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ORIGINAL RESEARCH

Genes and Virtue: Exploring How Heritability Beliefs Shape Conceptions of Virtue and Its Development

Matthew Vess[1] · Rebecca J. Brooker[1] · Matt Stichter[2] · Jenae M. Neiderhiser[3]

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Abstract
In this paper, we provide an overview of our ongoing project in the Genetics and Human Agency Initiative sponsored by the John Templeton Foundation. Our project focuses on the ways that lay beliefs about the heritability of virtue influence reasoning about the nature of virtue, parenting behaviors, and the development of virtue in children. First, we provide philosophical perspectives on the nature of virtue and suggest that viewing virtue as a malleable skill may have important advantages. Next, we review theory and research that highlights the ways that lay heritability beliefs potentially undermine conceptualizations of virtue as a malleable skill. Finally, we discuss how lay heritability beliefs might ultimately affect parent–child interactions and child virtue development. The paper thus provides a brief description our project's theoretical foundation and a general look at the empirical questions it will tackle.

Keywords Genetic essentialism · Virtue · Lay heritability beliefs

Introduction

Awareness of the role of heritable factors for individual outcomes, although long-acknowledged in the scientific community, has drastically increased in lay populations in the last decade. For example, 23andMe, a company that offers DNA testing and analysis to the general population, boasts genotyping more than 2 million customers since 2006. These tests have, among other things, helped people identify their own risks for certain types of disease (e.g., Parkinson's disease; U.S. Food and Drug Administration 2017) and, in the case of some White supremacists (Akpan 2017), to acquire undesired information about their family origins. In addition, the popular media regularly publishes stories that document the results of genetic research studies, such as those conducted as part of the Human Genome Project. An individual casually perusing http://www.bbc.com, for instance, might have come across an article linking the "warrior gene" to criminality (Hogenboom 2014) or an article describing techniques that can manipulate genetic code to achieve specific outcomes (Gallagher 2017). These reports highlight the significant advances that have been made in genetics research and the evolution of our understanding of how genes operate to produce specific outcomes. At the same time, however, the complex genetic information contained in these reports and the results of products such as 23andme do not fully inform lay consumers about the appropriate uses of the information provided. It is instead incumbent upon individuals in the lay population to interpret information about heritability for themselves. These lay interpretations, accurate or not, then become the critical foundation for subsequent courses of action.

In what follows, we provide a broad overview of our project funded by the John Templeton Foundation's Genetics and Human Agency initiative, which examines lay beliefs about genetics in the context of parenting and virtue development. We begin with a discussion of the philosophical landscape in which our work is situated, emphasizing meaningful distinctions between different ways of conceptualizing virtue. Next, we review perspectives in social psychology that offer clues about how genetic information

✉ Matthew Vess

[1] Department of Psychological and Brain Sciences, Texas A&M University, 4235 TAMU, College Station, TX 77843, USA

[2] School of Politics, Philosophy, and Public Affairs, Washington State University, PO Box 644880, Pullman, WA 99164, USA

[3] Department of Psychology, The Pennsylvania State University, 431 Moore Building, University Park, PA 16802, USA

and lay beliefs about heritability might influence the ways that people conceptualize virtue and the beliefs they have about positively shaping its development. Finally, we review developmental research on parenting practices and virtue development to generate hypotheses about the effects of lay heritability beliefs on parenting practices and virtue development in children. Here, we give a very brief sketch of a planned study central to our project that will directly test whether parents' beliefs about the heritability of virtue relate to actual virtue expression in their offspring. Throughout this paper, we do not intend to provide a thorough treatment of all aspects of our project or issues likely related to it. That type of presentation would be premature given the stage of our project and goes beyond the scope of this special issue. Rather, our focal goal is to provide a concise description of how this project was conceived and an overview of the empirical questions we aim to address.

The philosophy of virtue as a skill

Virtues are generally viewed as characteristics that contribute to well-being (Foot 1978; Hursthouse 1999; Zagzebski 1996). Characteristics like temperance, honesty, kindness, generosity, and curiosity are considered virtuous strengths because they contribute to flourishing and self-actualization (Park et al. 2004). Yet, while a connection to flourishing and well-being is central to most treatments of virtue, different ways of conceptualizing virtue and virtue development exist. Perhaps the most commonly endorsed conceptualization of virtue is rooted in Aristotelian ethics and portrays virtue as a collection of stable character traits that influence behavior consistently across context and time (Russell 2009; Snow 2010). These character traits are acquired through habituation, a process starting in early childhood. From this perspective, people develop dispositional characteristics such as honesty, kindness, and generosity that predispose them to act consistently with regard to moral reasons across a variety of situations and over time. That is, a personality trait view of virtue invites the expectation that a virtuous person should behave virtuously across contexts precisely because they have acquired stable traits that consistently produce virtuous action.

The philosophical account of virtue as a personality trait, while perhaps intuitively appealing, has been challenged by philosophers in the light of evidence from social psychological research that undermines the robustness of trait-level explanations for virtuous behavior (Doris 1998; Harman 1999). These challenges were made in response to classic experiments in social psychology showing that morally-relevant behavior is much more strongly influenced by features of situations than trait-views of virtue would predict (Darley and Batson 1973; Haney et al. 1973; Latané and Darley 1970; Milgram 1974; Tversky and Kahneman 1981). For example, Darley and Batson's (1973) "good Samaritan" study showed that seminary students' moral behavior was strongly shaped by being in a hurry, a morally irrelevant feature of the situation that was experimentally induced via random assignment. Similarly, situations that allow individuals to easily rationalize immoral acts produce greater immoral behavior than situations that do not (Batson et al. 1997), suggesting that moral behaviors can be driven by motives and situational factors that are independent of dispositional character traits. Insofar as we expect most adults to have developed virtuous character traits to some extent, we ought to be seeing a higher degree of consistent responsiveness to moral reasons (rather than consistency merely with respect to how they construe situations) than is revealed in these types of experiments (Alfano 2013; Olin and Doris 2014). Thus, while the person-situation debate played out much earlier within psychology (Mischel 1979), a more recent debate has impacted virtue theory within philosophy and has prompted the search for alternative conceptions of virtue that can more adequately account for the impact of situational factors on virtuous behavior.

One promising alternative conceptualizes virtues as practical skills, for both involve knowing how to act well in particular situations. According to the 'virtue as skill' thesis, virtue and virtuous characteristics are considered malleable skills that require training, practice, and improvement across time and contexts. A central aspect of this thesis is that the moral knowledge of the virtuous person is analogous to the practical knowledge of the expert in a skill (Annas 2011; Sosa 2007; Stichter 2017). Just as skill acquisition is a matter of degree, and requires practice to improve, so to with virtues as skills. Indeed, a skill approach emphasizes deliberate training to change and improve one's virtuous behavior (Stichter in press): whether by (1) increasing reliability in familiar conditions (similar to habituation); (2) extending current levels of performance to a difficult condition (e.g. driving as safe in icy conditions as dry conditions); or (3) tackling a more difficult task (e.g. a complex task like driving while also navigating to a new location). The conception of virtue as a skill thus differs from a trait view of virtue in several key ways. First, whereas a trait view of virtue sees virtue acquisition as primarily driven by habituation (Pollard 2003), a skill view of virtue sees virtue acquisition as driven by deliberative efforts to positively change one's level of virtue. Second, the trait view of virtue sees situational influences as barriers to the habituation of virtuous characteristics. In contrast, the skill model of virtue sees situational influences on virtuous behaviors as critical experiences that provide opportunities to assess one's virtue and strive to improve it (Stichter in press). Third, and finally, whereas a trait view of virtue implies a degree of difficulty in overriding and altering dispositional habits, the skill view of

virtue implies a relatively greater degree of malleability in virtuous characteristics across context and time. As Narvaez (2005) put it, "moral behavior is pried from the rigidity of personality temperament and put into the realm of learnable behavior. It appears more like behavior in other domains like football or chess, as a set of skills that can be learned" (p. 141). Taken together, then, the skill view of virtue provides a philosophical conception of virtue that is compatible with empirical evidence on situational variation in virtuous behavior (Milgram 1974) by modeling virtues as skills that people must deliberately hone to perform well.

Lay conceptions of virtue in the context of genetic information

Different ways of conceptualizing virtue are at the heart of our ongoing project. In particular, a broad goal of our interdisciplinary project is to develop a compelling theoretical account of how genetic information might shape lay conceptions of virtue and to identify ways of thinking about virtue that may be more optimal for its development. We posit that, in addition to its philosophical merits (Stichter 2017), a skill based conception of virtue has practical advantages for lay people. Research and theory on lay beliefs about the nature of personal characteristics (Dweck 2000; Molden and Dweck 2006; Yeager and Dweck 2012) supports this view. According to these perspectives, lay people can adopt beliefs that personal characteristics are relatively fixed or relatively malleable. Which view an individual adopts has meaningful and predictable consequences for their judgments, behaviors, and experienced outcomes. For example, youth who endorse a relatively stronger fixed view of personality show greater negative reactions to ostracism, stress, and health problems than youth who endorse a relatively weaker fixed (and thus more malleable) view of personality (Yeager et al. 2014). One of the broad findings from this theoretical framework is that malleable views of personal characteristics lead people to respond more adaptively to setbacks by adopting orientations that foster self-improvement (Molden and Dweck 2006). Because malleable (vs. fixed) views of character promote orientations focused on learning and acquiring skills, they would seem to be naturally aligned with the "virtue as skill" approach to conceptualizing virtue, suggesting that the "virtue as skill" view of virtue may be psychologically advantageous for development.

Lay conceptions about the heritability of virtue may, however, introduce important challenges to lay people's proclivity for viewing virtue and virtue development through the lens of malleable skill acquisition. That is, research and theory (Dar-Nimrod and Heine 2011) point out that exposure to information about the heritability of characteristics leads people to adopt a particular psychological orientation to those characteristics. This orientation, referred to as *genetic essentialism*, is characterized by four defining qualities. First, people view the heritable characteristics with a sense of fatalism, believing that possessing the gene makes possession of the characteristic uncontrollable and determined. Second, people tend to see the heritable characteristic as fundamentally caused by genes. This means that people view characteristics that are described in terms of their genetic origins as relatively less influenced by social or environmental forces. Third, people see those who possess the gene as members of a distinct group and those who do not possess gene as unlikely to possess the characteristic linked to the gene. Fourth, and finally, characteristics described as heritable are viewed as natural, implying in many cases that they are "good" because they follow a natural tendency. These four aspects of genetic essentialism operate whenever people encounter information that highlights the genetic origins or explanations for a particular characteristic or outcome. In other words, exposure to genetically based arguments for phenomena elicits an essentialism bias that leads people to adopt stronger views that the phenomena are natural, immutable, discrete, and solely caused by genetic influence.

The consequences of genetic essentialism biases can be seen in a number of domains. For instance, information about heritability can distort perceptions of criminality. As one example, Cheung and Heine (2015) hypothesized that accounts of criminality as rooted in one's genotype would lead people to view perpetrators as less responsible for their crimes and more likely to repeat criminal behavior in the future. This hypothesis follows from genetic essentialism accounts in that greater essentialism should make people see genetically influenced behaviors as less controllable, thus mitigating perceived responsibility and increasing beliefs that the behavior is likely to keep occurring. In one study, participants were randomly assigned to read a vignette describing a murderer. The vignettes differed based on whether they highlighted a genetic root of violence, an environmental root of violence, or no explanation for the violence at all. The results were generally in accord with hypotheses. Exposure to information about the genetic roots of violence, relative to the control condition, led to lower judgments that the perpetrator had control over his actions and greater beliefs that the perpetrator would offend again.

Similar findings have emerged in the context of mental illness. Lebowitz et al. (2013), for example, asked depressed individuals to indicate how much their feelings of depression were being caused by genetic/biological factors and how long those feelings were likely to persist. Greater endorsement of genetic/biological causes of depressive feelings were associated with longer estimates for how long those feelings would last. In a related fashion, the results of a meta-analysis of 28 experiments focused on manipulations of genetic attributions for mental illness revealed robust experimental

effects on judgments of blame and pessimism about disease prognosis. People exposed to genetic information (vs. control information) judge people suffering from mental illness as less to blame for their condition but more likely to experience difficulty recovering (Kvaale et al. 2013). Mental health care professionals are also not immune from biased thinking in response to genetic information. Clinicians, for example, report less empathy for patients when the patients' conditions are explained in biogenetic (vs. psychosocial) terms (Lebowitz and Ahn 2014). Overall, there is considerable support for a "Mixed-Blessings" Model of genetic attributions of mental illness (Haslam and Kvaale 2015). Genetic attributions of mental illness have the positive effect of making people view affected persons as less responsible for the condition, but also catalyze the negative belief that recovery from mental disorder is less likely and elicit stigmas about those suffering from it.

Taken together, convergent lines of research and theory suggest that biogenetic explanations elicit a psychological orientation known as genetic essentialism, which can promote beliefs that genes make psychological characteristics and behaviors unavoidable and less malleable. These essentialism biases are, of course, similar to lay beliefs that characteristics such as one's personality are relatively fixed (Dweck 2000), and, indeed, work on essentialism suggests that lay entity (fixed) theories are positively correlated with essentialism biases in general (Haslam et al. 2006), and genetic essentialism biases in particular (Keller 2005). We therefore propose that these frameworks have relevance for understanding how beliefs about the genetic origins of virtuous characteristics relate to lay people's conceptualization of virtue. Returning to the recent philosophical arguments that liken virtue to a skill (Stichter 2017), it is theoretically plausible that biogenetic explanations for the origins of virtuous characteristics may prompt weaker beliefs that virtues are skills that can be improved. Our ongoing research being conducted as part of this project is specifically addressing this possibility through both correlation and experimental methods.

Heritability beliefs, parenting and virtue development

Understanding how genetic information might relate to the ways that people conceptualize virtue has at least one important potential implication. It can shed light on the ways that heritability beliefs might influence parenting behavior and virtue development in children. Indeed, social-constructivist theories posit that morality and virtue are constructed by children via interactions with others (Kohlberg 1969; Smetana 1999). In early life, of course, interactions with others primarily involve social exchanges with caregivers. The majority of work examining associations between parenting and child virtue has tested links between parent behaviors and an *absence* of virtuous characteristics in children. This work suggests that more authoritarian parenting practices, comprising high levels of controlling, harsh, and punitive behaviors coupled with low levels of warmth (Baumrind 1973), are associated with a greater number of problem behaviors in children, putatively reflecting low levels of virtue (Baumrind 1991; Dodge et al. 1994). Parental permissiveness, characterized by an absence of limits, and parental absence/rejection are similarly associated with more problematic, low-virtue behaviors (e.g., more lying, greater delinquency, etc; Slicker 1998). A smaller subset of work reports positive associations between authoritative parenting practices, characterized by consistent attentiveness, warmth, open communication, and autonomy support (Baumrind 1973), and positive behaviors in children, including resistance to cheating (Kochanska and Murray 2000), curiosity (Kashdan et al. 2004), and honesty in adolescent males (Stouthamer-Loeber and Loeber 1986). Greater maternal warmth also predicts developmental increases in levels of fidelity in adolescence, which includes youths' commitment to fairness, equality, and "doing what is right" (Brittian and Lerner 2013). While less research has been conducted with fathers, there is some evidence for similar effects of maternal and paternal behaviors on child virtue development. For example, greater warmth and positivity in both mothers and fathers, a key element of authoritative parenting, is linked to a higher sense of social responsibility in childhood and early adolescence (Reiss et al. 2000). Notably, a dearth of research on this topic has resulted in limited knowledge regarding the degree to which such effects persist over time.

An even lesser-understood aspect of virtue development is the degree to which parents perceive themselves as able to influence virtue development in their offspring. Greater parental efficacy, generally studied as parents' own beliefs that their behaviors will have an impact on a specific child outcome, leads to behaviors that are consistent with authoritative parenting practices. Importantly, conceptual models posit that the association between greater efficacy and authoritative behaviors in parents ultimately promote more positive development in children (Ardelt and Eccles 2001). Empirical work largely offers support for this assertion. Greater parental efficacy is linked to more sensitive, authoritative parenting practices across much of childhood and adolescence (Jones and Prinz 2005). Self-reported parental efficacy is also positively associated with parental warmth during middle childhood (Izzo et al. 2000), parental acceptance across childhood (Dumka et al. 1996), and more parental involvement during adolescence (Shumow and Lomax 2002). Furthermore, there is evidence that high levels of parental efficacy may diminish the use of authoritarian parenting behaviors; at least one study has shown that

greater efficacy is linked to less inconsistent discipline practices between ages 3 and 12 (Dumka et al. 1996).

Because genetic information promotes essentialist thinking (Dar-Nimrod and Heine 2011), it is possible that beliefs about heritability may influence parent behaviors in ways that are important for virtue development during childhood. Indeed, there is at least preliminary evidence that greater biological essentialism predicts maternal and paternal involvement with young children. Greater belief in the idea that parenting is biologically embedded in mothers (but learned for fathers) predicts less direct interactions between fathers and their children and more hours spent in maternal care during the first 3 years of life (Gaunt 2006). Qualitative work further suggests that greater biological beliefs about parenting, specifically endorsing a "feminine advantage" with regard to childcare, may lead to mothers limiting overall paternal involvement (Hauser 2012). While these studies indicate that beliefs about the biological origins of parenting efficacy account for some variability in actual parenting practices, direct evidence of how heritability beliefs about certain characteristics shape parenting behaviors relevant to those traits is generally absent in the literature. One exception is a study by Moorman and Pomerantz (2010) focused on mothers' lay beliefs about their children's problem solving ability. Mothers in this study who were induced to believe that children's problem solving abilities were fixed, rather than malleable, were less involved and interacted less constructively with their child when solving a set of challenging problems. This study thus offers some indication that genetic explanations of virtue development may undermine effective parenting, at least to the extent that such explanations attenuate views that virtue is a malleable skill that can be developed through practice.

A final arm of our project focuses specifically on this possibility. Based on the essentialism biases that genetic information can elicit (Dar-Nimrod and Heine 2011), we generally propose that genetic attributions of virtue will predict less positive parenting beliefs and behaviors. This possibility is consistent with the Moorman and Pomerantz (2010) study noted above, which found that mothers' beliefs that a child characteristic was a fixed, rather than a malleable skill, elicited less responsive and effective parenting behaviors. Research documenting links between genetic essentialism biases and weakened beliefs that characteristics are malleable skills suggests that heritability beliefs may give rise to similar parental practices. In addition, a genetic essentialist orientation could increase internal attributions (Cheung and Heine 2015) for children's behavior and diminish parents' perceptions that they can control child outcomes. Both internal attributions for child behavior and low perceived parental control (Guzell and Vernon-Feagans 2004) have been associated with parenting practices that are less optimal for positive development. Thus, it seems theoretically plausible that genetic explanations for virtue could give rise to less adaptive parental beliefs and parenting practices.

This is the goal of the major study that we have planned in our project. Briefly, we aim to recruit older children and adolescents along with their primary giver to a laboratory study. Both parents and children will complete a variety of measures, including measures of heritability beliefs, virtuous character, and parent–child interactions. For example, children will complete a series of validated behavior tasks that assess virtuous characteristics such honesty, creativity, and generosity. We will also ask parents and children to report on their relationships and to engage in tasks where parenting behaviors can be directly assessed. As one example, they will engage in a problem solving task that we will record and subsequently code parenting behaviors on dimensions like warmth, coercion, and control (Reiss et al. 2000). These data will provide a means to test, for the first time, whether parental heritability beliefs relate to actual parenting behaviors and child virtue outcomes. As such, this study will be a potential launch pad for extending work on biological essentialism to a domain of considerable relevance: parenting and child development.

Indeed, while not an explicit focus of our funded project, finding support for the theoretical links between essentialism, conceptions of virtue, and virtue development raises logical future directions focused on mitigating the negative effects of heritability beliefs on parenting. Existing work has already shed light on the ways that this might be possible by identifying reliable methods for instilling orientations that can reduce fatalistic beliefs about genetics (Farrell et al. 2015; Lebowitz et al. 2013; Lebowitz and Ahn 2015; Miu and Yaeger 2015). For example, Lebowitz and Ahn (2015) showed that exposure to information about the malleability of biological influences on depression increased the perceived controllability of mood among depressed individuals who had strong beliefs about the heritability of depression. This effect was strikingly observed 6 weeks after the intervention was administered. Similarly, Farrell et al. (2015) found that an intervention emphasizing the malleability of biology subsequently increased the perceived controllability of disordered eating among individuals high in eating disorder symptoms. Together, these types of findings offer encouraging approaches for mitigating the negative effects of genetic essentialism on parenting and virtue development, should evidence for such negative effects emerge in our project.

In closing

Information about genetic contributions to the development of psychological characteristics is more accessible than it has ever been, raising questions about how this information

is being received and used by lay people to guide their judgments and behavior. There is robust evidence that exposure to genetic explanations triggers a tendency towards genetic essentialism, a psychological orientation characterized by heightened beliefs that outcomes are natural, immutable, and fundamentally determined by genes. We aim to utilize this work to better understand how genetic information and beliefs about the heritability of virtuous characteristics affect people's conceptualizations of virtue and virtue development. In terms of the philosophy of virtue, our ongoing theorizing and research suggests that genetic accounts of virtue may lead people to view virtue less as a malleable skill, setting the stage for potentially negative effects on parenting and virtue development. Our planned work will test these possibilities, yielding new knowledge into the complex links between genetic information, lay beliefs, and aspects of human agency and flourishing. We look forward to reporting it.

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Compliance with ethical standards

Conflict of interest Matthew Vess declares that he has no conflict of interest. Rebecca Brooker declares that she has no conflict of interest. Matt Stichter declares that he has no conflict of interest. Jenae Neiderhiser declares that she has no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Human and Animal Rights and Informed consent This article does not contain any studies with human participants performed by any of the authors.

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