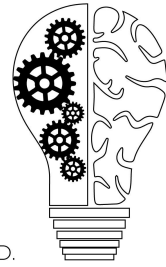


## Episode 097: The Big Five Personality Traits:

### **Conscientiousness Part 1**

Alexis Carnduff B.S., Alec Zane B.A., Maddison Ulrich, B.S.,  
Matthew Hagele M.A., Kyle Logan B.S., David Puder, M.D.



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This PDF is a supplement to the podcast “Psychiatry & Psychotherapy” found on [iTunes](#), [Google Play](#), [Stitcher](#), [Overcast](#), [PlayerFM](#), [PodBean](#), [TuneIn](#), [Podtail](#), [Blubrry](#), [Podfanatic](#)

There are no conflicts of interest for this episode.

## Facets of the Big Five:

We are examining the facets of the most studied personality model, the Big Five. The facets are as follows:

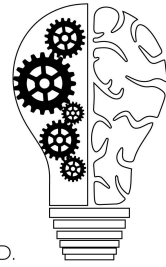
1. Extraversion: the positive emotion dimension associated with gregariousness, charisma, enthusiasm, assertiveness, and social ability.
2. Neuroticism: negative emotionality associated with proclivity to anxiety, anger, irritability, and emotional pain.
3. Agreeableness: compassion, politeness, maternal in orientation (those who often care about others more than themselves), cooperative more than competitive. Prone to be taken advantage of and harbor resentment.
4. Openness to experience: the combination of interest and ideas known as intellect. Associated interest in aesthetics. Enjoyment in ideas and spending time in creative pursuits.
5. *Conscientiousness: central to orderliness and industrialism. Good predictor of long term life success, especially in academic attainment. Focus of energy on attention to detail and responsibility ([DeYoung 2007](#)).*

When looking at causes of mortality, we know that high blood pressure and high serum cholesterol increases the risk of mortality. It's fascinating that *low conscientiousness also increases mortality risk*. In a meta-analysis of 7 cohorts containing 76,150 participants, low conscientiousness reflecting poor self-control and lack of long-term planning was associated with an increased risk of mortality. Those that scored in the lowest third of conscientiousness had a 1.4 times higher risk of death after correcting for age, sex, and ethnicity ([Jokela, et al., 2013](#)).

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## **A Brief History**

The five factor model, or Big Five, originating from studies of trait-descriptive adjectives drawn from the lexicon, is the most widely used classification system for personality traits. The Lexicon approach to personality proposes that people naturally create terms for common traits so that they can describe and discuss them ([DeYoung, 2007](#)). Sir Francis Galton first proposed that the world's language encodes single terms for personality-descriptive terms ([Goldberg, 1993](#)).

Gordon Allport and Henry S. Odbert used Webster's New International Dictionary as their source of vocabulary. From a list of approximately 400,000 words, Allport and Odbert identified 17,953 unique terms to describe personality or behavior.

Using their list of nearly 18,000 terms, Allport and Odbert created four categories or "columns":

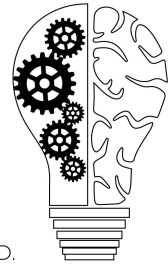
- Column I: This group contains 4,504 terms that describe or are related to personality traits. Arguably the most important of the four, its terms most closely related to those used by modern personality psychologists (e.g. aggressive, introverted, sociable).
- Column II: In contrast with the more stable dispositions described by terms in Column I, this group includes terms describing present states, attitudes, emotions, and moods (e.g. rejoicing, frantic).
- Column III: The largest of the four groups, Column III contains 5,226 words related to social evaluations of an individual's character (e.g. worthy, insignificant). Unlike the previous two columns, this group does not refer to internal psychological attributes of a person. As such, Allport and Odbert acknowledged that Column III did not meet their definition of trait-related terms.
- Column IV: The last of Allport and Odbert's four columns contained 3,682 words. Called the "miscellaneous column" by the authors, Column IV contains important personality-descriptive terms that did not fit into the other three columns.

Throughout the 1940s, researchers such as Raymond Cattell and Donald Fiske used factor analysis to explore the overarching structure of the trait terms in Allport and Odbert's Column I. Rather than rely on factors obtained by these researchers, Warren Norman conducted an independent analysis of Allport and Odbert's terms in 1963. Despite finding a five-factor structure similar to Fiske's, Norman decided to return to Allport and Odbert's original list to create a more precise and better-structured taxonomy of terms. Using the 1961 edition of Webster's International Dictionary, Norman added relevant terms and removed those from the list that were no longer in use. This resulted in a source list of approximately 40,000 potential trait-descriptive terms. Using this list, Norman then removed terms that were deemed archaic or

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obsolete, solely evaluative, overly obscure, dialect-specific, loosely related to personality, and purely physical. By doing so, the original list was reduced to 2,797 unique trait-descriptive adjectives. Norman's work would eventually serve as the basis for Dean Peabody and Lewis Goldberg's explorations of the Big Five personality traits.

- Factor analysis
  - Take a large set of questions to administer to a large number of people and then statistically analyze, to see what groups of questions seem to group together. For example, imagine at first you have 2,797 unique terms that are connected to fish, the question would be which groups of fish swim the same direction.

### **Gold Standard Measurement:**

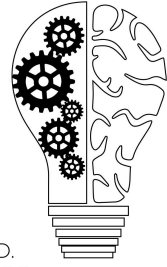
The NEO inventories are concise measures of the five major dimensions, or domains, of personality and the most important traits or facets that define each domain. Together, the five broad domain scales and the 30 specific facet scales allow a comprehensive assessment of adolescent and adult personality ([Costa Jr& McCrae, 2008](#)). The NEO-PI-3 is the newer version of the inventory, and it is suitable for the assessment of individuals aged 12 years and older. The NEO-PI-3 is a modification of NEO PI-R in which 37 of the 240 items have been replaced. Compared to prior forms, the new items are easier to understand and have better psychometric properties. This new form has also been shown to be suitable for assessing personality in middle school-aged children and adolescents, as well as in adults.

There are two versions of all NEO inventories: Form S, for self reports, and Form R, for observer ratings. Form S consists of a series of items answered by respondents to describe themselves; Form R is a companion instrument with parallel items written in third person for peer, spouse, or expert ratings. Table 1 lists the NEO domains and their facets and provides a rough sense of the constructs measured by this instrument.

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**Table 1**  
**Domains and Facets Measured by the NEO Personality Inventory-3 (NEO-PI-3)**

<b>Domains</b>	<b>Extraversion (E) facets</b>	<b>Agreeableness (A) facets</b>
N: Neuroticism	E1: Warmth	A1: Trust
E: Extraversion	E2: Gregariousness	A2: Straightforwardness
O: Openness	E3: Assertiveness	A3: Altruism
A: Agreeableness	E4: Activity	A4: Compliance
C: Conscientiousness	E5: Excitement-Seeking	A5: Modesty
<b>Neuroticism (N) facets</b>	E6: Positive Emotions	A6: Tender-Mindedness
N1: Anxiety	<b>Openness (O) facets</b>	<b>Conscientiousness (C) facets</b>
N2: Angry Hostility	O1: Fantasy	C1: Competence
N3: Depression	O2: Aesthetics	C2: Order
N4: Self-Consciousness	O3: Feelings	C3: Dutifulness
N5: Impulsiveness	O4: Actions	C4: Achievement Striving
N6: Vulnerability	O5: Ideas	C5: Self-Discipline
	O6: Values	C6: Deliberation

### The domains of conscientiousness:

The conscientious individual is purposeful, strong willed, and determined. Digman and Takemoto-Chock (1981) referred to this domain as “will to achieve”. On the positive side, high C is associated with academic and occupational achievement; On the negative side, high C may lead to annoying fastidiousness, compulsive neatness, or workaholic behavior ([Brummett, Siegler, Day & Costa, 2008](#)).

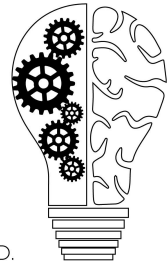
#### C1: competence

“Competence refers to the sense that one is capable, sensible, prudent, and effective. High scores on this scale feel well prepared to deal with life. Low scorers have a lower opinion of their abilities and admit that they are often unprepared and inept. Of all the C facet scaled, competence is highly associated with self-esteem and internal locus of control” (Costa, McCrae, et al., 1991).

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<b>C1: Competence</b>	Low	High
Definition	<ul style="list-style-type: none"> <li>• Can act thoughtlessly</li> <li>• Can feel unsuccessful</li> <li>• Comes into a situation not being fully prepared</li> </ul>	<ul style="list-style-type: none"> <li>• Keeps informed and makes intelligent decisions</li> <li>• Good judgement</li> </ul>
Strengths	<ul style="list-style-type: none"> <li>• Sporadic and spontaneous</li> <li>• Thinks on their feet</li> <li>• Able to jump to a potentially rewarding decision faster</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient and effective at work</li> <li>• Has many skills</li> <li>• Possesses common sense</li> </ul>

### C2: order

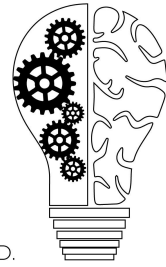
“High scorers on this scale are neat, tidy, and well organized. They keep things in their proper places. Low scorers are unable to get organized and describe themselves as unmethodical. Carried to an extreme, high order may contribute to obsessive compulsive personality disorder” (Costa, McCrae, et al., 1991).

<b>C2: Order</b>	Low	High
Definition	<ul style="list-style-type: none"> <li>• Not orderly or methodical</li> <li>• Can't seem to get organized</li> <li>• Spends time looking for misplaced items</li> </ul>	<ul style="list-style-type: none"> <li>• Likes things in their place</li> <li>• Picky about how jobs should be done</li> </ul>
Strengths	<ul style="list-style-type: none"> <li>• Doesn't mind clutter</li> <li>• Not compulsive around cleanliness</li> <li>• More easy going</li> </ul>	<ul style="list-style-type: none"> <li>• Keeps belongings neat and clean</li> <li>• Organizes things such as information or data well</li> </ul>

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#### C3: dutifulness

“In one sense, conscientiousness means ‘governed by conscience’, and that aspect of C is assessed as dutifulness.

High scorers on this scale adhere strictly to their ethical principles and scrupulously fulfill their moral obligations as they understand them. Low scorers are more casual about such matters and may be somewhat undependable or unreliable” (Costa, McCrae, et al., 1991).

<b>C3: Dutifulness</b>	Low	High
Definition	<ul style="list-style-type: none"><li>• Struggles with dependability and reliability</li><li>• Ignores small rules</li></ul>	<ul style="list-style-type: none"><li>• Attends work and school even while feeling under the weather</li><li>• Pays debts quickly</li><li>• Does jobs carefully</li><li>• Performs tasks conscientiously</li></ul>
Strengths	<ul style="list-style-type: none"><li>• Doesn't get caught up in small details</li><li>• Overcommits less</li></ul>	<ul style="list-style-type: none"><li>• Follows through with commitments</li><li>• Follows own set of ethical principles</li></ul>

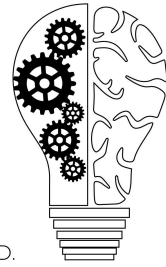
#### C4: achievement striving

“Individuals who score high on this facet have high aspiration levels and work hard to achieve their goals. They are diligent and purposeful and have a sense of direction in life. Very high scorers, however, may invest too much in their careers and become workaholics. Low scorers are lackadaisical and perhaps even lazy. They are not driven to succeed. They lack ambition and may seem aimless, but they are often perfectly content with their low levels of achievement.” (Costa, McCrae, et al., 1991)

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<b>C4: Achievement Striving</b>	Low	High
Definition	<ul style="list-style-type: none"><li>• Not driven to get ahead</li><li>• May not stick with self improvement plans</li><li>• Does not consider themselves ambitious</li><li>• May need outside structure such as coaching/therapy to identify and move towards goals</li></ul>	<ul style="list-style-type: none"><li>• Strives to achieve and be excellent in what they do</li><li>• Works hard towards goals in an orderly way</li><li>• Clear about goals</li><li>• Example: may need to learn the importance of self care to run the marathon (sleep is necessary).</li></ul>
Strengths	<ul style="list-style-type: none"><li>• May treasure alternative things like family more than work</li><li>• May enjoy the journey and feel more present in the moment</li></ul>	<ul style="list-style-type: none"><li>• Get ahead early in life, know what they want, push hard for goals</li></ul>

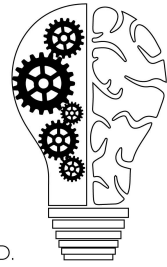
### C5: self-discipline

“By this term, we refer to an individual’s ability to begin tasks and carry them through to completion, despite boredom or distractions. High scorers can motivate themselves to get the job done. Low scorers procrastinate in beginning chores and are easily discouraged and eager to quit. Low self-discipline is easily confused with impulsiveness - both are evidence of poor self-control -- but empirically, they are distinct. People who have high levels of impulsiveness cannot resist doing what they do not want themselves to do; people who have low levels of self discipline cannot force themselves to do what they want themselves to do. The former requires an emotional stability; the latter, a degree of motivation that they do not possess” (Costa, McCrae, et al., 1991).

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<b>C5: Self Discipline</b>	Low	High
Definition	<ul style="list-style-type: none"><li>● Trouble with internal motivation</li><li>● Can get overwhelmed with unfinished projects</li><li>● Inclined to start new projects before finishing a prior one</li><li>● Wastes time before focusing on work</li></ul>	<ul style="list-style-type: none"><li>● Self paces in order to meet deadlines</li><li>● Possesses self-discipline</li></ul>
Strengths	<ul style="list-style-type: none"><li>● May not get bogged down in timelines</li></ul>	<ul style="list-style-type: none"><li>● Finishes projects</li><li>● Productive; gets the job done</li></ul>

### C6: deliberation

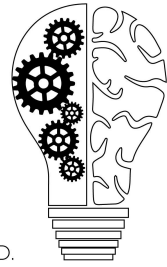
“The final facet of conscientiousness is deliberation -- the tendency to think carefully before acting. High scorers on this facet are cautious and deliberate. Low scorers are hasty and often speak or act without considering the consequences. At best, low scorers are spontaneous and able to make snap decisions when necessary” (Costa, McCrae, et al., 1991).



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<b>C6: Deliberation</b>	Low	High
Definition	<ul style="list-style-type: none"><li>• May have done stupid things</li><li>• Can act before thinking</li><li>• Has a general idea for vacations, not everything is planned out</li></ul>	<ul style="list-style-type: none"><li>• Rarely makes decisions in haste</li><li>• Always considers consequences</li><li>• Plans trips carefully</li><li>• Thinks twice before answering</li></ul>
Strengths	<ul style="list-style-type: none"><li>• Makes spur of the moment choices</li><li>• Carefree and fun; goes with the flow</li></ul>	<ul style="list-style-type: none"><li>• Thinks things through before making a decision</li></ul>

## Conscientiousness over the life course:

*The Handbook of Personality Development* describes different “life tasks” that a person might experience in different phases of their life. These events “are indicative of investing in one’s future success” and will influence the development of a person’s conscientiousness ([McAdams, Shiner, & Tackett, 2018](#)).

## Childhood and adolescence:

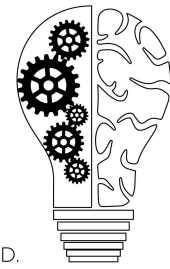
### Childhood:

To assess origins of conscientiousness in childhood, one paper looked at the elements of “self-regulation”, “academic motivation”, and “internalized compliance/internalization of standards” ([Eisenberg, 2014](#)).

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To measure self-regulation, this study assessed “effortful control”, which they defined as “the efficiency of executive attention—including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors.” They explained that “as well as planning and the integration of information, effortful control includes the following:

- A. Attention focusing (the tendency to maintain an attentional focus upon task-related channels)
- B. Attention shifting (the capacity to intentionally shift attentional focus to desired channels, thereby avoiding unintentional focusing on particular channels)
- C. Inhibitory control (i.e., the capacity to suppress positively toned impulses and resist the execution of inappropriate approach tendencies)
- D. Activation control (i.e., the capacity to perform an action when there is a strong tendency to avoid” [Evans & Rothbart, 2007](#); [Rothbart, Ahadi, & Hershey, 1994](#))

The researchers found that starting at approximately 3 years of age, the test-retest consistency of effortful control is roughly between .2 and .5 during childhood, depending on the time in between assessments and age at assessment ([Eisenberg, 2014](#)). While these levels of consistency are a far cry from unity, they suggest meaningful consistency across childhood from an early age, especially in light of assessment difficulties in children.

What are the experiences responsible for driving these changes between different groups of children? The most important social experience during this time period is in education. Here, children are exposed to new ideas, interact with different people, and form peer groups. Relative to later adolescence, there is some work suggesting that success in school is related to positive conscientiousness development ([Brandt, 2019](#)). For example, increases in conscientiousness are related to increases in achievement behavior. School encourages skills that lead to success, such as being responsible, paying attention in class, and resisting impulses. By doing this, schools are rewarding students to modify their motivations, goals, and behaviors. The end result is that spending a significant amount of time immersed in environments that promote changes in behavior may lead to enduring, prolonged changes in one’s identity and ultimately conscientiousness. This study also found that positive student-teacher relationships, positive peers, parents who are involved in school, positive feelings about school, finding school and classes engaging, and putting effort into one’s schoolwork are associated with increases in conscientiousness ([Brandt, 2019](#)).

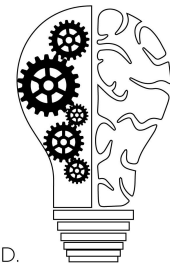
The Stanford Marshmallow Experiment

[Attention in Delay of Gratification.](#)

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In the marshmallow experiment, the researcher placed a marshmallow in front of the child, and told the child that he was going to leave the room. If the child did not eat the marshmallow while he was away, then they would be rewarded with a second marshmallow. However, if the child decided to eat the first one before the researcher came back, then they would not get a second marshmallow. The choice was simple: one treat right now or two treats later. The researcher left the room for 15 minutes and watched what happened ([Mischel, 1970](#)).

### **Adolescence:**

To obtain a more objective measure of cognitive academic competencies and school-related achievements in adolescence, follow-up studies looked at Scholastic Aptitude Test (SAT) scores of the participants. In parts of the experiment where the rewards were exposed and no strategies were supplied, the children who were able to wait longer as preschoolers were rated in adolescence by their parents as significantly more attentive, better able to concentrate, more competent, more playful, and more intelligent. They were also seen as better at pursuing goals, delaying gratification, showing self-control, resisting temptation, tolerating frustration, and coping maturely with stress. Beyond parental ratings, both verbal and quantitative SAT scores were significantly related to seconds of preschool delay time. The linear regression slope predicting SAT verbal scores from seconds of preschool delay time was 0.10 with a standard error of 0.04; for predicting SAT quantitative scores, the slope was 0.13 with a standard error of 0.03. The correlations were 0.42 for SAT verbal scores and 0.57 for SAT quantitative scores. In contrast, individual differences in delay behavior when the rewards were obscured did not reliably predict either parental ratings or SAT performance ([Mischel, 1989](#)). (Notice in the table below how conscientious defines the construct of many of the statements.)

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#### *Q-Sort Correlates ( $p < .10$ ) in Adolescence of Preschool Self-Imposed Delay: Sexes Combined*

Q-sort item	1st & 2nd delay	1st delay only
Is verbally fluent, can express ideas well in language.	0.48****	0.47****
Uses and responds to reason.	0.47****	0.42****
Is attentive and able to concentrate.	0.46****	0.44****
Is planful, thinks ahead.	0.42****	0.40****
Is competent, skillful.	0.38****	0.41****
Is resourceful in initiating activities.	0.35****	0.32****
Is self-reliant, confident, trusts own judgment.	0.32****	0.33****
Becomes strongly involved in what s/he does.	0.29**	0.34****
Can be trusted, is dependable.	0.29**	0.23*
Is self-assertive.	0.27**	0.26**
Is curious, exploring, eager to learn, open to new experiences.	0.25**	0.27**
Shows concern for moral issues, e.g., reciprocity, fairness, and the welfare of others.	0.25**	0.18
Is persistent in activities; does not give up easily.	0.24*	0.25**
Is an interesting, arresting child.	0.24*	0.23*
Is admired and sought out by other children.	0.23*	0.17
Has high standards of performance for self.	0.22*	0.18
Is considerate and thoughtful of other children.	0.21*	0.13
Is helpful and cooperative.	0.21*	0.18
Tends to go to pieces under stress, becomes rattled and disorganized.	-0.47****	-0.43****
Appears to feel unworthy, thinks of self as "bad."	-0.43****	-0.38****
Is shy and reserved, makes social contacts slowly.	-0.39****	-0.42****
Is stubborn.	-0.36****	-0.25**
Teases other children.	-0.32****	-0.29**
Reverts to more immature behavior when under stress.	-0.31**	-0.34****
Is afraid of being deprived, is concerned about getting enough.	-0.27**	-0.18
Tends to be suspicious and distrustful of others.	-0.27**	-0.22*
Shows specific mannerisms or behavioral rituals.	-0.27**	-0.23*
Is unable to delay gratification, cannot wait for satisfactions. (When placed low, implies needless or excessive delay.)	-0.26**	-0.20
Is jealous and envious of others.	-0.26**	-0.23*
Tends to become rigidly repetitive or immobilized when under stress.	-0.26**	-0.23*
Tends to withdraw and disengage when under stress.	-0.25**	-0.17
Overreacts to minor frustrations; is easily irritated and/or angered.	-0.24*	-0.19
Tends to be indecisive and vacillating.	-0.24*	-0.29**
Tends to be sulky or whiny.	-0.24*	-0.24*
Has unusual thought processes; thinks and perceives in uncommon ways.	-0.23*	-0.14
Is inappropriate in emotive behavior.	-0.23*	-0.20
Attempts to transfer blame to others.	-0.23*	-0.19
Is restless and fidgety.	-0.23*	-0.16
Has rapid shifts in mood, is emotionally labile.	-0.21*	-0.20
Is inhibited and constricted.	-0.20**	-0.24*
Has a readiness to feel guilty, puts blame on self (whether verbalized or not).	-0.19	-0.21*

Note.  $N = 67$ ; all  $p$  values are two-tailed.

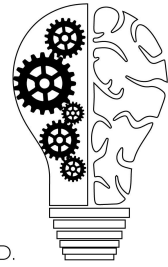
\*  $p < .10$ . \*\*  $p < .05$ . \*\*\*  $p < .01$ . \*\*\*\*  $p < .001$ .

“To more closely assess the nature of the competencies in adolescence predicted by preschool waiting time, and in particular to estimate which of the significant correlations with parental rating measures may reflect such school-related achievements and abilities as assessed by SAT scores, partial correlations between delay time and parental ratings were computed, controlling for both verbal and quantitative SAT scores. After the variance attributable to SAT was partialled out, of the 11 CCQ items judged relevant (see Table 3), the following remained

## **Episode 097: The Big Five Personality Traits:**

### **Conscientiousness Part 1**

Alexis Carnduff B.S., Alec Zane B.A., Maddison Ulrich, B.S.,  
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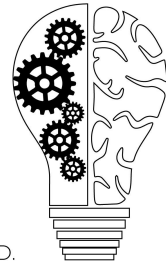
significantly correlated with delay time ( $p < .05$ ,  $df = 29$ ): uses and responds to reason ( $r = .40$ ); is planful, thinks ahead ( $r = .38$ ); and tends to go to pieces under stress, becomes rattled and disorganized ( $r = -.36$ ). The correlation between preschool delay time and the item is unable to delay gratification remained virtually unchanged ( $r = -.33$ ). On the ACQ, 2 items remained significant ( $p < .05$ ,  $df = 23$ ): how likely is your child to exhibit self-control in frustrating situations? ( $r = .47$ ) and when trying to concentrate, how distractible is your son or daughter? ( $r = -.54$ )” ([Shoda, 1990](#)).

## **Adulthood:**

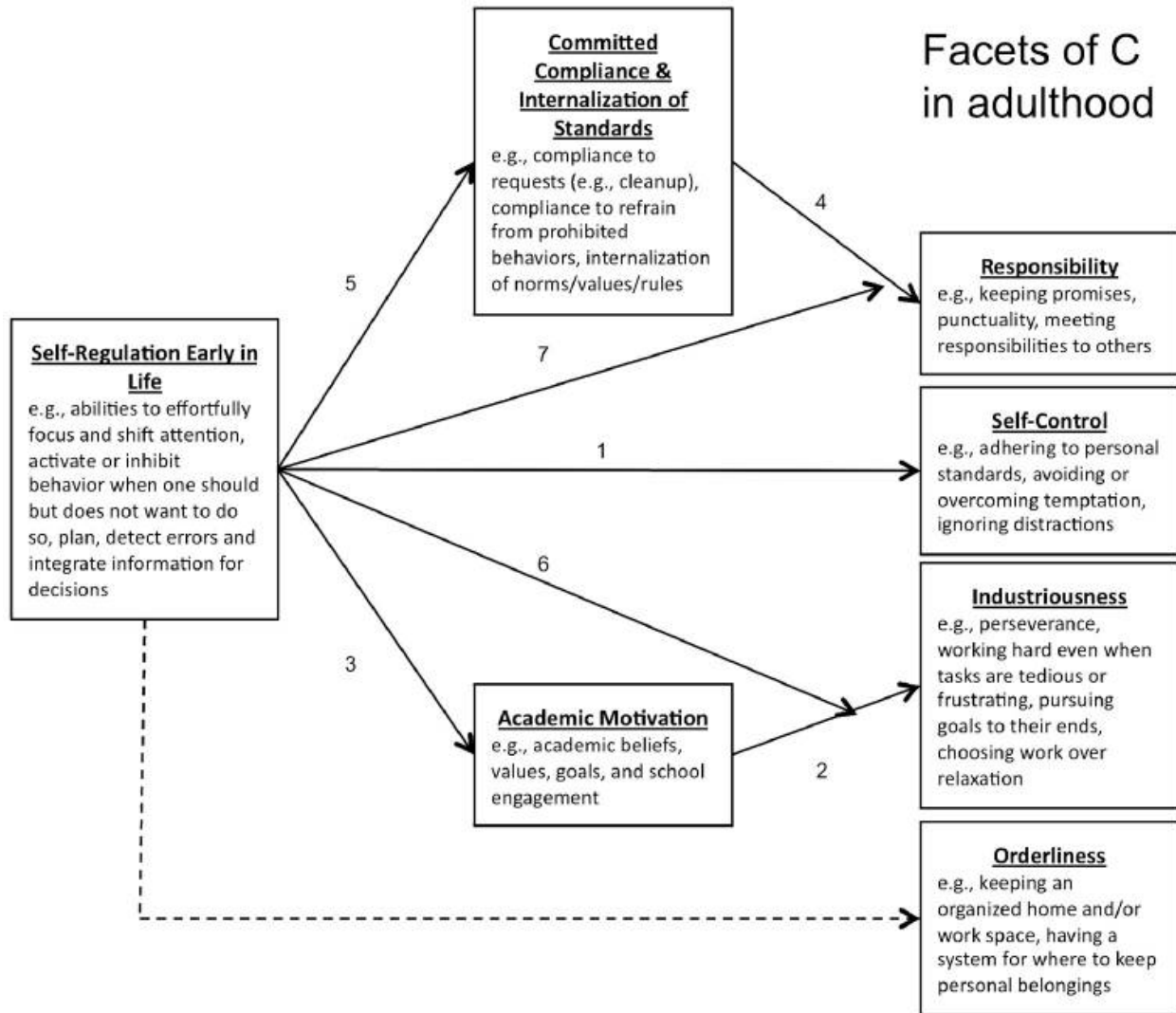
Conscientiousness starts in childhood with the traits “self-regulation, academic motivation, and internalized compliance/internalization of standards” ([Eisenberg, 2014](#)). The following flow chart shows the progression of these three traits over time into the facets of conscientiousness in adulthood:

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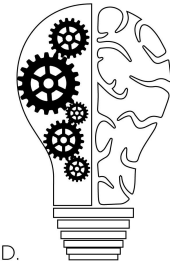


When assessed in one study, conscientiousness was largely independent of intelligence, and when academic achievement in high school was accounted for, conscientiousness continued to predict achievement at university ([Poropat, 2009](#)).

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Many previous cross-sectional and longitudinal studies have found that conscientiousness increases from young adulthood to 60 years of age. More specifically, a person's conscientiousness increases the most during their young adult years, then tapers off by the time they reach middle age ([Widiger, 2017](#)).

To expand on the findings from childhood school success, as stated in *the Oxford Handbook of the Five Factor Model*, "some of the most influential experiences in adulthood relate to achievement settings. For example, students tend to increase in conscientiousness during the final year of high school, likely in preparation for the new responsibilities they anticipate taking on in college or in the workforce (Bleidhorn, 2012). However, individual experiences are important, as not everyone follows this pattern." ([Widiger, 2017](#)) A few things mentioned in the book which are associated with increased conscientiousness are: starting your first job, healthy eating, exercising, safe driving, entering into your first romantic relationship. Conversely, substance abuse was linked to decreased conscientiousness. Interestingly, no long-term changes in conscientiousness were associated with having a child, despite all of the increased responsibilities that go into parenting (van Scheppingen et al., 2016). In summary, a calm life in terms of having a job, family, and housing situation set up prior to retirement age bodes well for the transition into retirement, but it may not prompt improvement in personality traits ([Widiger, 2017](#)).

#### Older adulthood:

After middle age, a person's conscientiousness declines as they get older ([Widiger, 2017](#)). This may be due to leaving the workplace and starting retirement. "With the loss of structure provided by work, older adults may feel disorganized or have fewer daily pressures for orderliness. Conscientious individuals may be especially affected by the transition to retirement given that they tend to invest a lot into work, as well as excel at it. While engaging in new activities such as volunteering and spending more time with one's family makes the transition easier, these activities may be especially important for the highly conscientious, who likely desire more structures, goal-oriented activities to fill their time" ([Widiger, 2017](#)). Conscientiousness also plays an important role in declining health as a person ages.

#### Family Dynamics:

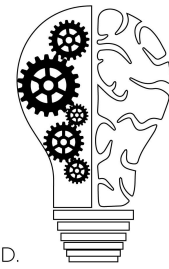
Children whose parents were affectionate towards them tend to score higher on conscientiousness scales ([McCrae & Costa Jr, 1988](#)). One study states that "interactions of parents with their children are among the major determinants of adult character and personality.



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Cautiously interpreted, retrospective reports provide one useful source of evidence -- particularly in an area in which so few prospective studies have been completed.” This study uses the subject’s self-report and the report of a peer to assess personality.

**Correlations of Self-Reported and Peer-Rated NEO Personality Inventory Scales With Dimensions of Parent-Child Relations**

PCR II dimensions	N	NEO-PI self-report scales			
		E	O	A	C
<i>Ratings of father</i>					
Loving-rejecting	- 30***	09*	11*	19***	10*
Casual-demanding	- 12**	- 13**	10*	06	- 11*
Attention	07	11*	- 01	- 13**	- 05
<i>Ratings of mother</i>					
Loving-rejecting	- 29***	10*	11**	27***	19***
Casual-demanding	- 01	- 13**	14***	03	- 14**
Attention	01	08*	- 02	- 08	02
	N	NEO-PI peer-rating scales			
		E	O	A	C
<i>Ratings of father</i>					
Loving-rejecting	- 17**	06	12*	14*	06
Casual-demanding	- 13*	- 02	19**	23**	- 01
Attention	00	00	04	- 02	- 04
<i>Ratings of mother</i>					
Loving-rejecting	- 13*	03	03	03	05
Casual-demanding	- 03	- 02	.12*	12	- 07
Attention	- 02	- 05	- 03	- 11	07

Note *N*s = 567-596 for N, E, and O scales and 420-440 for A and C scales in self-reports, *N*s = 242-252 in peer ratings N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness

a Significant,  $p < .05$ , one-tailed, as replication of self-report correlation

\* $p < .05$

\*\* $p < .01$

\*\*\* $p < .001$

According to the self-report, more loving fathers had a positive 0.10 correlation with higher conscientious adult children. More demanding fathers had a negative 0.11 correlation. More loving mothers had a positive 0.19 correlation with higher conscientious adult children. More demanding mothers had a negative 0.14 correlation. The peer rating was not statistically significant. Of note, these results show about <4% variance for conscientiousness. From this study, we can assume that the parents’ actions (as remembered retrospectively) have little consequence in terms of conscientiousness.

## Conscientiousness and genetics:

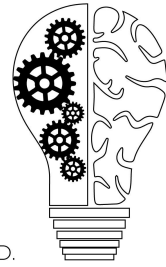
The previous articles demonstrate the ongoing importance of conscientiousness throughout life as well as the potential for changing levels of conscientiousness. These changing levels likely



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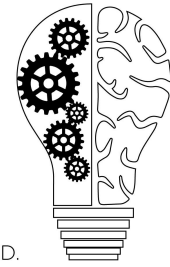
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reflect environmental factors, but genetics likely also contribute to conscientiousness. One group approached this question and the five dimensions by “decomposing observed trait variance into genetic and environmental components” ([Jang, Livesley, & Vernon, 1996](#)).

- Participants: 123 monozygotic and 127 dizygotic twin pairs 16 years or older and who were raised in the same home. Participants were recruited through “newspaper advertisements and media stories.”
- Methods: Participants completed the NEO-PI-R form (questionnaire used most widely for personality assessment).
  - “The principal genetic effects are additive, symbolized by the heritability coefficient,  $h^2$ , indicating the extent to which parents and offspring genetically resemble one another, and non-additive effects due to dominance ( $d^2$ ) when two genes at the same locus on a homologous chromosome interact. Environmental variance is routinely decomposed into shared environmental factors ( $c^2$ ), features that distinguish the general environment of one family from another” (emphasis added).
- Results: Monozygotic and dizygotic twin correlations with the five dimensions as well as the estimated contributions of genetic and environmental effects are provided below:

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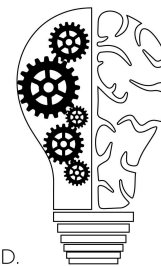
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**Table 2**  
Twin Correlations and Heritability Estimates of the Revised NEO  
Personality Inventory (NEO-PI-R) Dimensions and Facets

Dimension and facets	$r_{MZ}$	$r_{DZ}$	$h^2$	$SE_A$	$d^2$	$SE_D$	$c^2$	$SE_C$	$e^2$	$SE_E$
<i>Neuroticism</i>	.41	.18	.41	.06					.59	.04
Anxiety	.26	.13	.26	.08					.74	.05
Angry Hostility	.37	-.01			.33	.07			.67	.05
Depression	.33	.14	.31	.07					.69	.05
Self-										
Conscientiousness	.38	.19	.38	.06					.62	.04
Impulsiveness	.36	.21	.36	.07					.64	.04
Vulnerability	.45	.17	.44	.06					.56	.04
<i>Extraversion</i>	.55	.23	.53	.05					.47	.04
Warmth	.43	.14			.43	.06			.57	.05
Gregariousness	.56	.19	.52	.05					.48	.04
Assertiveness	.42	.10			.42	.06			.58	.05
Activity	.29	.14	.29	.07					.71	.05
Excitement										
Seeking	.42	.02			.41	.06			.59	.05
Positive Emotions	.38	.24	.39	.06					.61	.04
<i>Openness</i>	.58	.21			.61	.05			.39	.04
Fantasy	.32	.22	.34	.07					.66	.05
Aesthetics	.60	.14			.57	.05			.43	.04
Feelings	.44	.35					.39	.05	.61	.03
Actions	.42	.21	.44	.06					.56	.04
Ideas	.53	.09			.52	.06			.48	.04
Values	.49	.27	.51	.06					.49	.04
<i>Agreeableness</i>	.41	.26	.41	.06					.59	.04
Trust	.27	.21	.30	.07					.70	.05
Straight-										
forwardness	.47	.17	.47	.06					.53	.04
Altruism	.34	.18	.34	.07					.66	.05
Compliance	.33	.10			.34	.07			.66	.05
Modesty	.30	.36					.33	.06	.67	.04
Tender-										
Mindedness	.41	.15			.45	.06			.55	.04
<i>Conscientiousness</i>	.37	.27	.44	.06					.56	.04
Competence	.37	.13	.34	.07					.66	.05

## Episode 097: The Big Five Personality Traits: Conscientiousness Part 1

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**Table 2**  
Continued

Dimension and facets	$r_{MZ}$	$r_{DZ}$	$h^2$	$SE_A$	$d^2$	$SE_D$	$c^2$	$SE_C$	$e^2$	$SE_E$
Order	.25	.23					.24	.07	.76	.04
Dutifulness	.42	.23	.44	.06					.56	.04
Achievement										
Striving	.41	.18	.42	.06					.58	.04
Self-Discipline	.30	.37					.34	.06	.66	.04
Deliberation	.26	.18					.23	.07	.77	.04

Note.  $N_s$  = 123 monozygotic (MZ) pairs, 127 dizygotic (DZ) pairs; heritability estimates are based on the squared maximum-likelihood parameter estimates from the best-fitting model by AIC (Akaike's Information Criterion; Akaike, 1987);  $SE_A$ ,  $SE_D$ ,  $SE_C$ , and  $SE_E$  are the standard errors of the maximum-likelihood parameter estimates for additive genetic, nonadditive genetic, shared environmental, and nonshared environmental components of variance, respectively.

“Pearson correlations for the MZ twins exceeded those for the DZ twins for all scales except modesty and self-discipline; this suggests a genetic influence on most NEO-PI-R scales” (emphasis added). From data in this study, we can infer that conscientiousness is heritable by 44%.

The above study was an expansion of similar work done with a twin study a few years earlier based on data from the Swedish Adoption/Twin Study of Aging. This study examined the genetic variance in openness, conscientiousness, and agreeableness through the use of an abbreviated NEO-PI ([Bergeman, Chlpuer, Plomin, et al., 1993](#)).

- Participants: Four populations were examined including 82 pairs of monozygotic twins raised apart, 171 pairs of dizygotic twins raised apart, 132 pairs of monozygotic twins raised together, and 167 pairs of dizygotic twins raised together.
- Method: Participants were born between 1886 and 1958, so zygosity was determined based on physical similarities. Shortened NEO-PI was completed in 1984 as part of a larger battery.
- Results: The monozygotic (MZ) and dizygotic (DZ) twins reared apart correlated .43 and .23, respectively, for openness, .15 and —.03 for conscientiousness, and .19 and .10 for agreeableness. For MZ and DZ twins reared together, the correlations were slightly higher: for openness, .51 and .14, for conscientiousness, .41 and .23, and for agreeableness, .47 and .11, respectively.

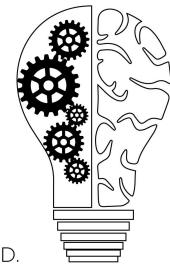
Total genetic influences estimated using model fitting techniques accounted for 40%, 12%, and 29% of the variance for openness, agreeableness, and conscientiousness, respectively.

A recent meta-analysis examined personality heritability with special attention to “possible moderator effects of study design, type of personality model, and gender on heritability estimates.” This study found that roughly 40% of personality differences could be attributed to

## Episode 097: The Big Five Personality Traits:

### Conscientiousness Part 1

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genetics while 60% of these differences were due to environmental factors ([Vukasović & Bratko, 2015](#)).

- Participants: A total of 39 published and 6 unpublished studies with 62 independent effect sizes were included in this meta-analysis. These papers included more than 100,000 total participants.
- Method: Multiple hypotheses were tested, but we are most interested in the first hypothesis which claims “there will be a statistically significant genetic effect on individual differences in personality. To do this, a meta-analysis was conducted for average personality heritability estimates and additional 11 analyses were conducted for each personality trait in three personality models included in this study.”
- Results:
  - “There is a statistically significant genetic effect on individual differences in personality, with an average heritability estimate of 0.39, SE 0.020, 95% CI [.35, .43].”
  - Based on 16 effect sizes, differences in conscientiousness could be attributed to genetic factors 31% of the time with an effect size estimate of 0.31 and 95% CI of [.22, .40].

This meta-analysis examined both twin and non-twin data which may explain its lower estimates of genetic influence when compared to previous studies which were based only on twin data such as (Johnson et al., 2008) and (van den Berg et al., 2014). Of note, gender and personality models were not significant moderators of personality variability.

#### HERITABILITY OF PERSONALITY

Table 3

*Average Effect Size Estimate (ES), 95% Confidence Interval (CI), and Number of Effect Sizes (k) by Study Design and Personality Model*

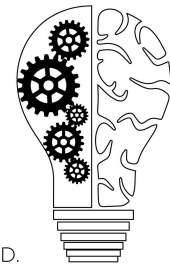
Study design	Personality model			Total ES, 95% CI, k
	Eysenck ES, 95% CI, k	Tellegen ES, 95% CI, k	FFM ES, 95% CI, k	
Twins	.44, [.42, .47], 21	.53, [.49, .56], 7	.48, [.45, .51], 10	.47, [.45, .49], 38
FS and AS	.24, [.17, .32], 10	—	.19, [.11, .27], 6	.22, [.17, .28], 16
Total	.38, [.33, .42], 31	.53, [.49, .56], 7	.37, [.29, .45], 16	.39, [.35, .43], 54

*Note.* Tellegen = Tellegen’s personality model; Eysenck = Eysenck’s personality model; FFM = five-factor model of personality; twins = twins reared together, twins reared together and their family members, and twins reared apart; FS = family study; AS = adoption study.

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Five-factor model				
Neuroticism	.37	.047	[.28, .47]	16
Extraversion	.36	.043	[.28, .45]	17
Openness	.41	.051	[.31, .51]	16
Agreeableness	.35	.035	[.28, .42]	16
Conscientiousness	.31	.045	[.22, .40]	16

*Note.* SE = standard error of the effect size.

Another recent meta-analysis examined the link between specific genetic variations and personality variance. Studies included “twin, linkage, candidate gene association studies, genome-wide association studies and polygenic analyses.” We will report on the specific genetic links to conscientiousness as they are most relevant to the current discussion ([Sanchez-Roige, Gray, MacKillop, Chen, & Palmer, 2018](#)).

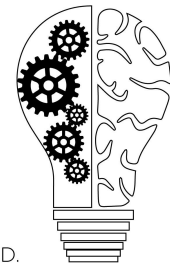
- Participants: A meta-analysis of the study types described above.
- Methods: Meta-analysis focusing on “polygenic strategies for studying the genetics of personality” including SNP heritability, gene-set and pathway-based analyses, and genomic profile risk scoring.
  - Meta-analysis of NEO personality traits and genome-wide association studies. GWAS interrogates hundreds of thousands to millions of SNPs. Does not assume any prior knowledge about how traits are presented.
  - Genome-wide linkage studies - take advantage of close familial relationships to identify chromosomal regions.
- Results: the study reported “significant linkage results for conscientiousness (NEO) at 20p13.

A later meta-analysis (N = 6149) of 4 genome-wide linkage scans by (Amin et al, 62) identified 11q24 for openness to experience (NEO). “De Moor et al<sup>77</sup> conducted a meta-analysis of NEO personality traits that showed significant associations for (...) conscientiousness in the gene KATNAL2 (rs2576037, P = 4.9 × 10<sup>-8</sup> ).” Of note, the KATNAL2 gene is linked with neurodevelopment including neuronal migration, axonal growth, and dendritic pruning (P=2.0 x 10<sup>-6</sup>).

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# So if genes and early environment have an impact, what about free will?

Though it is difficult to examine the direct impact of free will due to its unsettled existence and nature, it is possible to examine a belief in free will. A study by [Stillman, et al., 2010](#) on personal achievement and job performance found correlations between a belief in free will and the Big Five personality traits. This study included multiple variables and an additional study which will not be discussed here. (For a deeper dive into the concept of free will, please see Free Will in Psychiatry & Psychotherapy [Part 1](#), [Part 2](#), and [Part 3](#))

- Participants: 143 undergraduate students participated for partial course credit
- Methods: Testing measures included the Free Will subscale of the Free Will and Determinism Scale (measuring belief in free will), Ten-Item Personality Inventory (measuring Big Five traits), SAT scores (measuring intelligence), Locus of Control Scale (interanality dimension), and a self-reported measure of “expected career performance”
- Results: The study found a 0.25 correlation between a belief in free will and conscientiousness. The original table is included below.

Multiple facets of conscientiousness such as competence, order, dutifulness, and self-discipline may appear to be colloquially linked to free will. However, these categories could also be linked to other concepts such as locus of control and will require additional research to clarify any associations or correlations between these sub-facets of conscientiousness and a belief in free will.

A belief in free will has been associated with a number of positive life outcomes such as decreases in racial prejudice ([Zhao, X., Liu, L., Zhang, X. X., Shi, J. X., & Huang, Z. W. \(2014\)](#)), setting more personal goals, and higher academic performance ([Crescioni, A. W., Baumeister, R. F., Ainsworth, S. E., Ent, M., & Lambert, N. M. \(2016\)](#)). Future research may reveal conscientiousness or some of its sub-facets as mediators of these associations with belief in free will.

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### Conscientiousness Part 1

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**Table 1.** Correlations, Means, and Standard Deviations Among Independent and Dependent Variables for Study 1

	Free Will Belief	Openness	Conscientiousness	Extraversion	Agreeableness	Emotional Stability	Intelligence	Locus of Control	Expected Career Performance
M	28.05	11.08	11.59	10.19	10.52	10.14	1100	36.71	50.48
SD	3.15	1.94	1.89	2.49	2.17	2.29	122	6.64	5.38
Free will belief		.17*	.25**	.03	.07	.21*	-.09	.23**	.33**
Openness			.22*	.28**	.22*	.42**	.09	.20*	.19*
Conscientiousness				.09	.19*	.34**	.02	.22**	.43**
Extraversion					.16	.06	-.19*	.08	.13
Agreeableness						.23*	-.04	.09	.28**
Emotional stability							.07	.11	.13
Intelligence								.03	.06
Locus of control									.26**

Note: Free will belief is measured by the Paulhus and Margesson (1994) Free Will subscale.

\*  $p < .05$ . \*\*  $p < .01$ .

### Key Points

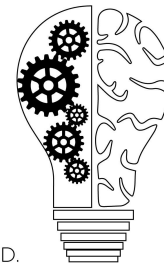
- Higher conscientiousness is associated with a healthy body weight, engaging in preventative medicine, healthier diets, and exercising more. Conscientiousness is also associated with self-control and responsibility. The current research in this article supports that the environment has powerful effects on conscientiousness.
- Positive student-teacher relationships, positive peers, parents who are involved in school, positive feelings about school, finding school and classes engaging, and putting effort into one's schoolwork are associated with increases in conscientiousness.
- Kids with affectionate parents tend to score higher on conscientiousness as adults while kids with demanding parents tend to score lower on conscientiousness as adults.
- The environment has significant effects on conscientiousness: Monozygotic twins reared apart only had a 0.15 correlation on conscientiousness, when reared together there was a 0.41 correlation on conscientiousness.
- Both conscientiousness and self control increase in young adulthood and continue to increase up to the age 60.
- The correlation of 0.25 between a belief in free will and conscientiousness represents an interesting opportunity for growth since both conscientiousness and a belief in free will can change throughout life and individual decisions.



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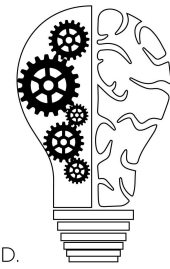
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## **Episode 097: The Big Five Personality Traits:**

### **Conscientiousness Part 1**

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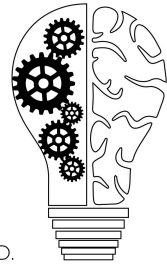
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