



## Exploring Relations between Beliefs about the Genetic Etiology of Virtue and the Endorsement of Parenting Practices

Grace N. Rivera, Matthew Vess, Rebecca J. Brooker, Matt Stichter, and Jenae M. Neiderhiser

### SYNOPSIS

**Objective.** We investigated associations between adults' beliefs about the heritability of virtue and endorsements of the efficacy of specific parenting styles. **Design.** In Studies 1 ( $N = 405$ ) and 2 ( $N = 400$ ), beliefs about both the genetic etiology of virtuous characteristics and parenting were assessed in samples of parents and non-parents. In Study 3 ( $N = 775$ ), participants were induced to view virtue as determined by genes or as determined by social factors. Heritability beliefs and authoritarian parenting endorsements were subsequently measured. **Results.** Study 1 and Study 2 converged to reveal that tendencies to view characteristics as determined by genes were positively associated with endorsement of authoritarian parenting styles. This association occurred independent of individual differences in essentialism and right-wing authoritarianism. Study 3 revealed that exposure to genetic accounts of virtue increased beliefs that virtue is caused by genes, which in turn was positively associated with endorsements of authoritarian parenting responses to child problem behavior. Exposure to genetic accounts of virtue increased endorsement of authoritarian parenting among parents, but was unrelated to authoritarian parenting among non-parents. **Conclusions.** These studies suggest that genetic accounts of virtuous characteristics reliably relate to more positive beliefs about harsh and controlling parenting practices, illuminating an unrecognized cognitive factor associated with authoritarian parenting endorsement.

### INTRODUCTION

Virtues, broadly speaking, are characteristics (e.g., honesty, kindness) that contribute to well-being and flourishing (Foot, 1978; Park, Peterson, & Seligman, 2004; Peterson & Seligman, 2004). Virtues have been conceptualized as *acquired* characteristics, such that they require experience and self-regulation to develop (Stichter, 2018). Scientific inquiry has revealed a nuanced account of how both genes (Loewen et al., 2013; Steger, Hicks, Kashdan, Krueger, & Bouchard, 2007) and the caregiving environment relate to the development of virtuous characteristics in children (Augustine & Stifter, 2015; Carlo, McGinley, Hayes, Batenhorst, & Wilkinson, 2007; DeVries, Hildebrandt, & Zan, 2000; Kochanska & Murray, 2000; Peterson & Seligman, 2004). For example, behavioral genetics research on virtuous

characteristics (Steger et al., 2007) has suggested that the median amount of variance in virtuous behavior accounted for by heritable factors is around 42%. Perhaps not surprisingly, there were also substantial non-shared environmental effects, which aligns with other evidence that environmental factors prospectively predict the development of virtuous characteristics (Wang, Batanova, Ferris, & Lerner, 2016). More broadly, such findings highlight the reality that both genes and environments play complex roles in development and that a consideration of the interplay between genes and environment will be pivotal for accurate scholarly understanding of the causes of developmental outcomes (Horwitz & Neiderhiser, 2011).

Of course, scholars are not the only people interested in causal accounts of outcomes such as virtue and personal characteristics. Lay people, too, seem greatly concerned with generating causal accounts of why people express certain characteristics (Malle, 2011). It is in this context that the interpretation of evidence for genetic etiologies of complex characteristics may be particularly impactful, as lay people seem quick to adopt genetic causal accounts of complex human behaviors at the expense of more nuanced (and, perhaps, accurate) environmental or interactionist explanations of those same behaviors (Dar-Nimrod & Heine, 2011a). Genetic accounts may be particularly potent causal explanations because they are “perceived as offering an underlying, materialistic, immutable, and fundamental cause of an individual’s nature” (Dar-Nimrod & Heine, 2011a, p. 831). Consequently, lay reasoning that is grounded in genetic causal accounts gives rise to a biased and inaccurate view of the phenotype as being determined primarily by genetics. This deterministic view subsequently colors people’s judgments and decisions in ways that depart from what empirical research on heritability and genetics actually permits (Dar-Nimrod & Heine, 2011b). At the very least, a stronger belief in the genetic origins of a characteristic may be linked to a compensatory belief that stronger environmental effects are needed to alter the expression of the phenotype. In the current research, we explored how people’s beliefs about the genetic etiology of virtue related to their judgments about the types of parenting behaviors that most effectively shape virtue development.

### ***Genetic Attributions and Essentialist Beliefs***

Our conceptual and empirical approach is largely grounded in work on genetic essentialism. Exposure to information that highlights genetic influences on characteristics activates essentialism biases by leading people to see genes as the fundamental cause of an outcome, relatively independent of environmental influences (Dar-Nimrod & Heine, 2011b). The essentialist thinking that coincides with genetic causal accounts elicits complex effects on people’s judgments and decisions. For example, participants who are led

to believe that they have a genetic predisposition toward some characteristic (e.g., alcoholism, Dar-Nimrod, Zuckerman, & Duberstein, 2013; obesity, Dar-Nimrod, Cheung, Ruby, & Heine, 2014) perceive that they have less personal control over behaviors that are relevant for that characteristic. This effect on diminished perceptions of control has been found repeatedly in domains relevant to personal and mental health and can lead to lower perceptions of blame for heritable conditions (e.g., mental illness; Haslam & Kvaale, 2015). Yet, at the same time, genetic accounts of personal characteristics can instill a sense of fatalistic pessimism and reduce empathic responding. For example, genetic accounts of mental illness led mental health clinicians to consistently report less empathy for mentally ill patients (Lebowitz & Ahn, 2014), even though they saw that person as less blameworthy for their condition. This “double-edged sword” of genetic causal accounts also influences judgments in legal contexts, as genetic explanations have the capacity to both increase and decrease punitive judgments (Cheung & Heine, 2015, p. 1723; but, see also Scurich & Appelbaum, 2015).

Overall, much of the work on genetic essentialism reveals complex and, at times, seemingly contradictory effects. In the case of stigma and punitive judgments of others, genetic causal accounts activate competing mechanisms (e.g., perceptions of control, perceived stability of characteristic) that both positively and negatively shape the valence of people’s judgments and behaviors. This complexity is also borne out when people apply genetic causal accounts to their own characteristics, as evidenced by people responding to genetic accounts of their own vulnerability to alcoholism with decreased perceptions of personal control, but also increased willingness to join an alcohol control workshop (Dar-Nimrod et al., 2013). Despite what science actually supports regarding the link between genes and developmental outcomes, the adoption of a genetic causal account of a characteristic seems to change the ways that lay people think about that characteristic, subsequently influencing a variety of judgments, decisions, and behaviors. We suggest that the genetic essentialism effect may have an important relation to people’s beliefs about the efficacy of different parenting practices on the development of virtue.

### ***Parenting Styles and Children’s Virtuous Character Development***

Historically, much of the work on approaches to parenting has focused on parenting styles, or patterns of parent attitudes and practices that are considered trait-level constructs (Grusec & Goodnow, 1994) and are adopted by parents across many different situations (Baumrind, 1978; Darling & Steinberg, 1993). Constellations of parenting practices are frequently referenced through categorical labels, the three most common of which (Clark, Yang, McClernon, & Fuemmeler, 2014) are authoritative, authoritarian, and permissive “styles” that

reflect levels of parent behavior across two dimensions: support and control (Maccoby & Martin, 1983). Support tends to be operationalized as emotional expressions of warmth and affection as well as engagement in open and honest communication with one's child (Robinson, Mandlco, Olsen, & Hart, 2001). Both authoritative and permissive parenting styles can involve high levels of support. Authoritarian parenting, in contrast, involves low levels of warmth and the prioritization of strict standards over open dialogue (Baumrind, 1978; Robinson et al., 2001). Parental control involves parents' command over and monitoring of children's behaviors (Barber, 1996; Barber, Stolz, Olsen, Collins, & Burchinal, 2005). Authoritative parenting tends to involve control that is child-focused, in that it is adapted according to situational demands and children's behaviors. In contrast, authoritarian parenting involves high levels of adult-focused control that disregards children's autonomy and frequently relies on coercive strategies (Baumrind, 1978; Baumrind, Larzelere, & Owens, 2010). Permissive parenting is generally low in control, with parents often ignoring child misbehavior and/or failing to follow through on initial efforts to regulate child behavior (Baumrind, 1978; Baumrind et al., 2010; Robinson et al., 2001).

Although child and parent behaviors both dynamically contribute to and shape the parent-child relationship (Pettit, Laird, Dodge, Bates, & Criss, 2001), there is evidence that parenting styles have important consequences for virtue development. For example, authoritarian parenting, including dominance, excessive and harsh control, and punitiveness (Baumrind, 1978; Baumrind et al., 2010) shows reliable positive associations with externalizing behaviors (Pinquart, 2017a) that have been directly linked to less virtuous characteristics (e.g., moral disengagement) in adolescence (Gini, Pozzoli, & Hymel, 2014). Likewise, mothers' authoritarian parenting practices when children were 4–5 years old negatively predicted concern for others and prosocial behaviors in children 2 years later (Hastings, Zahn-Waxler, Robinson, Usher, & Bridges, 2000). In contrast, authoritative parenting practices, including high levels of parental warmth, acceptance, positivity, and engagement, positively predict adolescents' virtuous characteristics, such as forgiveness (Christensen, Padilla-Walker, Busby, Hardy, & Day, 2011), resistance to cheating (Kochanska & Murray, 2000), and honesty among boys (Stouthamer-Loeber & Loeber, 1986). Finally, the link between permissive parenting practices and child virtue development is relatively less clear, but theory suggests that it is likely complex. That is, if parental warmth is the critical variable for child virtue development, children of more permissive parents should resemble children of more authoritative parents in terms of levels of virtuous characteristics, as both styles are characterized by high levels of warmth. However, if control is the critical factor for child virtue development, children of more permissive parents should show markedly different levels of virtue development relative to children of both more authoritative and more authoritarian parents, for whom levels of control

are markedly higher. Given permissive parenting has small positive associations with child externalizing behaviors (Pinquart, 2017b), but is not associated with child internalizing problems (Pinquart, 2017b). It is possible that permissive parenting might be most associated with lower expression of child virtues that involve concern for others, while perhaps unassociated with other, more self-focused, virtues. Regardless, the links between different parenting practices and virtue development highlight the importance of identifying factors that might influence parenting behaviors.

### ***Genetic Attributions and Parenting Beliefs***

We suggest that beliefs about the genetic etiology of virtuous characteristics are a novel cognitive factor potentially associated with the endorsement of authoritarian parenting. Genetic causal accounts trigger internal attributions (Cheung & Heine, 2015) and perceptions of immutability (Haslam, Bastian, Bain, & Kashima, 2006), both of which are causally connected to more authoritarian parenting practices (Coplan, Hastings, Lagacé-Séguin, & Moulton, 2002; Moorman & Pomerantz, 2010; Slep & O’leary, 1998). Moreover, greater endorsement of genetic causal accounts often coincides with an increased willingness to adopt more invasive approaches to externally controlling an expressed characteristic (e.g., pharmacological treatments over psychosocial interventions; Lebowitz & Ahn, 2014) and the endorsement of more restrictive social policies (e.g., tax on sugar-sweetened beverages; Pearl & Lebowitz, 2014). In the context of parenting, genetic causal accounts of virtuous characteristics may be associated with a greater willingness to adopt parenting orientations that similarly include low warmth, an increased tendency to make internal attributions for negative behavior, and more external control over children’s behavior. As such, our core hypothesis was that causal accounts of characteristics that emphasize genes or heritability will be associated with greater endorsement of authoritarian orientations to parenting.

Of course, there may also be reasons to expect associations between beliefs about the heritability of virtuous characteristics and the endorsement of permissive parenting practices. One intuition might be that, if people view virtuous characteristics as completely determined by genes, they may see children as less blameworthy for non-virtuous behaviors (Cheung & Heine, 2015) and less responsive to intervention. These lower perceptions of blameworthiness and likelihood of responsiveness to intervention might manifest as low levels of punishment and control that are characteristic of permissive parenting. However, even though genetic causal accounts reduce perceptions of personal control and blameworthiness, the evidence does not suggest that people simply give up on all interventions. The closest analogue to parenting in the genetic

essentialism literature may be work on mental health professionals who respond to genetic causal accounts with an increased endorsement of pharmaceutical intervention (Lebowitz & Ahn, 2014). They endorse an approach to control that is largely external to the person, in much the same way that authoritarian parents impose external restrictions on child autonomy. Thus, aspects of genetic essentialism may be compatible with the endorsement of both authoritarian and permissive parenting orientations, but the cumulative evidence led us to most confidently predict a positive association between genetic causal beliefs and an authoritarian orientation.

## STUDY 1

Study 1 tested whether tendencies to make genetic attributions for personal characteristics related to people's beliefs about the efficacy of different parenting styles. Participants completed a three-component essentialism scale (Bastian & Haslam, 2008) that assessed perceptions that personal characteristics (in general) are biologically based, informative, and discrete. For Studies 1 and 2, we primarily focused on the facet of biological essentialism<sup>1</sup> because it most directly captures beliefs about a genetic origin to personal characteristics. Participants also indicated their beliefs about whether certain parenting practices reflected "good" parenting. These parenting practices included authoritarian, authoritative, and permissive practices, given previous evidence that these practices are associated with virtue development. We also included measures of right-wing authoritarianism (RWA) and tendencies to see characteristics as entirely determined by social factors. RWA reflects a general respect and submissiveness toward legitimate authority and a tendency to punish those who deviate from those norms (Altemeyer, 1981). RWA positively correlates with facets of essentialism (Rangel & Keller, 2011) and authoritarian parenting (Manuel, 2006). Including it allowed us to assess whether genetic essentialism beliefs would operate beyond a more general authoritarian personality profile. In addition, people can hold essentialism beliefs focused on the social environment (Rangel & Keller, 2011), whereby people view an entity's essence as determined entirely by their environment. This facet of essentialism positively correlates with other types of essentialist thinking, but can be distinguished from genetic determinism. We included the measure in Study 1 to test the specificity of our predicted association between genetic essentialism beliefs and parenting orientations. Materials and data for all studies can be found on the Open Science Framework (OSF): <https://osf.io/quzk3/>.

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<sup>1</sup>Biological essentialism and genetic essentialism are distinct concepts, with genetic attributions being a specific kind of biological attribution. We suspect that lay understandings of biological versus genetic attributions substantially overlap. We therefore utilized this validated measure of biological essentialism to assess lay genetic essentialist beliefs.

## STUDY 1 METHOD

### Participants

Adults ( $N = 405$ ; 226 females, 172 males, 1 genderless, 6 missing) living in the United States were recruited from Amazon Mechanical Turk and compensated 0.75 USD. Participants were diverse in age ( $M = 35.94$ ,  $SD = 11.63$ ) and indicated being predominantly White (81.7%; 9.1% African-American or Black, 6.4% Asian, 1.5% American Indian or Alaska Native, 0.5% Native Hawaiian or Pacific Islander, 1.2% another ethnicity, 1.5% did not report). Roughly 7.2% of participants were Hispanic or Latino and nearly half (44%) were married (54.6% not married, 1.5% did not report). Reported annual household income ranged from 0 USD to 300,000 USD ( $M = 59,547.72$ , USD  $SD = 42,622.40$  USD). Two hundred and one participants identified as parents, and 198 identified as non-parents (6 did not respond). Parents had, on average, 2.06 children ( $SD = 1.20$ ) who ranged in ages from less than 1 month to 56 years ( $M = 12.99$ ,  $SD = 11.31$ ).

### Procedure

Participants accessed the study by following a link provided in the Amazon MTurk posting and completed the measures described below in random order.<sup>2</sup>

### Measures

#### Biological Essentialism

Participants completed the 15-item Essentialism Scale (Bastian & Haslam, 2008), which assesses tendencies to hold essentialist beliefs about personal characteristics.<sup>3</sup> The measure consists of three interrelated factors that assess tendencies to see personal characteristics as fundamentally grounded in biology/genes (e.g., “Whether someone is one kind of person or another is determined by their biological make-up.”), discrete (e.g., “The kind of person someone is, is clearly defined; they are a certain kind of person or they are not.”), and informative (e.g., “When getting to know a person, it is possible to get a picture of the kind of person they are very quickly.”). Participants indicated agreement with each item on 1 (*disagree totally*) to 9 (*agree totally*) scales. The biological subscale most clearly

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<sup>2</sup>For all studies, we also collected information about participants’ race, ethnicity, sex, age, marital status, and annual household income as an assessment of sociodemographic variables. For participants who indicated they were parents, we asked whether they were biological parents and to report the number, age, and gender of their children. In Study 3, we collected an additional measure of subjective SES.

<sup>3</sup>The characteristics referred to in this scale are not specific individual characteristics such as height or extraversion; rather, these items ask participants to consider individuals and their constellations of characteristics more broadly, using language like “kind of person someone is” or “basic qualities that a person has.” The full measure is available on OSF.



captures our interest in genetic attributions. We averaged responses into separate scores for biological essentialism, discreteness, and informativeness composites.

### **Parenting Styles**

We used Robinson et al.'s (2001) 62-item Parenting Styles and Dimensions Questionnaire, adapted to assess participants' beliefs about what constitutes "good" parenting. The instructions read: "Below are several statements that people sometimes use to describe good parents. What is your opinion? How much do you agree that each statement describes "good" parents?" Each item was prefaced with the statement "GOOD PARENTS ARE PARENTS WHO \_\_\_\_." Participants inserted each parenting behavior (e.g., "guide their child with punishment," "spank their child when the child is disobedient") in the blank and indicated their agreement with that statement on a 1 (*disagree strongly*) to 7 (*agree strongly*) scale. We computed composite Authoritarian, Authoritative, and Permissiveness scales. The authoritarian parenting scale consists of four subscales (i.e., Verbal Hostility, Corporal Punishment, Non-Reasoning/Punitive Strategies, and Directiveness), as does the authoritative subscale (i.e., Warmth and Involvement, Reasoning/Induction, Democratic Participation, and Good-Natured/Easy-going) the permissive parenting scale consists of three subscales (i.e., Lack of Follow-through, Ignoring Misbehavior, and Lack of Self-Confidence).<sup>4</sup> Our analyses, however, focused on the global composites as that is where our hypotheses were cast.

### **Right-Wing Authoritarianism**

We used the 15-item Short Scale of Right-Wing Authoritarianism (RWA; Zakrisson, 2005) to assess authoritarian personality. Participants responded to each item on a 1 (*disagree completely*) to 9 (*agree completely*) scale. Responses were averaged into a composite measure, with higher numbers indicating greater RWA.

### **Social Essentialism**

We included the 12-item Belief in Social Determinism Scale (Rangel & Keller, 2011) to assess differences in the belief that character is determined by socioenvironmental factors. Items on the measure include: "An individual's personality often reveals the social origin of the person." and "What a person thinks and does is the product of his or her social origin." Responses were made on 1 (*disagree totally*) to 9 (*agree totally*) scale and were averaged into a composite measure.

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<sup>4</sup>Both the composite measures and the subscales of these parenting measures are available in the datasets on OSF for interested readers.



## STUDY 1 RESULTS

### Primary Analyses

Table 1 presents descriptive statistics and the bivariate correlations between aspects of essentialism, parenting styles, and RWA. Biological essentialism was positively correlated with authoritarian and permissive styles as indicative of “good” parenting; it negatively correlated with endorsement of an authoritative style.

Regression analyses were conducted to test whether the associations between biological essentialism and parenting styles occurred beyond the influence of the other aspects of essentialism, as well as beyond differences in general authoritarian personality. Each facet of essentialism (including social essentialism) and RWA were entered into simultaneous models which were regressed onto beliefs about each individual parenting style (Table 2). Biological essentialism was a unique positive associate of authoritarian and permissive style endorsement, and a unique negative associate of authoritative parenting endorsement.

Given the cross-sectional nature of our data, and because endorsements of each parenting style were correlated, we also conducted a multiple regression analysis in which endorsement of each parenting style served as simultaneous associates of biological essentialism. Authoritarian parenting style endorsement was positively associated with biological essentialism,  $b = .53$  ( $SE = .13$ ),  $t(401) = 4.22$ ,  $p < .001$ , 95%CI [.28, .78]. In contrast, authoritative ( $b = -.10$  ( $SE = .13$ ),  $t(401) = -0.73$ ,  $p = .469$ , 95%CI [-.36, .16]) and permissive parenting styles ( $b = .24$  ( $SE = .14$ ),  $t(401) = 1.75$ ,  $p = .082$ , 95%CI [-.03, .50]) were not uniquely associated with biological essentialism when entered into a simultaneous model with authoritarian parenting.<sup>5</sup>

**Table 1.** Bivariate correlations between key variables in Study 1.

	<i>a</i>	<i>M(SD)</i>	1.	2.	3.	4.	5.	6.	7.
1. Biological essentialism	.94	4.16 (1.85)	-						
2. Discreteness	.93	4.66 (1.87)	.54***	-					
3. Informativeness	.86	4.81 (1.58)	.45***	.63***	-				
4. Social essentialism	.90	5.38 (1.31)	.35***	.33***	.38***	-			
5. Right-wing authoritarianism	.93	3.95 (1.82)	.23***	.40***	.30***	.09	-		
6. Authoritarian parenting	.89	2.97 (0.86)	.33***	.24***	.20***	.05	.35***	-	
7. Authoritative parenting	.95	5.76 (0.86)	-.24***	-.11*	-.12*	.06	-.33***	-.54***	-
8. Permissive parenting	.90	2.50 (0.83)	.26***	.01	.04	-.08	.08	.53***	-.58***

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

<sup>5</sup>When endorsement of all three parenting styles are entered along with RWA and the other facets of essentialism, permissiveness is significantly associated with biological essentialism and the association between authoritarian parenting endorsement and biological essentialism becomes marginally significant. These analyses are provided in the supplemental materials, but are conceptually and empirically distinct from models that just isolate the variance in genetic essentialism that covaries with the endorsement of each parenting style independent of each other.

**Table 2.** Regression analyses predicting endorsement of each type of parenting orientation in Study 1.

Variable	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI
<b>Authoritarian Parenting</b>					
Right-wing authoritarianism	.14	.02	5.94	.001	.09,.19
Social Essentialism	-.05	.03	-1.63	.104	-.12,.19
Discreteness	-.02	.03	-.58	.561	-.08,.04
Informativeness	.03	.03	.77	.441	-.04,.09
Biological Essentialism	.14	.03	5.35	.001	.09,.19
<b>Authoritative Parenting</b>					
Right-wing authoritarianism	-.15	.02	-6.37	.001	-.20, -.11
Social Essentialism	.10	.03	3.06	.002	.04,.17
Discreteness	.07	.03	2.20	.029	.01,.13
Informativeness	-.03	.03	-.81	.420	-.09,.04
Biological Essentialism	-.13	.03	-4.84	.001	-.18, -.08
<b>Permissive Parenting</b>					
Right-wing authoritarianism	.03	.02	1.43	.153	-.01,.08
Social Essentialism	-.11	.03	-3.26	.001	-.17, -.04
Discreteness	-.09	.03	-2.99	.003	-.15, -.03
Informativeness	.01	.03	.43	.671	-.05,.08
Biological Essentialism	.18	.03	7.01	.001	.13,.24

### Secondary Analyses

Given evidence that men endorse higher levels of essentialism than women in some domains (Smiler & Gelman, 2008) and that fathers engage in more authoritarian parenting practices compared to mothers (Russell et al., 1998; Tein, Roosa, & Michaels, 1994), as well as the fact that not all of our participants were parents, we explored whether participant sex or parental status might moderate the observed associations between biological essentialism and authoritarian parenting endorsement. We report significant effects here; full analyses can be found in the supplementary materials. Parental status did not moderate any biological essentialism effects on parenting style endorsement. There was, however, a significant Sex x Biological Essentialism interaction on authoritarian parenting style endorsement ( $b = -.10$  ( $SE = .05$ ),  $t(391) = 2.11$ ,  $p = .036$ , 95%CI  $[-.18, -.01]$ ). This interaction can be explained by a stronger simple effect of biological essentialism for males ( $b = .21$  ( $SE = .03$ ),  $t(393) = 6.37$ ,  $p < .001$ , 95%CI  $[.14, .27]$ ) than females ( $b = .10$  ( $SE = .03$ ),  $t(393) = 3.53$ ,  $p < .001$ , 95%CI  $[.05, .16]$ ).

We also tested whether the observed associations between biological essentialism and authoritarian parenting beliefs were moderated by length of time as a parent (these analyses did not include non-parents). To operationalize length of time as a parent, we created a variable using the reported age of their oldest child ( $M = 14.51$ ,  $SD = 12.05$ ). Age of oldest child and biological essentialism were entered into Step 1 of the model, and their interaction term was entered into Step 2. Age of oldest child was negatively associated with authoritarian parenting beliefs ( $b = -.02$ ,  $SE = .01$ ,  $t(196) = 3.77$ ,  $p < .001$ , 95%CI  $[-.03, -.01]$ ), while biological essentialism

was positively associated with authoritarian parenting beliefs ( $b = .12$ ,  $SE = .03$ ,  $t(196) = 4.10$ ,  $p < .001$ , 95%CI [.06, .18]). Additionally, there was a significant Age of oldest child by Biological essentialism interaction, ( $b = -.01$ ,  $SE = .003$ ,  $t(196) = 2.42$ ,  $p = .017$ , 95%CI [-.01, -.001]), such that biological essentialism had a stronger association with authoritarian parenting beliefs for parents whose oldest children were relatively younger ( $-1 SD$ ;  $b = .20$ ,  $SE = .05$ ,  $t(196) = 4.28$ ,  $p < .001$ , 95%CI [.11, .29]) compared to relatively older ( $+1 SD$ ;  $b = .05$ ,  $SE = .04$ ,  $t(196) = 1.21$ ,  $p = .23$ , 95%CI [-.03, .13]).

Finally, we tested whether the observed associations between biological essentialism and authoritarian parenting beliefs were moderated by participant age. Participant age was negatively associated with authoritarian parenting ( $b = -.02$ ,  $SE = .003$ ,  $t(395) = -4.59$ ,  $p < .001$ , 95%CI [-.02, -.01]). There was also a significant interaction between Participant age and Biological essentialism, ( $b = -.01$ ,  $SE = .002$ ,  $t(394) = -3.13$ ,  $p = .002$ , 95%CI [-.01, -.002]), such that biological essentialism had a stronger association with authoritarian parenting beliefs at younger ( $-1 SD$ ) ages ( $b = .23$ ,  $SE = .03$ ,  $t(394) = 7.32$ ,  $p < .001$ , 95%CI [.17, .29]) compared to older ( $+1 SD$ ) ages ( $b = .10$ ,  $SE = .03$ ,  $t(394) = 3.61$ ,  $p < .001$ , 95%CI [.05, .16]).

## STUDY 1 DISCUSSION

Biological essentialism positively correlated with the endorsement of authoritarian and permissive parenting and negatively correlated with the endorsement of authoritative parenting. These associations occurred above and beyond the variance explained by the other facets of essentialism and RWA. Additionally, there was some evidence that these associations may be more robust for authoritarian parenting endorsement, as authoritarian parenting endorsement emerged as the only significant associate of biological essentialism when endorsement of each parenting style was entered simultaneously in the same regression model. These results generally align with the collection of effects documented in the genetic essentialism literature (e.g., less empathy, greater control; see Tabb, Lebowitz, & Appelbaum, 2019).

Secondary analyses revealed that both age of oldest child and age of participants moderated the association between biological essentialism and authoritarian parenting beliefs, such that biological essentialism had a stronger association with authoritarian parenting beliefs at relatively younger oldest child ages for the sample and amongst relatively younger participants. Given the age range of our sample, the results of these interactions suggest the practically important possibility that these types of associations may occur most strongly for people who are or are more likely to become actively involved in child rearing.

## STUDY 2

Study 1 provides initial support for our hypotheses but was not specifically focused on beliefs about virtue. Instead, we assessed general aspects of essentialism and general beliefs about what constitutes “good” parenting. As such, we sought to conceptually replicate the Study 1 findings in Study 2 with a more specific focus on beliefs about the heritability of virtue and beliefs about parenting practices that are most effective for cultivating virtue development.

## STUDY 2 METHOD

### *Participants*

Adult participants living in the United States ( $N = 400$ , 185 males, 212 females, 3 unreported) were recruited from Amazon MTurk and compensated 0.75 USD. Participants were diverse in age ( $M = 35.39$ ,  $SD = 11.10$ ) and predominantly indicated being White (78.8%, 10.5% Asian, 8.8% African-American or Black, 1.3% American Indian or Alaska Native, 0.5% Native Hawaiian or Other Pacific Islander, 2.3% another race, 0.8% did not report). Six percent of participants (6.8%) were Hispanic or Latino and 41.3% of were married (58% not married, 0.8% did not report). Reported annual household income ranged from 600 USD to 250,000 USD ( $M = 56,313.11$ , USD  $SD = 40,183.21$  USD). Less than half (46.5%) of participants reported being parents ( $M = 1.98$ ,  $SD = 1.06$ ), with children ranging from 2 months to 52 years ( $M = 11.34$ ,  $SD = 9.79$ ) in age.

### *Procedure*

The procedure was identical to Study 1.

### *Measures*

#### *Beliefs about the Heritability of Virtue*

Participants rated the extent to which they believed a variety of virtuous characteristics are shaped by a person’s genes. We used 24 character strengths obtained from the Values in Action measure (VIA; Peterson & Seligman, 2004), which included short descriptions of each trait. Some sample items include “Honesty (living life in a genuine and authentic way)” and “Kindness (being caring and generous to others).” Participants indicated their beliefs about each trait on a 1 (*not at all shaped by genes*) to 9 (*totally shaped by genes*) scale. Responses were averaged, with higher numbers indicating greater beliefs that virtuous characteristics are heritable.

### Biological Essentialism

As in Study 1, we used the 4-item biological component of Bastian and Haslam (2008) Essentialism Scale to assess participants' beliefs about the biological basis of individuals' characteristics.

### Parenting Styles

We again used an adapted version of Robinson et al.'s (2001) Parenting Styles and Dimensions Questionnaire to assess beliefs about parenting. However, to more closely connect to virtue development, we modified the scale to assess participants' beliefs about the effectiveness of parenting practices for influencing virtue development. Each item was prefaced with the statement "PARENTS WHO \_\_\_\_\_ WILL POSITIVELY INFLUENCE THE MORAL CHARACTER OF THEIR CHILDREN." Participants inserted each parenting behavior in the blank and indicated their agreement on a 1 (*disagree strongly*) to 7 (*agree strongly*) scale. We generated composite Authoritarian, Authoritative, and Permissiveness composites.

## STUDY 2 RESULTS

### Primary Analyses

Table 3 presents the descriptive statistics and correlations among Study 2 measures. As predicted, heritability beliefs and biological essentialism were strongly (and positively) correlated. Both measures positively correlated with the endorsement of authoritarian and permissive parenting and negatively correlated with the endorsement of authoritative parenting styles.

As in Study 1, we also examined whether each parenting style uniquely related to heritability beliefs and biological essentialism. First, we entered all three parenting styles into a simultaneous regression model with beliefs about the heritability of virtuous characteristics as our outcome measure. Authoritarian parenting was positively associated with heritability beliefs ( $b = .57$ ,  $SE = .11$ ,  $t(395) = 4.99$ ,  $p < .001$ , 95%CI [.35, .80]). In contrast, authoritative parenting ( $b = .01$ ,  $SE = .12$ ,  $t(395) = 0.09$ ,  $p = .927$ , 95%CI [-.22, .24]) and permissive parenting ( $b = .15$ ,  $SE = .13$ ,  $t(395) = 1.15$ ,  $p$

**Table 3.** Correlations among key study variables in Study 2.

	<i>a</i>	<i>M (SD)</i>	1.	2.	3.	4.	5.
1. Heritability Beliefs	.98	4.28 (1.89)	-				
2. Biological Essentialism	.91	4.50 (1.96)	.66***	-			
3. Authoritarian Parenting	.92	3.03 (0.97)	.33***	.34***	-		
4. Authoritative Parenting	.95	5.57 (0.85)	-.14**	-.15**	-.37***	-	
5. Permissive Parenting	.92	2.53 (0.91)	.24***	.20***	.58***	-.44***	-

\*\* $p < .01$ . \*\*\* $p < .001$ , two-tailed.

= .250, 95%CI [-.10, .39]) were not significantly associated with beliefs about the heritability of virtuous characteristics.

Next, we entered all three parenting styles into a simultaneous regression model with biological essentialism as our outcome measure. As in Study 1, authoritarian parenting was significantly associated with biological essentialism ( $b = .68$ ,  $SE = .12$ ,  $t(395) = 5.69$ ,  $p < .001$ , 95%CI [.45, .92]). Authoritative parenting ( $b = -.03$ ,  $SE = .13$ ,  $t(395) = 0.21$ ,  $p = .837$ , 95%CI [-.27, .22]) and permissive parenting ( $b = .01$ ,  $SE = .13$ ,  $t(395) = 0.06$ ,  $p = .950$ , 95%CI [-.25, .27]) were not associated with biological essentialism.

### Secondary Analyses

As in Study 1, we tested several possible moderators (participant sex, parent status, age of oldest child, and age of participant) of the associations between our indicators of genetic causal beliefs and parenting styles. The full results of these analyses can be found in the supplemental material, but for space and clarity we present the results of models with significant interactions below.

First, we tested whether the observed associations between heritability beliefs and authoritarian parenting endorsement were moderated by participant sex and/or parental status. There was a significant Sex x Heritability Belief interaction, ( $b = -.10$ ,  $SE = .05$ ,  $t(390) = 2.12$ ,  $p = .034$ , 95%CI [-.20, -.01]), such that heritability beliefs had a stronger association with authoritarian parenting beliefs for males ( $b = .22$ ,  $SE = .04$ ,  $t(392) = 6.07$ ,  $p < .001$ , 95%CI [.15, .30]) than females ( $b = .12$ ,  $SE = .03$ ,  $t(392) = 3.68$ ,  $p < .001$ , 95%CI [.05, .18]). There was also a significant three-way Sex x Parental Status x Heritability interaction, ( $b = -.23$ ,  $SE = .10$ ,  $t(389) = 2.29$ ,  $p = .023$ , 95%CI [-.42, -.03]). We probed this interaction by looking at the simple 2-way Sex x Heritability beliefs within parents and non-parents. For parents, there was a significant simple 2-way interaction between Sex and Heritability beliefs ( $b = -.23$ ,  $SE = .07$ ,  $t(389) = 3.13$ ,  $p = .002$ , 95%CI [-.38, -.09]), such that heritability beliefs had a stronger association with authoritarian parenting beliefs for fathers ( $b = .32$ ,  $SE = .06$ ,  $t(389) = 5.34$ ,  $p < .001$ , 95%CI [.20, .44]) than it did for mothers ( $b = .09$ ,  $SE = .04$ ,  $t(389) = 2.12$ ,  $p = .035$ , 95%CI [.01, .17]). For non-parents, there was not a significant simple two-way interaction ( $b = .01$ ,  $SE = .07$ ,  $t(389) = 0.08$ ,  $p = .935$ , 95%CI [-.12, .13]).

We also tested whether the observed associations between heritability beliefs and authoritarian parenting endorsement were moderated by the age of oldest child ( $M = 13.11$ ,  $SD = 10.65$ ). Heritability beliefs positively associated with authoritarian parenting beliefs ( $b = .18$ ,  $SE = .03$ ,  $t(180) = 5.24$ ,  $p < .001$ , 95%CI [.11, .25]), while age of oldest child was not associated with authoritarian parenting beliefs. There was a significant Age of oldest child by Heritability beliefs interaction, ( $b = -.01$ ,  $SE = .004$ ,  $t(180) = -2.46$ ,  $p = .015$ , 95%CI [-.02, -.002]), such that heritability beliefs

had a stronger association with authoritarian parenting beliefs for parents whose oldest child was relatively younger ( $-1$  SD;  $b = .27$ ,  $SE = .05$ ,  $t(180) = 5.43$ ,  $p < .001$ , 95%CI [.17, .37]) compared to relatively older ( $+1$  SD;  $b = .08$ ,  $SE = .05$ ,  $t(180) = 1.54$ ,  $p = .125$ , 95%CI [-.02, .19]).

## STUDY 2 DISCUSSION

The primary results cohere with our Study 1 findings. Biological essentialism and beliefs about the heritability of virtuous characteristics both positively correlated with the endorsement of authoritarian and permissive parenting styles and negatively correlated with the endorsement of authoritative parenting styles as effective ways to promote the development of virtuous characteristics. When the endorsement of all three parenting styles were entered simultaneously into regression models, only authoritarian parenting endorsement uniquely related to biological essentialism and beliefs about the heritability of virtuous characteristics.

We found evidence of an interaction between sex and heritability beliefs, such that the association between these beliefs and authoritarian parenting endorsement was stronger for males than females. Study 2 also indicated that this association may be stronger for parents compared to non-parents and for fathers most of all. Of course, it is important to note that the association between heritability beliefs and authoritarian parenting endorsement was significantly different than zero for males and females as well as both parents and non-parents. We also observed associations involving parental experience that were generally consistent with Study 1. We found that heritability beliefs had a stronger association with authoritarian parenting beliefs for relatively newer parents. However, none of these interactions reached traditional levels of significance when biological essentialism was entered into the model in place of heritability beliefs. We also did not observe significant interactions involving age of participants for either the measure of heritability beliefs or the measure of biological essentialism (see supplementary materials).

## STUDY 3

Significant bivariate associations between indicators of genetic causal beliefs and each parenting style emerged in both Study 1 and Study 2, and the overall pattern of available data across the first two studies suggests that the association between genetic essentialist beliefs and authoritarian parenting endorsements in particular may be relatively robust. We therefore focused exclusively on authoritarian parenting in Study 3 and addressed the important question of whether beliefs about the heritability of virtue causally shape the endorsement of authoritarian parenting. We employed an experimental design modeled after other research on genetic attributions (Lebowitz, Ahn,



& Nolen-Hoeksema, 2013) and randomly assigned participants to conditions of an experimental manipulation designed to strengthen their belief in the etiology of virtue as primarily genetic versus primarily socioenvironmental. After this, participants read a vignette about an adolescent who recently engaged in several problem behaviors. The primary dependent variable was participant reports on the likelihood of adopting an authoritarian parenting response to this child's behavior. We hypothesized that the genetic condition would elicit greater endorsement of authoritarian parenting by eliciting greater beliefs about the heritability of virtue.

## STUDY 3 METHOD

### *Participants*

Adult participants ( $N = 815$ ; 431 females, 373 males, 2 non-binary, 9 did not identify their gender) living in the United States were recruited from Amazon MTurk and compensated 0.75 USD. Twenty participants were excluded for not completing the writing task. An additional 20 participants were excluded from analyses after indicating that their data did not reflect quality responses (see below). The final sample consisted of 775 participants (422 females, 350 males, 2 non-binary, 1 did not identify their gender) who were diverse in age ( $M = 35.7$ ,  $SD = 11.25$ ) and predominantly indicated being White (77.1%; 11.2% African-American or Black, 8.5% Asian, 1.9% American Indian or Alaska Native, 3.2% another race). Roughly eight percent (8.6%) of participants identified as Hispanic or Latino and nearly half (45.2%) of participants reported being married (54.8% not married). Reported annual household income ranged from 0 USD to 825,000 USD ( $M = 59,867.01$ , USD  $SD = 50,463.81$  USD). Approximately half (49.4%) of participants reported being parents of children ( $M = 1.01$ ,  $SD = 1.28$ ) who ranged in age from 1 month to 54 years ( $M = 12.40$ ,  $SD = 10.24$ ).

### *Procedure*

Participants followed a link in the MTurk system and were directed to a study ostensibly focused on the ways people read, react to, and construct persuasive messages. The materials are described below in the order they were presented. After completing the study, participants read a debriefing sheet that thoroughly debunked the deception and explained the goals of the study.

### *Measures*

#### *Genetic Attributions Manipulation*

Participants were first asked to read and react to a persuasive argument about emotions ostensibly written by a former participant. They evaluated the

argument on filler items designed to bolster the cover story. After indicating their reactions, participants created their own persuasive argument from a list of compiled “facts.” Participants read the facts and used them to construct a persuasive argument. Depending on random assignment, half of the participants received facts that contained information about genetic explanations for virtue, and the other half received information about socio-environmental explanations for virtue. This approach is consistent with previous research which suggests that people more strongly adopt positions they have argued for (Higgins, 1999; Lebowitz et al., 2013).

### ***Heritability Beliefs***

Participants indicated the extent to which they believed a person’s level of virtue is determined by their genes on a 1 (*not at all shaped by genes*) to 9 (*totally shaped by genes*) scale ( $M = 4.64$ ,  $SD = 2.17$ ).

### ***Virtue as Improvable***

Participants indicated the extent to which they believed virtue is something that can be improved through practice and effort on a 1 (*not at all*) to 9 (*completely*) scale ( $M = 7.41$ ,  $SD = 1.43$ ). Results using this item (termed “Skill beliefs”) are located in Tables S6 and S7 in the supplemental materials.

### ***Problem Behavior Vignette***

Participants read a vignette about an adolescent who had recently gotten in trouble for engaging in several problem behaviors. The vignette read:

Taylor is a freshman student currently attending the local high school. Taylor enjoys what typical teens do these days – hanging out with friends and using social media. Recently, Taylor’s school called his parents. The school reported that Taylor and his friends had recently vandalized another student’s property and, when initially questioned, lied about what had actually occurred. This was the second recent incident that prompted a call home from the school. Earlier in the month, Taylor forged a parent signature on a failed exam to avoid showing it to them.

### ***Endorsement of Authoritarian Parenting***

We asked participants to read a description of how parents could respond to Taylor’s behavior and to indicate how likely they would be to respond in that way. The parenting description read:

As a parent, you would attempt to shape, control, and evaluate Taylor’s behavior and attitudes in accordance with an absolute standard that is not negotiable. You would value obedience and use punishment to curb Taylor’s actions and beliefs to align with what you feel is right. You would believe that Taylor’s autonomy should be restricted and that Taylor should follow your instructions without discussion. You would believe that Taylor needs to understand that you are in charge, that you

have complete authority in determining what the rules and punishments should be. You would exercise firm control over Taylor's activities, making sure that the rules you have set are followed without question or conversation.

Participants indicated how likely they would be to adopt this response on a 1 (*not at all*) to 9 (*extremely*) scale ( $M = 4.13$ ,  $SD = 1.93$ ). Immediately after the vignette, participants also responded to 11 items that assessed various types of reactions (Jacobs, Woolfson, & Hunter, 2017). For example, they indicated their beliefs about how problematic the behavior was, how much control they believed Taylor had, and how much Taylor's behavior reflected his "character." These items were included for exploratory purposes and are not described in our main analyses. We provide exploratory analyses in the Supplemental Materials and interested scholars can access the data on OSF.

### ***Seriousness Check***

Finally, participants indicated if they had just clicked through the survey without much thought and whether we should exclude their data (Aust, Diedenhofen, Ullrich, & Musch, 2013).

## **STUDY 3 RESULTS**

### ***Primary Analyses***

An independent samples *t*-test indicated that participants in the genetic ( $M = 5.35$ ,  $SD = 2.04$ ) versus socioenvironmental ( $M = 3.91$ ,  $SD = 2.05$ ) condition reported greater beliefs that virtue is "caused" by genes,  $t(772) = 9.75$ ,  $p < .001$ ,  $d = 0.70$ , 95%CI (1.72, 1.15). This result provides evidence that the manipulation effectively induced differences in heritability beliefs.

We next tested our primary hypothesis that the genetic explanation condition would lead to greater endorsement of authoritarian parenting. The total effect of condition was not significant,  $t(772) = 0.609$ ,  $p = .542$ ,  $d = .04$ , 95%CI (-0.19, 0.36). Those in the genetic condition ( $M = 4.17$ ,  $SD = 1.90$ ) did not differ from those in the socioenvironmental condition ( $M = 4.08$ ,  $SD = 1.96$ ).

### ***Secondary Analyses***

We also conducted a 2 (condition) x 2 (sex) x 2 (parent status) ANOVA on authoritarian parenting endorsement to test the effects of participant sex and parent status. These analyses returned a significant main effect of parent status,  $F(1, 763) = 12.72$ ,  $p < .001$ ,  $d = .28$ , 95%CI (.27, .81), such that parents ( $M = 4.39$ ,  $SD = 1.94$ ) were more likely than non-parents ( $M = 3.86$ ,  $SD = 1.88$ ) to endorse authoritarian parenting. There was also a significant

Parent Status x Condition interaction,  $F(1, 763) = 4.48$ ,  $p = .035$ ,  $\eta_p^2 = .01$ , 95%CI (.00, .02) (Figure 2). We probed this interaction by testing the simple condition effects within parents and non-parents. There was no effect of experimental condition for non-parents,  $F(1, 763) = 0.91$ ,  $p = .340$ ,  $d = -.10$ , 95%CI (-.20, .58). In contrast, parents in the genetic condition reported greater authoritarian endorsement than parents in the socioenvironmental condition,  $F(1, 763) = 4.10$ ,  $p = .043$ ,  $d = .21$ , 95%CI (.01, .81). No other effects in the ANOVA were significant (full results are provided in the Supplementary Materials).

### Indirect Effects Tests

Although there was no total experimental effect on the endorsement of authoritarian parenting, correlation analyses indicated that the continuous measure of heritability beliefs positively correlated with authoritarian parenting endorsement,  $r(771) = .22$ ,  $p < .001$ . This correlation is consistent with the findings of Studies 1 and 2. As such, and because the manipulation significantly affected heritability beliefs, we tested whether the experimental effect on beliefs about the heritability of virtue was related to the endorsement of authoritarian parenting. This is a test of an indirect effect of experimental condition on authoritarian endorsement through beliefs about heritability. This approach is consistent with recommendations in psychological science (Hayes, 2009, 2013; Rucker, Preacher, Tormala, & Petty, 2011) and analytic approaches featured in earlier work on genetic attributions (Cheung & Heine, 2015). Figure 1 presents the results of our indirect effects test. We found evidence that exposure to genetic versus socioenvironmental explanations for virtue led to stronger beliefs about the heritability of virtue, which in turn positively related to authoritarian parenting endorsement. This indirect effect was significantly different than zero.

Because we did observe an experimental effect on authoritarian endorsement for parents (but non-parents), we also conducted indirect effects tests for parents and non-parents separately. The results indicated that the indirect effect was significant for both parents (95% CI: 0.13, 0.43) and non-parents

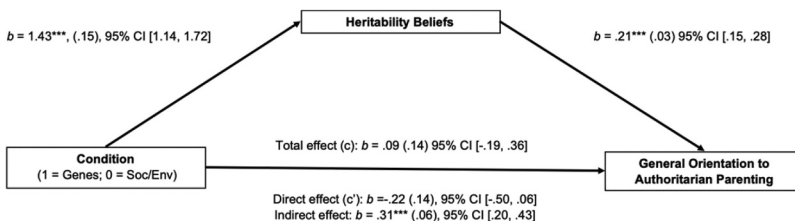
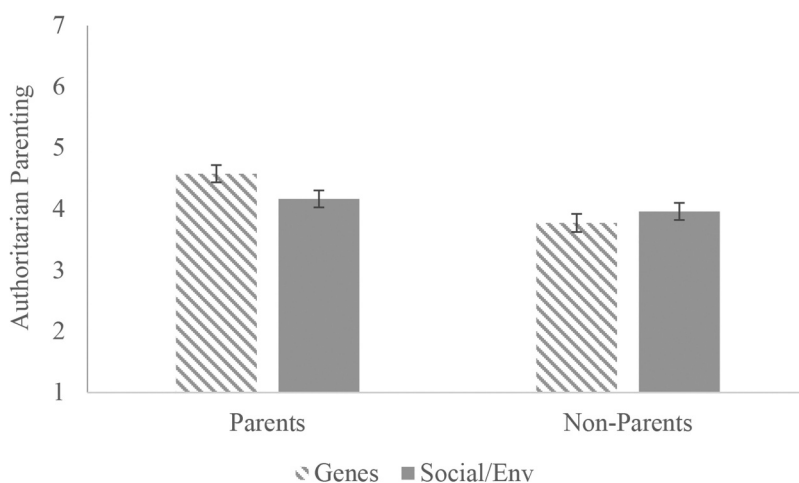


Figure 1. Indirect effects model; \*\*\* $p < .001$ .



**Figure 2.** Interaction between parental status and condition on authoritarian parenting endorsement in Study 3. Bars represent condition means and lines represent standard errors around the means.

(95% CI: 0.20, 0.54). This result indicates that, although parent status moderated the total effect of condition on authoritarian endorsement, the indirect effect linking genetic causal attributions to authoritarian endorsement through heritability beliefs is present for both parents and non-parents.

### STUDY 3 DISCUSSION

Study 3 revealed that exposure to genetic accounts of virtue led participants to adopt greater beliefs that virtue was determined by genes, which in turn was related to greater endorsements of authoritarian parenting. Although the size of the effect warrants some caution when interpreting its implications, the significant indirect association between the manipulation and authoritarian parenting through heritability beliefs revealed a potential process by which exposure to information about genetic influences on virtue relates to people's willingness to adopt more controlling and punitive responses to adolescent problem behavior. We also found evidence that exposure to genetic accounts of virtue exert a total effect on authoritarian parenting endorsement for people who are parents themselves (but not for non-parents). This evidence, combined with the significant indirect effect noted above, suggests that exposure to genetic accounts of virtue may shift parents to a more authoritarian orientation by eliciting greater beliefs about the genetic etiology of virtue. Of course, this pattern of results likely raises questions about why the indirect effect, but critically not the total effect, was significant for both parents and non-parents. One possibility is that, perhaps especially for non-parents, the manipulation exerted an influence on some unmeasured variable that had an opposing association with authoritarian

parenting endorsement. This type of effect could conceivably counteract the positive effect of heritability beliefs in the full sample (Rucker et al., 2011). Regardless, from a practical standpoint, the results involving parents may be most significant in the sense that endorsement of parenting practices are most consequential for people who are actually in a position to parent. In this vein, we observed that people who have offspring respond to information about the genetic (vs. socioenvironmental) etiology of virtue with greater endorsement of authoritarian parenting, and that this effect is at least partially mediated by parents' beliefs about the genetic origins of virtuous characteristics.

## GENERAL DISCUSSION

Across three studies, viewing virtue development as being caused by genes related to people's beliefs about effective parenting behaviors. In Studies 1 and 2, genetic causal beliefs positively correlated with the endorsement of authoritarian parenting and permissive parenting, and negatively correlated with the endorsement of authoritative parenting. These associations emerged independent of the influence of other theoretically relevant variables (e.g., right-wing authoritarianism). In addition, authoritarian parenting endorsement had a robust association with genetic beliefs across Studies 1 and 2, even when controlling for the variance explained by the other parenting styles in a simultaneous regression model. Building on these findings, Study 3 focused exclusively on authoritarian parenting endorsement. The study revealed that exposure to genetic accounts of virtue increased beliefs that virtue is caused by genes, which, in turn, positively associated with endorsements of authoritarian parenting. Exposure to genetic accounts of virtue also exerted a total effect on endorsement of authoritarian parenting among self-reported parents. Thus, beliefs about the heritability of virtue significantly relate to authoritarian parenting endorsement for parents and non-parents, but the impact of receiving genetic accounts of virtue on parenting orientations may be most robust and directly influential among people who are or have been in a position to parent.

Secondary analyses revealed that age of oldest child and sex (male or female) moderated the associations between genetic causal beliefs and endorsement of authoritarian parenting in Studies 1 and 2. There was a stronger association between genetic causal beliefs and authoritarian parenting beliefs for parents of relatively younger offspring. When considering parent sex, the patterns suggested that for men, and perhaps fathers especially (Study 2), genetic causal beliefs seem to be more strongly linked to endorsement of authoritarian parenting. However, the positive associations between genetic causal beliefs and authoritarian parenting endorsements were significantly different than zero for women as well. In addition, there was some inconsistency in these effects across studies. None of these moderating effects

emerged in Study 3 and, in Study 2, the moderating effects were only observed with one of our genetic causal beliefs measures. Nevertheless, the patterns of these findings offer evidence that these effects may be somewhat stronger for men and more likely to emerge for parents of relatively younger children.

Our findings also revealed a seemingly contradictory pattern of associations in the sense that genetic causal beliefs were positively correlated with both permissive and authoritarian parenting endorsement. These bivariate associations suggest the possibility that genetic causal beliefs might be correlated with the endorsement of an aspect of permissive and authoritarian parenting that is somewhat distinct from the harsh control that is unique to authoritarian approaches. One possibility is that our measure of permissiveness, which should theoretically reflect high levels of warmth and low levels of control, actually captures an approach to parenting that is characterized by low warmth and low control. More specifically, the low demandingness of permissiveness can coincide with either high (indulgent) or low (neglectful) levels of responsiveness (warmth; Maccoby & Martin, 1983). The positive association between authoritarian and permissive endorsement observed in our studies would make sense if the permissive dimension is tapping into a neglectful typology, at least insofar as both authoritarian and neglectful orientations would reflect low levels of responsiveness (warmth). Such a pattern notably aligns with genetic essentialism research indicating that genetic causal accounts negatively predict emotional responsiveness (empathy; Lebowitz & Ahn, 2014) and positively predict more punitive and restrictive forms of control (Pearl & Lebowitz, 2014). Nevertheless, the association between genetic causal beliefs and authoritarian endorsement was the most robust across our studies, suggesting that there may be something particularly relevant about the authoritarian style that connects to genetic causal beliefs.

It is also important to note several limitations of these studies. First, although we observed an experimental effect on authoritarian parenting endorsement for parents in Study 3, this effect was small and our data cannot rule out the possibility that there is a causal effect in the other direction. It is plausible that the endorsement of authoritarian parenting behaviors and genetic causal beliefs are only related insofar as people have experienced or assume that less demanding approaches to parenting will be unsuccessful for helping child virtue development. Having tried or considered these other approaches, they might opt for a more restrictive form of parenting and, if unsuccessful, conclude that the behavior to be changed is more strongly linked to biological or genetic factors. Relatedly, parents may also endorse greater essentialist beliefs to justify their support for harsh parenting behaviors, particularly those that could elicit feelings of parental guilt (Durrant, Rose-Krasnor, & Broberg, 2003).



Our work is also limited in regards to our measurement of parenting beliefs. There is mixed evidence for a link between beliefs about parenting and behavior, with some studies finding positive associations (e.g., Conger, McCarty, Yang, Lahey, & Kropp, 1984) and others finding no association (e.g., Smetana & Daddis, 2002). However, stronger evidence in favor of this link is observed when the beliefs and behaviors measured correspond conceptually rather than being overly general (see Bornstein, 2016). A second limitation of our measurement approach was that it captured the endorsement of broad parenting “styles” and domain-general beliefs. Contemporary approaches to parenting recognize the domain-specificity of different parenting practices and the qualitatively different forms of parental control that parents can employ across different contexts (Smetana, 2017). It seems plausible that greater beliefs that virtuous characteristics are caused by genes could be associated with more controlling and less empathic responses in some contexts, but more permissive responses in other contexts. Our studies simply cannot address that question.

The cross-sectional nature of our designs are additionally insensitive to the many normative shifts in parenting over time (Roberts, Block, & Block, 1984). For example, sensitive parents show stable use of praise and reasoning between the ages of 3–12 years, but gradually change the way that punishment is implemented as children age (Roberts et al., 1984). Because our results assess more general beliefs about parenting rather than age-specific beliefs, they may (or may not) be applicable at all stages of child development or all developmental contexts. Furthermore, while our experimental approach in Study 3 offers some evidence for a potential causal process among parents, our approach to testing this causal process involved measurement of the mediator and outcome measure at the same time point, which is limited relative to longitudinal tests of mediation (Fritz & MacKinnon, 2012; Jose, 2016; Maxwell & Cole, 2007).

Finally, our samples were all recruited using Amazon Mechanical Turk. It is possible that collecting such samples online could affect the quality of our data via inattentive participants. We included a seriousness check in Study 3 as an attempt to address this concern. Compared to other methods, such as screening out the fastest 10% of participants, duplicate IP addresses, and inconsistent answers, a seriousness check is a more successful data screening method for increasing data quality, and provides incremental validity (Aust et al., 2013). This seriousness check item was only in Study 3. This is a limitation of our research; it would have been ideal to have this item in all studies.

## IMPLICATIONS FOR THEORY AND PRACTICE

Despite these limitations, our findings extend research on genetic attributions and genetic essentialism. Extant research has provided clear evidence that genetic accounts of personal characteristics can influence people's judgments and behaviors in a number of domains. For example, genetic accounts of mental illness influence people's optimism for recovery and judgments of blame for the condition as well as the degree of empathy in caregivers' response to patients (Haslam & Kvaale, 2015). Our findings suggest that genetic attributions for virtuous characteristics are positively associated with the endorsement of what is ultimately a more punitive, less warm, and more controlling orientation to parenting. Authoritarian approaches to parenting are characterized by an unwillingness to consider the child's perspective, emphasizing punishment with little or no need for explanation. In this way, our work aligns with other studies reporting that essentialist beliefs reduce orientations to punishment that emphasize rehabilitation and offender welfare (Kraus & Keltner, 2013) and increases support for more restrictive social policies (Pearl & Lebowitz, 2014). Our results, however, reveal a specific role of genetic causal beliefs in the relatively more intimate, and previously unstudied, context of parenting.

The introduction of genetic causal beliefs to the domain of parenting may also have implications for developmental science. Developmental psychology research on factors that predict differences in approaches to parenting has elucidated how certain parent cognitions (see Bornstein, 2016, for an overview) prospectively relate to parenting practices. Our findings compliment this work by identifying a novel cognitive factor (i.e., genetic causal beliefs) that is associated with the endorsement of authoritarian parenting. That this endorsement emerged even when participants were asked to consider how to best shape the development of virtue is striking, given evidence that authoritarian parenting practices are consistently linked to outcomes negatively related to virtuous characteristics (see Pinquart, 2017a, 2017b). This raises a potentially important practical question. Should scholars and science writers avoid communicating genetic research findings to the lay public, lest they contribute to unconstructive parenting practices? Even if our findings provided unequivocal support for such a possibility, which they do not, the mechanisms of such effects are likely driven more by the way that genetics research is communicated or interpreted and less by whether it is communicated or not (Dar-Nimrod & Heine, 2011b). Our findings, along with other research on genetic essentialism (Lebowitz & Ahn, 2018), suggest that communications that do not counteract an essentialist or deterministic view of genes may be linked to problematic parenting outcomes. Indeed, the current work suggests that genetic accounts of virtuous characteristics reliably relate to more positive beliefs about the very parenting practices that ultimately predict lower levels of virtue development.

## ADDRESSES AND AFFILIATIONS

Matthew Vess, 4235 TAMU, College Station, TX 77840. Email: [vess@tamu.edu](mailto:vess@tamu.edu). Grace N. Rivera and Rebecca J. Brooker are at Texas A&M University. Matt Stichter is at Washington State University. Jenae M. Neiderhiser is at The Pennsylvania State University.

## ARTICLE INFORMATION

### ***Conflict of Interest Disclosures***

Each author signed a form for disclosure of potential conflicts of interest. No authors reported any financial or other conflicts of interest in relation to the work described.

### ***Ethical Principles***

The authors affirm having followed professional ethical guidelines in preparing this work. These guidelines include obtaining informed consent from human participants, maintaining ethical treatment and respect for the rights of human or animal participants, and ensuring the privacy of participants and their data, such as ensuring that individual participants cannot be identified in reported results or from publicly available original or archival data.

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