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### Extraversion

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### Abstract and Keywords

This chapter provides a review of extraversion, defined as a dimension of personality reflecting individual differences in the tendencies to experience and exhibit positive affect, assertive behavior, decisive thinking, and desires for social attention. Extraversion is one of five basic tendencies in the Five-Factor Model (FFM) of personality. In the FFM, basic tendencies are conceptualized as including the following characteristics. They are organized hierarchically, based in biology, develop over time according to intrinsic maturation principles, are manifested in characteristic adaptations (i.e., are expressed in affective, behavioral, and cognitive tendencies), influence one's objective biography, are reflected in the self-concept, and have both adaptive and maladaptive variants. This chapter is organized around the theory and research on extraversion relevant to each of the aforementioned characteristics.

Keywords: extraversion, surgency, gregariousness, friendliness, assertiveness, leadership, sociability

Personality trait dimensions are abstractions used to describe and explain consistency and coherence in affect, behavior, cognition, and desire—the “ABCDs” of personality (Ortony, Norman, & Revelle, 2005; Revelle, 2008)—over time and space. Introversion–extraversion (referred to from here on as extraversion) is a higher order dimension of personality reflecting tendencies to experience and exhibit positive affect, assertive behavior, decisive thinking, and desires for social attention (Wilt & Revelle, 2009). More extraverted individuals are characterized by energy, dominance, spontaneity, and sociability, whereas more introverted individuals tend to be described as more lethargic, inhibited, reflective, and quiet.

Generally speaking, it is important to study extraversion due to its emergence as one of the basic and fundamental dimensions in almost all current theories and taxonomies of

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normal personality traits (Ashton & Lee, 2007; Costa & McCrae, 1992; Eysenck & Himmelweit, 1947; Goldberg, 1990; Hogan, 1982; Norman, 1963), its role in contributing to effective functioning and well-being in a number of different domains (Lucas & Fujita, 2000; Magee, Heaven, & Miller, 2013; Ozer & Benet-Martinez, 2006; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007), and its relations to various forms of psychopathology (Krueger, Caspi, Moffitt, Silva, & McGee, 1996; Widiger, 2005). This chapter focuses in particular on extraversion from the framework of the Five-Factor Model (FFM; Costa & McCrae, 1992; McCrae & Costa, 2008) of personality.

Although it is recognized that extraversion in the FFM is similar to the extraversion constructs in other theories of personality in terms of its conceptual and operational natures (McCrae & Costa, 2008), and indeed all studies of extraversion are likely tapping into common features of the trait, it is worth noting that the FFM provides a unique perspective from which to view and organize current theory and research on extraversion. FFM categorizes Extraversion as one of the five *basic tendencies* (along with Neuroticism, Openness, Agreeableness, and Conscientiousness). In the FFM, basic tendencies are conceptualized as being organized hierarchically, biologically based, developing over time according to intrinsic maturation principles, being manifested in characteristic adaptations (i.e., are expressed in affective, behavioral, and cognitive tendencies), influencing our objective biography, being reflected in the self-concept, and possibly having both adaptive and maladaptive variants. This chapter is organized around the research relevant to each of the aforementioned characteristics as they apply to extraversion with the aim of providing an overview of what is known about this important trait.

## Extraversion as a Basic Tendency

### Extraversion Is in All Prominent Models

C. G. Jung (Jung, 1921/1971) first introduced the term extraversion, describing more extraverted individuals as being more focused on the outer world, in contrast to more introverted individuals who were thought to be focused more on their own inner mentality. Extraversion for Jung was engaging with the world, whereas introversion was being drawn inward into thought. Although Jung originated the name, Gerard Heymans and Wilhelm Wundt perhaps did more to establish the empirical basis for studying extraversion. Heymans and Wiersma (1909), using early techniques that were crude cousins of factor analysis, identified extraversion along a continuum of “strong” and

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“weak” functioning (Eysenck, 1992). Reanalysis of the original data using factor analysis has confirmed the presence of a factor similar to extraversion, ranging from energetic to submissive (Van der Werff, 1985). Wundt (1897) reorganized the temperaments of Hippocrates and Galen into two dimensions, changeability and excitability; the choleric and sanguine temperaments were thought to be more changeable, whereas the melancholic and phlegmatic temperaments were conceptualized as being less changeable. The changeability dimension was later conceptualized as extraversion by Hans Eysenck (Eysenck, 1981; Eysenck & Himmelweit, 1947).

Perhaps nobody has done as much for extraversion as Eysenck, and he demonstrated the importance of extraversion as a fundamental dimension of personality in a series of experimental and taxometric studies (Eysenck, 1952; Eysenck & Himmelweit, 1947). He was one of the first to attempt a thorough description and measurement of extraversion that evolved with the development of several inventories—the Maudsley Personality Questionnaire (MPQ; Eysenck, 1959), the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1964), the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975), and the Eysenck Personality Profile (EPP; Eysenck & Wilson, 1991)—the content of which included items mainly assessing sociability and impulsivity in varying proportions depending on the inventory (Rocklin & Revelle, 1981). Another early measure that also went through several versions (Guilford & Guilford, 1934) and that deserves mention is the Guilford-Zimmerman Temperament Survey (GZTS; Guilford & Zimmerman, 1949). The GZTS included a dimension defined at one end by the tendency for quiet reflection and at the other end by impulsivity (named introversion–extraversion), and it included yet another dimension that contained sociability content similar to Eysenck’s extraversion. The differences between Eysenck’s and Guilford’s conceptualizations of extraversion led to an influential debate about the appropriate content of extraversion (Eysenck, 1977; Guilford, 1975, 1977).

Extraversion consistently emerged from early lexical analyses aimed at determining the fundamental dimensions of personality (see also the chapter by De Raad and Mlačić). Allport and Odbert’s (1936) list of trait words extracted from an unabridged dictionary formed the basis for Raymond Cattell’s Herculean efforts to catalogue and organize the trait domain (e.g., Cattell, 1943a,b, 1947). Over a number of years, Cattell narrowed Allport and Odbert’s (1936) list of trait adjectives to 171 paragraph descriptors, then 35 paragraph descriptors, and finally through factor analysis to 12 factors and four additional scales that in turn were measured by the 16PF inventory of primary personality factors (Cattell, 1947). In the 16PF, a higher order factor of extraversion encompasses five of the primary factors that together contain content reflecting impulsivity, sociability, and ascendance (Cattell, 1957). The work of Fiske (1949) and Tupes and Christal (1961) examined the structure of peer ratings based on the paragraph

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descriptors of Cattell and consistently found five factors, one of which was labeled surgency or extraversion. This work laid the foundation for Warren Norman's (1963) seminal factor analysis on what he considered to be the best marker scales from Tupes and Christal (1961) that revealed what are now known as the Big Five factors of personality (Goldberg, 1990).

Each of the Big Five is conceptualized as a broad factor subsuming a number of narrower traits. The first factor in the Big Five, Surgency (also called extraversion), consists of more specific traits such as talkative, energetic, assertive, and adventurous. Lewis Goldberg (1993) and John Digman (1990) have perhaps conducted the most rigorous and influential research attesting to the validity of the Big Five structure, which was replicated in the languages of many different cultures (Goldberg, 1990, 1992). A wide range of inventories has been developed over the past 20 years to assess the Big Five (e.g., Goldberg, 1992; Hofstee, de Raad, & Goldberg, 1992; John, Donahue, & Kentle, 1991; Rammstedt & John, 2007; see also the chapter by Simms, Williams, and Simms). The most extensive assessment of the Big Five is the Abridged Big Five Circumplex (AB5C; Hofstee et al., 1992); the adjectives included in this inventory have high loadings on two factors<sup>1</sup> (each adjective has a primary loading on one factor and a secondary loading on the second one) such that pairs of the Big Five dimensions have a circumplex structure. Facets including items with their primary loadings in the extraversion domain in this inventory are gregariousness, friendliness, assertiveness, poise, leadership, provocativeness, self-disclosure, talkativeness, and sociability.

The FFM (McCrae & Costa, 2008) identifies personality dimensions similar to the Big Five and has also been replicated across many cultures. Although often used synonymously with the Big Five, the FFM was derived from factor analysis of questionnaires rather than adjectives. The most comprehensive instrument used to assess the traits in the FFM, the NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1992), assumes a hierarchical structure with each higher order factor seen as the aggregate of six lower order facets. Extraversion's lower order facets in this inventory are warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotion. DeYoung, Quilty, and Peterson (2007) recently contributed an important addition to the assessment of Big Five/FFM traits by developing the Big Five Aspects Scales (BFAS), an inventory that was empirically derived from the NEO PI-R and an open-source measure of the AB5C included in the International Personality Item Pool (IPIP) (Goldberg, 1999; Goldberg et al., 2006). In the BFAS, extraversion is represented by the lower order aspects of enthusiasm and assertiveness.

Various other models of traits identify extraversion as a basic dimension of personality. Also relying on factor analysis of adjectives from the dictionary, Tellegen (1985)

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developed a seven-factor taxonomy including five factors that resemble the Big Five and two additional factors of positive and negative evaluation. Tellegen's (1982) inventory, the Minnesota Personality Questionnaire, operationalizes extraversion hierarchically as well, with its lower order facets termed well-being, social potency, social closeness, and achievement. Hogan's (1982) Socioanalytic Theory includes a higher order factor similar to extraversion that consists of the facets sociability and ambition, and the HEXACO model of personality (Ashton & Lee, 2001, 2007; Lee & Ashton, 2004) represents extraversion with four lower order facets termed expressiveness, liveliness, sociability, and social boldness.

## Defining Extraversion's Lower Order Structure

The idea from FFM that basic tendencies are hierarchically organized is borne out in the previous description of theories and inventories including extraversion, as most of the inventories include lower order facets that together comprise the higher order trait of extraversion. There is clearly quite a bit of overlap across inventories in terms of what content is included in the extraversion domain, although there are also differences in which content is emphasized as well as the overall breadth of coverage. The difficulty of defining facets in a nonarbitrary way (Costa & McCrae, 1998) perhaps contributes to some of the inconsistency in the operationalization of extraversion across inventories. This presents a challenge for moving toward a better understanding of extraversion because a detailed and precise knowledge of lower order constructs is necessary in order to achieve a greater comprehension of the broad trait (McCrae & Costa, 1992).

Notwithstanding the inherent difficulties in generating a comprehensive list of lower order constructs within a trait domain, the NEO PI-R (Costa & McCrae, 1992) may be viewed as a prototypical example of a traditional hierarchical representation of facet structure. The NEO PI-R was rationally derived through extensive literature reviews, theory building, and intuition, and it shows good convergent and discriminant validity (McCrae & Costa, 1992). The NEO PI-R (and many other inventories designed to assess the hierarchical structure of traits described earlier) assumes a simple structure, in which lower order facets are thought to associate with only one higher order trait and are empirically associated with each other only through the shared variance of the latent, higher order trait that they have in common. In the case of the NEO PI-R extraversion, this implies that the facets of warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotion are all thought to be connected through some common process.

Advocates of the FFM have proposed that the common process is the disposition to engage in social behavior (McCrae & Costa, 1997), whereas other theorists have posited

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that the core of extraversion is positive emotionality (Tellegen, 1985; Watson & Clark, 1997) or the propensity to seek social attention (Ashton, Lee, & Paunonen, 2002). However, as Hofstee, de Raad, and Goldberg (1992) showed in their development of the AB5C, personality inventories do not typically show simple structure empirically, as lower order constructs across different traits tend to be associated with one another even when controlling for the variance of higher order factors (see also the chapter by Wright). Additionally, the use of simple structure as applied to personality data leads to imprecise and inaccurate solutions (Pettersson & Turkheimer, 2014). These findings raise questions about the traditional way of thinking about the hierarchical structure of extraversion (and traits in general), and so alternative ways of representing traits at different levels of breadth deserve consideration.

Eysenck (1970) proposed an intriguing multilevel representation of extraversion that consisted of four distinct levels of abstraction. *Specific responses* are the most narrow level in this schematic and comprise individual behaviors such as flirting on a single occasion. One level above are *habitual responses* such as behaving in a lively manner at various parties on recurring occasions. At the next level are facet-level constructs, such as gregariousness, and finally at the highest level of the hierarchy is the broad trait of extraversion. This hierarchy is unique in at least two respects. First, constructs at lower levels are specified as residing within only one higher order level. Second, Eysenck did not specify links between constructs included at the same level of a hierarchy nor between constructs across levels. This type of hierarchy may be a useful way of understanding how extraversion manifests at different levels of specificity; however, little research has examined whether this elegant hypothetical structure can be operationalized reliably.

Another unique perspective on higher order traits is provided by the increasingly popular network perspective (Borsboom & Cramer, 2013; Cramer et al., 2012; Goekoop, Goekoop, & Scholte, 2012; van Os, Lataster, Delespaul, Wichers, & Myin-Germeys, 2014). The network perspective proposes that higher order traits such as extraversion emerge from the interactions between lower order affective, behavioral, and cognitive (ABC) states. In contrast to the latent variable view of traditional trait hierarchies, the lower order constructs are thought to be correlated due to their influences on each other over time rather than sharing a common, higher order factor. This view therefore shifts the focus of organization away from the trait level to the trait's more narrow aspects. As applied to extraversion, the network approach, in stark contrast to Eysenck's hierarchy, posits strong associations between specific ABC constructs within the domain of extraversion. For an empirical example of how NEO PI-R extraversion can be visualized from the network perspective, see Cramer et al. (2012). This approach is appealing due to its ability to accommodate the complexity of associations between lower order levels of

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personality, but issues regarding how best to model network variables and the relegation of higher order traits such as extraversion to summary variables with no causal or organizing influence demand attention.

In addition to issues pertaining to how best to organize the traits residing in the extraversion domain, there is also debate about just which traits should be considered a part of extraversion. Perhaps the most longstanding and lively debate has centered around whether constructs similar to impulsivity should be thought of as lower order features of extraversion (Revelle, 1997). Eysenck included impulsivity content in his original inventories, yet he appeared to be ambivalent about whether impulsivity should be thought of as a central feature. Analyses of the structure of the EPI and the EPQ showed that the greatest difference between the inventories was that the EPI contained a substantial amount of both sociability and impulsivity, whereas the EPQ contained much more sociability than impulsivity (Rocklin & Revelle, 1981). Jeffrey Gray's original version of Reinforcement Sensitivity Theory (Gray, 1970, 1981, 1982) conceptualized Eysenck's extraversion as impulsivity minus anxiety; specifically, Gray believed that impulsivity graphically rotated 45 degrees in conceptual space from extraversion.

Zuckerman (1991) likewise included a construct similar to impulsivity in his general theory of personality, identifying a factor of sensation seeking that reflects a lack of planning, impulsive decision making, and taking risks for the sake of novelty. In yet another model of personality to grapple with issues about distinguishing among the aforementioned constructs, Cloninger, Svrakic, and Przybeck (1993) considered impulsivity to be part of a factor labeled novelty seeking that also contained approach behavior, high responsivity to reward, and a quickness to lose one's temper. Although still far from settling this debate, studies including a wide array of scales covering the terrain of extraversion, impulsivity, and sensation seeking have been making progress toward delineating the structure of these constructs. Factor analyses of the NEO PI-R and various impulsivity and sensation-seeking scales showed that some forms of impulsivity were more similar to NEO PI-R conscientiousness, whereas sensation seeking emerged as more highly associated with NEO PI-R extraversion (Whiteside & Lynam, 2001). Additionally, a recent study (Quilty, DeYoung, Oakman, & Bagby, 2014) used confirmatory factor analysis to show that sensation seeking is related to but not subsumed by extraversion's aspects of assertiveness and enthusiasm.

## **The ABCD Approach as an Organizing Framework**

The disagreements about extraversion's content should not be discouraging to those hoping for rapprochement regarding the scope of the extraversion domain; rather, it is just this type of healthy scientific debate that produces advancement in knowledge. Steps

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toward a synthesis of current ideas will likely arise out of an organizing framework that is capable of sorting out the differences among prominent theories' conceptualizations of extraversion. The aforementioned affect, behavior, cognition, and desire (ABCD) approach to personality might be one way of integrating different theories and operationalizations of traits (Ortony et al., 2005; Revelle, Wilt, & Condon, 2011; Wilt, Oehlberg, & Revelle, 2011). Putting this approach to the test, Rauthmann and Will (2011) showed that recurrent themes in the scientific literature pertaining to the trait of Machiavellianism can be organized coherently into ABCD aspects. To understand this approach, it is useful to first define the ABCD domains.

Despite its ostensibly intuitive nature, there have been inconsistencies in the way the term behavior has been applied in the field of personality. Adopted herein is the definition of behavior offered by (1) Furr (2009)—“behaviour may be defined as verbal utterances (excluding verbal reports in psychological assessment contexts) or movements that are potentially available to careful observers using normal sensory processes” (p. 372)—and added to it (2) the observation of Ortony et al. (2005) that behavior encompasses physical actions that may not be observable through normal sensory processes (e.g., contractions of the gut). Behavior is how the mental processes of affect, cognition, and motivation manifest themselves and become tangible and concrete (Shweder, 1999). Descriptions of affect tend to converge on the definition of affect as a higher order category subsuming valenced condition such as moods, emotions, feelings, feeling-like states, and preferences (Ortony et al., 2005; Pytlik Zillig, Hemenover, & Dienstbier, 2002; Scherer, 1995). Cognition, or cognitive activity, is also thought of as a higher order category and encompasses mental contents and processes (Gruszka, Matthews, & Szymura, 2010). Attention, memory, knowledge, problem solving, beliefs, appraisals, interpretations, representations, and expectations are all included in the domain of cognition (Cervone, 2004; Ellsworth, 1994; Ortony et al., 2005; Revelle, 1995). The domain of desire refers to people's (conscious or unconscious) goals, needs, wants, and wishes (Winter, John, Stewart, Klohnen, & Duncan, 1998). What binds these constructs in common is that they represent states that people would like to bring about or to prevent (Chulef, Read, & Walsh, 2001).<sup>2</sup> By relying on basic dimensions of phenomenological experience, the ABCD approach defines, clarifies, and explicates the meaning of traits in terms of psychological content. Thus, it can bring a more logical and meaningful organization to the characteristics that together characterize extraversion.

Across the inventories summarized previously, extraversion is defined by themes such as enthusiasm, assertiveness, sociability, dominance, agency, gregariousness, and warmth. Although these terms together do well to describe the landscape of extraversion, they provide little insight into the dynamic ABCD processes that differentiate individuals residing at different levels of the extraversion continuum. In contrast, take, for example,



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the results of an initial effort to delineate extraversion by its ABCD components (Wilt, 2014). Extraversion items from the International Personality Item Pool (Goldberg, 1999; Goldberg et al., 2006) versions of the NEO PI-R and AB5C that were rated by experts as containing relatively high amounts of A, B, C, and D were aggregated into scales reflecting the ABCD components of extraversion (see Table 1). These items together paint a coherent psychological portrait of the extraversion continuum as comprising positive affects (especially around people), gregarious and talkative behaviors, spontaneous and decisive cognitions, and desires for attention and influence.

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Table 1. Extraversion Items and ABCD Content

	<b>AB5C Primary</b>	<b>NEO Domain</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<i>Affect items</i>						
Love surprise parties.		E	<b>90</b>	2	3	5
Love excitement.		E	<b>77</b>	10	7	7
Feel comfortable around people.	E	E	<b>76</b>	4	13	8
Have a lot of fun.	E	E	<b>74</b>	10	10	6
Express childlike joy.	E	E	<b>72</b>	26	2	1
Dislike neighbors living too close.	E-		<b>72</b>	9	4	15
Often feel uncomfortable around others.	E-	E-	<b>70</b>	10	13	8
<i>Behavior items</i>						
Make a lot of noise.	E		6	<b>83</b>	6	6
Speak loudly.	E		7	<b>82</b>	5	7
Start conversations.	E		7	<b>81</b>	5	8
Speak softly.	E-		10	<b>79</b>	3	8
Am the first to act.	E		7	<b>79</b>	4	10
Don't talk a lot.	E-		8	<b>78</b>	7	7
Never stop talking.	E		7	<b>78</b>	7	8

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<i>Cognition items</i>						
Come up with a solution right away.	E		6	27	<b>59</b>	10
Know no limits.	E		13	23	<b>48</b>	16
Know how to captivate people.	E		13	29	<b>45</b>	13
Can take strong measures.	E		11	<b>35</b>	<b>43</b>	12
Know what I want.	E		9	1	<b>36</b>	<b>54</b>
React quickly.		E	23	39	<b>34</b>	3
Let things proceed at their own pace.		E-	15	<b>37</b>	<b>33</b>	15
<i>Desire items</i>						
Seek to influence others.		E	6	15	21	<b>58</b>
Seek adventure.		E	11	23	9	<b>57</b>
Demand to be the center of interest.	E		14	26	5	<b>55</b>
Know what I want.	E		9	1	<b>36</b>	<b>54</b>
Seek quiet.	E-	E-	9	<b>35</b>	11	<b>45</b>
Try to lead others.	E	E	5	<b>43</b>	8	<b>44</b>
Can easily push myself forward.	E		14	26	20	<b>40</b>

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*Note:* The second and third columns show trait domains for each item for the IPIP-AB5C and IPIP-NEO PI-R. Trait domain indicators with a “-” sign next to them signify that the item was reverse-scored with respect to extraversion.

The ABCDs are just one possibility for organizing the facet-level constructs of extraversion in meaningful ways. Another conceptualization about the nature of traits that shows promise is the division of traits into the *situations* in which trait-relevant *behaviors* are carried out and the *explanations* for those behaviors (Yang et al., 2014). For example, the situation of meeting new people at a party might elicit conversation for the more extraverted individual, because she or he believes that will facilitate social connections. For individuals who are more introverted, a party might send them in search of a quiet spot alone because they are overwhelmed by the pressure to interact socially. Read et al. (2010) provide an excellent review and simulation study showing how these scenarios may play out in dynamic fashion. Future research may seek points of contact and departure between this approach, the ABCD approach, and other intriguing explanatory models of traits (e.g., DeYoung, 2015; Fleeson, 2012; Read et al., 2010), with the overarching and related aims of refining the conceptual definition of extraversion and devising more accurate assessment techniques for all levels of the extraversion hierarchy.

## Evolution, Genetics, and Biology

Interest in the physiological bases of human personality dates back at least 2,500 years to the linking of bodily humors to the four temperaments described by Hippocrates and Galen: blood for sanguine, yellow bile for choleric, black bile for melancholic, and phlegm for phlegmatic (Stelmack & Stalikas, 1991). Current theories of the evolutionary, genetic, and neurophysiological underpinnings of personality, however, differ dramatically from their origins. The fundamental notion that any logical explanation of traits needs to be consistent with basic biology though remains as true now as it did then. The FFM (McCrae & Costa, 2008) proposes that the five basic tendencies all have a strong biological foundation. We now review research on the topic of the evolutionary, genetic, and biological basis of extraversion.

## Evolutionary Perspectives

The idea that traits evolved as strategies to meet adaptive challenges in the social environment is a popular notion among evolutionary psychologists (e.g., Buss, 2009;

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Denissen & Penke, 2008; Nettle, 2006). Genetic polymorphisms that relate to variations in traits, such as extraversion, can be maintained by natural selection in a number of ways (Buss, 1991, 2009; Nettle, 2006). Selection pressures vary over time or, due to geographic location, different phenotypes, may become more or less adaptive. Natural selection can also maintain variation in traits in the case of frequency dependent selection, in which the fitness of a phenotype depends on its frequency relative to other phenotypes in a given population. As applied to extraversion, the evolutionary result of any or all of these circumstances would be between-person variations in genes that bias individuals toward developing more extraverted or introverted phenotypes.

Studies showing that extraversion is moderately heritable,  $h^2 = 0.45-0.50$ , with little if any shared environmental influence (Bouchard & Loehlin, 2001), support the idea that extraversion has a substantial genetic basis (see also the chapter by South). Establishing heritability is the first step in uncovering specific genetic pathways, with optimistic theorists positing that extraversion may eventually be linked to specific polymorphic genes (Munafò, 2009; Penke, Denissen, & Miller, 2007). There has been some progress on this front, as extraversion has been associated with several genetic polymorphisms (Canli, 2006; Ebstein, Benjamin, & Belmaker, 2003; Luo, Kranzler, Zuo, Wang, & Gelernter, 2007).

Compelling evidence for the genetic basis of extraversion also comes from studies of nonhuman animals. If extraversion was simply a byproduct of human culture, traits similar to extraversion would not be expected to be found in other species. However, Gosling and John (1999) synthesized research on personality factors in nonhuman animals and found that factor labels that reside in the domain of extraversion were nearly ubiquitous across species. For example, individual differences in pigs and rhesus monkeys can be described by sociability, dogs and cats by energy, and octopi by approach-avoidance tendencies. In a vivid example, it was noted that more introverted octopi tend to stay in their dens and hide themselves by changing color and releasing ink.

The variation in extraversion across a multitude of species raises questions about how different levels of extraversion contribute to fitness. Nettle (2005, 2006) has proposed that there are fitness trade-offs at the poles of the extraversion continuum. A potential fitness benefit of higher extraversion may be the enhanced ability to form and sustain interpersonal relationships (Ashton & Lee, 2007; Nettle, 2005). Indeed, extraversion promotes social status and more extraverted individuals may enjoy the benefits of greater social influence and dominance (Anderson, John, Keltner, & Kring, 2001). Importantly, for arguments about whether the social benefits of extraversion actually increase fitness, extraversion is related to having more sexual partners (Nettle, 2005). So, why don't we live in a world of all extraverts? For one, more extraverted individuals may expose

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themselves to more safety risks as indicated by being hospitalized more for injuries (Nettle, 2005), perhaps due in part to engaging in increased antagonistic competition (Schaller & Murray, 2008). Introversion is also a protective factor against exposure to infectious illness, and thus geographic regions with high infectious disease prevalence may select for genetic polymorphisms that bias individuals toward introversion (Nettle, 2005; Schaller & Murray, 2008).

An example of how different levels of extraversion may be more or less adaptive depending on the environment comes from a study conducted by Camperio Ciani, Capiluppi, Veronese, and Sartori (2007) that assessed the personality of people living on the mainland in Italy and on the small islands off the mainland. It was found that compared to people living on the mainland and recent immigrants to the islands, individuals from families that inhabited the islands for 20 generations or more were less extraverted. Furthermore, emigrants from the islands were more extraverted than islanders who never emigrated. Camperio Ciani et al. (2007) proposed that selective emigration from the islands based on genetic differences is the underlying cause for these population differences in extraversion. More generally, genetically driven selective emigration might be one plausible contributor to differences in extraversion (or any personality trait) across regions within the same country (Rentfrow et al., 2013) as well as across countries (McCrae & Terracciano, 2005).

In contrast to the view of traits as evolutionarily adaptive, Tooby and Cosmides (1990) described an alternative model in which individuals engage in facultative calibration of their traits to personal and environmental cues over the course of development. That is, given a certain set of environmental conditions or physical characteristics, individuals will differ in their behavioral strategies based on which strategies are most adaptive for those specific circumstances. An example of how this might play out comes from a study showing that physical attractiveness and strength explained a large portion of the variance in extraversion scores (Lukaszewski & Roney, 2011). Lukaszewski and Roney reasoned that because reproductive success rates for extraverted behavioral strategies are likely to depend in part on these physical qualities, stronger and more attractive individuals tend to favor extraversion so as to increase their likelihood of obtaining mates.

Having different levels of extraversion may have contributed to adaptive fitness across phylogenetic history, or has extraversion simply calibrated over the course of ontogeny? Questions such as these are likely to stir controversy, but they are also likely to keep areas of study related to evolutionary personality psychology moving forward rapidly. After overcoming early criticisms that evolutionary topics were not amenable to empirical tests, researchers have found creative ways to operationalize hypotheses based on evolutionary theories. Future research will require even greater innovation, but it will be

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critical to meet the many challenges that lie in wait if personality is to realize the aspiration of having evolutionary theory as its meta-theoretical anchor (Ashton & Lee, 2001; Buss, 1995; McAdams & Pals, 2006).

## Brain Systems Underlying Variation in Extraversion

Evolutionary and genetic influences represent the most distal steps in tracing the biological underpinnings of extraversion. Genes do not act directly on behavior; rather, their effects are mediated by brain structure and function. Research investigating how individual differences in brain systems may lead to variations in extraversion has a rich history, starting with two titans (Eysenck and Gray) in the history of biological theories for extraversion (see also the chapter by Allen and DeYoung).

### Eysenck and Gray

The now famous debate between Hans Eysenck and Jeffrey Gray marks the beginning of contemporary theories about the neurobiological basis of extraversion (Matthews & Gilliland, 1999). Eysenck laid the groundwork for biological theorizing with his arousal hypothesis of extraversion (Eysenck, 1967). The basis of Eysenck's theory was the idea that a person's extraversion was dependent upon their threshold for arousal in the ascending reticular activating system, or ARAS (the ARAS is a feedback loop connecting the cortex to the reticular activating system). Eysenck chose the ARAS because of its known roles in attention and learning (Eysenck, 1973), two processes that he had long believed were integral sources of individual differences in extraversion (Eysenck, 1957). Eysenck posited that extraversion was related to higher thresholds for arousal and thus to lower levels of cortical arousal at baseline. Based on Wundt's notion that people try to maintain moderate arousal (Wundt, 1897), Eysenck believed that this low arousal at baseline could explain the relations between extraversion and the pursuit of stimulating activities such as stimulant drugs (cigarettes), sexual activities, and social interaction. However, problematic for Eysenck's theory are studies showing that resting brain activity rarely differs as a function of extraversion (Stelmack, 1990, 1997), as well as electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) studies finding that the association between extraversion and cortical arousal is sometimes positive and sometimes negative (Matthews & Gilliland, 1999; Zuckerman, 2005). Additionally, arousal-based frameworks are limited in capturing key components of extraversion concerning reward processing, incentive motivation, and behavioral approach (Depue & Collins, 1999; Gray, 1981; Smillie, Pickering, & Jackson, 2006).

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Jeffrey Gray proposed an alternative causal theory of extraversion that was well-suited to explain extraversion's relations to approach processes, termed Reinforcement Sensitivity Theory (RST; Gray, 1970, 1981, 1982). The original formulation of RST, which was based on animal research, postulated the existence of three separate neural systems underlying behavior: (1) the Behavioral Approach System (BAS), (2) the Behavioral Inhibition System (BIS), and (3) the Fight-Flight System (FFS). The primary emphasis was on the effects of the BIS and BAS. Sensitivity of the BAS was thought to underlie trait impulsivity, and sensitivity of the BIS was thought to underlie trait anxiety. These traits were conceptualized as primary traits that together could explain Eysenck's extraversion. Specifically, Eysenck's extraversion was thought to be impulsivity minus anxiety.

Gray's theory has undergone drastic revisions that are beyond the scope of this chapter (Corr, 2008; Gray & McNaughton, 2000; Smillie, 2015; Smillie et al., 2006),<sup>3</sup> but it is worth mentioning that the BAS is thought to mediate reactions to all appetitive stimuli and to produce various characteristics associated with extraversion: the emotion of anticipatory pleasure and the pursuit of rewarding, impulsive, and risky behaviors (Corr & Cooper, 2015). Indeed, although Gray described only one system for approach, he did not rule out the possibility that approach processes are multidimensional. From an evolutionary standpoint, the diversification of approach systems would be consistent with an evolutionary arms race in which predators must evolve multiple strategies for catching their prey (Dawkins & Krebs, 1979). The penalty for a failed approach is not as severe as for failed avoidance according to the so-called "life-dinner" principle; as the predator loses a meal, the prey would lose its life (Dawkins & Krebs, 1979). Psychometric assessments of the BAS (Carver & White, 1994; Corr, 2008) reflect the complexity of approach, with scales assessing varied components such as interest in rewards, emotional reactivity to rewards, persistence in obtaining rewards, pleasure-seeking behavior, and impulsive obtainment of an incentive.

Given their conceptual similarities, it is surprising that more research has not explored the associations between BAS-related characteristics and extraversion. In the first study examining the relationships between Carver and White's (1994) BIS/BAS scales and extraversion, Smits and Boeck (2006) found that the overall BAS scale and all three of the subscales (drive, fun-seeking, and reward-reactivity) were positively associated with extraversion. Likewise, Keiser and Ross (2011) found a positive relationship between Carver and White's (1994) total BAS scale and extraversion. In the only study to examine links between Carver and White's (1994) BAS scales and the NEO PI-R, Segarra, Poy, López, and Moltó (2014) showed that BAS fun-seeking was uniquely related to the facets of warmth, gregariousness, activity, excitement-seeking, and positive emotions; reward responsivity was related to warmth, activity, excitement-seeking, and positive emotions; and drive was related only to assertiveness. Further specification of the associations



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between approach-related phenomena and extraversion has the potential to better situate revised-RST (Gray & McNaughton, 2000) as a viable biological foundation for the FFM of extraversion (Wilt & Revelle, 2009).

## Reward Processing and Dopaminergic Functioning

Gray's efforts were just the starting points in relating extraversion to brain mechanisms engaged in reward processing. Depue (1995) proposed a neurological Behavioral Facilitation System (BFS) as the causal basis for agentic components of extraversion (Depue, 1995; Depue & Collins, 1999).<sup>4</sup> The neuroanatomical correlate of the BFS is hypothesized as the mesocorticolimbic dopaminergic system, which is integral in desire and reward and is thought to facilitate behavioral approach by increasing the salience of positive stimuli. Depue's model of behavioral facilitation is a threshold model in that dopamine must reach a certain level for approach behavior to be elicited. Thus, approach behavior is thought to depend on tonic level of dopamine as well as on phasic level (Depue, 1995). A growing body of evidence directly implicates dopaminergic function in extraversion (e.g., Depue & Collins, 1999; Wacker, Chavanon, & Stemmler, 2006). DeYoung (2010) and Smillie (2008) reviewed seminal work that has linked extraversion to genetic variations in dopamine function and reward-seeking behavior (Reuter, 2007), size of brain structures involved in reward processing (Omura, Constable, & Canli, 2005; Rauch et al., 2005), brain activity in response to rewarding stimuli (Canli, 2004; Rauch et al., 2005), and responses to psychotropic drugs that influence the functioning of dopamine (Rammsayer, 1998; Wacker et al., 2006).

Animal studies have also generated evidence in support of dopamine's involvement in reward processing. Drugs that increase dopamine (dopamine agonists), such as amphetamines, have been shown to increase the degree to which rats pursue rewards (Wyvell & Berridge, 2000). In contrast, drugs that block dopamine (dopamine antagonists) decrease reward-seeking behaviors (Wise, 2004). Mice bred without the ability to synthesize dopamine show deficits in reward-seeking behavior; however, if dopamine production is restored in the dorsal striatum of those mice via gene therapy, they exhibit increases in goal pursuit (Robinson, Sotak, During, & Palmiter, 2006).

It is notable that the studies on animals have concerned the role of dopamine in the pursuit of reward without mentioning consumption of rewards. Indeed, this is consistent with descriptions of separate reward systems for mediating appetitive, incentive-seeking behaviors ("wanting"), as opposed to consummatory behaviors ("liking") (Berridge, 2007, 2012). The idea that dopaminergic functioning underlies reward-seeking behaviors rather than reward-liking behaviors emerges from this distinction. Taking another step forward

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in this line of reasoning leads to the hypothesis that extraversion, due to its association with dopaminergic functioning, should in turn be associated specifically with features of reward-seeking behavior instead of reward-liking behavior. That is, more extraverted people should respond with energized and excited affects when in appetitive situations; conversely, extraversion should not be related to increases in pleasantness when simply enjoying a reward. These two predictions have been supported across a series of recent studies (Smillie, Cooper, Wilt, & Revelle, 2012; Smillie, Geaney, Wilt, Cooper, & Revelle, 2013). More extraverted people consistently responded with higher levels of energy and vigor to situations meant to elicit reward-pursuit behavior (e.g., imagining buying a lottery ticket and winning); however, extraversion did not relate to an experience of pleasantness when people were presented with merely pleasant scenarios that lacked a reward-pursuit component (e.g., imagining lying on a beach on a pleasant day). These findings led to the specification and narrowing of the affect-reactivity model of extraversion (Larsen & Ketelaar, 1991; Strelau, 1987), which originally stated that extraversion should relate to reacting more strongly to *all* forms of positive stimuli. These studies also illustrate how biologically informed theories can generate fruitful predictions at the behavioral level.

## Development

Evidence indicating that extraversion has a strong biological component indicates that early forms of what will later be called extraversion should appear when people are relatively young. Indeed, according to the FFM, genetic and biological factors influence the development of extraversion across the lifespan (McCrae et al., 2000) and are much more important than social/environmental factors for shaping the trajectory of trait development in general [but see Bleidorn, Kandler, Riemann, Angleitner, & Spinath (2012) and Wood & Roberts (2006) for opposing viewpoints]. To begin tracking the development of extraversion, we first examined first its temperamental origins (see also the chapter by De Pauw).

## Childhood Temperament

In the study of children, temperament refers to individual differences in reactivity and self-control that arise from a constitutional basis (Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Rothbart, 1981). Observational studies of infants in the laboratory show that temperamental precursors of extraversion appear as early as 3 months, and by 6 months the familiar smiling, laughing, and approach behaviors of extraversion are readily

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apparent (Rothbart, Derryberry, & Hershey, 2000). In preschool-aged children, observational studies (Wilson, Schalet, Hicks, & Zucker, 2013) yielded a dimension termed “anxious introversion,” which reflects differences on a dimension characterized at one pole by shyness and inhibition and at the other by liveliness and activity. A factor reflecting extraversion emerges in studies of parent-reported temperament in childhood as well (Rothbart & Bates, 1998); this factor includes activity level, sociability, and enjoyment. In a testament to the prominence of extraversion, parent reports identify an extraversion factor in youth as young as 3 years and up to age 20 years (Soto & John, 2014).

Throughout childhood, features related to extraversion appear to be important in determining how children interact with their peers. From ages 5 to 12 years, children who are more sociable and less withdrawn are more popular and are less likely to experience rejection (Newcomb, Bukowski, & Pattee, 1993). More extraverted children and adolescents also tend to enjoy higher degrees of peer support (Asendorpf & van Aken, 2003). Although this seems to be good news for extraverted youth and their parents, it has been noted that findings such as these highlight the importance of attending more closely to the social needs of more introverted individuals during their formative years (Cain, 2013).

## Adolescence Through Adulthood

Questions regarding how extraversion changes from adolescence through adulthood have received a considerable amount of attention. During late adolescence (around ages 16–20 years), extraversion increases slightly (Bleidorn et al., 2013; Lüdtke, Roberts, Trautwein, & Nagy, 2011). Obtaining a job during this time, however, is related to decreases in extraversion (Bleidorn et al., 2013), perhaps suggesting that entering roles in which responsibility is valued is conducive to introversion among adolescents. Extraversion continues to increase during the years spent at university, at least on average (Vaidya, Gray, Haig, & Watson, 2002). Analyses looking at change in extraversion at the level of the individual rather than group-level change show that whereas some individuals increase in extraversion during college (about 17%), most stay the same (80%), and a small minority (3%) of people show decreases in extraversion (Vaidya et al., 2002).

After emerging from adolescence and entering adulthood, extraversion exhibits high differential stability, or rank-order stability (Lucas & Donnellan, 2011; Specht, Egloff, & Schmukle, 2011). This means that a person’s level of extraversion will remain relatively stable in relation to the extraversion levels of others. That is, on average, more extraverted younger adults tend to be more extraverted older adults. Differential stability

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tends to be highest among middle-aged individuals (around ages 40 to 60 years), with lower levels found in younger and older people.

Although the rank ordering of individuals with regard to extraversion remains relatively stable throughout adulthood, there are still interesting patterns of change in extraversion throughout the lifespan. In a national sample of over 10,000 American adults, cross-sectional analyses showed a linear decrease in extraversion between individuals in their thirties and in those in their eighties (Costa et al., 1986). Cross-cultural studies of individuals between college age and middle age have corroborated the finding that over time, extraversion decreases slightly and in a linear fashion (McCrae et al., 1999; McCrae & Terracciano, 2005).

A more nuanced story emerges when considering change in extraversion among different birth cohorts and when examining change at the facet level. In a study of three birth cohorts of men (1897–1919, 1920–1929, and 1930–1945) over the span of 12 years (people in the study were initially ages 43 to 91 years), Mroczek and Spiro (2003) found that the overall trajectory of extraversion by age showed the same small linear decrease reported in previous studies. Yet the two younger cohorts showed slight increases in extraversion, whereas the oldest cohort showed a slight decrease.

Extraversion's facets have distinct patterns of age-related change. Roberts, Walton, and Viechtbauer (2006) summarized the results of 113 longitudinal studies involving over 50,000 people and concluded that social dominance (i.e., independence, dominance) increases from adolescence to the thirties and then levels out through the fifties, whereas social vitality (i.e., sociability, positive affect) increases from adolescence to young adulthood, stays stable throughout the fifties, and then declines slightly in old age. These findings, in conjunction with the analyses of individual-level change in extraversion during college (Vaidya et al., 2002), emphasize the importance of carefully investigating what at first may appear to be relatively straightforward findings about the development of extraversion.

## **Are Societies as a Whole Becoming More Extraverted?**

At least in select western societies, the answer to this question is a resounding yes. From the late 1960s to early 1990s, cross-temporal meta-analyses done on 59 studies involving over 16,000 American college students revealed that for both men and women, extraversion has increased by nearly one standard deviation (Twenge, 2001); however, this finding should be treated with caution as it may be an artifact of using different scales to measure extraversion at different times. In a study of nearly 9,000 college students in The Netherlands, mean extraversion scores show a clear, positive trend from

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1982 to 2007 (Smits, Dolan, Vorst, Wicherts, & Timmerman, 2011). Various reasons have been put forward for the increased prevalence of extraversion in western cultures, such as more opportunity for contact with a wider variety of people, less strict parenting styles, and an increase in service jobs in relation to industry (Smits et al., 2011). It has also been suggested that western societies increasingly value outgoing and assertive traits over more reflective and quiet characteristics (Cain, 2013). As it seems as if these trends will continue for the foreseeable future, so may the societal shift upward in extraversion.

## Extraversion Characteristic Adaptations

The FFM proposes that basic tendencies such as extraversion should be expressed in characteristic adaptations (McCrae, 2009). It is worth noting again, as discussed in previous chapters, that characteristic adaptations are not simply observable trait content. Rather, they are conceptualized as the manifest affective, behavioral, and cognitive products of the interactions between biologically based traits and the environment (McCrae & Costa, 2008). As noted earlier in this chapter, desire or motivation can be added to the aforementioned affective, behavioral, and cognitive domains, and in so doing a comprehensive “ABCD” description of the psychological terrain of traits as they interface with different social environments over time and space can be formed. Thus, the issues addressed in the sections on characteristic adaptations concern whether and how extraversion is related to different ABCDs.

The most general answer to the question of whether extraversion is related to ABCDs in daily life can be found by examining whether the dispositional *trait* of extraversion is related to the personality *state* of extraversion. Personality states are short-term, concrete and contextualized patterns of ABCDs compared to the more stable and decontextualized ABCD components of personality traits (Bleidorn, 2009; Fleeson, 2001). Personality states may be described in the same way as personality traits, and so extraversion states broadly encompass short-term manifestations of vitality, assertiveness, spontaneity, and desires for social attention. Experience-sampling studies suggest that trait measures of extraversion indeed correlate highly with aggregate mean levels of extraversion states (Ching et al., 2014; Fleeson & Gallagher, 2009; Heller, Komar, & Lee, 2007; Schutte, Malouff, Segrera, Wolf, & Rodgers, 2003; Wilt, Nettle, Spain, & Fleeson, 2011), to single extraversion states, and also to the median, mode, maximum, and minimum of the distribution of extraversion states (Fleeson & Gallagher, 2009). These findings might be taken to indicate that those scoring highly in extraversion are always found in extraverted states (and more introverted individuals are always found

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in introverted states), but in fact this is far from true. In actuality, people display a wide variability of extraversion states throughout the course of their lives; sometimes highly extraverted people act very introverted and vice versa (Fleeson, 2001). This makes good sense when extraversion states are thought of as characteristic adaptations reflecting the output of dispositional extraversion in combination with environmental variables—different situations facilitate extraversion to varying degrees—even the most extraverted individuals might remain quiet at church, whereas the most introverted individuals will likely have a laugh (or two) at a lively party.

We next turn to a review of the relationship between extraversion and each individual ABCD domain of characteristic adaptations. As there are literally thousands of studies that could be categorized as addressing the ABCDs associated with extraversion, the following sections cannot even come close to providing an exhaustive summary of this research. Rather, they are necessarily a focused attempt to highlight findings in each area that are potentially important, and in sum represent a selective overview of how extraversion is manifested in ABCDs.

## Affect

One of the best-known findings in all of personality is the robust relationship between extraversion and positive affect. Trait extraversion is related to trait levels of positive affect (Lucas & Baird, 2004; Lucas & Fujita, 2000; Watson & Clark, 1992), aggregated ratings of momentary positive affect (Ching et al., 2014; Flory, Manuck, Matthews, & Muldoon, 2004; Spain, Eaton, & Funder, 2000; Wilt, Nofle, et al., 2011), and even to single ratings of current positive affect (Lucas & Baird, 2004; Uziel, 2006). Trait extraversion appears to be specifically more strongly related to activated positive affect—feeling happy and energetic, as opposed to deactivated positive affect—feeling relaxed or at ease (Smillie, DeYoung, & Hall, 2014). A growing number of studies have also shown that being in extraverted states over the course of daily life is conducive to experiencing higher levels of state positive affect (Ching et al., 2014; Heller et al., 2007; Lischetzke, Pfeifer, Crayen, & Eid, 2012; Wilt, Nofle, et al., 2011). Moreover, experiments in which participants were instructed to act extraverted or introverted revealed a causal effect of extraversion states on positive affect, even for introverts (Fleeson, Malanos, & Achille, 2002; McNiel & Fleeson, 2006; McNiel, Lowman, & Fleeson, 2010). The experience of positive feelings is no doubt a core characteristic of both trait and state extraversion (Watson & Clark, 1997). These findings raise the more fundamental question of why extraversion is related to positive affect.

A number of explanations have been put forward for the association between trait levels of extraversion and positive affect. The original affect-reactivity hypothesis (Gross,

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Sutton, & Ketelaar, 1998) posited that extraverts, due to their more reactive reward processing system, should exhibit stronger positive reactions in all forms of positive situations. This hypothesis received mixed support across a number of studies (Lucas & Baird, 2004). Studies that assessed positive affect using terms reflecting energy and arousal found support for the affective-reactivity hypothesis, but those that favored affective terms reflecting pleasantness and happiness did not (Smillie et al., 2012). This led to a specification of the affective-reactivity hypothesis (discussed previously) indicating that extraverted people should exhibit stronger activated positive reactions in rewarding situations, which has been replicated consistently in experiments (Smillie et al., 2012, 2013) and which has received initial support in natural environments (Oerlemans & Bakker, 2014). Yet as these results concern only activated positive feelings, they fail to explain why extraversion is then related to pleasantness and happiness.

Another explanation for the extraversion-positive affect association that has been put forward is the social activity hypothesis (Watson, 1988; Watson, Clark, McIntyre, & Hamaker, 1992), which states that extraversion is related to positive affect due to greater participation in social activities. Although sensible, this hypothesis has achieved only weak and inconsistent support across a number of studies (Argyle & Lu, 1990; Diener, Sandvik, Pavot, & Fujita, 1992; Lucas & Diener, 2001; Lucas, Le, & Dyrenforth, 2008; Oerlemans & Bakker, 2014; Srivastava, Angelo, & Vallereux, 2008). A revision of the social activity hypothesis, that extraversion is related to positive affect due to the quality (rather than the quantity) of social experiences, has received some initial support (Smillie, Wilt, Kabani, Garratt, & Revelle, 2015), but awaits further replication. Additionally, studies have identified specific mediators of the extraversion-positive affect association, such as mood regulation abilities (Lischetzke & Eid, 2006), resilience (Lü, Wang, Liu, & Zhang, 2014), and perceived uniqueness (Koydemir, Şimşek, & Demir, 2014). Further theoretical advances are necessary to integrate these seemingly disparate findings into a coherent conceptual framework.

A further explanation for the extraversion-happiness association is that trait extraversion increases the likelihood of being in extraverted states (Fleeson & Gallagher, 2009) that lead directly to more positive affect states (Fleeson et al., 2002). The accumulation of positive states might therefore lead individuals higher in extraversion to report higher levels of positive affect in general (Wilt, Nofle, et al., 2011). Aspects of this hypothesis have been supported in multiple experience sampling studies (Wilt, Nofle, et al., 2011) and even across multiple cultures, including the United States, Venezuela, the Philippines, China, and Japan (Ching et al., 2014). If the association between trait extraversion and trait positive affect can be explained by the association between state extraversion and state positive affect (i.e., it is what extraverts do that leads to higher

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levels of positive affect), then explaining the state-level association between extraversion and positive affect becomes necessary to understanding the trait-level association. Little research has explored the mechanisms connecting state extraversion to state positive affect (but see Lischetzke et al., 2012 for evidence that state extraversion is related to state positive affect through intentional mood regulation), but a recent article (Smillie, 2013) nicely summarized a number of potential explanations. Briefly, Smillie (2013) reviewed research suggesting that state extraversion may be associated with state positive affect through increased reward-processing states, social reinforcement, the social desirability of extraverted behavior, the perception that extraversion states are effective at producing progress toward goals, the physical actions involved in extraversion states, and the psychological significance of bodily states associated with extraversion. It is clear that the study of extraversion and positive affect has been enormously fruitful, and it is not difficult to predict that this topic will continue to stimulate innovative investigations for a long time to come.

## Behavior

Evidence for the role of extraversion in behavior comes from a variety of different methodologies. Investigations relying on self-report show that extraversion associates with the content of behavior as well as specific behaviors. More extraverted individuals describe their behaviors as bold, socially adept, and secure (Funder, Furr, & Colvin, 2000), and they report consuming more alcohol, going to more parties, dating more people, and exercising more often (Paunonen, 2003). These studies suggest that extraversion may be highly relevant to a wide spectrum of interpersonal behaviors. Findings from a recent study (DeYoung, Weisberg, Quilty, & Peterson, 2013) supported this idea by showing that the aspects of extraversion are uniquely associated with the dimensions of the interpersonal circumplex (Wiggins, 1996): assertiveness was related to the interpersonal dimension of dominance-submissiveness, whereas enthusiasm was related to the dimension running from gregarious to aloof.

The social nature of extraversion may act as a cue allowing people to accurately assess others' levels of extraversion. Acquaintances, experimenters, and confederates are able to correctly identify more extraverted people after observing a number of short tasks involving social activities (Borkenau, Mauer, Riemann, Spinath, & Angleitner, 2004). Perhaps one characteristic that signifies extraversion is a greater use of gestures. In an experiment that involved describing the meaning of words to another person, more extraverted people tended to accompany their speech with physical movements meant to convey meaning (Hostetter & Potthoff, 2012). Another feature that seems to be emblematic of extraversion is simply the propensity to talk more frequently. Judges



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listening to recordings of random samples of activity throughout the course of people's daily lives rated those who were more talkative as more extraverted (Mehl, Gosling, & Pennebaker, 2006). This turned out to be a good heuristic, as coding the recordings revealed that self-described extraverts did indeed spend more time talking to people and more time with others in general (Mehl et al., 2006).

Differences in the communication styles depending on extraversion extend from talking and gesturing to writing and electronic communication. When asked to write in a stream of consciousness mode about their feelings related to being in college, more extraverted university students include more positive emotion words as well as more socially relevant words—such as references to communicating or being with other people—in their written descriptions (Pennebaker & King, 1999). Similarly, the online blogs of more extraverted people contain more positive emotions and social references to friends, family, and sexual behaviors (Yarkoni, 2010). Breaking down the relation between extraversion and blog content by NEO PI-R facets showed that friendliness, gregariousness, and cheerfulness accounted for these findings rather than the facets of excitement seeking, assertiveness, or activity level (activity level was, however, related to more achievement-related references). The text messages that extraverted college students send surprisingly do not contain more positive words but, similar to the blogs of more extraverted people, they do include more social and sexual references (Holtgraves, 2011). Extraversion is also related to more total time spent texting (Butt & Phillips, 2008).

It should come as no surprise, given the foregoing discussion, that more extraverted individuals report a higher quantity of social participation when asked to recall their daily activities (Srivastava et al., 2008). There are also differences in the quality of the social participation of extraverts. In a laboratory study of dynamic social interactions (Eaton & Funder, 2003), it was found that not only did extraverts behave in more social ways, but they also influenced the emotions, behaviors, and cognitive interpersonal judgments of their conversation partners to create a more positive social environment. Recent work suggests that extraversion is so ingrained with positive social interactions that more extraverted people automatically and implicitly associate people with rewards (Wilkowski & Ferguson, 2014). Extraverts seem to reap the benefits of their social adroitness, as they exhibit levels of social well-being higher than introverts (Hill, Turiano, Mroczek, & Roberts, 2012; Smillie et al., 2015; Wilt, Cox, & McAdams, 2010).

It is obvious that extraversion is related to sociability, but this does not mean that introverts do not value social interactions nor that introverted behavior is inherently asocial. Introverts actually talk as much as extraverts in one-on-one situations, but, as group size increases, more extraverted individuals spend a disproportionately large amount of time talking (Antill, 1974). More introverted individuals might also value quality rather than quantity when it comes to socializing, preferring a few good friends to

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a large number of acquaintances (Cain, 2013). A mixture of extraverted and introverted behaviors might be more valuable in the literal, monetary sense when it comes to sales. In a study of outbound call representatives, it was found that *ambiverted* individuals, those toward the middle of the distribution of extraversion scores, generated the most sales revenue (Grant, 2013). As Grant (2013) suggests, perhaps listening has been underrated as a social skill.

## Cognition

As people navigate their daily lives, they encounter a range of environments that might present positive and/or negative consequences. Broadly speaking, people are motivated to engage with positive stimuli and avoid negative stimuli, but many situations are ambiguous with regard to their objective valence. For example, is a job interview objectively rewarding due to the chance to have intellectually stimulating conversations, or is it punishing because of the potential for being negatively evaluated by a possible employer? The answer, of course, is that a job interview, like so many other complex social environments, contains a mixture of positive and negative (and neutral) elements. Individual differences further complicate the landscape, as what some see as positive or neutral, say, public speaking, might be viewed as an extremely negative situation by others. Individual differences in how people perceive and categorize their environments (i.e., individual differences in cognition) will to a large extent determine their engagement with the world.

The section outlining the associations between extraversion and positive affect suggested that extraversion should relate to judging the environment more positively. This notion is borne out in a number of studies. Extraversion is associated with judging neutral events more positively (Uziel, 2006) and with recognizing positive stimuli more quickly after an initial positive prime (Robinson, 2007). Extraverts judge positively valenced words (“hug” and “smile”) as more similar than negatively valenced words (“grief” and “death”) and as more similar than words that are related by semantic quality (“smile and face”) (Rogers & Revelle, 1998; Weiler, 1992). The section describing extraversion’s association with social behaviors hints at the idea that extraversion should associate with more favorable cognitions regarding social situations. Indeed, extraversion’s association with more positive and less negative beliefs about interacting with others in extraverted ways (Zelenski et al., 2013) perhaps explains why introverts do not engage in high levels of extraverted behavior even though they experience the positive affective benefits of acting extraverted (e.g., Fleeson et al., 2002; Wilt, Nettle, et al., 2011).

Moving past the general idea that extraversion relates to seeing the world in a rose-colored tinge are studies of information processing tasks that vary as a function of

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extraversion. There is considerable evidence that extraversion is associated with a superior recall on traditional, verbal short-term memory tasks (M. Eysenck, 1981; Matthews, 1992) and with poorer vigilance (Beauducel, Brocke, & Leue, 2006; Koelega, 1992). An excellent integrative review (Matthews, Deary, & Whiteman, 2003) concluded that extraverts show advantages with regard to dividing attention between tasks, resisting distractions, and short-term memory. Introverts, in contrast, are better at sustained attention tasks, solving complex problems, and long-term recall. These findings, taken together, suggest that extraversion may relate to excelling in complex environments where a variety of stimuli are competing for attention, whereas introversion might be better suited to quiet tasks requiring persistence. It is perhaps due to these differences in cognition that dynamic social environments seem to be the extravert's natural habitat.

## Desire

People with different levels of extraversion pursue and relate to their goals in different ways. Echoing previous discussions about the integral relationship between extraversion and reward pursuit, extraversion is associated with attaching more importance to goals, more intense goal pursuit, greater optimism about achieving goals, and higher expectations for happiness when goals are achieved (Romero, Villar, Luengo, & Gómez-Fraguela, 2009). These findings add to the already large amount of evidence reviewed linking extraversion to heightened engagement with rewarding stimuli. It is therefore clear that extraversion is associated with approach motivation (Elliot & Thrash, 2002; Heller et al., 2007), an energizing drive that directs behavior toward rewards (Elliot, 2006). The following discussion focuses on the specific rewards that extraverts desire to attain.

Extraversion relates to higher general motivation for social contact, intimacy, and interdependence, as well as to drives for power, status, and positive affect (Emmons, 1986; King, 1995; King & Broyles, 1997; Olson & Weber, 2004). These findings suggest that extraversion is associated with the broad motivations for affiliation and agency (Depue & Morrone-Strupinsky, 2005), or *getting along* and *getting ahead* (Hogan, 1982). These motives permeate the lives of extraverts. With regard to getting along, extraversion is related to the pursuit of communal life goals and careers in the social domain; with regard to getting ahead, extraverts desire lives in which they accomplish more goals related to personal agency, in domains such as economics, aesthetics, politics, and hedonism (Bleidorn et al., 2010; Larson, Rottinghaus, & Borgen, 2002; Roberts & Robins, 2000, 2004). Extraverted states may also facilitate goals related to getting along and getting ahead. People with higher levels of affiliation and achievement goals enact

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more extraverted states over time (Bleidorn, 2009). Additionally, the short-term goals of being more sociable, enthusiastic, and assertive are associated with state extraversion (McCabe & Fleeson, 2012).

## Objective Biography

The characteristic adaptations just described are psychological structures and patterns that bridge the gap between basic traits and *objective biography*—a person's factual life story. Objective biography brings personality traits back to the person by describing the real successes, struggles, failures, and redemptions that people experience as they navigate their lives.

A person's level of extraversion in late adolescence is an important determinant of subsequent life events in the near future. Magnus, Diener, Fujita, and Pavot (1993) determined that extraversion in a sample of college undergraduates prospectively predicted the occurrence of objective, positive life events over the course of 4 years. In this study, the composite of positive life events included 20 events that received high ratings on the dimensions of objectivity and positivity. This list included seminal events in the domains of relationships, education, career, and leisure (e.g., getting engaged, getting married, getting into graduate school, receiving a promotion or raise, beginning a hobby). Extraversion was unrelated to the occurrence of objective, negative life events (e.g., divorce, death of a loved one, getting fired, being the victim of a crime). Vaidya et al. (2002) used similar lists of positive/negative life events and found that in a sample of undergraduates, not only was extraversion related to a higher occurrence of positive events over 2.5 years, but the occurrence of positive events over that time was also related to increases in extraversion. In a study tracking German high school students for 4 years, Lüdtkke et al. (2011) pinpointed specific, positive events that were most highly related to extraversion; this list included getting promoted, starting a job, going abroad, and starting a relationship.

In adulthood, extraversion remains a robust predictor of social outcomes. People with higher levels of extraversion have a greater number of social relationships and greater social support (Berkman, Glass, Brissette, & Seeman, 2000). As noted in the section on evolutionary costs and benefits, extraversion is associated with having more sexual partners (Nettle, 2005). Extraversion is related to greater marriage satisfaction with (Watson et al., 2004) but also to higher rates of infidelity (Nettle, 2005). Extraversion is also particularly powerful in predicting occupational outcomes. Extraverted individuals are more satisfied with their jobs (Thoresen, Kaplan, Barsky, Warren, & de Chermont, 2003) and show higher levels of job performance (Sackett & Walmsley, 2014); adolescent ratings of extraversion predict higher income and job status 46 years later, even after

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controlling for cognitive ability (Judge, Higgins, Thoresen, & Barrick, 1999). All of these findings attest to the conclusion that extraversion is highly relevant to the lives that people lead (Ozer & Benet-Martinez, 2006; Roberts et al., 2007), and thus people with different levels of extraversion have very different objective biographies.

## Self-Concept and Identity

Self-concept refers to how people think about, perceive, and evaluate themselves (Baumeister, 1999). It includes memories and evaluations of past, present, and future selves (Markus & Nurius, 1986). In the FFM, self-concept is defined as being consistent with traits, and is also influenced by characteristic adaptations and objective biography (McCrae & Costa, 2008). Said differently, when answering the question “Who am I?,” people draw on information from their basic tendencies, their characteristic ABCD patterns, and actual events and circumstances in their lives. Indeed, extraversion is pertinent to how we define ourselves.

In support of the claim that self-concept is consistent with our traits, introversion is related to describing the “true” or “authentic” self as more introverted, whereas people who are more extraverted endorse an extraverted true-self concept (Fleeson & Wilt, 2010). Extraversion is also relevant to evaluative aspects of the self-concept. Higher levels of extraversion are associated with higher self-esteem (Aluja, Rolland, García, & Rossier, 2007; Watson, Suls, & Haig, 2002), which refers to a global evaluation of general worth as a person (Crocker & Luhtanen, 2003). This finding is sensible given the generally positively valenced characteristic adaptations and objective biographies of more extraverted people. Positive affect and social support have been identified as mediators of the association between extraversion and self-esteem (Swickert, Hittner, Kitos, & Cox-Fuenzalida, 2004).

Self-concept includes a person’s identity, which is a sense of coherence and unity based on self-defined investments in life choices (Erikson, 1963). An increasingly influential theory conceptualizes identity as internalized life stories that together comprise what has been termed *narrative identity* (McAdams, 1993; Singer, 2004; Thorne & Nam, 2009). Life stories are self-authored and psychologically constructed integrations of the remembered past, experienced present, and imagined future that represent one way in which people potentially instill their lives with unity, meaning, and purpose. Life stories are constructed within the narrative mode of human cognition (Bruner, 2004), and thus narrative terms (e.g., imagery, plot, theme, scene, setting, conflict, character, ending) are thought to be the best way to describe and characterize life stories (McAdams, 2008).

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Few studies have examined the links between extraversion and narrative identity, but the results from those that have done so suggest that they are indeed linked. Research has shown that extraversion relates to the structure and contents of life stories as well as the ways that the different scenes in the life story are classified (McAdams et al., 2004; McLean & Fournier, 2008; Raggatt, 2006; Thomsen, Olesen, Schnieber, & Tonnesvang, 2013). More extraverted individuals tell stories with a high degree of positive emotions, see events as having more positive connections to the self, and organize scenes from their stories by characteristics such as status, optimism, sociability, and activity. People with higher levels of extraversion are more concerned with interpersonal trust when describing life story scenes from childhood and adolescence, and they are concerned with giving back to society, or generativity, in scenes from their adulthood. The social nature of extraversion is apparent in the way that they communicate their life stories. More extraverted people share important memories with others more often and report a high degree of comfort in doing so (McLean & Pasupathi, 2006).

## Extraversion and Psychopathology

Thus far, extraversion has been discussed in the context of “normal” personality functioning as opposed to “abnormal” or clinical manifestations of the trait. Yet Eysenck had very early recognized the importance of extraversion in psychiatric disorders (e.g., Eysenck & Himmelweit, 1947) and continued to emphasize the application of normal personality traits to psychopathology (Eysenck, 1957). In the FFM, basic tendencies are also conceptualized as having both adaptive and maladaptive variants (McCrae & Costa, 2008). Provided next is a brief summary of how both low and high levels of extraversion relate to psychopathology.

A variety of studies show that categorically defined personality disorders (PDs) may be conceptualized as maladaptive or “extreme” variants of traits included in models of normal personality (e.g., Bagby, 2013; Gore & Widiger, 2013; Samuel, Carroll, Rounsaville, & Ball, 2013; Sellbom, Anderson, & Bagby, 2013; Van den Akker et al., 2013; see also the chapter by Widiger, Gore, Crego, Rojas, and Oltmanns). Extreme introversion is defined by characteristics such as social withdrawal, social detachment, intimacy avoidance, restricted affectivity, and anhedonia (Gore & Widiger, 2013; Skodol et al., 2011; Watson, Stasik, Ro, & Clark, 2013), all of which may be relevant to maladaptive personality functioning. Indeed, Skodol et al. (2011) theorized that these features may represent core components of the schizoid, schizotypal, and avoidant PDs. Low levels of extraversion and related traits reflecting low levels of social connection have additionally been related to problems with anxiety and depression (Jylhä & Isometsä, 2006; Krueger et al., 1996; Trull & Sher, 1994; Watson, Gamez, & Simms, 2005). However, extremely

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high extraversion poses risks for personality pathology as well, as people falling at this end of the continuum are more likely to be sexually promiscuous, emotionally intrusive, and engage in excessive self-disclosure and thrill-seeking behaviors (McCrae, Löckenhoff, & Costa, 2005). People with high levels of extraversion are also more likely to have difficulties with substance abuse (Atherton, Robins, Rentfrow, & Lamb, 2014; Krueger et al., 1996), possibly due to their elevated reward-seeking tendencies.

## Conclusions

Several years ago, we (Wilt & Revelle, 2009) highlighted three areas of research on extraversion about which we were particularly enthusiastic: the role of extraversion in ongoing functioning, the integration of psychological and biological theories of extraversion, and the use of public domain personality assessment to study the structure of extraversion and its predictive validity in important domains. We were optimistic at the time, but we did not anticipate just how quickly progress would occur in these and many other areas, as reviewed in this chapter. The rapid accumulation of research on an already expansive topic makes even more important the existence of an overarching theoretical framework. The FFM provides a comprehensive and parsimonious organizational architecture by which to classify and group the myriad findings emerging from this exciting field. We are confident that in the next decade and beyond we will see many more such advances.

## References

- Allport, G. W., & Odbert, H. S. (1936). Trait names: A psycholexical study. *Psychological Monographs*, 47(211), 171.
- Aluja, A., Rolland, J.-P., García, L. F., & Rossier, J. (2007). Dimensionality of the Rosenberg self-esteem scale and its relationships with the Three- and the Five-Factor personality models. *Journal of Personality Assessment*, 88(2), 246–249.
- Anderson, C., John, O. P., Keltner, D., & Kring, A. M. (2001). Who attains social status? effects of personality and physical attractiveness in social groups. *Journal of Personality and Social Psychology*, 81(1), 116–132.
- Antill, J. K. (1974). The validity and predictive power of introversion-extraversion for quantitative aspects of conversational patterns. *Dissertation Abstracts International*, 35(1-B), 532.

# Extraversion

---

- Argyle, M., & Lu, L. (1990). The happiness of extraverts. *Personality and Individual Differences, 11*(10), 1011-1017.
- Asendorpf, J. B., & van Aken, M. A. G. (2003). Personality-relationship transaction in adolescence: Core versus surface personality characteristics. *Journal of Personality, 71*(4), 629-666.
- Ashton, M. C., & Lee, K. (2001). A theoretical basis for the major dimensions of personality. *European Journal of Personality, 15*(5), 327-353.
- Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11*(2), 150-166.
- Ashton, M. C., Lee, K., & Paunonen, S. V. (2002). What is the central feature of extraversion?: Social attention versus reward sensitivity. *Journal of Personality and Social Psychology, 83*(1), 245-251.
- Atherton, O. E., Robins, R. W., Rentfrow, P. J., & Lamb, M. E. (2014). Personality correlates of risky health outcomes: Findings from a large internet study. *Journal of Research in Personality, 50*, 56-60.
- Atkinson, J. W., & Raynor, J. O. (1978). *Personality, motivation, and achievement*. Washington, DC: Hemisphere.
- Bagby, R. M. (2013). Introduction to special issue on the personality inventory for DSM-5 (PID-5). *Assessment, 20*(3), 267-268.
- Baumeister, R. F. (1999). *The self in social psychology*. New York, NY: Psychology Press.
- Beauducel, A., Brocke, B., & Leue, A. (2006). Energetical bases of extraversion: Effort, arousal, EEG, and performance. *International Journal of Psychophysiology, 62*(2), 212-223.
- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine, 51*(6), 843-857.
- Berridge, K. C. (2007). The debate over dopamine's role in reward: The case for incentive salience. *Psychopharmacology, 191*(3), 391-431.
- Berridge, K. C. (2012). From prediction error to incentive salience: Mesolimbic computation of reward motivation. *European Journal of Neuroscience, 35*(7), 1124-1143.



# Extraversion

---

- Bleidorn, W. (2009). Linking personality states, current social roles and major life goals. *European Journal of Personality, 23*(6), 509–530.
- Bleidorn, W., Kandler, C., Hülshager, U. R., Riemann, R., Angleitner, A., & Spinath, F. M. (2010). Nature and nurture of the interplay between personality traits and major life goals. *Journal of Personality and Social Psychology, 99*(2), 366–379.
- Bleidorn, W., Kandler, C., Riemann, R., Angleitner, A., & Spinath, F. M. (2012). Genetic and environmental influences on personality profile stability: Unraveling the normativeness problem. *Journal of Personality, 80*(4), 1029–1060.
- Bleidorn, W., Klimstra, T. A., Denissen, J. J., Rentfrow, P. J., Potter, J., & Gosling, S. D. (2013). Personality maturation around the world: A cross-cultural examination of social-investment theory. *Psychological Science, 24*(12), 2530–2540.
- Borkenau, P., Mauer, N., Riemann, R., Spinath, F. M., & Angleitner, A. (2004). Thin slices of behavior as cues of personality and intelligence. *Journal of Personality and Social Psychology, 86*(4), 599–614.
- Borsboom, D., & Cramer, A. O. (2013). Network analysis: An integrative approach to the structure of psychopathology. *Annual Review of Clinical Psychology, 9*, 91–121.
- Bouchard, T. J., & Loehlin, J. C. (2001). Genes, evolution, and personality. *Behavior Genetics, 31*(3), 243–273.
- Bruner, J. (2004). Life as narrative. *Social Research, 71*(3), 691–710.
- Buss, D. M. (1991). Evolutionary personality psychology. *Annual Review of Psychology, 42*, 459–491.
- Buss, D. M. (1995). Evolutionary psychology: A new paradigm for psychological science. *Psychological Inquiry, 6*(1), 1–30.
- Buss, D. M. (2009). How can evolutionary psychology successfully explain personality and individual differences? *Perspectives on Psychological Science, 4*(4), 359–366.
- Butt, S., & Phillips, J. G. (2008). Personality and self reported mobile phone use. *Computers in Human Behavior, 24*(2), 346–360.
- Cain, S. (2013). *Quiet: The power of introverts in a world that can't stop talking*. New York, NY: Broadway Books.

# Extraversion

---

- Camperio Ciani, A. S., Capiluppi, C., Veronese, A., & Sartori, G. (2007). The adaptive value of personality differences revealed by small island population dynamics. *European Journal of Personality, 21*(1), 3-22. doi:10.1002/per.595.
- Canli, T. (2004). Functional brain mapping of extraversion and neuroticism: Learning from individual differences in emotion processing. *Journal of Personality, 72*(6), 1105-1132.
- Canli, T. (2006). *Genomic imaging of extraversion* (pp. 93-115). New York, NY: The Guilford Press.
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333.
- Cattell, R. (1947). Confirmation and clarification of primary personality factors. *Psychometrika, 12*(3), 197-220.
- Cattell, R. B. (1943a). The description of personality: Basic traits resolved into clusters. *The Journal of Abnormal and Social Psychology, 38*(4), 476-506.
- Cattell, R. B. (1943b). The description of personality. I. Foundations of trait measurement. *Psychological Review, 50*(6), 559-594.
- Cattell, R. B. (1957). *Personality and motivation structure and measurement*. Oxford, England: World Book.
- Cervone, D. (2004). The architecture of personality. *Psychological Review, 111*(1), 183-204.
- Ching, C. M., Church, A. T., Katigbak, M. S., Reyes, J. A. S., Tanaka-Matsumi, J., Takaoka, S., ... Rincon, B. C. (2014). The manifestation of traits in everyday behavior and affect: A five-culture study. *Journal of Research in Personality, 48*, 1-16.
- Chulef, A. S., Read, S. J., & Walsh, D. A. (2001). A hierarchical taxonomy of human goals. *Motivation and Emotion, 25*(3), 191-232.
- Cloninger, C., Svrakic, D. M., & Przybeck, T. R. (1993). A psychobiological model of temperament and character. *Archives of General Psychiatry, 50*(12), 975-990.
- Corr, P. J. (2008). *The reinforcement sensitivity theory of personality*. Cambridge, England: Cambridge University Press.

# Extraversion

---

Corr, P. J., & Cooper, A. (2015). The Corr-Cooper reinforcement sensitivity theory personality questionnaire (RST-PQ): Development and validation. Unpublished manuscript, City University, London, UK.

Costa, J., McCrae, R. R., Zonderman, A. B., Barbano, H. E., Lebowitz, B., & Larson, C. M. (1986). Cross-sectional studies of personality in a national sample: II. Stability in neuroticism, extraversion, and openness. *Psychology and Aging, 1*(2), 144-149. doi: 10.1037/0882-7974.1.2.144.

Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences, 13*(6), 653-665.

Costa, P. T., & McCrae, R. R. (1998). Six approaches to the explication of facet-level traits: Examples from conscientiousness. *European Journal of Personality, 12*(2), 117-134.

Cramer, A. O., Sluis, S., Noordhof, A., Wichers, M., Geschwind, N., Aggen, S. H., ... Borsboom, D. (2012). Dimensions of normal personality as networks in search of equilibrium: You can't like parties if you don't like people. *European Journal of Personality, 26*(4), 414-431.

Crocker, J., & Luhtanen, R. K. (2003). Level of self-esteem and contingencies of self-worth: Unique effects on academic, social, and financial problems in college students. *Personality and Social Psychology Bulletin, 29*(6), 701-712.

Dawkins, R., & Krebs, J. R. (1979). Arms races between and within species. *Proceedings of the Royal Society of London. Series B, Biological Sciences, 205*(1161), 489-511.

Denissen, J. J., & Penke, L. (2008). Motivational individual reaction norms underlying the Five-Factor Model of personality: First steps towards a theory-based conceptual framework. *Journal of Research in Personality, 42*(5), 1285-1302.

Depue, R. A. (1995). Neurobiological factors in personality and depression. *European Journal of Personality, 9*(5), 413-439.

Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences, 22*(3), 491-569.

Depue, R. A., & Morrone-Strupinsky, J. V. (2005). A neurobehavioral model of affiliative bonding: Implications for conceptualizing a human trait of affiliation. *Behavioral and Brain Sciences, 28*(3), 313-395.

# Extraversion

---

- DeYoung, C. G. (2010). Personality neuroscience and the biology of traits. *Social and Personality Psychology Compass*, 4(12), 1165–1180.
- DeYoung, C. G. (2015). Cybernetic Big Five theory. *Journal of Research in Personality*, 56, 33–58.
- DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology*, 93(5), 880–896.
- DeYoung, C. G., Weisberg, Y. J., Quilty, L. C., & Peterson, J. B. (2013). Unifying the aspects of the Big Five, the interpersonal circumplex, and trait affiliation. *Journal of Personality*, 81(5), 465–475.
- Diener, E., Sandvik, E., Pavot, W., & Fujita, F. (1992). Extraversion and subjective well-being in a U.S. national probability sample. *Journal of Research in Personality*, 26(3), 205–215.
- Digman, J. M. (1990). Personality structure: Emergence of the Five-Factor Model. *Annual Review of Psychology*, 41, 417–440.
- Durbin, C., Klein, D. N., Hayden, E. P., Buckley, M. E., & Moerk, K. C. (2005). Temperamental emotionality in preschoolers and parental mood disorders. *Journal of Abnormal Psychology*, 114(1), 28–37.
- Eaton, L. G., & Funder, D. C. (2003). The creation and consequences of the social world: An interactional analysis of extraversion. *European Journal of Personality*, 17(5), 375–395.
- Ebstein, R. P., Benjamin, J., & Belmaker, R. H. (2003). *Behavioral genetics, genomics, and personality* (pp. 365–388). Washington, DC: American Psychological Association.
- Elliot, A. J. (2006). The hierarchical model of approach-avoidance motivation. *Motivation and Emotion*, 30(2), 111–116.
- Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach-avoidance temperaments and goals. *Journal of Personality and Social Psychology*, 82, 804–818.
- Ellsworth, P. C. (1994). William James and emotion: Is a century of fame worth a century of misunderstanding? *Psychological Review*, 101(2), 222–229.
- Emmons, R. A. (1986). Personal strivings: An approach to personality and subjective well-being. *Journal of Personality and Social Psychology*, 51(5), 1058–1068.

# Extraversion

---

Erikson, E. H. (1963). *Childhood and society* (2nd ed.). Oxford, England: Norton & Co.

Eysenck, H. J. (1952). *The scientific study of personality*. London, England: Routledge & Kegan Paul.

Eysenck, H. J. (1957). *The dynamics of anxiety and hysteria; an experimental application of modern learning theory to psychiatry*. Oxford, England: Praeger.

Eysenck, H. J. (1959). The "Maudsley Personality Inventory" as determinant of neurotic tendency and extraversion. *Zeitschrift fur Experimentelle und Angewandte Psychologie*, 6 Apr-Jun, 167-190.

Eysenck, H. J. (1967). *The biological basis of personality*. Springfield, NJ: Thomas.

Eysenck, H. J. (1970). *The structure of human personality*. London, England: Methuen.

Eysenck, H. J. (1973). *Eysenck on extraversion*. New York, NY: Wiley.

Eysenck, H. J. (1977). Personality and factor analysis: A reply to Guilford. *Psychological Bulletin*, 84(3), 405-411.

Eysenck, H. J. (1981). *General features of the model* (pp. 1-37). Berlin, Germany: Springer-Verlag.

Eysenck, H. J. (1992). *A hundred years of personality research, from Heymans to modern times*. Houten, The Netherlands: Bohn.

Eysenck, H. J., & Eysenck, S. B. G. (1964). *Eysenck Personality Inventory*. San Diego, CA: Educational and Industrial Testing Service.

Eysenck, H. J., & Himmelweit, H. T. (1947). *Dimensions of personality; a record of research carried out in collaboration with H.T. Himmelweit [and others]*. London, England: Kegan Paul, Trench.

Eysenck, H. J., & Wilson, G. D. (1991). *The Eysenck Personality Profiler (version 6)*. Worthing, England: Psi-Press.

Eysenck, M. (1981). *Learning, memory and personality* (pp. 169-209). New York, NY: Springer.

Eysenck, S. B., & Eysenck, H. J. (1975). *Manual of the Eysenck Personality Questionnaire*. London, England: Huer & Stoughton.

# Extraversion

---

Fiske, D. W. (1949). Consistency of the factorial structures of personality ratings from different sources. *Journal of Abnormal and Social Psychology, 44*, 329-344.

Fleeson, W. (2001). Toward a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology, 80*(6), 1011-1027.

Fleeson, W. (2012). Perspectives on the person: Rapid growth and opportunities for integration. In K. Deaux & M. Snyder (Eds.), *The Oxford handbook of personality and social psychology* (p. 33). New York, NY: Oxford University Press.

Fleeson, W., & Gallagher, P. (2009). The implications of Big Five standing for the distribution of trait manifestation in behavior: Fifteen experience-sampling studies and a meta-analysis. *Journal of Personality and Social Psychology, 97*(6), 1097-1114.

Fleeson, W., Malanos, A. B., & Achille, N. M. (2002). An intraindividual process approach to the relationship between extraversion and positive affect: Is acting extraverted as "good" as being extraverted? *Journal of Personality and Social Psychology, 83*(6), 1409-1422.

Fleeson, W., & Wilt, J. (2010). The relevance of Big Five trait content in behavior to subjective authenticity: Do high levels of within-person behavioral variability undermine or enable authenticity achievement? *Journal of Personality, 78*(4), 1353-1382.

Flory, J. D., Manuck, S. B., Matthews, K. A., & Muldoon, M. F. (2004). Serotonergic function in the central nervous system is associated with daily ratings of positive mood. *Psychiatry Research, 129*(1), 11-19.

Funder, D. C., Furr, R., & Colvin, C. (2000). The Riverside Behavioral Q-sort: A tool for the description of social behavior. *Journal of Personality, 68*(3), 451-489.

Furr, R. M. (2009). Personality psychology as a truly behavioural science. *European Journal of Personality, 23*(5), 369-401.

Goekoop, R., Goekoop, J. G., & Scholte, H. S. (2012). The network structure of human personality according to the NEO-PI-R: Matching network community structure to factor structure. *PLoS One, 7*(12), e51558.

Goldberg, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology, 59*(6), 1216-1229.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4*(1), 26-42.

# Extraversion

---

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, 48(1), 26–34.

Goldberg, L. R. (1999). *A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models* (Vol. 75, pp. 7–28). Tilburg, The Netherlands: Tilburg University Press.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality*, 40(1), 84–96.

Gore, W. L., & Widiger, T. A. (2013). The DSM-5 dimensional trait model and Five-Factor Models of general personality. *Journal of Abnormal Psychology*, 122(3), 816.

Gosling, S. D., & John, O. P. (1999). Personality dimensions in nonhuman animals: A cross-species review. *Current Directions in Psychological Science (Wiley-Blackwell)*, 8(3), 69–75.

Grant, A. M. (2013). Rethinking the extraverted sales ideal: The ambivert advantage. *Psychological Science*, 24(6), 1024–1030.

Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, 8(8), 249–266.

Gray, J. A. (1981). *A critique of Eysenck's theory of personality* (pp. 246–277). Berlin, Germany: Springer-Verlag.

Gray, J. A. (1982). *Neuropsychological theory of anxiety: An investigation of the septal-hippocampal system*. Cambridge, England: Cambridge University Press.

Gray, J. A., & McNaughton, N. (2000). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system* (2nd ed.). Oxford, England: Oxford University Press.

Gross, J. J., Sutton, S. K., & Ketelaar, T. (1998). Relations between affect and personality: Support for the affect-level and affective reactivity views. *Personality and Social Psychology Bulletin*, 24(3), 279–288.

Gruszka, A., Matthews, G., & Szymura, B. (2010). *Handbook of individual differences in cognition: Attention, memory, and executive control*. New York, NY: Springer-Verlag.

Guilford, J. P. (1975). Factors and factors of personality. *Psychological Bulletin*, 82(5), 802–814.

# Extraversion

---

- Guilford, J. P. (1977). Will the real factor of extraversion-introversion please stand up? A reply to Eysenck. *Psychological Bulletin*, 84(3), 412-416.
- Guilford, J. P., & Guilford, R. B. (1934). An analysis of the factors in a typical test of introversion-extroversion. *Journal of Abnormal and Social Psychology*, 28(4), 377-399.
- Guilford, J. P., & Zimmerman, W. S. (1949). *The Guilford-Zimmerman Temperament Survey*. Oxford, England: Sheridan Supply.
- Heckhausen, H. (1991). *Motivation and action*. New York, NY: Springer-Verlag.
- Heller, D., Komar, J., & Lee, W. B. (2007). The dynamics of personality states, goals, and well-being. *Personality and Social Psychology Bulletin*, 33(6), 898-910.
- Heymans, G., & Wiersma, E. (1909). Beitrage zur apeziellen psychologie auf grund einer masse-nuntersuchung [contributions to differential psychology based on a large scale investigation]. *Zeitschrift fur Psychologic*, 51, 1-72.
- Hill, P. L., Turiano, N. A., Mroczek, D. K., & Roberts, B. W. (2012). Examining concurrent and longitudinal relations between personality traits and social well-being in adulthood. *Social Psychological and Personality Science*, 3(6), 698-705.
- Hofstee, W. K., de Raad, B., & Goldberg, L. R. (1992). Integration of the Big Five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology*, 63(1), 146-163.
- Hogan, R. (1982). *A socioanalytic theory of personality, vol. 30 of Nebraska Symposium on Motivation*. Lincoln, NE: University of Nebraska Press.
- Holtgraves, T. (2011). Text messaging, personality, and the social context. *Journal of Research in Personality*, 45(1), 92-99.
- Hostetter, A. B., & Potthoff, A. L. (2012). Effects of personality and social situation on representational gesture production. *Gesture*, 12(1), 62-83.
- Humphreys, M. S., & Revelle, W. (1984). Personality, motivation, and performance: A theory of the relationship between individual differences and information processing. *Psychological Review*, 91(2), 153-184.
- John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory-Versions 4a and 54*. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.



# Extraversion

---

- Judge, T. A., Higgins, C. A., Thoresen, C. J., & Barrick, M. R. (1999). The Big Five personality traits, general mental ability, and career success across the life span. *Personnel Psychology, 52*(3), 621-652.
- Jung, C. G. (1921/1971). *Psychological types: Collected Works* (Vol. 6). Princeton, NJ: Princeton University Press.
- Jylhä, P., & Isometsä, E. (2006). The relationship of neuroticism and extraversion to symptoms of anxiety and depression in the general population. *Depression & Anxiety, 23*(5), 281-289.
- Keiser, H. N., & Ross, S. R. (2011). Carver and Whites BIS/BAS scales and domains and facets of the Five Factor Model of personality. *Personality and Individual Differences, 51*(1), 39-44.
- King, L. A. (1995). Wishes, motives, goals, and personal memories: Relations of measures of human motivation. *Journal of Personality, 63*(4), 985-1007.
- King, L. A., & Broyles, S. J. (1997). Wishes, gender, personality, and well-being. *Journal of Personality, 65*(1), 49-76.
- Koelega, H. S. (1992). Extraversion and vigilance performance: 30 years of inconsistencies. *Psychological Bulletin, 112*(2), 239-258.
- Koydemir, S., Şimşek, O. F., & Demir, M. (2014). Pathways from personality to happiness: Sense of uniqueness as a mediator. *Journal of Humanistic Psychology, 54*(3), 314-335.
- Krueger, R. F., Caspi, A., Moffitt, T. E., Silva, P. A., & McGee, R. (1996). Personality traits are differentially linked to mental disorders: A multitrait-multidiagnosis study of an adolescent birth cohort. *Journal of Abnormal Psychology, 105*(3), 299-312.
- Larsen, R. J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional states. *Journal of Personality and Social Psychology, 61*(1), 132-140.
- Larson, L. M., Rottinghaus, P. J., & Borgen, F. H. (2002). Meta-analyses of Big Six interests and Big Five personality factors. *Journal of Vocational Behavior, 61*(2), 217-239.
- Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39*(2), 329-358.
- Lischetzke, T., & Eid, M. (2006). Why extraverts are happier than introverts: The role of mood regulation. *Journal of Personality, 74*(4), 1127-1162.

# Extraversion

---

Lischetzke, T., Pfeifer, H., Crayen, C., & Eid, M. (2012). Motivation to regulate mood as a mediator between state extraversion and pleasant and unpleasant mood. *Journal of Research in Personality*, *46*(4), 414–422.

Lü, W., Wang, Z., Liu, Y., & Zhang, H. (2014). Resilience as a mediator between extraversion, neuroticism and happiness, PA and NA. *Personality and Individual Differences*, *63*, 128–133.

Lucas, R. E., & Baird, B. M. (2004). Extraversion and emotional reactivity. *Journal of Personality and Social Psychology*, *86*(3), 473–485.

Lucas, R. E., & Diener, E. (2001). Understanding extraverts' enjoyment of social situations: The importance of pleasantness. *Journal of Personality and Social Psychology*, *81*(2), 343–356.

Lucas, R. E., & Donnellan, M. B. (2011). Personality development across the life span: Longitudinal analyses with a national sample from Germany. *Journal of Personality and Social Psychology*, *101*(4), 847–861.

Lucas, R. E., & Fujita, F. (2000). Factors influencing the relation between extraversion and pleasant affect. *Journal of Personality and Social Psychology*, *79*(6), 1039–1056.

Lucas, R. E., Le, K., & Dyrenforth, P. S. (2008). Explaining the extraversion/positive affect relation: Sociability cannot account for extraverts' greater happiness. *Journal of Personality*, *76*(3), 385–414.

Lüdtke, O., Roberts, B. W., Trautwein, U., & Nagy, G. (2011). A random walk down university avenue: Life paths, life events, and personality trait change at the transition to university life. *Journal of Personality and Social Psychology*, *101*(3), 620–637.

Lukaszewski, A. W., & Roney, J. R. (2011). The origins of extraversion: Joint effects of facultative calibration and genetic polymorphism. *Personality and Social Psychology Bulletin*, *37*(3), 409–421.

Luo, X., Kranzler, H. R., Zuo, L., Wang, S., & Gelernter, J. (2007). Personality traits of agreeableness and extraversion are associated with ADH4 variation. *Biological Psychiatry*, *61*(5), 599–608.

Magee, C. A., Heaven, P. C. L., & Miller, L. M. (2013). Personality change predicts self-reported mental and physical health. *Journal of Personality*, *81*(3), 324–334.

# Extraversion

---

Magnus, K., Diener, E., Fujita, F., & Pavot, W. (1993). Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis. *Journal of Personality and Social Psychology*, 65(5), 1046-1053.

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, 41(9), 954.

Matthews, G. (1992). *Extraversion, Vol. 3: State and trait* (pp. 95-126). San Diego, CA: Academic Press.

Matthews, G., Deary, I. J., & Whiteman, M. C. (2003). *Personality traits*. Cambridge, England: Cambridge University Press.

Matthews, G., & Gilliland, K. (1999). The personality theories of H. J. Eysenck and J. A. Gray: A comparative review. *Personality and Individual Differences*, 26(4), 583-626.

McAdams, D. P. (1993). *The stories we live by: Personal myths and the making of the self*. New York, NY: William Morrow & Co.

McAdams, D. P. (2008). *Personal narratives and the life story* (3rd ed., pp. 242-264). New York, NY: Guilford Press.

McAdams, D. P., Anyidoho, N. A., Brown, C., Huang, Y. T., Kaplan, B., & Machado, M. A. (2004). Traits and stories: Links between dispositional and narrative features of personality. *Journal of Personality*, 72(4), 761-784.

McAdams, D. P., & Pals, J. L. (2006). A new Big Five: Fundamental principles for an integrative science of personality. *American Psychologist*, 61(3), 204-217.

McCabe, K. O., & Fleeson, W. (2012). What is extraversion for? Integrating trait and motivational perspectives and identifying the purpose of extraversion. *Psychological Science*, 23(12), 1498-1505.

McCrae, R. R. (2009). *The Five-Factor Model of personality traits: Consensus and controversy* (Chap. 9, pp. 148-161). Cambridge, England: Cambridge University Press.

McCrae, R. R., & Costa, P. T. (1992). Discriminant validity of NEO-PIR facet scales. *Educational and Psychological Measurement*, 52(1), 229-237.

McCrae, R. R., & Costa, P. T. (1997). Personality trait structure as a human universal. *American Psychologist*, 52(5), 509-516.

McCrae, R. R., & Costa, P. T. (2008). *The five-factor theory of personality* (3rd ed., pp. 159-181). New York, NY: Guilford Press.

# Extraversion

---

- McCrae, R. R., Costa, P. T., de Lima, M. P., Simões, A., Ostendorf, F., Angleitner, A., ... Piedmont, R. L. (1999). Age differences in personality across the adult life span: Parallels in five cultures. *Developmental Psychology, 35*(2), 466–477.
- McCrae, R. R., Costa, P. T., Jr., Ostendorf, F., Angleitner, A., Hrebícková, M., Avia, M. D., ... Woodfield, R. (2000). Nature over nurture: Temperament, personality, and life span development. *Journal of Personality and Social Psychology, 78*(1), 173.
- McCrae, R. R., Löckenhoff, C. E., & Costa, J. (2005). A step toward DSM-V: Cataloguing personality-related problems in living. *European Journal of Personality, 19*(4), 269–286. doi:10.1002/per.564.
- McCrae, R. R., & Terracciano, A. (2005). Universal features of personality traits from the observer's perspective: Data from 50 cultures. *Journal of Personality and Social Psychology, 88*(3), 547–561.
- McLean, K. C., & Fournier, M. A. (2008). The content and processes of autobiographical reasoning in narrative identity. *Journal of Research in Personality, 42*(3), 527–545.
- McLean, K. C., & Pasupathi, M. (2006). Collaborative narration of the past and extraversion. *Journal of Research in Personality, 40*(6), 1219–1231.
- McNiel, J., & Fleeson, W. (2006). The causal effects of extraversion on positive affect and neuroticism on negative affect: Manipulating state extraversion and state neuroticism in an experimental approach. *Journal of Research in Personality, 40*(5), 529–550.
- McNiel, J. M., Lowman, J. C., & Fleeson, W. (2010). The effect of state extraversion on four types of affect. *European Journal of Personality, 24*(1), 18–35.
- Mehl, M. R., Gosling, S. D., & Pennebaker, J. W. (2006). Personality in its natural habitat: Manifestations and implicit folk theories of personality in daily life. *Journal of Personality and Social Psychology, 90*(5), 862–877.
- Mroczek, D. K., & Spiro, I. (2003). Modeling intraindividual change in personality traits: Findings from the normative aging study. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 58B*(3), P153–P165.
- Munafò, M. R. (2009). *Behavioural genetics: From variance to DNA* (pp. 287–304). New York, NY: Cambridge University Press.
- Nettle, D. (2005). An evolutionary approach to the extraversion continuum. *Evolution and Human Behavior, 26*(4), 363–373.

# Extraversion

---

Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist*, *61*(6), 622-631.

Newcomb, A. F., Bukowski, W. M., & Pattee, L. (1993). Children's peer relations. *Psychological Bulletin*, *113*(1), 99-128.

Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factors structure in peer nomination personality ratings. *Journal of Abnormal and Social Psychology*, *66*(6), 574-583.

Oerlemans, W. G., & Bakker, A. B. (2014). Why extraverts are happier: A day reconstruction study. *Journal of Research in Personality*, *50*, 11-22.

Olson, K. R., & Weber, D. A. (2004). Relations between Big Five traits and fundamental motives. *Psychological Reports*, *95*(3), 795-802.

Omura, K., Constable, R., & Canli, T. (2005). Amygdala gray matter concentration is associated with extraversion and neuroticism. *Neuroreport: For Rapid Communication of Neuroscience Research*, *16*(17), 1905-1908.

Ortony, A., Norman, D. A., & Revelle, W. (2005). *Effective functioning: A three level model of affect, motivation, cognition, and behavior* (pp. 173-202). New York, NY: Oxford University Press.

Ozer, D. J., & Benet-Martinez, V. (2006). Personality and the prediction of consequential outcomes. *Annual Review of Psychology*, *57*, 401-421.

Paunonen, S. V. (2003). Big Five factors of personality and replicated predictions of behavior. *Journal of Personality and Social Psychology*, *84*(2), 411-422.

Penke, L., Denissen, J. J. A., & Miller, G. F. (2007). The evolutionary genetics of personality. *European Journal of Personality*, *21*(5), 549-587.

Pennebaker, J. W., & King, L. A. (1999). Linguistic styles: Language use as an individual difference. *Journal of Personality and Social Psychology*, *77*(6), 1296-1312.

Pettersson, E., & Turkheimer, E. (2014). Self-reported personality pathology has complex structure and imposing simple structure degrades test information. *Multivariate Behavioral Research*, *49*(4), 372-389.

Pytlik Zillig, L. M., Hemenover, S. H., & Dienstbier, R. A. (2002). What do we assess when we assess a Big 5 trait? A content analysis of the affective, behavioral and cognitive

# Extraversion

---

processes represented in the Big 5 personality inventories. *Personality and Social Psychology Bulletin*, 28(6), 847-858.

Quilty, L. C., DeYoung, C. G., Oakman, J. M., & Bagby, R. M. (2014). Extraversion and behavioral activation: Integrating the components of approach. *Journal of Personality Assessment*, 96(1), 87-94.

Raggatt, P. (2006). Putting the Five-Factor Model into context: Evidence linking Big Five traits to narrative identity. *Journal of Personality*, 74(5), 1321-1347.

Rammsayer, T. H. (1998). Extraversion and dopamine: Individual differences in response to changes in dopaminergic activity as a possible biological basis of extraversion. *European Psychologist*, 3(1), 37-50.

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five inventory in English and German. *Journal of Research in Personality*, 41(1), 203-212.

Rauch, S. L., Milad, M. R., Orr, S. P., Quinn, B. T., Fischl, B., & Pitman, R. K. (2005). Orbitofrontal thickness, retention of fear extinction, and extraversion. *Neuroreport: For Rapid Communication of Neuroscience Research*, 16(17), 1909-1912.

Rauthmann, J. F., & Will, T. (2011). Proposing a multidimensional Machiavellianism conceptualization. *Social Behavior & Personality: An International Journal*, 39(3), 391-403.

Read, S. J., Monroe, B. M., Brownstein, A. L., Yang, Y., Chopra, G., & Miller, L. C. (2010). A neural network model of the structure and dynamics of human personality. *Psychological Review*, 117(1), 61-92.

Rentfrow, P. J., Gosling, S. D., Jokela, M., Stillwell, D. J., Kosinski, M., & Potter, J. (2013). Divided we stand: Three psychological regions of the United States and their political, economic, social, and health correlates. *Journal of Personality and Social Psychology*, 105(6), 996-1012.

Reuter, M. (2007). *Neuroimaging and genetics*. Cambridge, England: Cambridge University Press.

Revelle, W. (1995). Personality processes. *Annual Review of Psychology*, 46, 295-328.

Revelle, W. (1997). *Extraversion and impulsivity: The lost dimension?* In H. Nyborg (Ed.), *The scientific study of human nature: Tribute to Hans J. Eysenck at eighty* (pp. 189-212). Amsterdam, The Netherlands: Pergamon/Elsevier Science Inc.

# Extraversion

---

Revelle, W. (2008). *The contribution of reinforcement sensitivity theory to personality theory* (pp. 508–527). Cambridge, England: Cambridge University Press.

Revelle, W., Wilt, J., & Condon, D. M. (2011). *Individual differences and differential psychology: A brief history and prospect* (Chap. 1, 2nd ed., pp. 3–38). London, England: Wiley-Blackwell.

Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science*, 2(4), 313–345.

Roberts, B. W., & Robins, R. W. (2000). Broad dispositions, broad aspirations: The intersection of personality traits and major life goals. *Personality and Social Psychology Bulletin*, 26(10), 1284–1296.

Roberts, B. W., & Robins, R. W. (2004). Person-environment fit and its implications for personality development: A longitudinal study. *Journal of Personality*, 72(1), 89–110.

Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin*, 132(1), 1–25.

Robinson, M. D. (2007). Personality, affective processing, and self-regulation: Toward process-based views of extraversion, neuroticism, and agreeableness. *Social and Personality Psychology Compass*, 1(1), 223–235.

Robinson, S., Sotak, B. N., During, M. J., & Palmiter, R. D. (2006). Local dopamine production in the dorsal striatum restores goal-directed behavior in dopamine-deficient mice. *Behavioral Neuroscience*, 120(1), 196–200.

Rocklin, T., & Revelle, W. (1981). The measurement of extraversion: A comparison of the Eysenck Personality Inventory and the Eysenck Personality Questionnaire. *British Journal of Social Psychology*, 20(4), 279–284.

Rogers, G. M., & Revelle, W. (1998). Personality, mood, and the evaluation of affective and neutral word pairs. *Journal of Personality and Social Psychology*, 74(6), 1592–1605.

Romero, E., Villar, P., Luengo, M. A., & Gómez-Fraguela, J. A. (2009). Traits, personal strivings and well-being. *Journal of Research in Personality*, 43(4), 535–546.

Rothbart, M., & Bates, J. (1998). *Temperament* (Vol. III, pp. 105–176). New York, NY: Wiley.

# Extraversion

---

Rothbart, M. K. (1981). Measurement of temperament in infancy. *Child Development*, 52(2), 569–578.

Rothbart, M. K., Derryberry, D., & Hershey, K. (2000). *Stability of temperament in childhood: Laboratory infant assessment to parent report at seven years* (Chap. 4, pp. 85–120). New York, NY: Routledge.

Sackett, P. R., & Walmsley, P. T. (2014). Which personality attributes are most important in the workplace? *Perspectives on Psychological Science*, 9(5), 538–551.

Samuel, D. B., Carroll, K. M., Rounsaville, B. J., & Ball, S. A. (2013). Personality disorders as maladaptive, extreme variants of normal personality: Borderline personality disorder and neuroticism in a substance using sample. *Journal of Personality Disorders*, 27(5), 625–635.

Schaller, M., & Murray, D. R. (2008). Pathogens, personality, and culture: Disease prevalence predicts worldwide variability in sociosexuality, extraversion, and openness to experience. *Journal of Personality and Social Psychology*, 95(1), 212–221. doi: 10.1037/0022-3514.95.1.212.

Scherer, K. R. (1995). Plato's legacy: Relationships between cognition, emotion, and motivation. *Geneva Studies in Emotion and Communication*, 9(1), 1–7.

Schutte, N. S., Malouff, J. M., Segrera, E., Wolf, A., & Rodgers, L. (2003). States reflecting the Big Five dimensions. *Personality and Individual Differences*, 34(4), 591–603.

Segarra, P., Poy, R., López, R., & Moltó, J. (2014). Characterizing Carver and White's BIS/BAS subscales using the Five Factor Model of personality. *Personality and Individual Differences*, 61, 18–23.

Sellbom, M., Anderson, J. L., & Bagby, R. M. (2013). Assessing DSM-5 Section III personality traits and disorders with the MMPI-2-RF. *Assessment*, 20(6), 709–722.

Shweder, R. A. (1999). Why cultural psychology? *Ethos*, 27(1), 62–73.

Singer, J. A. (2004). Narrative identity and meaning making across the adult lifespan: An introduction. *Journal of Personality*, 72(3), 437–459.

Skodol, A. E., Clark, L. A., Bender, D. S., Krueger, R. F., Morey, L. C., Verheul, R., ... Oldham, J. M. (2011). Proposed changes in personality and personality disorder assessment and diagnosis for DSM-5 Part I: Description and rationale. *Personality Disorders: Theory, Research, and Treatment*, 2(1), 4–22.



# Extraversion

---

- Smillie, L. (2008). What is reinforcement sensitivity theory. *European Journal of Personality*, 22(5), 359-384.
- Smillie, L. D. (2013). Why does it feel good to act like an extravert? *Social and Personality Psychology Compass*, 7(12), 878-887.
- Smillie, L. D. (2015). What is reinforcement sensitivity? Neuroscience paradigms for approach-avoidance processes in personality.
- Smillie, L. D., Cooper, A. J., Wilt, J., & Revelle, W. (2012). Do extraverts get more bang for the buck? Refining the affective-reactivity hypothesis of extraversion. *Journal of Personality and Social Psychology*, 103(2), 306.
- Smillie, L. D., DeYoung, C. G., & Hall, P. J. (2014). Clarifying the relation between extraversion and positive affect. *Journal of Personality*, 83(5), 564-574.
- Smillie, L. D., Geaney, J. T., Wilt, J., Cooper, A. J., & Revelle, W. (2013). Aspects of extraversion are unrelated to pleasant affective-reactivity: Further examination of the affective-reactivity hypothesis. *Journal of Research in Personality*, 47(5), 580-587.
- Smillie, L. D., Pickering, A. D., & Jackson, C. J. (2006). The new reinforcement sensitivity theory: Implications for personality measurement. *Personality and Social Psychology Review*, 10(4), 320-335.
- Smillie, L. D., Wilt, J., Kabbani, R., Garratt, C., & Revelle, W. (2015). Quality of social experience explains the relation between extraversion and positive affect. *Emotion*, 15(3), 339-349.
- Smits, D. J. M., & Boeck, P. D. (2006). From BIS/BAS to the Big Five. *European Journal of Personality*, 20(4), 255-270.
- Smits, I. A. M., Dolan, C. V., Vorst, H. C. M., Wicherts, J. M., & Timmerman, M. E. (2011). Cohort differences in Big Five personality factors over a period of 25 years. *Journal of Personality and Social Psychology*, 100(6), 1124-1138.
- Soto, C. J., & John, O. P. (2014). Traits in transition: The structure of parent-reported personality traits from early childhood to early adulthood. *Journal of Personality*, 82(3), 182-199.
- Spain, J. S., Eaton, L. G., & Funder, D. C. (2000). Perspectives on personality: The relative accuracy of self versus others for the prediction of emotion and behavior. *Journal of Personality*, 68(5), 837-867.

# Extraversion

---

- Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the Big Five. *Journal of Personality and Social Psychology, 101*(4), 862–882.
- Srivastava, S., Angelo, K. M., & Vallereux, S. R. (2008). Extraversion and positive affect: A day reconstruction study of person-environment transactions. *Journal of Research in Personality, 42*(6), 1613–1618.
- Stelmack, R. M. (1990). Biological bases of extraversion: Psychophysiological evidence. *Journal of Personality, 58*(1), 293–311.
- Stelmack, R. M. (1997). Toward a paradigm in personality: Comment on Eysenck's (1997) view. *Journal of Personality and Social Psychology, 73*(6), 1238–1241.
- Stelmack, R. M., & Stalikas, A. (1991). Galen and the humour theory of temperament. *Personality and Individual Differences, 12*(3), 255–263.
- Strelau, J. (1987). Emotion as a key concept in temperament research. *Journal of Research in Personality, 21*(4), 510–528.
- Swickert, R., Hittner, J. B., Kitos, N., & Cox-Fuenzalida, L.-E. (2004). Direct or indirect, that is the question: A re-evaluation of extraversion's influence on self-esteem. *Personality and Individual Differences, 36*(1), 207–217.
- Tellegen, A. (1982). Brief manual for the differential personality questionnaire. Unpublished manuscript, University of Minnesota, Minneapolis.
- Tellegen, A. (1985). *Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report* (pp. 681–706). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Thomsen, D. K., Olesen, M. H., Schnieber, A., & Tonnesvang, J. (2013). The emotional content of life stories: Positivity bias and relation to personality. *Cognition & Emotion, 28*(2), 260–277.
- Thoresen, C. J., Kaplan, S. A., Barsky, A. P., Warren, C. R., & de Chermont, K. (2003). The affective underpinnings of job perceptions and attitudes: A meta-analytic review and integration. *Psychological Bulletin, 129*(6), 914–945. doi:10.1037/0033-2909.129.6.914.
- Thorne, A., & Nam, V. (2009). *The storied construction of personality* (Chap. 28, pp. 491–505). Cambridge, England: Cambridge University Press.

# Extraversion

---

- Tooby, J., & Cosmides, L. (1990). On the universality of human nature and the uniqueness of the individual: The role of genetics and adaptation. *Journal of Personality*, *58*(1), 17–67.
- Trull, T. J., & Sher, K. J. (1994). Relationship between the Five-Factor Model of personality and Axis I disorders in a nonclinical sample. *Journal of Abnormal Psychology*, *103*(2), 350–360.
- Tupes, E. C., & Christal, R. E. (1961). Recurrent personality factors based on trait ratings. Technical Report 61-97, USAF ASD Technical Report. Reprinted in *Journal of Personality*, 1992, *60*, 225–251.
- Twenge, J. M. (2001). Birth cohort changes in extraversion: A cross-temporal meta-analysis, 1966–1993. *Personality and Individual Differences*, *30*(5), 735–748.
- Uziel, L. (2006). The extraverted and the neurotic glasses are of different colors. *Personality and Individual Differences*, *41*(4), 745–754.
- Vaidya, J. G., Gray, E. K., Haig, J., & Watson, D. (2002). On the temporal stability of personality: Evidence for differential stability and the role of life experiences. *Journal of Personality and Social Psychology*, *83*(6), 1469–1484.
- Van den Akker, A. L., Prinzie, P., Deković, M., De Haan, A. D., Asscher, J. J., & Widiger, T. (2013). The development of personality extremity from childhood to adolescence: Relations to internalizing and externalizing problems. *Journal of Personality and Social Psychology*, *105*(6), 1038.
- Van der Werff, J. (1985). Heymans' temperamental dimensions in personality research. *Journal of Research in Personality*, *19*(3), 279–287.
- van Os, J., Lataster, T., Delespaul, P., Wichers, M., & Myin-Germeys, I. (2014). Evidence that a psychopathology interactome has diagnostic value, predicting clinical needs: An experience sampling study. *PloS One*, *9*(1), e86652.
- Wacker, J., Chavanon, M.-L., & Stemmler, G. (2006). Investigating the dopaminergic basis of extraversion in humans: A multilevel approach. *Journal of Personality and Social Psychology*, *91*(1), 171–187.
- Watson, D. (1988). Intraindividual and interindividual analyses of positive and negative affect: Their relation to health complaints, perceived stress, and daily activities. *Journal of Personality and Social Psychology*, *54*(6), 1020–1030.

# Extraversion

---

Watson, D., & Clark, L. A. (1992). On traits and temperament: General and specific factors of emotional experience and their relation to the Five-Factor Model. *Journal of Personality, 60*(2), 441-476.

Watson, D., & Clark, L. A. (1997). *Extraversion and its positive emotional core* (pp. 767-793). San Diego, CA: Academic Press.

Watson, D., Clark, L. A., McIntyre, C. W., & Hamaker, S. (1992). Affect, personality, and social activity. *Journal of Personality and Social Psychology, 63*(6), 1011-1025.

Watson, D., Gamez, W., & Simms, L. J. (2005). Basic dimensions of temperament and their relation to anxiety and depression: A symptom-based perspective. *Journal of Research in Personality, 39*(1), 46-66.

Watson, D., Klohnen, E. C., Casillas, A., Nus Simms, E., Haig, J., & Berry, D. S. (2004). Match makers and deal breakers: Analyses of assortative mating in newlywed couples. *Journal of Personality, 72*(5), 1029-1068.

Watson, D., Stasik, S. M., Ro, E., & Clark, L. A. (2013). Integrating normal and pathological personality: Relating the DSM-5 trait-dimensional model to general traits of personality. *Assessment, 20*(3), 312-326.

Watson, D., Suls, J., & Haig, J. (2002). Global self-esteem in relation to structural models of personality and affectivity. *Journal of Personality and Social Psychology, 83*(1), 185-197.

Weiler, M. A. (1992). Sensitivity to affectively valenced stimuli. Ph.D. thesis.

Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*(4), 669-689.

Widiger, T. A. (2005). Five Factor Model of personality disorder: Integrating science and practice. *Journal of Research in Personality, 39*(1), 67-83.

Wiggins, J. S. (1996). An informal history of the interpersonal circumplex tradition. *Journal of Personality Assessment, 66*(2), 217-233.

Wilkowski, B. M., & Ferguson, E. L. (2014). Just loving these people: Extraverts implicitly associate people with reward. *Journal of Research in Personality, 54*, 93-102.

Wilson, S., Schalet, B. D., Hicks, B. M., & Zucker, R. A. (2013). Identifying early childhood personality dimensions using the California Child Q-Set and prospective

# Extraversion

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associations with behavioral and psychosocial development. *Journal of Research in Personality*, 47(4), 339–350.

Wilt, J. (2014). A New Form and Function for Personality (Doctoral dissertation). Retrieved from Proquest. ()

Wilt, J., Cox, K. S., & McAdams, D. P. (2010). The Eriksonian life story: Developmental scripts and psychosocial adaptation. *Journal of Adult Development*, 17(3), 156–161.

Wilt, J., Nettle, E. E., Spain, J. S., & Fleeson, W. (2011). The dynamic role of personality states in mediating the extraversion–positive affect relationship. *Journal of Personality*, 80(5), 1205–1236.

Wilt, J., Oehlberg, K., & Revelle, W. (2011). Anxiety in personality. *Personality and Individual Differences*, 50(7), 987–993.

Wilt, J., & Revelle, W. (2009). *Extraversion* (pp. 27–45). New York, NY: Guilford Press.

Winter, D. G., John, O. P., Stewart, A. J., Klohnen, E. C., & Duncan, L. E. (1998). Traits and motives: Toward an integration of two traditions in personality research. *Psychological Review*, 105(2), 230–250.

Wise, R. A. (2004). Dopamine, learning and motivation. *Nature Reviews Neuroscience*, 5(6), 483–494.

Wood, D., & Roberts, B. W. (2006). The effect of age and role information on expectations for Big Five personality traits. *Personality and Social Psychology Bulletin*, 32(11), 1482–1496.

Wundt, W. (1897). *Outlines of psychology*. Oxford, England: Engelmann.

Wyvell, C. L., & Berridge, K. C. (2000). Intra-accumbens amphetamine increases the conditioned incentive salience of sucrose reward: Enhancement of reward “wanting” without enhanced “liking” or response reinforcement. *The Journal of Neuroscience*, 20(21), 8122–8130.

Yang, Y., Read, S. J., Denson, T. F., Xu, Y., Zhang, J., & Pedersen, W. C. (2014). The key ingredients of personality traits situations, behaviors, and explanations. *Personality and Social Psychology Bulletin*, 40(1), 79–91.

Yarkoni, T. (2010). Personality in 100,000 words: A large-scale analysis of personality and word use among bloggers. *Journal of Research in Personality*, 44(3), 363–373.

# Extraversion

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Zelenski, J. M., Whelan, D. C., Nealis, L. J., Besner, C. M., Santoro, M. S., & Wynn, J. E. (2013). Personality and affective forecasting: Trait introverts underpredict the hedonic benefits of acting extraverted. *Journal of Personality and Social Psychology, 104*(6), 1092–1108.

Zuckerman, M. (1991). *Psychobiology of personality*. Cambridge, England: Cambridge University Press.

Zuckerman, M. (2005). *Psychobiology of personality (2nd ed., rev. & updated)*. New York, NY: Cambridge University Press.

## Notes:

(<sup>1</sup>) There were few adjectives that had substantial loadings on up to three factors.

(<sup>2</sup>) Desire is chosen over the term “motivation” due to desire’s more specific connotation of referring to what people want, as compared with motivation’s more general connotation of referring to the factors that energize, direct, and select behavior (Atkinson & Raynor, 1978; Heckhausen, 1991; Humphreys & Revelle, 1984). Whereas the factors that guide behavior may include affect, cognition, desire, and even behavior itself, desire links more naturally to goals, wants, and wishes.

(<sup>3</sup>) The main change to the theory is that the system formerly referred to as the FFS (now FFFS—“Fight, Flight, Freeze System”) has been given a greater role, mediating responses to all aversive stimuli and generating the fear response.

(<sup>4</sup>) Depue has also proposed that “affiliative extraversion,” encompassing warmth and social closeness, may be related to opiate functioning (Depue & Morrone-Strupinsky, 2005)

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