personality changes.

Several authors studied the relation of family risk factors (parent-child conflict, family life events, and parental substance use) to adolescent substance use (tobacco, alcohol, and marijuana) (Wills, 2001). Ravaja et al. (2011) examined, in particular, the relationship of parental alcohol use (i.e., the frequency of alcohol intake and getting drunk) and smoking to Cloninger's Temperament and Character dimensions in young adulthood. The authors used a 14-year longitudinal study of 1,849 (1,101 female)

randomly selected healthy adolescents and young adults, and their parents. Alcohol consumption and smoking were self-reported by the parents. Offspring temperament and character were measured by the Temperament and Character Inventory (TCI) 14 years later. Maternal and paternal frequency of alcohol intake, getting drunk and smoking were associated with offspring temperament and character dimensions, particularly *Novelty Seeking*, in young adulthood for both men and women. The results support the relevance of Cloninger's concepts and the TCI in identifying subjects with unique characteristics related to their family histories.

# Temperament, contraceptive and fertility

Temperament has a directed relation to decision making processes and risk assumption (Paulus, 2002). In the sphere of generativity, the role of temperament on the selection of contraceptive methods seems to determine different choices. Aker et al. (2007) conducted a cross-sectional study carried out at the Ondokuz Mayis University Samsun Health College with the participation of 102 young women. The participants were asked to complete the Contraception Choice Questionnaire devised by the researchers, and the Cloninger Temperament and Character Inventory. The mean age of the participants was 22.30 ± 1.27 years; 39 participants mentioned Norplant, 30 condoms, 17 intrauterine devices and 16 oral contraceptives as the method they would consider using in the future. The mean scores of Self-directedness and Self-transcendence of the groups differed significantly. Students who indicated they would choose oral contraceptives had higher average scores for Self-directedness than those choosing intrauterine devices; the mean Self-transcendence scores of students choosing intrauterine devices were significantly higher than the scores of those selecting condoms. Subjects choosing Norplant cited ease of use; those choosing condoms cited their eliciting fewer side effects; those choosing intrauterine devices cited their high levels of safety; and those choosing oral contraceptives cited ease of use and high reliability as the reasons for their choices. Authors think that identifying the roles of temperament and character in the selection process of a contraceptive method will help in achieving a wider application of contraception.

On the opposite situation, despite of the desire to have a baby, people experienced a stressful situation by individuals and couples all around the world: the inability to conceive children. The consequences of infertility are manifold and can include societal repercussions and personal suffering (Cousineau, 2007). To evaluate the personality features of infertile patients

Fassino et al. (2002) conducted a double-blind, controlled study, in the field of diagnosis and care of infertility. The authors assessed 142 infertile couples with obstetric-gynecologic clinical and instrumental examinations. The couples were divided into three groups: organic infertility, functional infertility, and infertility of uncertain origin. The third group was excluded. Organic infertility and functional infertility were ascertained with gynecologic and andrologic clinical examinations, seminal liquid examination, postcoital testing, progesterone assay, hysterosalpingography, biopsy of endometrium, and laparoscopy. Personality traits were assessed with the Temperament and Character Inventory (TCI). Results of the Temperament and Character Inventory shows that infertile women showed lower Cooperativeness than control women. Women with functional infertility had lower scores in Cooperativeness and Self-directedness than women with organic infertility. Men belonging to the functional infertility group had a lower Novelty Seeking score than did those of the organic infertility group. Men and women in the functional infertility group showed higher Harm Avoidance than those in the organic infertility and control groups. The results emphasize that the study of personality in the diagnostic and therapeutic assessment of infertility might provide useful predictive elements for functional infertility.

Damaged fallopian tubes can in some cases be repaired by surgery or in vitro fertilization can be used to bypass them. Intrauterine insemination with partner's or donor sperm is a treatment option in cases of infertility where sperm are too few or are insufficiently motile. Oocyte donors and sperm donors seems to have specific personality traits. Sydsjö et al. (2001) studied the personality characteristics of identifiable oocyte donors in a national sample of 181 Swedish women recruited during donation programmes. The majority of the donors had biological children of their own. The results from the TCI indicate that the oocyte donors were all within the normal range o character. With regard to personality, a significant difference was evident between the two groups: oocyte donors showed lower means for Harm Avoidance and higher scores for Persistence than the controls. This indicates that the donors felt less worried, and displayed a lower level of fear of uncertainty, shyness and fatiguability, and a higher level of Persistence, than the controls. In the sample, 29 of the donors were socalled 'known donors', that is the recipient couples and the donors were known to each other. 'Known donors' displayed a mature and stable character. Authors found that the women who had been accepted for

inclusion in this nationwide oocyte donor programme were all well adjusted and mature.

Sydsjö studied also the personality characteristics of identifiable sperm donors (n=7 performing gamete donation) in a national sample of Swedish men in comparison with the same characteristics of an age-matched control group. The mean age of the donors was 33.8 years (18-56 years). About one third of the donors had biological children of their own. With regard to personality, significant differences were present on Harm Avoidance, with lower means for sperm donors, and on Self-Directedness and Cooperativeness, with higher means for donors, compared with controls. This indicates that the donors sperm too, in general, feel less worried and suffer less from uncertainty, shyness and fatigability than controls. They also perceive themselves as being autonomous, with a capacity to take responsibility, to behave in a goal-directed manner, to be resourceful and self-acceptant, and to behave in a manner guided by meaningful values and goals. Furthermore, they describe themselves as being well integrated in humanity or society, and having a good capacity for identification with and acceptance of other people. The screening process at the clinics seems to generate a group of stable, mature and well-integrated donors, and this is a promising result for the future.

### Temperament and month of birth

General population studies have shown that Novelty Seeking of the Temperament and Character Inventory (TCI) of personality is lower for persons born in winter compared to those born in summer, particularly for women. Chotai et al. (2009) investigated this result in a specific population: the Northern Finland 1966 Birth Cohort, comprising 4968 subjects (2725 women, 2243 men). Novelty Seeking and Reward Dependence (RD) showed significant variations according to the month of birth. We found that women born during winter have significantly lower levels of Novelty Seeking compared to women born during summer, with a minimum for the birth month November and maximum for May. These results are similar to those found in a previous Swedish study. Furthermore, this study showed that men born during spring had significantly lower mean scores of Reward Dependence compared to men born during autumn, with a minimum for birth month March. This was in contrast to the Swedish study, where the minimum of Reward Dependence was obtained for the birth month December. Women born in winter have lower Novelty Seeking as adults compared to women born in summer. Because Novelty Seeking is modulated

by dopamine, this study gives further support to the studies in the literature that show that dopamine turnover for those born in winter is higher than for those born in summer.

Also Kamata et al. (2009) investigated the effect of month of birth on personality traits in 595 healthy Japanese. Personality traits were evaluated by the Temperament and Character Inventory (TCI). Statistical analyses were conducted in two steps. Firstly, months of the year were divided according to ambient temperature or photoperiod, and TCI scores were compared between month groups by analysis of covariance with age as a covariate. Secondly, multiple regression analysis was performed with TCI scores as dependent variables and ambient temperature and photoperiod at birth month and age as independent variables. Both analyses showed that higher ambient temperature at birth month was related to higher scores of Self-Directedness and Persistence in females. Also, higher ambient temperature at birth month was related to lower body mass index in females. These results suggest that month of birth affects Self-Directedness and Persistence in healthy Japanese females, and these effects may be mediated by body mass index changes associated with ambient temperature at birth month.

According to Mendlowicz et al. (2000) also sociodemographic factors should be considered in studies investigating temperaments and characters as defined by the Unified Biosocial Theory of Personality. The objective of his study was to investigate the influence of sociodemographic factors on temperament and character without the confounding influence of mental disorders. Ninety-four volunteers did not meet criteria for any Axis I and Axis II diagnosis, had no first-degree relatives with mental disorders, and were medically healthy. Analyses were conducted to determine the degree of association of each sociodemographic factor (i.e., age, gender, ethnicity, marital status, educational attainment, and occupational status) to personality dimension, while controlling for possible interactions with other sociodemographic factors. Partial correlation analysis showed a significant association between gender and Reward Dependence, and occupational status was significantly related to Reward Dependence, Cooperativeness, and Self-transcendence. Stepwise regression analysis indicated that gender and occupational status were significant predictors of Reward Dependence. Occupational status was the only predictor of Cooperativeness and Selftranscendence. These data suggest that sociodemographic factors should be predictive for temperaments and characters.

### Temperament transmission and parenting

In order to examine the relationships between parenting styles and personality traits over generations, Kitamura *et al.* (2009) conducted a cross-sectional questionnaire study for fathers and mothers of school-age children of grades 5–9. The parenting styles, measured by the Parental Bonding Instrument (PBI), and the personality traits, measured by the Temperament and Character Inventory (TCI), were correlated within and between the consecutive generations (the grandparents and the parents for the PBI and the parents and the children for the TCI). A series of structural equation modeling showed that (1) while the parenting styles were transmitted directly from the grandparents to the parents, it was partly mediated by the fathers' Co-operativeness (C) but not so for the mothers, (2) while the personality traits were transmitted directly from the parents to the children, it was only the fathers' parenting styles that mediated Cooperativeness, and (3) the parents' parenting styles had independent effects upon the children's personality traits.

Ono et al. (1999) were intrested too at the environmental and possible genetic contributions to character dimensions of personality. The authors investigated the relationship between dimensions of personality characteristics and the perceived rearing attitude of parents in the Japanese population. The scores on a measure of perceived parental attitude of 153 normal female students, measured on the Parker Parental Bonding Instrument, were correlated with personality features from the Japanese version of the Cloninger Temperament and Character Inventory. Self-Directedness, especially the subclasses of Responsibility vs Blaming and Congruent Second Nature vs Incongruent Habits, was significantly related to high scores on Maternal Care and low scores on Maternal Overprotection. The subscale of Self-acceptance vs Self-striving correlated only with low scores on Maternal Overprotection. Paternal Care was only related to the total scale scores on Self-Directedness. Results suggest that some personality traits may be related to the perceived attitudes of parents, especially of the mother, during childhood.

In the Lundberg's study (1999) a population sample comprised of 765 subjects (367 males and 398 females), in the age range of 15-81 years, completed the EMBU, a reliable questionnaire aimed at assessing experiences of parental rearing, and the TCI, a self-report questionnaire aimed at assessing dimensions of temperament and character. The study had three main aims: 1) to verify, on a larger scale, previous findings suggesting the occurrence of significant associations between experiences of parental

rearing and aspects of temperament and character, 2) to assess possible variations in temperament and character in cohorts of subjects who have grown up in different historical epochs, and 3) to investigate to what extent transgenerational differences in parental rearing are detectable in different associations with various dimensions of personality. Several, albeit small, significant and meaningful associations between experiences of parental rearing and both temperament and character dimensions have been found, adding support to the robustness of previously reported results obtained in an independent smaller series. Also, several significant differences among subjects in different age groups have been found, both concerning temperament variables and character dimensions. Finally, the results show that associations between experiences of parental rearing and dimensions of temperament and character are most pronounced in subjects belonging to the youngest cohort and almost nil in the cohort comprising the oldest subjects.

The effects of the Affectionless Control (AC) parenting style on personality traits were studied in 414 Japanese healthy subjects by Otani et al. (2009). Perceived parental rearing was assessed by the Parental Bonding Instrument, which comprises care and protection factors, and personality traits were assessed by the Temperament and Character Inventory, which has seven dimensions. Parental rearing was classified into four types, i.e., optimal parenting (high care/low protection), affectionate constraint (high care/high protection), neglectful parenting (low care/low protection), and Affectionless Control (low care/high protection). Males with maternal Affectionless Control showed significantly higher Harm Avoidance scores and lower scores of persistence and cooperativeness than those with maternal optimal parenting. Females with maternal Affectionless Control showed significantly higher Harm Avoidance scores and lower selfdirectedness scores than those with maternal optimal parenting. Paternal Affectionless Control was not significantly related to any personality score. In females, the interaction between paternal rearing and maternal rearing was significant; the effect of maternal Affectionless Control on Harm Avoidance scores was strongest when combined with paternal neglectful parenting. The present study suggests that the Affectionless Control type parenting by mothers is associated with specific personality traits, especially high Harm Avoidance, in healthy subjects.

### Temperament and child psychopathology

Few studies of temperament have tested goodness-of-fit theories of child behavior problems. Rettew et al. (2006) tested the hypothesis that

interactions between child and parent temperament dimensions predict levels of child psychopathology after controlling for the effects of these dimensions individually. Temperament and psychopathology were assessed in a total of 175 children (average of 10.9 years) using composite scores from multiple informants of the Junior Temperament and Character Inventory and the Achenbach System of Empirically Based Assessment. Parent temperament was assessed using the adult version of the Temperament and Character Inventory. Statistical analyses included multiple regression procedures to assess the contribution of child-parent temperament interactions after controlling for demographic variables, other types of child psychopathology, and the individual Temperament and Character Inventory and Junior Temperament and Character Inventory dimensions. Interactions between child and parent temperament dimensions predicted higher levels of externalizing, internalizing, and attention problems over and above the effects of these dimensions alone. Among others, the combination of high child Novelty Seeking with high maternal novelty was associated with child attention problems, whereas the combination of high child Harm Avoidance and high father Harm Avoidance was associated with increased child internalizing problems. Many child temperament dimensions also exerted significant effects independently. The association between a child temperament trait and psychopathology can be dependent upon the temperament of parents. These data lend support to previous theories of the importance of goodness-of-fit.

There is a considerable literature linking aspects of experienced parenting to later personality disorders. Because dimensionally measured personality disorders are associated with variations in normal personality traits, it is important to understand the contribution of parenting experienced in childhood to later normal personality traits. In Reti's report (2002), 742 community-based individuals, subjects from the Hopkins Epidemiology of Personality Disorders Study, were assessed for normal personality traits, as measured by the Revised NEO Personality Inventory and the Temperament and Character Inventory (TCI), and for parental behavior experienced as children, as measured by the Parental Bonding Instrument (PBI). The PBI dimensions were significantly, but moderately, correlate with measures of normal personality, the strongest associations being with the NEO factors, neuroticism and conscientiousness, and with the TCI factors, Selfdirectedness and Harm Avoidance. Subjects who reported lower parental care and higher parental intrusiveness were more likely to be higher in neuroticism, lower in conscientiousness, lower in Self-Directedness, and

higher in *Harm Avoidance*. Also, trends emerged suggesting both parent-specific and gender-specific differences in the relationship between the PBI dimensions and normal adult personality traits. As variations in normal personality traits are associated with dimensionally measured personality disorders, it is conceivable that the role of parenting in later personality disorder may be mediated by associations between parenting and normalpersonality traits.

Finally Richter *et al.* (2002) want to test the relationships between personality according to Cloninger's Temperament and Character Inventory (TCI) and perceived parental rearing under consideration of cognitive distortions as confounding variables. Five hundred and forty healthy volunteers completed the TCI, the EMBU questionnaire (assessing perceived parental rearing), and the Dysfunctional Attitude Scale. Genderspecific relationships were found between parental rearing and both the Temperament and Character dimensions. The factor structure of the TCI remained unchanged irrespective of the inclusion of the parental rearing factors. Since environmental factors (e.g., parental rearing) influence both Temperament (supposed to be genetically determined) and Character dimensions, the focus should be on the interaction between both aspects through the life span.

# Temperament in parents of delinquent adolescents

In 1998 Ruchin, Cloninger et al. argued that a variety of studies based on the psychobiological theory of personality by Cloninger postulate a personality relationship between certain traits and psychopathological manifestations. To test this theory, they administered the Temperament and Character Inventory and the Youth Self-Report to 188 male delinquents from a juvenile correction centre in Northern Russia, and to 111 age-matched male controls recruited from among schoolchildren. As assumed by previous studies, psychological symptoms were primarily positively correlated with Harm Avoidance and negatively correlated with Self-Directedness. At the same time, the higher levels of aggressive and delinquent behaviour were positively correlated with Novelty Seeking and negatively correlated with Cooperativeness.

Following, Ruchin *et al.* (1998) studied also the behaviour/emotional problems in male juvenile delinquents and controls in Russia and the role of personality traits. The comparison between 192 male delinquent adolescents and 121 controls from Northern Russia using the Temperament and Character Inventory (TCI) and Own Memories of Parental Rearing (EMBU) questionnaire on perceived parental rearing showed significant differences.

The delinquent group had a higher level of *Novelty Seeking*, *Harm Avoidance*, and *Self-transcendence*, and also scored lower on *Self-directedness*. Delinquents who committed nonviolent crimes (thefts) appeared to have a higher level of *Harm Avoidance* compared with those who committed violent crimes (hooliganism, robbery, rape, and murder). As concerns perceived parental rearing practices, delinquents experienced more parental rejection and overprotection. Most of the personality dimensions were found to be highly correlated with the level of parental emotional warmth. Furthermore, both temperament traits and maternal rearing practices predicted the development of character dimensions. Findings highlight the interactive nature of parent-child relationships and character development.

Richter et al. (2002) performed a cross-validation of results from investigations in juvenile delinquents in Russia and Germany concerning relationships of personality characteristics in terms of temperament and character with parental rearing. Both studies used the Temperament and Character Inventory (TCI) based on Cloninger's psychobiological theory, and the Own Memories on Parenting (Egna Minnen Beträffande Uppfostran-Swedish [EMBU]) questionnaire on parental rearing based on Perris' vulnerability model. The inter-relatedness of parental rearing, temperament, and character traits in socially normally integrated adolescents, as well as in delinquent adolescents, implying direct and indirect pathways from personality and parental rearing to delinquency, could be cross-validated. Differences between delinquents and socially normally integrated adolescents are rather based on different levels of expressions of various temperament traits, Harm Avoidance and Novelty Seeking in particular, and the character trait Self-directedness, as well as on parental rearing behavior (predominantly parental rejection and emotional warmth) than on different structures within related developmental processes.

### Temperament in late adulthood

Temperament continues into adulthood, and later studies have shown that these characteristics continue to influence behavior and adjustment throughout the life-span. Change versus stability of personality in late adulthood is an intriguing yet understudied issue. Yu *et al.* (2008) in a cross-sectional study examined age and gender differences in Cloninger's biosocial model of personality, as well as their relation to health in a Japanese community sample whose age exceeds 50 years. Participants

(N=330) completed the Temperament and Character Inventory and the General Health Questionnaire. Age-related decreases in *Reward Dependence*, *Self-directedness*, *Cooperativeness*, and an increase in *Self-transcendence* were found. Health was significantly predicted by *Harm Avoidance* and *Self-directedness*. Personality change in late adulthood tends to occur in environmentally-based character, in a pattern of gradual social detachment and internal spiritual growth. Personality is a stronger predictor of health than demographic variables.

Still Yu et al. (2008) aimed to examine individual differences in DMs and Cloninger's biosocial model of personality in two age groups (50-64, 65-93), as well as their influence on health. Effectively, current understanding of the use of psychological defense mechanisms in older adults is limited. A Japanese community sample (N = 330) completed the Temperament and Character Inventory (TCI-125), the Defense Style Questionnaire (DSQ-40), and the General Health Questionnaire (GHQ-28). Across age groups, psychological well-being was related to lower levels of Harm Avoidance and higher levels of Self-directedness. In addition, older age was related to decreases in Reward Dependence, Cooperativeness, and increases in Self-transcendence, defense mechanisms of isolation, denial, and splitting. An Age X Gender interaction revealed that men and women varied in their pattern of age differences for some specific defense mechanisms. Results further suggest that image-distortion defense may function to compensate resource loss.

Recent research on autonoetic consciousness indicates that the ability to remember the past and the ability to project oneself into the future are closely related. The purpose of the study conducted by Quoidbach *et al.* (2008) was to confirm this proposition by examining whether the relationship observed between personality and episodic memory could be extended to episodic future thinking and, more generally, to investigate the influence of personality traits on self-information processing in the past and in the future.

Concerning the TCI-R dimensions, results show that *Novelty Seeking* negatively predicts the emotional intensity of past and future positive events. *Novelty Seeking* also positively predicts the amount of autonoetic consciousness, i.e., the feeling of mentally travelling through time and experiencing the event as if it was happening, only in the positive future condition. Autonoetic consciousness is also positively predicted by *Cooperativeness* in the positive future, negative future and negative past conditions. Additionally, *Cooperativeness* also predicts the degree to which

subjects tend to feel emotions when imagining positive future events as well as the quality of representation for positive past events. At last, *Persistence* is a significant predictor of coherence of generated events for both positive and negative past events. Neuroticism and *Harm Avoidance* predict more negative past memories and future projections. Conversely, no links were found between phenomenal characteristics and *Self-transcendence*.

Therefore, this study provide an additional evidence to the idea that MTT into the past and into the future rely on a common set of processes by which past experiences are used to envision the future.

#### **Conclusions**

Temperament, is the innate part of a person that determines how he reacts to people, places and events. In short, it is how people interact with their environment and the world around them. Temperament determines our perception of ourselves and the people around us. It is also the instrument trought with we face life stresses and pressures.

Understanding a child's temperament can help reframe how parents interpret children's behavior and could help them to guide their child respecting individual differences rather than try to change him. It is an opportunity to make small and reasonable accommodations to routines that can reduce tension.

It is important for parents to recognize their own temperaments too. Recognizing each individual's temperament, will help to prevent and manage problems that may arise from the differences among family members, expecially in couple relationships and marriage.

Temperament continues into adulthood, and later studies have shown that these characteristics continue to influence behavior and adjustment throughout the life-span. Independently of age-specific activity and situations, many researchers agree that the functional significance of temperamental traits become evident when individuals are facing with difficult situations, extreme stressors or demands that exceed their capacities to cope. Based on this point of view, different approaches have been developed, depending on whether these situations and demands refer to children or to adults. Temperament plays a regulatory function consisting in modifying or moderating the stimulative and temporal characteristics of situations to behave adequately according to the individual's temperamental traits.

Parents, teachers, doctors, employers, researchers can all profit from understanding temperament. The understanding of temperament gives us a

"special knowledge" of the inner functioning of each individual. It helps to identify the pressures or feelings they are dealing with and where they are coming from: (a) himself/herself; (b) the world in which he/she lives; (c) his/her weaknesses or desires. Temperament is a determining factor in finding the most comfortable career for us, the most satisfying hobbies, in decision making and assumption of responsibilities, in our dependence/independence and in our spiritual development.

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### Appendix A & B

The appendix shows the main informations that has been analyzed in this review, to give a panoramic and rapid view of the topics regarding Temperament and generativity, trought a conceptual map.

# Appendix A

### Gender differences in Temperament

In 32 studies, conducted in Europe, North America, Asia and some Mediterranean Nation, woman, compared to men, score higher in Reward Dependence and Harm Avoidance

### Temperament and interpersonal relationships: sensivity, empathy and alexithimia

Interpersonal sensitivity is related to low Self-Directedness and high Harm Avoidance.

Women with an optimal sustained attention show higher scores on the Cooperativeness and a higher Empathy Quotient.

Low Reward Dependence, low Self-Directedness, and high Cooperativeness has paths to Alexithymia.

#### Temperament in couple relationship

Correlations between spouses in self-reports are very low for Temperament, with only Harm Avoidance having a statistically significant correlation. On the other hand, all three Character dimensions are significantly correlated.

The temperament of individuals with Pathological Love has high levels of Novelty Seeking, Harm Avoidance, and Reward Dependence compared to healthy subjects, and character is marked by reduced levels of Self-Directedness and high levels of Self-Transcendence.

### Temperament in the delicate phase of pregnancy

Low Self-Directedness is a strong predictor of depression in expectant parents during pregnancy regardless of gender, and high Harm Avoidance is an additional predictor of depression in expectant mothers. Depression, anxiety, and Novelty Seeking are lower among women who discontinued substance use during pregnancy, compared to those who did not. Maternal and paternal frequency of alcohol intake, getting drunk and smoking are associated with Novelty Seeking in young adulthood for both men and women.

### Temperament, contraceptive and fertility

Students who prefer oral contraceptive have higher scores for Self-Directedness than those choosing inrauterine devices; the mean Self-Transcendence scores of students choosing intrauterine devices are significantly higher than the scores of those selecting condoms.

Oocyte donors show lower means for Harm Avoidance and higher scores for Persistence than the controls. Infertile women show lower Cooperativeness than control women. Men belonging to the functional infertility group have a lower Novelty Seeking than the organic infertility group. Men and women in the functional infertility group show higher Harm Avoidance than those in the organic infertility and control groups.

Sperm donors show lower means for Harm Avoidance and higher means on Self-Directedness and Cooperativeness compared with controls.

### APPENDIX B

#### Temperament and month of birth

Women born during winter have significantly lower levels of Novelty Seeking compared to women born during summer.

Men born during spring have significantly lower mean scores of Reward Dependence compared to men born during autumn. Higher ambient temperature at birth month is related to higher scores of Self-Directedness and Persistence in females. Gender and occupational status are significant predictors of Reward Dependence.

Occupational status is a predictor of Cooperativeness and Self-Transcendence.

### Temperament transmission and parenting

The parenting styles are transmitted directly from the grandparents to the parents, and from parents to the children partly mediated by the fathers' Cooperativeness.

Self-Directedness is significantly related to high scores on Maternal Care and low scores on Maternal Overprotection.

AC (low care/high protection) type parenting by mothers is associated with high Harm Avoidance and lower Self-Directedness.

### Temperament and child psychopathology

The combination of high child Novelty Seeking with high maternal Novelty is associated with child attention problems, whereas the combination of high child Harm Avoidance and high father Harm Avoidance is associated with increased child internalizing problems.

Subjects who report lower parental care and higher parental intrusiveness are more likely to be higher in neuroticism, lower in conscientiousness, lower in Self-Directedness, and higher in Harm Avoidance.

Environmental factors (e.g., parental rearing) influence both Temperament (supposed to be genetically determined) and Character dimensions.

### Temperament in parents of delinquent adolescents

Psychological symptoms are positively correlated with Harm Avoidance and negatively correlated with Self-Directedness. The higher levels of aggressive and delinquent behaviour are positively correlated with Novelty-Seeking and negatively correlated with Co-operativeness.

The delinquent group has a higher level of Novelty Seeking, Harm Avoidance, and Self-transcendence, and also scored lower on Self-directedness. Delinquents who committed nonviolent crimes appeared to have a higher level of Harm Avoidance compared with those who committed violent crimes.

Differences between delinquents and socially normally integrated adolescents are rather based on different Harm Avoidance and Novelty Seeking and the character trait Self-directedness

#### Temperament in late adulthood

Age-related personality traits decrease in Reward Dependence, Self-Directedness, Cooperativeness, and increase in Self-Transcendence. Health is significantly predicted by Harm Avoidance and Self-Directedness.

Psychological well-being is related to lower levels of Harm Avoidance and higher levels of Self-directedness. In addition, older age is related to decreases in Reward Dependence, Cooperativeness, and increases in Self-transcendence, defense mechanisms of isolation, denial, and splitting.

Neuroticism and Harm
Avoidance predict more
negative past memories and
future projections. Novelty
Seeking positively predicts the
autonoetic consciousness,
only in the positive future
condition.

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