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“Personality: is it influenced by your genes

BY PRITPAL KAUR
KLEAR · JANUARY 18, 2015

Beatrix Potter

“I hold that a strongly marked personal can influence descendants for generations.”

Beatrix Potter

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After studying personality over the past decade, scientists have recognized Brain Derived Neurotrophic Factor (BDNF) as a major contributor. However, recent research has investigated the effect of the season of birth.

### BDNF (Genetics)

BDNF is a protein involved in the survival of nerve cells via supporting growth,

... or the environment you have grown in?

http://www.sciencenutshell.com/personality-makes/
maintenance and maturation (differentiation). It is found active in synapses of nerve cells, is crucial in learning and creating new memories.

![Figure 1: BNDF serum levels - the lower the level; the higher the neuroticism (Montag 2014)](image)

**Protein Levels**

Various studies have found BDNF protein levels associated with anxiety-related personality traits and disorders. Low

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levels in blood serum have been linked to depression, obsessive behaviour (neuroticism) and excessive worrying, pessimism and shyness (harm avoidance) [Figure 1].

However low blood plasma levels have mostly been identified in conscientiousness, extravert and low harm avoidance personalities.

**Gene Mutations**

The BDNF gene itself, on chromosome 11 (11p13), has also been investigated. Mutations, or
alleles, affecting the protein makeup are believed to influence certain traits.

Val66Met: This polymorphism (the replacement of the proteins amino acid Valine with Methionine) disrupts the cell’s BDNF secretion, decreasing levels in blood. It is also linked to grey matter deficiencies of the hippocampus and prefrontal cortex; brain regions involved in interpreting meanings of social situations.
fMRI scans reveal individuals who carry the allele show increased right amygdala activity whilst viewing (un)pleasant images (Figure 2), suggesting carriers may have stronger responses to emotional stimuli.

Figure 2: fMRI scans of Val66Met carriers (A) vs. non-carriers (B) when processing images (Montag et al 2008)

**Gender**

Differences between BDNF
expression in males and females are thought to also affect traits. Animal experiments found only female BDNF gene knockouts (no expression) displayed increased depression.

Season of Birth (SOB) [Environment]

The season that you were born is considered to affect anxiety, novelty seeking (excitability, impulsiveness, quick loss of temper), hyperthymic personality
(high novelty seeking; low harm avoidance) and depression.

A study of 400 Hungarian students found more summer babies were hyperthymic (extreme positivity with mood swings), autumn babies had reduced rates of depression and winter babies were less likely to be irritable.

**Spring/Summer**

Evidence implies those born in spring/summer are more likely to have lower harm avoidance and
greater novelty seeking traits. A potential reason may be due to pregnancy; micronutrients, important for brain and nervous system development (plus BDNF!), are enriched during the first trimester (summer) of spring babies. Moreover, serum BDNF tends to be higher. Nevertheless other studies suggest SOB interacts more strongly with neurotransmitters such as dopamine—read more here...
Conclusion

Personality is a mixture of your genes and environment; 40% of identical twins are estimated to share personalities. Nonetheless, personality is incredibly complex, rather than relying solely on BDNF. Lesser-known studies have failed to find the seemingly strong link between Val66Met, BDNF serum levels and personality. Thus other contributors have yet to be discovered.
NOTE:
neuroticism appears negative but many neurotics are organised, goal-orientated and reflective. Read here...

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