The Roots of Narcissus: Old and New Models of the Evolution of Narcissism

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What are the evolutionary roots of narcissism? Finding answers to this question will require some serious digging. Current explanations for the origins of narcissism tend to emphasize environmental and experiential explanations (e.g., Kohut 1971) with little attention given to biological and evolutionary factors. Many papers suggest that narcissism is created by particular parenting styles (either indulgent or neglectful), cultural trends toward a heightened importance of individualism, increased usage of social media, and/or exposure to the antics of narcissistic celebrities. These kinds of explanations are incomplete because they do not address the role that biological factors might play in the development of narcissism. Although the modern environment matters in shaping narcissism, as all traits are inseparable from their environments (Roberts and Jackson 2008), biological factors also are relevant to its development. Indeed, narcissism, like most individual differences in personality, is heritable (Coolidge et al. 2001, 2004; Livesley et al. 1993; Vernon et al. 2008). Accordingly, the goal of the present chapter is to draw on recent advances in evolutionary personality psychology (Buss 1991, 2009; Buss and Hawley 2011; Keller and Miller 2006; Nettle 2006; Penke et al. 2007) to consider biologically informed accounts of the origins of narcissism. Our overarching point is that narcissism has a biological component that should be factored into any comprehensive account of the origins of this multifaceted construct.

The plan for this chapter is to define narcissism, outline the largely unsuccessful search for a specific gene for narcissism, and then provide an overview of the various ways that researchers have started thinking about how genetic and environmental factors work together to influence the development of narcissism. In particular, we cover three explanations for the origin of narcissism: (1) Narcissism is rooted in physical characteristics that, in turn, shape one's psychological development; (2) narcissism is shaped by complex gene × environment interactions; and (3) narcissism is related to numerous genes with small effects that have been subjected to selection pressures over the course of human evolutionary history. Building on this third explanation, we propose a model for the origins of narcissism. Namely, narcissism is a function of selection for short-term mating (Holtzman and Strube 2011) and dominance (Tracy et al. 2011), as these two attributes facilitate their reproduction and survival, respectively.

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Defining Narcissism

Narcissism is a complex construct that involves attributes such as arrogance, assertiveness, a sense of authority, entitlement, exhibitionism, exploitativeness, forcefulness, self-absorption,

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social potency, and vanity (Emmons 1984; Raskin and Terry 1988). Given the burgeoning work on the evolutionary underpinnings of the Big Five domains, it is useful to consider how narcissism relates to this taxonomy of traits. In particular, narcissists tend to score high on extraversion and low on agreeableness (Paulhus 2001), a finding that generalizes from self-report studies to research that measures the Big Five traits behaviorally (Holtzman et al. 2010). Individuals high in narcissism also tend to score low on conscientiousness, with the exception of a relatively high score on the achievement-striving facet (Lynam and Widiger 2001). Thus, narcissism can be understood as a pattern of thoughts, feelings, and behaviors that empirically overlap with extraversion, disagreeableness, and, to some extent, low conscientiousness.

Narcissism can be distinguished from the neighboring constructs that constitute the other two components of the "Dark Triad"—Machiavellianism and psychopathy (Furnham et al. 2013; Paulhus and Williams 2002). Machiavellianism is characterized by scheming. Machiavellians operate "behind the scenes" and tend to be manipulative. Machiavellians are less extraverted than narcissists. Also noteworthy, Machiavellianism appears to be less heritable than narcissism (Vernon et al. 2008), although more research is needed to provide conclusive data on this point. The correlation between narcissism and Machiavellianism is approximately.25 (Paulhus and Williams 2002). Thus, there is little reason to suspect that narcissism and Machiavellianism are the same construct.

Psychopathy is characterized by callousness and a lifestyle that is often reckless, and—quite unlike narcissism—explicitly antisocial (Furnham et al. 2013). Psychopaths tend to be less conscientious than narcissists (Lynam and Widiger 2001, 2007; Paulhus and Williams 2002) and, in particular, they are lower in the achievement-striving facet of conscientiousness. Nevertheless, the constructs empirically overlap, with correlations as high as .50 (Paulhus and Williams 2002). In particular, the first factor ("primary psychopathy"), and to a lesser extent the second factor ("secondary psychopathy"), overlap with narcissism (see Table 2 in Jakobwitz and Egan 2006). For a review on the conceptual and empirical differences between psychopathy and narcissism, see Furnham and colleagues (2013). For evolutionary accounts of psychopathy, see Mealey (1995) or Lalumiere et al. (2008).

The Search for Genes That Code for Narcissism

Any reader who wants replicable evidence for the existence of a specific gene for narcissism will be disappointed. Large genome-wide association studies (GWAS) have not identified single gene linked to extraversion or (low) agreeableness (de Moor et al. 2012). Just as there is no single gene for personality traits and most psychiatric disorders (Kendler 2005), there probably is no single gene for narcissism. One reason is that narcissism is not a single entity or taxon, such that the narcissist can be distinguished from the nonnarcissist (Foster and Campbell 2007). When researchers talk about the proverbial narcissist, they are using shorthand to refer to people who report possessing a large number of narcissistic attributes. Multiple genes are likely to be responsible for creating variation in this complex phenotype.

Nonetheless, genetically informed studies are important because they highlight the importance of biological factors for understanding the origins of narcissism. Researchers are now proposing theoretical models that delineate how heritable factors work with environmental factors to explain the development of narcissistic tendencies. There are currently three primary explanations: (1) genetic factors might influence physical characteristics, which then contribute to the development of narcissistic characteristics (reactive heritability); (2) particular genetically influenced attributes interact with environmental factors to produce narcissistic characteristics (gene × environment interactions); or (3) numerous genes combine additively and interactively to produce narcissistic attributes (gene × gene interactions). This third explanation raises interesting questions about the selective pressures that produce

variability in narcissistic attributes, a key question in evolutionary personality psychology. Before describing these explanations, however, we note that these explanations are neither exhaustive nor mutually exclusive. Indeed, we believe there is validity in each of these accounts.

Explanation #1: Reactive Heritability

One way to explain the origins of narcissism draws on the idea that organisms pursue different kinds of interpersonal strategies based on their physical features. Buss (2009) noted that an aggressive interpersonal strategy may prove more successful for larger and more physically formidable children as opposed to more diminutive children. Using force to obtain resources works better for larger individuals than smaller individuals. These insights are acquired early in the life span and are then elaborated into personality attributes over the course of development. This is the gist of the notion of reactive heritability (Tooby and Cosmides 1990) or the idea that the physical self provides constraints and opportunities that shape the development of personality attributes. The traits that reactive heritability impact are called facultatively calibrated traits (Lukaszewski 2011).

According to the reactive heritability explanation, narcissism might be a psychological profile that develops because of certain physical attributes (Holtzman 2011). The viability of this explanation begins with a physical profile associated with narcissism. Absent reliable physical correlates the idea that narcissistic attributes are facultatively calibrated traits that cannot gain traction. As it stands, narcissists tend to be strong (Gangestad et al. 2007), they move in a smooth way—perhaps indicative of athleticism (Back et al. 2010; Table 3), and they tend to have a particular facial appearance (Holtzman 2011). Anecdotally, narcissistic attributes are linked to sharper features in women, whereas narcissism appears to correlate with a larger head, thinner lips, a thicker jaw, and fuller brows in men (see Fig. 1 in Holtzman 2011). Male narcissists self-report that they are hairier and self-report having a larger penis (Moskowitz et al. 2009) than nonnarcissists. Although self-reports of a larger penis might be explained by the self-enhancing tendencies of narcissists, other findings are more difficult to explain as artifacts of reporting. Thus, some connection between physical characteristics and narcissistic attributes may exist. The reactive heritability account would further suggest that much of the overlap between physical traits and narcissistic traits should be attributable to shared genetic influences. This hypothesis could be tested using a multivariate model applied to twin data, and this strikes us as an important test for future studies.

There are at least two developmental processes that can link heritable physical features to individual differences in narcissism. First, physical features may afford certain opportunities and cues that cause a person to think about the self in a certain way (self-reflection). For example, a strong person may learn that he or she can act in a particular way with less interference from others. An athletic youth might succeed at sports and earn status among her or his peers. This status may translate to feelings of power and social dominance. Second, social evocation might be a factor that elicits narcissism, as certain physical attributes generate expectations in others that are more or less independent of how the target actually acts in the first place (Snyder et al. 1977; Zebrowitz et al. 2002; Zebrowitz et al. 1996). For example, others may expect a physically strong person to take a leadership role regardless of the individual's initial preferences for leadership. Once thrust into the leadership role, the individual will be subjected to particular rewards and punishments, which might shape psychological development. Being expected to act as a leader could eventually shape a person into a leader—and leadership is one facet frequently captured by measures of narcissism (Emmons 1984). In sum, physical characteristics (e.g., strength and attractiveness), which have been partially shaped by evolution (Liu et al. 2012; Silventoinen et al. 2008), may impact self-reflective processes and social processes, thereby influencing personality development in general and narcissism in particular.

Explanation #2: Gene × Environment Interactions

A second explanation for the origin of narcissism is that genetically influenced tendencies and environmental features may interact to produce variation in personality (Penke et al. 2007), including attributes linked with narcissism (for a similar argument about antisocial tendencies, see Caspi et al. 2002; Sadeh et al. 2010). According to this perspective, people vary in their genotypes, with different people having more or less potential to become narcissistic because of their genetic endowment. The expression of narcissistic tendencies, however, depends on environmental contingencies. The development of a narcissistic phenotype may depend upon genotypic factors acting with environmental factors in a developmental process.

One example of this process draws on work by Cramer (2011; see also Tracy and Robins 2003). There are now hints that young children (age 3–4 years) vary in temperamental proclivities toward narcissism. Temperament—for the purposes of positing an evolutionary account, and based on the average heritability of narcissism in children (33 %; Coolidge et al. 2001, 2004)—is assumed to be under at least some nontrivial genetic influence. These early childhood individual differences may interact with parenting strategies (authoritarianism, indulgence) to produce narcissistic attributes in adolescence and adulthood. Thus, although there is evidence of temperamental correlates of adult narcissism at an early age, the development of high levels of narcissism depends on the interaction between temperament and parenting (or other environmental factors). Under certain conditions, people who are genetically predisposed to become narcissistic, because of dispositional tendencies toward exuberance and confidence (or even a dispositional tendency toward emotional brittleness), will not develop high levels of narcissistic traits if they are raised in environments that feature developmentally appropriate levels of parental demandingness and responsiveness. According to this kind of model, parenting may be relevant to the development of narcissism for only those children with certain genotypes.

Readers familiar with the behavior genetics literature may find any suggestion of a role for parenting as inconsistent with the evidence of near-zero shared environmental effects for most aspects of adult personality (Harris 1995, 2000). This may not, however, be the correct way to interpret behavioral genetic research. As it stands, gene × environment effects are captured by the additive genetic component of the basic twin model used in behavioral genetic studies to partition observed variation into underlying additive genetic effects, shared environment effects, and unique environmental effects (plus measurement error; Johnson et al. 2011; Purcell 2002). In other words, gene × shared environmental factors like parenting styles end up being captured by the additive genetic factor in the common twin model. This means that "heritability" estimates may reflect, in part, environmental inputs that interact with genetic factors. Thus, researchers who espouse the importance of the gene × environment interactionist paradigm tend to argue that the environmental factors may have been underemphasized in the behavioral genetic literature (Penke et al. 2007; Roberts and Jackson 2008). This is also one reason why Jackson and colleagues argue that heritability does not unequivocally mean that there is a "genetic substrate" for a trait (Jackson et al. 2011). Nonetheless, our point is that genetic factors are likely to be relevant for understanding the origins of narcissism with the caveat that the critical issues often amount to how genetically influenced proclivities are translated into phenotypic personality attributes in concert with environmental factors.

Explanation #3: Evolutionary Selection

We propose that genetically influenced attributes are part of the explanation for the origins of narcissism. This perspective leads to questions about the evolutionary significance of heritable variation in the tendency to exhibit narcissistic attributes. A set of theories concerning the evolutionary origin and functions of narcissism relies on different models of evolutionary selection. In this

section, we consider two key types of selection pressures: Direct selection (i.e., mutation–selection balance) and balancing selection. Direct selection operates by favoring particular variants in the population in general, while (typically) selecting against mutation; the constant influx of mutations across generations creates phenotypic variance within the population (Keller and Miller 2006; Lande 1975). That is, some people carry higher mutation loads. These models are gaining support (Verweij et al. 2012), as traits that are clearly socially undesirable tend to accrue in populations where inbreeding is common, suggesting that direct selection is operating.

Direct selection models, however, do not seem to apply particularly well to narcissism; instead, evolutionary models that invoke concepts related to balancing selection appear to hold more promise for explaining narcissism. Balancing selection occurs when two (or more) alternative strategies are seemingly viable. This is the case if the optima for traits differ between environments (Nettle 2006). For example, high levels of trait neuroticism might facilitate survival in especially dangerous environments in which risks of bodily injury are great (see Nettle 2006). Organisms who are highly sensitive to threat (i.e., highly vigilant) will be less likely to die in such a high-threat context when compared to less reactive conspecifics. On the other hand, high levels of neuroticism may not confer such advantages in relatively safe environments. In these cases, a highly reactive nervous system may impart more costs than benefits because of the inherent biological costs associated with heightened stress reactivity, as well as any opportunity costs due to missed opportunities to explore the environment. In short, the costs and benefits of a particular trait level seem to depend on the particular context. This kind of situation tends to preserve personality variation across generations, especially to the extent that humans have inhabited a wide range of environments over the course of their evolutionary history.

Balancing selection may even happen within a single environment. For instance, frequency-dependent selection is a type of balancing selection in which the number of organisms who exhibit a strategy determines whether that variant will be selected (Keller and Miller 2006); the evolutionary advantages of a particular strategy depend on the frequencies of all possible strategies in the local ecology. Howard (1984) discusses the case of bullfrogs with alternative mating strategies (see also Simpson and Gangestad 1992). If a large number of frogs adopt one type of mating strategy (such as croaking loudly to attract females), then there will be opportunities for alternative strategies to find success (such as circling the croaking male and intercepting the approaching females). If there are too many frogs that have evolved to fill one niche, then there is an opportunity for frogs with a different strategy to exploit a different niche. If these mating strategies also have a genetic basis, then they exemplify frequency-dependent selection and thus provide an example of balancing selection. Balancing selection for polygenic traits does indeed appear to be viable in certain circumstances (Turelli and Barton 2004).

In sum, narcissism is typically understood with reference to balancing selection (rather than direct selection) when considering the selective pressures that shape this construct. In other words, we suspect that variability in narcissism has been preserved across evolutionary history because the particular costs and benefits associated with narcissistic attributes depend on a wide range of environmental factors. Variation exists because narcissistic attributes can be beneficial for survival and reproduction in certain contexts. As it stands, there are a number of specific possibilities that might explain the origins of narcissistic traits rooted in balancing selection models. We described a few of these explanations in this section. However, we do not intend this to be an exhaustive summary of the possibilities.

Explanation #3A: Narcissism and Short-Term Mating

Holtzman and Strube (2011) argued that narcissistic strategies were maintained over generations due to the viability of short-term mating (e.g., promiscuity, one-night stands). The 2011

version of the theory is a frequency-dependent selection argument that is consistent with life history theory (Ellis et al. 2012; Jonason et al. 2012; McDonald et al. 2012; Simpson et al. 2011), and it was partially inspired by key developments in the psychopathy literature (e.g., Lalumiere et al. 2001; Mealey 1995). In particular, Holtzman and Strube (2011) argued that there may have been frequency-dependent selection for short-term mating among a population of people who largely engaged in long-term relationships (see also Eastwick 2009). This evolutionary context included a tension between selection for short-term mating (part of a fast life history strategy) versus selection for long-term mating (part of a slow life history strategy). There is some evidence consistent with Holtzman and Strube's (2011) evolutionary account, given that narcissism is associated with many traits that theoretically would have been selected in short-term mating contexts: coercion, attractiveness, and unique physical traits.

First and foremost, narcissism is positively associated with short-term mating behaviors (Buss and Shackelford 1997; Foster et al. 2006; Jonason et al. 2009; Reise and Wright 1996). Perhaps the most convincing evidence of this link comes from Dufner et al. (2013), who demonstrated that, compared to male nonnarcissists, male narcissists tend to be more likely to obtain contact information from random females on a city street. This behavioral evidence suggests that male narcissists are successful at achieving a crucial first step in short-term mating—gaining access to potential mates. Narcissism is also associated with sexually coercive tendencies (Bushman et al. 2003; Williams et al. 2009). Moreover, Holtzman and Strube (2010) argue that narcissism should be associated with attractiveness, given that people in short-term mating contexts tend to weigh attractiveness more heavily (Li et al. 2002; Li and Kenrick 2006). Narcissism is indeed associated with attractiveness (Dufner et al. 2013; Holtzman and Strube 2010; Rauthmann and Kolar 2013), an effect that has been replicated by various independent research groups.

It is important to point out a few findings that are inconsistent with Holtzman and Strube's (2011) evolutionary account. Perhaps the most important finding that contradicts the original account is that narcissism was not clearly related to unadorned physical attractiveness—operationalized as attractiveness when one dresses in a neutral gray outfit (Holtzman and Strube 2013). This suggests that the attractiveness of narcissists is explained by something other than their "inherent beauty" per se, such as the tendency of narcissists to adopt flattering styles. A second piece of evidence also runs counter to the original hypothesis: Although socially aversive traits are associated positively with symmetry (Holtzman et al. 2011), narcissism was not clearly positively associated with physical symmetry. All in all, little evidence at this juncture suggests that narcissism is tied to unadorned attractiveness.

Thus, these findings beg for an explanation: The correlation between narcissism and raw attractiveness hovers around zero. However, when allowed to control and modify their own appearances (i.e., adorned attractiveness), narcissists are rated as physically attractive by observers. Holtzman and Strube (2013) recommend that dynamic self-regulatory theories of narcissism (Morf and Rhodewalt 2001) or the conspicuous consumption literature (Sedikides et al. 2011; Sedikides et al. 2007; Sundie et al. 2011) may be useful for trying to explain the link between narcissism and adorned attractiveness. The link between attractiveness and narcissism may in part hinge on cultural inputs, such as manipulating one's appearance and signaling that the individual has resources (i.e., conspicuous consumption). In turn, manipulating one's image may itself hinge on evolutionarily grounded motives; see the conspicuous consumption literature for further reading (Sundie et al. 2011).

Explanation #3B: Narcissism and Dominance

An alternative to the short-term mating account for the evolutionary origins of narcissism is offered by Tracy et al. (2011). This perspective argues that narcissism is related to dominance and that this explains the origins of narcissism. Dominance was selected because it is one route

to the attainment of status (Henrich and Gil-White 2001); simultaneously, there was selection for the emotion systems that enable humans to feel and exhibit hubristic pride—one of the core emotional correlates of narcissism (Tracy et al. 2009; Tracy and Robins 2003). According to this model, it was the expression of hubristic pride that helped narcissists appear dominant, which led to narcissists' social elevation. This rise in status hierarchies led to resource acquisition (food, desirable living locations, material goods) and these resources promoted survival.

There is indeed evidence that narcissism is tied to dominance (Bradlee and Emmons 1992). The two constructs are so similar that sometimes the labels are interchangeable, as in the California Psychological Inventory (Havlicek et al. 2005). However, one problem with the dominance model of narcissism is that it may treat dominance as an ultimate end in itself rather than as a means to achieving reproductive success. A devil's advocate would argue that dominant narcissists who never reproduced would never directly pass along genes to the next generation. Therefore, dominance by itself is unlikely to be an evolutionary endpoint; the dominant form of narcissism cannot evolve without conferring reproductive success. Essential to this argument is that dominance may constitute a crucial element of a larger strategy that involves both reproductive strategies and increased survival. This gives rise to an integrative third model that combines the dominance and the short-term mating explanations.

Explanation #3C: Selection for Short-Term Mating and Dominance-Shaped Narcissism

The novel idea here is that short-term mating strategies and dominance were dually selected. Short-term mating traits directly helped narcissists pass on their genes to the next generation, enabling reproductive success. Dominant traits helped narcissists strive for status, which had effects primarily on the likelihood of survival (and more secondarily or indirectly on their likelihood of reproductive success). Across evolutionary time, selection for each of these traits would have led to their covariation. This gives rise to an integrative theoretical model. Holtzman and Strube (2011) provide an explanation of the reproductive means by which narcissism is transmitted from one generation to the next, whereas Tracy and colleagues (e.g., Tracy and Robins 2003) primarily explain how narcissists survive and thrive. This integration directly answers the call for "a concern with the impact of personality variation on survival and reproductive success" (Nettle and Penke 2010, p. 4043).

This integration yields testable predictions. Namely, both short-term mating and dominance should significantly mediate the effects of narcissistic traits on behavior. Putting this theory to the test should reveal that in reproductively relevant domains, such as speed-dating paradigms, short-term mating should be a bigger mediator. In survival-relevant domains, such as physical aggression paradigms, dominance should be a bigger mediator. This theory makes the falsifiable prediction that one or the other proposed mediators will be significant for most narcissism–behavior relationships.

More broadly, this model of narcissism is representative of the emerging paradigm of social-cognitive evolutionary psychology. With respect to the narcissism literature, the model suggests that it is not short-term-mating motives that are always the most predictive of narcissistic behavior; nor are dominance motives always the most important way to explain narcissistic behavior. Instead, the inputs from the environment will determine which evolved program (a mating-relevant one or a survival-relevant one) is active at a given time.

Summary and Conclusions

Behavioral genetic evidence demonstrates that narcissism is heritable. This provides support for the idea that narcissism has a biological component, but, simultaneously, there is little reason to believe that narcissism will be explained by single genes. Instead, genetically informed research

highlights the importance of biological factors and provides a set of tools that can be used to test some theoretical propositions. The key is that biological components should be included in theorizing about the origins of this complex phenotype. In short, evolutionary personality psychology can make important contributions to the current understanding of narcissism.

Accordingly, we outlined three primary explanations of the evolutionary roots of narcissism: (1) Narcissism may reflect a strategic reaction to one's heritable physical characteristics rather than being directly a function of one's genes; (2) narcissism may be the outcome of gene × environment interactions; and (3) narcissism may be rooted in selection for strategies that have different cost and benefit ratios depending on environmental conditions. Expanding this third explanation, we forwarded the novel idea that narcissism has been selected for two primary advantages—because it facilitates short-term mating and helps to elevate a person within a dominance hierarchy. This integrative perspective on the evolutionary roots of narcissism will hopefully generate more attention to the role that biological factors play in the origins of narcissism.

In sum, the goal of this chapter was to ground narcissism in contemporary evolutionary psychology to provide biologically informed insights into the origins of narcissistic attributes. This is a challenging task and we have outlined several possibilities for understanding how and why narcissistic traits may have evolved. Our overarching goal is to encourage psychologists to entertain the possibility that narcissism has some biological roots. Indeed, if the psychological construct "narcissism" is anything like the narcissus plant, it will have a number of deep roots and involve a complicated development from seed to flower.

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References

Back, M. D., Schmukle, S. C., & Egloff, B. (2010). Why are narcissists so charming at first sight? Decoding the narcissism-popularity link at zero acquaintance. *Journal of Personality and Social Psychology, 98*, 132–145. doi:10.1037/a0016338.

Bradlee, P. M., & Emmons, R. A. (1992). Locating narcissism within the interpersonal circumplex and the 5-factor model. *Personality and Individual Differences, 13,* 821–830. doi:10.1016/0191-8869(92)90056-U.

Bushman, B. J., Bonacci, A. M., van Dijk, M., & Baumeister, R. F. (2003). Narcissism, sexual refusal, and aggression: Testing a narcissistic reactance model of sexual coercion. *Journal of Personality and Social Psychology, 84,* 1027–1040. doi:10.1037/0022-3514.84.5.1027.

Buss, D. M. (1991). Evolutionary personality psychology. *Annual Review of Psychology, 42,* 459–491. doi:10.1146/annurev.ps.42.020191.002331.

Buss, D. M. (2009). How can evolutionary psychology successfully explain personality and individual differences? *Perspectives on Psychological Science, 4,* 359–366.

Buss, D. M., & Hawley, P. H. (2011). *The evolution of personality and individual differences*. Oxford: University Press.

Buss, D. M., & Shackelford, T. K. (1997). Susceptibility to infidelity in the first year of marriage. *Journal of Research in Personality, 31*, 193–221. doi:10.1006/jrpe.1997.2175.

Caspi, A., McClay, J., Moffitt, T. E., Mill, J., Martin, J., Craig, I. W., Taylor, A., & Poulton, R. (2002). Role of genotype in the cycle of violence in maltreated children. *Science, 297*, 851–854. doi:10.1126/science.1072290.

Coolidge, F. L., Thede, L. L., & Jang, K. L. (2001). Heritability of personality disorders in childhood: A preliminary investigation. *Journal of Personality Disorders, 15,* 33–40. doi:10.1521/pedi.15.1.33.18645.

Coolidge, F. L., Thede, L. L., & Jang, K. L. (2004). Are personality disorders psychological manifestations of executive function deficits? Bivariate heritability evidence from a twin study. *Behavior Genetics, 34,* 75–84. doi:10.1023/b:bege.0000009486.97375.53.

Cramer, P. (2011). Young adult narcissism: A 20 year longitudinal study of the contribution of parenting styles, preschool precursors of narcissism, and denial. *Journal of Research in Personality, 45,* 19–28. doi:10.1016/j.jrp.2010.11.004.

de Moor, M. H. M., Costa, P. T., Terracciano, A., Krueger, R. F., de Geus, E. J. C., Toshiko, T., Penninx, B. W. J. H., Esko, T., Madden, P. A. F., Derringer, J., Amin, N., Willemsen, G., Hottenga, J. J., Distel, M. A., Uda, M., Sanna, S., Spinhoven, P., Hartman, C. A., Sullivan, P., Realo, A., Allik, J., Heath, A. C., Pergadia, M. L., Agrawal, A., Lin, P., Grucza, R., Nutile, T., Ciullo, M., Rujescu, D., Giegling, I., Konte, B., Widen, E., Cousminer, D. L., Eriksson, J. G., Palotie, A., Peltonen,

L., Luciano, M., Tenesa, A., Davies, G., Lopez, L. M., Hansell, N. K., Medland, S. E., Ferrucci, L., Schlessinger, D., Montgomery, G. W., Wright, M. J., Aulchenko, Y. S., Janssens, A. C. J. W., Oostra, B. A., Metspalu, A., Abecasis, G. R., Deary, I. J., Raikkonen, K., Bierut, L. J., Martin, N. G., van Duijn, C. M., & Boomsma, D. I. (2012). Meta-analysis of genome-wide association studies for personality. *Molecular Psychiatry, 17*, 337–349. doi:10.1038/mp.2010.128.

Dufner, M., Rauthmann, J. F., Czarna, A. Z., & Denissen, J. J. A. (2013). Are narcissists sexy? Zeroing in on the effect of narcissism on short-term mate appeal. *Personality & Social Psychology Bulletin, 39,* 870–882. doi:10.1177/0146167213483580.

Eastwick, P. W. (2009). Beyond the pleistocene: Using phylogeny and constraint to inform the evolutionary psychology of human mating. *Psychological Bulletin, 135,* 794–821. doi:10.1037/a0016845.

Ellis, B. J., Del Giudice, M., Dishion, T. J., Figueredo, A. J., Gray, P., Griskevicius, V., Hawley, P. H., Jacobs, W. J., James, J., Volk, A. A., & Wilson, D. S. (2012). The evolutionary basis of risky adolescent behavior: Implications for science, policy, and practice. *Developmental Psychology, 48,* 598–623. doi:10.1037/a0026220.

Emmons, R. A. (1984). Factor-analysis and construct-validity of the narcissistic personality inventory. *Journal of Personality Assessment, 48,* 291–300. doi:10.1207/s15327752jpa4803_11.

Foster, J. D., & Campbell, W. K. (2007). Are there such things as "Narcissists" in social psychology? A taxometric analysis of the narcissistic personality Inventory. *Personality and Individual Differences, 43,* 1321–1332. doi:10.1016/j.paid.2007.04.003.

Foster, J. D., Shrira, I., & Campbell, W. K. (2006). Theoretical models of narcissism, sexuality, and relationship commitment. *Journal of Social and Personal Relationships, 23,* 367–386. doi:10.1177/0265407506064204.

Furnham, A., Richards, S. C., & Paulhus, D. L. (2013). The dark triad of personality: A 10 year review. *Social and Personality Psychology Compass, 7,* 199–216. doi:10.1111/spc3.12018.

Gangestad, S. W., Garver-Apgar, C. E., Simpson, J. A., & Cousins, A. J. (2007). Changes in women's mate preferences across the ovulatory cycle. *Journal of Personality and Social Psychology, 92,* 151–163. doi:10.1037/0022-3514.92.1.151.

Harris, J. R. (1995). Where is the child's environment: A group socialization theory of development. *Psychological Review, 102,* 458–489. doi:10.1037/0033-295x.102.3.458.

Harris, J. R. (2000). The outcome of parenting: What do we really know? *Journal of Personality, 68,* 625–637. doi:10.1111/1467-6494.00110.

Havlicek, J., Roberts, S. C., & Flegr, J. (2005). Women's preference for dominant male odour: Effects of menstrual cycle and relationship status. *Biology Letters, 1,* 256–259. doi:10.1098/rsbl.2005.0332.

Henrich, J., & Gil-White, F. J. (2001). The evolution of prestige—Freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior, 22,* 165–196. doi:10.1016/s1090-5138(00)00071-4.

Holtzman, N. S. (2011). Facing a psychopath: Detecting the dark triad from emotionally-neutral faces, using prototypes from the personality faceaurus. *Journal of Research in Personality, 45,* 648–654. doi:10.1016/j.jrp.2011.09.002.

Holtzman, N. S., & Strube, M. J. (2010). Narcissism and attractiveness. *Journal of Research in Personality, 44,* 133–136. doi:10.1016/j.jrp.2009.10.004.

Holtzman, N. S., & Strube, M. J. (2011). The intertwined evolution of narcissism and short-term mating: An emerging hypothesis. In W. K. Campbell & J. D. Miller (Eds.), *The handbook of narcissism and narcissistic personality disorder: Theoretical approaches, empirical findings, and treatments* (pp. 210–220). Hoboken: Wiley.

Holtzman, N. S., & Strube, M. J. (2013). Dark personalities tend to create a physically attractive veneer. *Social Psychological and Personality Science, 4,* 461–467. doi:10.1177/1948550612461284.

Holtzman, N. S., Vazire, S., & Mehl, M. R. (2010). Sounds like a narcissist: Behavioral manifestations of narcissism in everyday life. *Journal of Research in Personality, 44,* 478–484. doi:10.1016/j.jrp.2010.06.001.

Holtzman, N. S., Augustine, A. A., & Senne, A. L. (2011). Are pro-social or socially aversive people more physically symmetrical? Symmetry in relation to over 200 personality variables. *Journal of Research in Personality, 45,* 87–91. doi:10.1016/j.jrp.2011.08.003.

Howard, R. D. (1984). Alternative mating behaviors of young male bullfrogs. *American Zoologist, 24,* 397–406.

Jackson, J. J., Hill, P. L., & Roberts, B. W. (2011). Sociogenomic theory as an answer to the heritability problem. *European Journal of Personality, 25,* 274–276.

Jakobwitz, S., & Egan, V. (2006). The dark triad and normal personality traits. *Personality and Individual Differences, 40,* 331–339. doi:10.1016/j.paid.2005.07.006.

Johnson, W., Penke, L., & Spinath, F. M. (2011). Heritability in the era of molecular genetics: Some thoughts for understanding genetic influences on behavioural traits. *European Journal of Personality, 25,* 254–266. doi:10.1002/per.836.

Jonason, P. K., Li, N. P., Webster, G. D., & Schmitt, D. P. (2009). The dark triad: Facilitating a short-term mating strategy in men. *European Journal of Personality, 23,* 5–18. doi:10.1002/per.698.

Jonason, P. K., Webster, G. D., Schmitt, D. P., Li, N. P., & Crysel, L. (2012). The antihero in popular culture: Life history theory and the dark triad personality traits. *Review of General Psychology, 16,* 192–199. doi:10.1037/a0027914.

Keller, M. C., & Miller, G. (2006). Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? *Behavioral and Brain Sciences, 29,* 385–452. doi:10.1017/s0140525x06009095.

Kendler, K. S. (2005). "A gene for…": The nature of gene action in psychiatric disorders. *American Journal of Psychiatry, 162,* 1243–1252. doi:10.1176/appi.ajp.162.7.1243.

Kohut, H. (1971). *The analysis of the self: A systematic approach to the psychoanalytic treatment of Narcissistic Personality Disorders*. New York: International Universities Press, Inc.

Lalumiere, M. L., Harris, G. T., & Rice, M. E. (2001). Psychopathy and developmental instability. *Evolution and Human Behavior, 22,* 75–92. doi:10.1016/s1090-5138(00)00064-7.

Lalumiere, M. L., Mishra, S., & Harris, G. T. (2008). In cold blood: The evolution of psychopathy. In J. Duntley & T. K. Shakelford (Eds.), *Evolutionary forensic psychology: Darwinian foundations of crime and law* (pp. 139–159). New York: Oxford University Press.

Lande, R. (1975). Maintenance of genetic-variability by mutation in a polygenic character with linked loci. *Genetical Research, 26,* 221–235.

Li, N. P., & Kenrick, D. T. (2006). Sex similarities and differences in preferences for short-term mates: What, whether, and why. *Journal of Personality and Social Psychology, 90,* 468–489. doi:10.1037/0022-3514.90.3.468.

Li, N. P., Bailey, J. M., Kenrick, D. T., & Linsenmeier, J. A. W. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology, 82,* 947–955. doi:10.1037//0022-3514.82.6.947.

Liu, F., van der Lijn, F., Schurmann, C., Zhu, G., Chakravarty, M. M., Hysi, P. G., Wollstein, A., Lao, O., de Bruijne, M., Ikram, M. A., van der Lugt, A., Rivadeneira, F., Uitterlinden, A. G., Hofman, A., Niessen, W. J., Homuth, G., de Zubicaray, G., McMahon, K. L., Thompson, P. M., Daboul, A., Puls, R., Hegenscheid, K., Bevan, L., Pausova, Z., Medland, S. E., Montgomery, G. W., Wright, M. J., Wicking, C., Boehringer, S., Spector, T. D., Paus, T., Martin, N. G., Biffar, R., Kayser, M., & Int Visible Trait Genetics, V. (2012). A genome-wide association study identifies five loci influencing facial morphology in Europeans. *Plos Genetics, 8*. doi:10.1371/journal.pgen.1002932.

Livesley, W. J., Jang, K. L., Jackson, D. N., & Vernon, P. A. (1993). Genetic and environmental contributions to dimensions of personality disorder. *American Journal of Psychiatry, 150,* 1826–1831.

Lukaszewski, A. W. (2011). The concept of 'reactive heritability': How heritable personality variation may arise from a universal human nature. *European Journal of Personality, 25,* 277–278.

Lynam, D. R., & Widiger, T. A. (2001). Using the five-factor model to represent the DSM-IV personality disorders: An expert consensus approach. [Article]. *Journal of Abnormal Psychology, 110,* 401–412. doi:10.1037//0021-843x.110.3.401.

Lynam, D. R., & Widiger, T. A. (2007). Using a general model of personality to identify the basic elements of psychopathy. *Journal of Personality Disorders, 21,* 160–178. doi:10.1521/pedi.2007.21.2.160.

McDonald, M. M., Donnellan, M. B., & Navarrete, C. D. (2012). A life history approach to understanding the dark triad. *Personality and Individual Differences, 52,* 601–605.

Mealey, L. (1995). The sociobiology of sociopathy: An integrated evolutionary model. *Behavioral and Brain Sciences, 18,* 523–541.

Morf, C. C., & Rhodewalt, F. (2001). Unraveling the paradoxes of narcissism: A dynamic self-regulatory processing model. *Psychological Inquiry, 12,* 177–196. doi:10.1207/s15327965pli1204_1.

Moskowitz, D. A., Rieger, G., & Seal, D. W. (2009). Narcissism, self-evaluations, and partner preferences among men who have sex with men. *Personality and Individual Differences, 46,* 725–728. doi:10.1016/j.paid.2009.01.033.

Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist, 61,* 622–631. doi:10.1037/0003-066x.61.6.622.

Nettle, D., & Penke, L. (2010). Personality: Bridging the literatures from human psychology and behavioural ecology. [Review]. *Philosophical Transactions of the Royal Society B-Biological Sciences, 365,* 4043–4050. doi:10.1098/rstb.2010.0061.

Paulhus, D. L. (2001). Normal narcissism: Two minimalist accounts. *Psychological Inquiry, 12,* 228–230.

Paulhus, D. L., & Williams, K. M. (2002). The dark triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality, 36,* 556–563. doi:10.1016/S0092-6566(02)00505-6.

Penke, L., Denissen, J. J. A., & Miller, G. F. (2007). The evolutionary genetics of personality. *European Journal of Personality, 21,* 549–587. doi:10.1002/per.629.

Purcell, S. (2002). Variance components models for gene-environment interaction in twin analysis. [Article]. *Twin Research, 5,* 554–571. doi:10.1375/136905202762342035.

Raskin, R., & Terry, H. (1988). A principal-components analysis of the narcissistic personality-inventory and further evidence of its construct-validity. *Journal of Personality and Social Psychology, 54,* 890–902. doi:10.1037/0022-3514.54.5.890.

Rauthmann, J. F., & Kolar, G. P. (2013). The perceived attractiveness and traits of the Dark Triad: Narcissists are perceived as hot, Machiavellians and psychopaths not. [Article]. *Personality and Individual Differences, 54,* 582–586. doi:10.1016/j.paid.2012.11.005.

Reise, S. P., & Wright, T. M. (1996). Personality traits, cluster B personality disorders, and sociosexuality. [Article]. *Journal of Research in Personality, 30,* 128–136. doi:10.1006/jrpe.1996.0009.

Roberts, B. W., & Jackson, J. J. (2008). Sociogenomic personality psychology. *Journal of Personality, 76*, 1523–1544. doi:10.1111/j.1467-6494.2008.00530.x.

Sadeh, N., Javdani, S., Jackson, J. J., Reynolds, E. K., Potenza, M. N., Gelernter, J., Lejuez, C. W., & Verona, E. (2010). Serotonin transporter gene associations with psychopathic traits in youth vary as a function of socioeconomic resources. *Journal of Abnormal Psychology, 119,* 604–609. doi:10.1037/a0019709.

Sedikides, C., Gregg, A. P., Cisek, S., & Hart, C. M. (2007). The I that buys: Narcissists as consumers. *Journal of Consumer Psychology, 17,* 254–257. doi:10.1016/S1057-7408(07)70035-9.

Sedikides, C., Cisek, S., & Hart, C. M. (2011). Narcissism and brand name consumerism. In W. K. Campbell & J. D. Miller (Eds.), *The handbook of narcissism and narcissistic personality disorder: Theoretical approaches, empirical findings, and treatments* (pp. 382–392). Hoboken: Wiley.

Silventoinen, K., Magnusson, P. K. E., Tynelius, P., Kaprio, J., & Rasmussen, F. (2008). Heritability of body size and muscle strength in young adulthood: A study of one million Swedish men. *Genetic Epidemiology, 32,* 341–349. doi:10.1002/gepi.20308.

Simpson, J. A., & Gangestad, S. W. (1992). Sociosexuality and romantic partner choice. *Journal of Personality, 60,* 31–51. doi:10.1111/j.1467-6494.1992.tb00264.x.

Simpson, J. A., Griskevicius, V., & Kim, J. S. (2011). Evolution, life history, and personality. In L. Horowitz & S. Strack (Eds.), *Handbook of interpersonal psychology: Theory, research, assessment, and therapeutic interventions* (pp. 75–89). New York: Wiley.

Snyder, M., Tanke, E. D., & Berscheid, E. (1977). Social perception and interpersonal behavior: On self-fulfilling nature of social stereotypes. *Journal of Personality and Social Psychology, 35,* 656–666.

Sundie, J. M., Griskevicius, V., Vohs, K. D., Kenrick, D. T., Tybur, J. M., & Beal, D. J. (2011). Peacocks, porsches, and thorstein veblen: Conspicuous consumption as a sexual signaling system. *Journal of Personality and Social Psychology, 100,* 664–680. doi:10.1037/a0021669.

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,* 17–67.

Tracy, J. L., & Robins, R. W. (2003). "Death of a (narcissistic) salesman": An integrative model of fragile self-esteem. *Psychological Inquiry, 14,* 57–62.

Tracy, J. L., Cheng, J. T., Robins, R. W., & Trzesniewski, K. H. (2009). Authentic and hubristic pride: The affective core of self-esteem and narcissism. *Self and Identity, 8,* 196–213. doi:10.1080/15298860802505053.

Tracy, J. L., Cheng, J. T., Martens, J. P., & Robins, R. W. (2011). The emotional dynamics of narcissism: Inflated by pride, deflated by shame. In W. K. Campbell & J. D. Miller (Eds.), *The handbook of narcissism and narcissistic personality disorder: Theoretical approaches, empirical findings, and treatments*. Hoboken: Wiley.

Turelli, M., & Barton, N. H. (2004). Polygenic variation maintained by balancing selection: Pleiotropy, sex-dependent allelic effects and GxE interactions. *Genetics, 166,* 1053–1079. doi:10.1534/genetics.166.2.1053.

Vernon, P. A., Villani, V. C., Vickers, L. C., & Harris, J. A. (2008). A behavioral genetic investigation of the dark triad and the big 5. *Personality and Individual Differences, 44,* 445–452. doi:10.1016/j.paid.2007.09.007.

Verweij, K. J. H., Yang, J., Lahti, J., Veijola, J., Hintsanen, M., Pulkki-Raback, L., Heinonen, K., Pouta, A., Pesonen, A.-K., Widen, E., Taanila, A., Isohanni, M., Miettunen, J., Palotie, A., Penke, L., Service, S. K., Heath, A. C., Montgomery, G. W., Raitakari, O., Kahonen, M., Viikari, J., Raikkonen, K., Eriksson, J. G., Keltikangas-Jarvinen, L., Lehtimaki, T., Martin, N. G., Jarvelin, M.-R., Visscher, P. M., Keller, M. C., & Zietsch, B. P. (2012). Maintenance of genetic variation in human personality: Testing evolutionary models by estimating heritability due to common causal variants and investigating the effect of distant inbreeding. *Evolution, 66,* 3238–3251. doi:10.1111/j.1558-5646.2012.01679.x.

Williams, K. M., Cooper, B. S., Howell, T. M., Yuille, J. C., & Paulhus, D. L. (2009). Inferring sexually deviant behavior from corresponding fantasies: The role of personality and pornography use. *Criminal Justice and Behavior, 36,* 198–222. doi:10.1177/0093854808327277.

Zebrowitz, L. A., Voinescu, L., & Collins, M. A. (1996). "'Wide-eyed" and "crooked-faced": Determinants of perceived and real honesty across the life span. *Personality and Social Psychology Bulletin, 22,* 1258–1269. doi:10.1177/01461672962212006.

Zebrowitz, L. A., Hall, J. A., Murphy, N. A., & Rhodes, G. (2002). Looking smart and looking good: Facial cues to intelligence and their origins. *Personality and Social Psychology Bulletin, 28,* 238–249. doi:10.1177/0146167202282009.