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Genetic causal beliefs and developmental context: Parents' beliefs predict psychologically controlling approaches to parenting

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Abstract

We examined the association of parents' genetic causal beliefs and parenting behaviors, hypothesizing a positive association between parents' genetic causal beliefs and their use of psychological control. Study 1 (N = 394) was a cross-sectional survey and revealed that parents' genetic essentialism beliefs were positively associated with their self-reported use of harsh psychological control, but only for parents who reported relatively high levels of problem behaviors in their children. Study 2 (N = 293) employed a 4-day longitudinal design and revealed that parents' genetic causal beliefs positively predicted the use of psychological control, especially on days when they perceived relatively high problem behaviors in children. Overall, the studies demonstrated that parents' genetic causal beliefs about character positively predicted psychologically controlling and harsh responses to child problem behaviors, which may ultimately be detrimental to child development.

Keywords

parenting, parental control, psychological control, genetic essentialism

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Awareness of and access to information about the genetic basis of psychological characteristics is rapidly advancing. One can now walk into a local pharmacy, purchase a product such as 23andMe, and within weeks have a report detailing one's genetic profile and how that profile might relate to important psychological characteristics. At the same time, accessibility to primary and secondary reports of genetic (heritability), genomic, and epigenetic research has introduced concerns about how lay people understand and react to it. Intentionally sensationalized or unintentionally exaggerated emphases on genetic causation might lead people to believe that genes account for more variance in expressed psychological characteristics than they actually do. In addition, even if people are somewhat accurate in identifying the heritability of expressed characteristics (Willoughby et al., 2019), there is reason to suspect that genetic causal beliefs may significantly bias people's reasoning about them. Indeed, as outlined by Heine and colleagues (2017), genetic causal accounts are particularly appealing and persuasive because genes make for effective "essence placeholders" (see also Dar-Nimrod & Heine, 2011a), which psychologically represent the assumed unobservable "essence" that defines the type of characteristics that an entity will express (Gelman, 2003; Hirschfeld & Gelman, 1994). This, coupled with the natural cognitive biases that emerge when genetic accounts of complex characteristics are highlighted (Dar-Nimrod & Heine, 2011b), can operate to create a more deterministic view of genes and development.

Emerging research has documented how a tendency towards "genetic essentialism" (Heine et al., 2017) can lead people to, among other things, see characteristics as less controllable when genetic causal accounts of those characteristics are emphasized. For example, people who are led to believe that they possess a gene for alcoholism report feeling less control over their drinking behavior and express a greater willingness to seek out external assistance in the form of alcohol counseling (Dar-Nimrod et al., 2013) relative to people who learned they did not possess a genetic risk for alcoholism. Similarly, genetic attributions for depression are positively associated with "prognostic pessimism," or a feeling that depression is enduring and difficult to remedy (Lebowitz et al., 2013). These types of findings indicate a robust relationship between genetic accounts of characteristics and a diminished sense of personal controllability or agency, which in some contexts appears to manifest as a heightened belief that stronger external control interventions are needed (e.g., external alcohol counseling). There is, perhaps most strikingly, even evidence that bogus genetic explanations for one's characteristics can operate in a sort of self-fulfilling manner to shape behavior and physiology above and beyond the influence of actual genetic propensities (Turnwald et al., 2019).

Psychological essentialism, and by extension genetic causal accounts, may also have notable interpersonal implications (Lebowitz & Appelbaum, 2019) that could impact family dynamics. Lebowitz and Ahn (2014), for example, randomly assigned mental health professionals to read case vignettes of people suffering from a mental illness that was either explained in terms of genetic/biological factors or psychosocial factors. Mental health providers who viewed mental illness through a genetic causal lens consistently reported less empathy for the patient even though the symptoms were equivalent in the two explanatory conditions. These results suggest that genetic causal accounts may

compromise important aspects of interpersonal alliances (i.e., warmth, empathy) that can ultimately undermine the trajectory of growth that such alliances afford.

Rivera and colleagues (2021) built on this pattern of interpersonal effects to examine how lay reasoning about the genetic etiology of character traits relates to reasoning about effective parenting. They hypothesized that individual differences in genetic essentialism may especially relate to the endorsement of parenting strategies involving harsher forms of control over children's behaviors (i.e., authoritarian parenting; Baumrind, 1966). Consistent with these hypotheses, three separate studies (Rivera et al., 2021) revealed that genetic causal beliefs (i.e., beliefs that character is caused by genes) positively correlated with the endorsement of authoritarian parenting behaviors. In addition, genetic causal beliefs positively correlated with the endorsement of permissive practices and negatively correlated with endorsement of authoritative practices at the bivariate level, but only the association between genetic causal beliefs and authoritarian practices emerged when all three parenting practices were simultaneously included in a regression model. This suggested that genetic causal beliefs may be uniquely tethered to practices that reflect harshness. Indeed, while it might be intuitive to predict that parents' essentialism beliefs would primarily predict less controlling (i.e., permissive) parenting practices due to the fatalistic views that essentialism entails (Dar-Nimrod et al., 2013), the results of Rivera and colleagues' studies suggested that essentialist beliefs are most robustly connected to parental coldness and the endorsement of punitive approaches to child control. Put another way, Rivera et al. (2021) suggested that when parents hold stronger genetic essentialism biases, they may display less responsiveness (or warmth; Maccoby & Martin, 1983) to their child and rely on harsh practices that constrain child autonomy in order to prevent behaviors that they believe the child can't control for themselves. Such reasoning aligns with other work showing that clinicians' genetic causal beliefs negatively predict their interpersonal warmth in therapeutic contexts (Lebowitz & Ahn, 2014) and that genetic essentialism predicts greater support for restrictive social policies on behaviors that are viewed as less controllable (e.g., banning junk food in schools to curb obesity when obesity is viewed as genetically caused; (Pearl & Lebowitz, 2014). Overall, then, the Rivera et al., (2021) findings offered suggestive support that genetic beliefs might meaningfully connect to the ways that parents interact with their children.

At the same time, however, the Rivera et al. (2021) findings are limited in at least three ways. First, the studies focused on lay endorsement of parenting behaviors, rather than assessing how parents report interacting with their actual children. It remains possible that general beliefs about the efficacy of parenting behaviors may be disconnected from what parents actually report doing. Clarifying whether genetic essentialism predicts actual parent behaviors is critical for understanding the mechanisms by which it may eventually impact child outcomes. Second, Rivera et al. (2021) did not consider the degree to which genetic essentialism and parenting behaviors relate as a function of perceived (or actual) child behaviors. It makes a great deal of sense that parents' beliefs about the genetic etiology of child characteristics may especially relate to parenting practices when their kids are engaging in problematic behaviors that might warrant intervention. Consideration of this more nuanced association between genetic essentialism and parenting practices is needed to more precisely anticipate how genetic essentialism operates in dynamic family

environments. It seems likely that they may primarily predict harsh forms of control when control is particularly needed (i.e., when child problem behavior is high). Third, and finally, the Rivera et al. (2021) findings were cross-sectional and could not address the possibility that these associations emerge within-parents over time. We addressed these limitations in the current research by focusing on parents' self-reported parenting practices (Studies 1 and 2), by considering the role of perceived child behaviors (Studies 1 and 2), and by employing a repeated assessment longitudinal design (Study 2). All materials and data are provided on the Open Science Framework (https://osf.io/qjvkm/?view_only=e9ee4400cc8548cc8600b91151526745).

Study 1

We evaluated whether parents' beliefs about the genetic etiology of character uniquely relates to psychological control (Barber, 1996), a form of highly controlling and cold parenting that is negatively linked to positive development (Scharf & Goldner, 2018). This type of parental control is consistent with the authoritarian practices featured in the Rivera and colleagues' (2021) studies, and we therefore predicted a positive association between parents' genetic essentialism beliefs and their use of psychologically controlling behaviors. Critically, however, we hypothesized that this relationship may be most evident when parents perceived greater levels of problem behavior in their child because it is in these contexts that efforts to control child behavior may be most likely to emerge. In addition, we also included a measure of behavioral monitoring (Stattin & Kerr, 2000), which reflects parents' active surveillance and knowledge of their children's activities and social relations (Stattin & Kerr, 2000). Because behavioral monitoring does not necessarily entail harshness or autonomy constraint, we did not expect it to relate to parents' genetic essentialism beliefs. The inclusion of this variable thus permitted a test of an alternative hypothesis that genetic essentialism would be associated with general parental involvement, as opposed to the harsh and controlling practices that our core hypotheses specifically emphasized. Ruling out this alternative would thus provide additional clarity about the specific ways that genetic essentialism relates to parenting.[1]

Method

Participants. Adult parents (N = 404; 264 females, 135 males, 5 chose not to report biological sex) living in the United States were recruited through Prolific and compensated $1.75. We aimed to recruit 400 participants based on available resources and an estimate that 400 participants would exceed the sample size needed (N = 395) to reliably detect a small effect (f^2 = .02) at power equal to .80 in a multiple (3) predictor regression model (Faul et al., 2009). Parents were invited to participate if they indicated in a screening survey that they had at least one child between 8 and 16 years of age.[2] However, six parents reported on children between 5 years old and 7 years old, four parents reported on a child 17 years old, and three parents did not indicate their child's age. We excluded these 13 participants and one additional participant who failed a seriousness check item (Aust et al., 2013). Our final sample consisted of 390 parents who ranged in age from 23 to

63 years of age (M = 39.06, SD = 7.02, median = 38.00) and were predominantly Non-Hispanic (97.4%; 2.6% Hispanic or Latino) and White (92.3%); 3.3% identified as African American or Black, .8% identified as American Indian or Alaska Native, 1.3% identified as Asian, and 2.3% identified as another race. A majority of parents identified as cis-female (66.5%; 33.5% cis-male). Parents had, on average, 2.10 kids (SD = .97, median = 2.00). Most participants completed high school, 2.6% did not graduate high school, 19% had a high school diploma or equivalent, 24.4% attended some college, 8.5% had an associate degree, 32.6% had a bachelor's degree, and 13.1% had graduate or professional training.

Procedure. The protocol was approved by the IRB at Texas A&M University. Participants did not provide written consent, as the IRB determined that the greatest known risk to participants was confidentiality concerns. Omitting documented consent addressed this risk and was more practical for the online environment. All participants received an information sheet that described the study and the known risks and benefits of participation. Participants accessed the study by following a link provided in the Prolific posting. Parents were asked to complete a series of surveys while thinking about one of their adolescent children (M = 11.66 years, SD = 2.64 years, median = 12 years).

Materials

Child Problem Behaviors. Children's problem behaviors were measured using two scales: The Strengths and Difficulties Questionnaire (SDQ; Muris et al., 2003) and the Behavior Problems Index (BPI; Zill & Peterson, 1986). Because problem scores on the SDQ and BPI were highly correlated (r = .88), we averaged problem scores on the SDQ and BPI into a single composite behavioral problems variable for analyses. Each item was weighted equally (M = 1.45, SD = .33, α =.94). This composite thus reflects general perceptions of child problem behavior overall.

Strengths and Difficulties Questionnaire. The SDQ (Goodman, 1997) consists of 25 items describing positive and negative attributes of children and adolescents. These items can be grouped to create 5 subscales of 5 items each: the emotional symptoms subscale, the conduct problems subscale, the hyperactivity-inattention subscale, the peer problems subscale, and the prosocial behavior subscale. Sample items include "Your child is considerate of other people's feelings," and "Your child often lies or cheats." Participants indicate on a 3-point scale the truth of each statement in regard to their child (1 = 'not true', 2 = 'somewhat true', and 3 = 'certainly true'). Items are coded so higher numbers equal higher levels of difficulties. The 20 difficulty items (excluding prosocial behavior items as recommended by Goodman, 1997) were included in our overall problem behavior composite.

Behavior Problems Index. The BPI (Zill & Peterson, 1986) is a 30 item questionnaire assessing parent perceptions of child antisocial behavior, anxiousness/depression, headstrongness, hyperactivity, immature dependency, and peer conflict/social

withdrawal. Sample items include "He/she feels or complains that no one loves him/her," and "He/she is rather high strung and nervous." Participants used the same 3-point scale as was utilized for the SDQ. All 30 items were included in our overall behavior problem composite.

Aspects of parental control

Psychological Control. Psychological control was measured by the 8-item Psychological Control Scale (Barber, 1996), which was adapted for parent responses. Participants responded on a three-point Likert-type scale (1 = Not like me; 2 = Somewhat like me; 3 = A lot like me) indicating how well each item described them. Sample items include "I am always trying to change how my child feels or thinks about things" and "I am less friendly with my child if he/she does not see things my way." Scores were averaged into a single composite scale (M = 1.22, SD = .25, α = .69), with higher scores indicating greater psychological control.

Behavioral Monitoring Scale. Behavioral control/monitoring was measured by the eight-item Behavioral Monitoring Scale (Stattin & Kerr, 2000). Parents indicated, on 5-point Likert scales (1 = almost never, 3 = about half the time, 5 = almost always), the degree to which they knew about their child's regular activities. Sample items include "Do you know what your child does during his or her free time?" and "Do you know who your child has as friends during his or her free time?" Scores were averaged to compute a composite scale (M = 1.45, SD = .48, α = .83), with higher scores indicating greater behavioral monitoring.

Genetic Essentialism Beliefs. We assessed genetic etiology beliefs with a validated 4-item measure from previous research (e.g., "Whether someone is one kind of person or another is determined by their biological make-up; Bastian & Haslam, 2008) and a single-item face valid question specifically designed to capture parents' beliefs that character is genetically determined. Responses were made on a 9-point Likert scale. The 5 items were highly correlated (r's > .59) and were averaged into a single genetic essentialism beliefs composite (M = 4.67, SD = 1.77, α = .93) with higher scores indicating greater genetic essentialist beliefs.

Results

Table 1 presents the descriptive statistics and bivariate correlations among relevant study measures. We conducted a regression analysis to examine whether genetic essentialism and perceived problem behaviors would interact to predict psychological control. There were significant main effects of genetic essentialism, b = .019, SE = .01, $t(386)$ =2.98, p = .003, 95%CI [.01, .03], and problem behaviors, b = .33, SE = .03, $t(386)$ = 9.69, p < .001, 95%CI [.27, .40]. There was also a significant interaction (Figure 1) between genetic essentialism and problem behaviors, b = .05, SE = .02, $t(386)$ = 2.60, p = .010, 95%CI [.01, .10]. Genetic essentialism positively predicted psychological control for those who

Table 1. Descriptive Statistics and Correlations Between Primary Study 1 Variables.

	M	*SD*	1.	2.	3.	4.	5.	6.
1. Genetic essentialism	4.67	1.77	—					
2. Child problem behaviors	1.45	.33	.042	—				
3. Psychological control	1.22	.25	.152**	.470**	—			
4. Behavioral monitoring	1.44	.48	.004	.282**	.315**	—		
5. Perceived parental control of behavior	2.89	.75	.105*	.620**	.450**	.310**	—	
6. Child age	11.71	2.68	.034	.043	.015	.225**	.039	—

Note: * $p < .05$. ** $p < .01$.

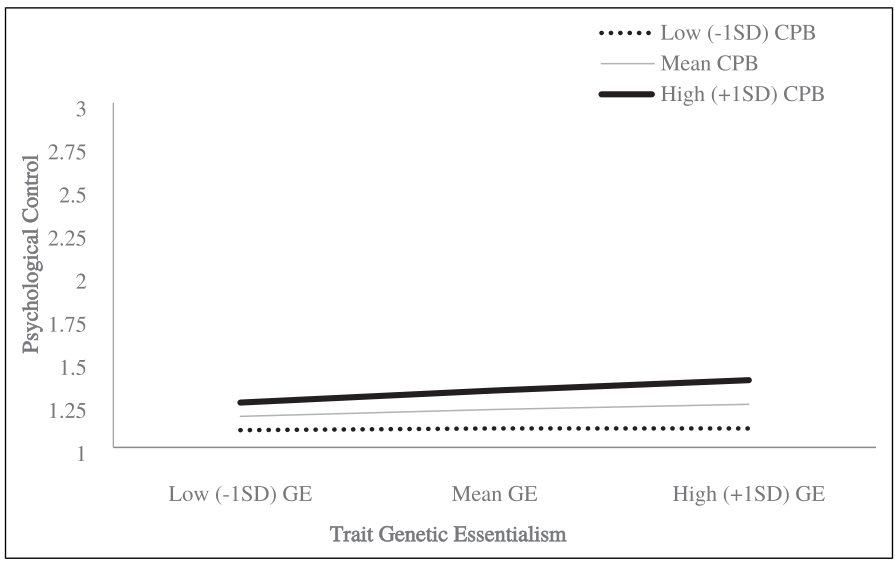

Figure 1. Genetic Essentialism x Daily Child Problem Behaviors on Psychological Control (Study 1). *Note.* Scores on psychological control could range from 1-3, with higher scores reflecting greater psychological control. CPB = daily perceived child problem behaviors; GE = trait genetic essentialism.

reported high (+1SD) child problem behaviors, $b = .04$, SE = .01, $t(386) = 3.95$, $p < .001$, 95%CI [.02, .05], but not for those who reported low (-1SD) child problem behaviors, $b = .001$, SE = .01, $t(386) = .10$, $p = .922$, 95%CI [−.02, .02].

For the behavioral monitoring outcome, the main effect of genetic essentialism was not significant, $b = -.002$, SE = .01, $t(386) = .16$, $p = .987$, 95%CI [-.03, .03]. There was, however, a significant positive main effect of problem behaviors, $b = .41$, SE = .07, $t(386) = 5.65$, $p < .001$, 95%CI [.27, .55]. We did not observe a significant interaction between genetic essentialism and problem behaviors, $b = -.01$, SE = .04, $t(386) = .26$, $p = .796$, 95%CI [−.10, .07].

Discussion

The Study 1 results supported our hypotheses. Parents' genetic essentialism beliefs were positively associated with self-reported harsh and autonomy restrictive parenting behaviors (i.e., psychological control), but this was true only for parents who reported relatively high levels of perceived child problem behaviors. This interaction effect, as noted earlier, makes sense in so far as controlling parenting behavior may be especially likely to emerge when parents perceived problematic behaviors in their children. In contrast, no significant relationship between genetic essentialism and behavioral monitoring emerged. This was consistent with our theorizing and suggests that genetic essentialism beliefs are uniquely related to controlling parenting behaviors characterized by harshness.

Study 2

The aim of Study 2 was to extend the Study 1 findings by examining within-person relationships between perceived child problem behaviors and psychological control as a function of genetic essentialism beliefs. We did this in a 4-wave longitudinal study that spanned consecutive days and assessed trait genetic essentialism beliefs, daily parenting, and child problem behaviors. We again measured psychological control as our primary outcome variable and we predicted that the relationship between genetic essentialism and daily psychological control would be strongest on days when child problem behavior was perceived to be high. In this study, we also included discrete measures of parental warmth, anger/hostility, and parent directedness towards their child. This enabled us to replicate Study 1 findings for psychological control and to conduct exploratory secondary analyses on discrete parenting behaviors (i.e., warmth, hostility and directedness) that are prominent in Baumrind's theoretical model. The theory and research guiding our approach predict that genetic essentialism should correlate positively with parent hostility and parent directedness, which are both facets of an authoritarian dimension of parenting (Robinson et al., 2001). Assessing them as discrete behaviors, however, enabled us to directly examine whether genetic essentialism is associated with both hostility and directedness (control). These discreet aspects are not distinguished in the aggregated psychological control outcome. The inclusion of a discreet measure of parent warmth allowed us to directly test whether genetic essentialism is associated with positive parental expressions of warmth. The robust links between measures of parental harshness and genetic essentialism might imply a negative link between genetic essentialism and discreet parent warmth, but, because harshness and warm affection can occur independent of one another, it also seemed plausible that genetic essentialism would specifically predict harshness while being unrelated to discreet positive parenting behaviors.

Method

Participants. Adult parents living in the United States ($N = 304$; 191 cis-females, 111 cis-males, 1 non-binary, 1 chose not to report biological sex) were recruited via Prime Panels

by CloudResearch (https://www.cloudresearch.com/products/prime-panels/). This panel service recruits online research participants from a pool of over 50 million participants. They were paid a rate that they agreed to through the Prime Panels service (approximately $6.50/hour). Our target sample size was based on a desire to maximize power with the resources that were available. We did not carry out a formal power analysis because such analyses are not straightforward for multilevel models, but we do note that our target of 300 participants exceeds the sample size recommended ($N = 250$) to reliably obtain stable correlation estimates (Schönbrodt & Perugini, 2013).

Parents were invited to participate if they indicated that they had at least one child between the ages of 9 and 19[3] in a screener utilized by the panel service. Two parents reported on children who were 5 years old and 3 parents did not indicate the age of the child they reported on. These 5 participants were excluded from analyses, resulting in a sample size of 299. Parents in our sample ranged in age from 23 to 62 years of age (M = 42.35, SD = 7.22) and had, on average, 2.14 kids (SD = 1.16). Participants identified as predominantly Non-Hispanic (92.3%; 6.4% Hispanic or Latino) and White (82.5%); 9.4% identified as African American or Black, 4.0% identified as Asian, .3% identified as Native Hawaiian or Pacific Islander, 3.7% identified as multiracial, and .7% did not report their race. A majority of parents identified as cis-female (62.5%; 36.8% cis-male. .7% did not report). Most participants completed high school, 7.4% did not graduate high school (<12 years), 4.7% had a high school diploma or equivalent (12 years), 32.8% attended some college or had an associate degree (13–14 years), 30.1% had a bachelor's degree (15 years), 20.0% had graduate or professional training (16–19 years), and 4.7% held a doctoral or professional degree (20+ years).

Procedure. The protocol was approved by the IRB at Texas A&M University. Participants did not provide written consent, as the IRB determined that the greatest known risk to participants was confidentiality concerns. Omitting documented consent addressed this risk and was more practical for the online environment. All participants did receive an information sheet that described the study and the known risks and benefits of participation. Participants accessed the study by following an internet link sent to them each day of the study.

Participants completed the online surveys across four consecutive days (Monday through Thursday). Trait measures (e.g., genetic essentialism) were included in the Day 1 survey. Daily measures of child problem behaviors and parenting behaviors were assessed in each survey. For each daily survey, parents were to answer a series of questions while thinking about their oldest child under the age of the 19 while completing the study (M = 14.30, SD = 2.80). They were instructed to think about this child for each wave of the study. Thirty-one (10.4%) participants only completed the first survey, 17 (5.7%) completed only two surveys, 49 (16.4%) completed only three surveys, and 202 (67.66%) completed all four surveys. Thus, the majority of participants provided data at more than one assessment. All participants were included in the analyses. Participants completed a seriousness check item daily (Aust et al., 2013) across all four days. One participant (on day two) indicated that they did not attend to the items. Their data for that day was removed.

Materials

Trait genetic essentialism beliefs. On Day 1 of the study, participants completed the same 4-item genetic essentialism measure (Bastian & Haslam, 2008) and a single face valid item that assesses parents' beliefs about whether genes determine a person's character. Responses were made on a 9-point Likert scale and were averaged into a single genetic essentialism beliefs composite ($M = 4.80$, $SD = 1.75$, $\alpha = .91$). Higher scores reflect greater genetic essentialism beliefs. This measure served as a trait indicator of genetic essentialism beliefs and was utilized as a Level 2 predictor in our multilevel models.

Daily child problem behaviors. The Iowa Conner's Scale (Loney et al., 1982) consists of 10 items describing child problem behaviors. The scale focuses on two classes of behavior reflecting impulsivity (e.g., fidgeting) and defiance (e.g., acting sarcastic). Each day, parents reported how much they experienced their child engaging in each of the behaviors "in the last 24 hours." In addition to these 10 behaviors, participants also indicated how much they experienced their child being "high strung," "disobedient," and "stubborn." These behaviors were taken from the BPI (Zill & Peterson, 1986) and were included to capture additional problematic behaviors. All responses were made on a 1 (*not at all*) to 7 (*an extreme amount*) scale. Our child problem behavior index thus consisted of 13 items that were averaged into a single behavior problem index for each day. The use of a shorter behavior problems scale in this study was due to the space limitations of the daily surveys and the resources available to adequately compensate participants for their time. Although shortened, the scaling from the original items was maintained. Items were scored so that higher numbers reflect higher levels of difficulties.

Daily parenting behaviors. Different aspects of parents' behaviors were measured using items from the Psychological Control Scale (Barber, 1996) and the Parenting Styles and Dimensions Questionnaire (PDSQ; Robinson et al., 2001). We again had to limit the number of items from each scale due to the space and time constraints of the 4-wave daily study. Parents were asked to report, each day, on their own behaviors toward their child across four domains of assessment.

Psychological control. Parents responded to 5 items taken from the 8-item Psychological Control Scale (Barber, 1996) featured in Study 1. In this study, however, participants responded on a 5-point Likert scale ranging from 1 (*does not describe me*) to 5 (*describes me extremely well*) based on how much each statement reflected their behavior over the last 24 hours. The change to a five-point format in Study 2 was based on our desire to provide the possibility for more variability across multiple daily assessments. Example items included "I often interrupted my child" and "I was constantly trying to change how my child feels or thinks about things." Responses were averaged into single daily psychological control composites, with higher scores reflecting greater psychological control.

Table 2. Descriptive Statistics for Study 2 Daily Variables.

		Day 1	Day 2	Day 3	Day 4
1. Child problems composite	*M*	2.50	2.11	1.98	1.99
	SD	1.20	1.17	1.07	1.13
	α	.94	.95	.94	.95
2. Psychological control	*M*	1.42	1.34	1.28	1.32
	SD	.67	.61	.56	.63
	α	.87	.86	.86	.89
3. Hostility	*M*	1.63	1.48	1.38	1.41
	SD	.84	.83	.66	.69
	α	.86	.88	.82	.84
4. Directedness	*M*	1.77	1.55	1.49	1.52
	SD	.90	.81	.72	.75
	α	.85	.88	.82	.86
5. Warmth	*M*	3.72	3.62	3.62	3.58
	SD	.87	1.01	1.00	1.04
	α	.77	.84	.86	.87

Parent verbal hostility. Three items from the verbal hostility subscale of the PDSQ were included to capture daily expressions of anger/hostility towards the child. Responses were made on the same 5-point Likert scale and were based on behaviors over the last 24 hours. The items were "argued with my child," "expressed anger towards my child," and "yelled or shouted when my child misbehaved." Responses were averaged into daily verbal hostility composites, with higher scores reflecting greater verbal hostility.

Parent directedness. Three items from the directedness subscale of the PDSQ were included to reflect daily parent autonomy granting. Parents indicated, on the same 5-point Likert scale used for other daily parenting behaviors, the degree to which items reflected their own behaviors over the last 24 hours. The items were "demanded that my child do things," "scolded or criticized my child to make them improve," and "scolded or criticized my child when their behavior didn't meet expectations." Responses were averaged into daily directedness composites, with higher scores reflecting greater parental directedness.

Parent warmth. Three items from the warmth subscale of the PDSQ were included to capture daily parental warmth. Parents indicated, on the same 5-point Likert scale, the degree to whih items reflected their behaviors over the last 24 hours. The items were "gave praise when my child was good," "expressed warm affection to my child," and "had warm and intimate times with my child." Responses were averaged into daily parental warmth composites, with higher scores reflecting greater parental warmth.

Results

Descriptive statistics within each daily survey are provided in Table 2.

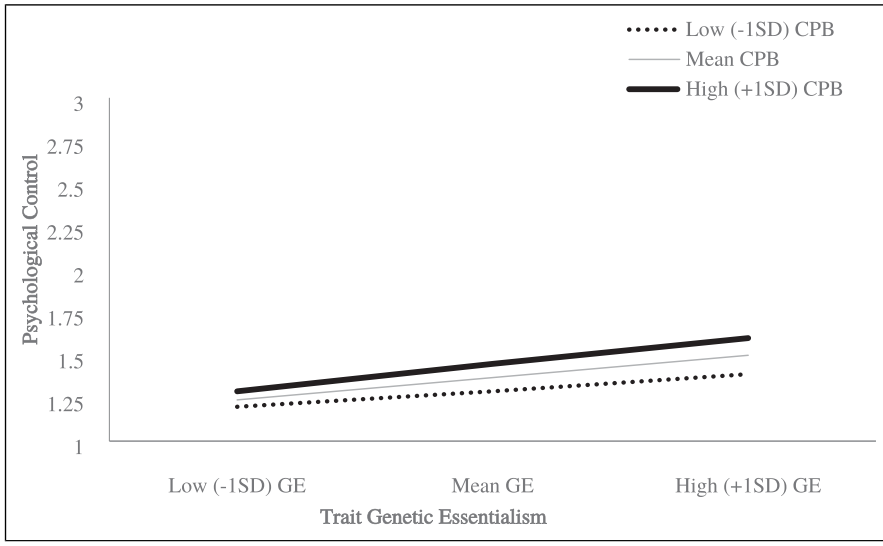

Figure 2. Genetic Essentialism x Daily Child Problem Behaviors on Psychological Control (Study 2). *Note.* Scores on psychological control could range from 1-5, with higher scores reflecting greater psychological control. CPB = daily perceived child problem behaviors; GE = trait genetic essentialism.

Primary analyses: Psychological control. We utilized linear mixed-model analyses to test whether trait genetic essentialism would be a stronger predictor of daily psychological control on days when parents perceived more difficulties from their children. The daily measures (psychological control and child problem behaviors) were nested within individuals. Our models employed both a random intercept and a random child problem behavior slope. The trait measure (genetic essentialism) was sample mean-centered, whereas the daily predictor (child problem behavior) was centered based on each individual's unique mean (i.e., cluster-based centered).

There was a main effect of both perceived child problem behavior, $b = .18$ ($SE = .02$), $t = 8.71$, $p < .001$, 95% CI (.14, .22), and trait genetic essentialism, $b = .07$ (SE = .02), $t = 3.57$, $p < .001$, 95% CI (.03, .11). Daily perceived child problem behavior and trait genetic essentialism beliefs positively predicted daily use of psychological control. The predicted child problem behavior X genetic essentialism interaction (Figure 2) was also significant, $b = .04$ (SE = .01), $t = 4.14$, $p < .001$, 95% CI (.02, .06). The relationship between trait genetic essentialism and psychological control was stronger on days of high (+1*SD*) perceived child problem behaviors, $b = .09$ (SE = .02), $t = 4.17$, $p < .001$, 95% CI (0.05, 0.13), relative to low (-1*SD*) perceived child problem behaviors, $b = .05$ (SE = .02), $t = 2.76$, $p = .006$, 95% CI (.02, .09).

Secondary analyses. We conducted identical analyses to those described on each of the other parenting measures (verbal hostility, directedness, warmth).

Parent verbal hostility. Both daily perceived child problem behaviors, $b = .36$ (SE = .04), $t = 10.08$, $p < .001$, 95% CI (.29, .43), and trait genetic essentialism, $b = .06$ (SE = .02), $t = 2.66$, $p = .008$, 95% CI (.02, .10), positively predicted daily reports of parental verbal hostility. There was, however, no significant child problem behavior X trait genetic essentialism interaction, $b = .01$ (SE = .02), $t = 0.61$, $p = .543$, 95% CI (−.03, .05).

Parent directedness. Daily perceived child problem behaviors, $b = .40$ (SE = .04), $t = 10.28$, $p < .001$, 95% CI (.32, .47) positively predicted daily reports of parent directedness, but trait genetic essentialism was not a positive predictor of parent directedness, $b = .04$ (SE = .02), $t = 1.93$, $p = .055$, 95% CI (−.0001, .09). There was also no significant child problem behavior X trait genetic essentialism interaction, $b = -.01$ (SE = .02), $t = .38$, $p = .707$, 95% CI (−.05, .03).

Parent warmth. Neither daily perceived child problem behaviors, $b = .06$ (SE = .05), $t = 1.29$, $p = .197$, 95% CI (−.03, .16), nor trait genetic essentialism, $b = -.02$ (SE = .03), $t = .86$, $p = .391$, 95% CI (−.08, .03), predicted daily reports of parent warmth. There was also no significant child problem behavior X trait genetic essentialism interaction, $b = -.03$ (SE = .03), $t = 1.13$, $p = .259$, 95% CI (−.08, .02).

Discussion

The effects detected in Study 2 align with the cross-sectional results of Study 1. Parents' beliefs about the genetic etiology of character positively predicted the use of psychological control especially on days when they perceived that their children were relatively high in problem behaviors. We also observed a conceptually similar relation between parents' genetic beliefs and their verbal hostility and a marginal relationship with overall directedness, though these relationships were not moderated by perceived child problem behavior. This seems to suggest that perceived child problem behavior might be particularly important for the link between genetic essentialism and psychological control. However, it is possible that the lack of a moderating effect of perceived child problem behavior on verbal hostility and directedness was an artifact of the measures utilized. Both the verbal hostility and the directedness composites included items that inquired about a parental action specifically in response to child misbehavior. Regardless, the fact that essentialism was positively associated with such negative parenting behaviors is broadly consistent with our theorizing and previous work on people's general endorsement of harsh/controlling parenting (Rivera et al., 2021). No significant relations between genetic essentialism and parental warmth were observed, suggesting that genetic essentialism might be especially connected to negative expressions of parenting behaviors.

General discussion

Overall, the current studies demonstrated that parents' beliefs about the genetic etiology of character positively predicts psychologically controlling and harsh responses to child problem behaviors. In this way, the work connects directly to other research focused on

the potentially negative interpersonal consequences of genetic accounts of complex characteristics. Much like clinicians adopt a less empathic orientation to potential clients when mental illness is framed as genetically caused, parents' belief that character is caused by genes covaries with a greater tendency to adopt a harsh orientation to parenting that is restrictive and psychologically distant. That this relation emerged on psychological control – rather than less harsh forms of control that can attenuate children's risk for maladjustment (i.e., behavioral monitoring; Barber et al., 2005)–offers evidence that genetic causal accounts specifically relate to harsh efforts to control and restrict child behavior. Moreover, because this harsh orientation to parenting does not effectively instill positive character development and skill acquisition more broadly (Crockenberg & Litman, 1990; Kochanska, 2002; Kuczynski, 1984), our findings offer some suggestive evidence that genetic causal accounts might relate negatively, either directly or indirectly, to positive child development.

While our findings extend work on genetic essentialism and parenting practices (Rivera et al., 2021), they may also have relevance for emerging philosophical perspectives on the nature of virtues as skills and developmental perspectives on the acquisition of virtue. Philosophical conceptions of virtues as skills (Stichter, 2018) are necessarily grounded in empirical models (e.g., self-regulation) that delineate how people acquire, maintain, and enhance desired ideals (e.g., virtue). That is, an account of virtue as skill can be grounded within self-regulation theories that cover both the considerations involved with setting goals and striving to accomplish those goals. To date, however, philosophical conceptions of virtue as skills have largely been grounded in the notion of deliberate practice and skill development. A limitation of this focus is that current philosophical perspectives are largely silent in regard to the social and interpersonal aspects of skill development. Our findings provide a new data point for considering how parents' genetic essentialism beliefs about character may negatively alter the virtue "training" environment.

Indeed, empirical investigations of both self-regulation and virtue illuminate the importance of the caregiving environment for virtue development. By middle childhood, for example, better self-regulation is both concurrently and longitudinally related to more virtuous behavior, including less cheating and more helping behaviors (Eiesnberg et al., 1997; Eisenberg et al., 1995; Kochanska et al., 1996; Kochanska & Murray, 2000). In both cases, the parenting context remains of primary importance (Grusec, 2006; Hoffman, 2000). Parent behaviors characterized by high levels of warmth and responsiveness, and low levels of coerciveness or punitiveness, emerge as primary predictors of better child functioning (Hart, 1988; Walker & Taylor, 1991, though see also Kochanska, 1997). Similarly, responses that are *overly* arousing for children lead to a self, rather than other, focus–a pattern of responding at odds with the overall goals of enhancing the other-focused skills of morality and virtue. In particular, coercive strategies including global assertions of parental control, threats of love withdrawal, and enforcing strict sanctions, are viewed as parents' self-focused efforts to change children's behavior against their will (Hoffman, 2000). Such parenting strategies appear to be effective at terminating unwanted behaviors but are ineffective in service of moral development (Crockenberg & Litman, 1990; Kochanska, 2002; Kuczynski, 1984). Our findings suggest that parents' genetic

causal beliefs about character are linked to the very parenting approaches that may be detrimental to the development of virtue in their children.

At the same, the limitations of our current studies should introduce some caution when thinking too broadly about the implications of our findings for moral development. Our findings were based on observed correlations, and it remains to be seen as to whether genetic causal accounts will directly impact parenting orientations and behaviors. Experimental studies that manipulate genetic essentialism beliefs will be needed to better understand the causal structure of these associations. Similarly, the sole reliance on self-reports from parents raises important questions about the effects of genetic causal beliefs on actual parenting behavior and the parenting practices perceived by children. In some ways, this latter question may be most important given that child perceptions of parenting may be particularly critical environmental requisites of optimal moral development. A subjective construal of the training environment may indeed have larger effects on moral development than the objective features of the environment. Our studies also focused on relatively older children and adolescents, did not assess parents' sexual orientation or disability status, and did not have the power to assess potential differences as a function of race or ethnicity. Questions about the generalizability of these findings should therefore be addressed. Finally, our research offers little insight into the mechanisms that connect genetic etiology beliefs to harsh parenting. It could be that genetic causal accounts of character makes the parent see the child's behavior as less agentic (Lebowitz & Appelbaum, 2019) and to perceive the child as less able to control unwanted behaviors. The lack of perceived agency invites a less "other" oriented response, and parents may feel the need to utilize strict forms of external control and autonomy restriction to block child behaviors that they perceive to be especially difficult for their child to control. Future studies should address this possibility. Regardless, our current studies highlight the utility of considering parents' genetic essentialism beliefs to better understand aspects of the family system that might ultimately influence developmental outcomes.

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Open research statement

As part of IARR's encouragement of open research practices, the authors have provided the following information: This research was not pre-registered. The data used in the research can be publicly posted. The data can be obtained at: https://osf.io/qjvkm/?view_only=e9ee4400cc8548cc8600b91151526745. The materials used in the research can be publicly posted. The materials can be obtained at: https://osf.io/qjvkm/?view_only=e9ee4400cc8548cc8600b91151526745 or by emailing: vess@tamu.edu.

Supplemental material

Supplemental material for this article is available online.

Notes

1. We also included a measure of parents' perceived ability to control their child's behavior (Parental Locus of Control scale; Campis et al., 1986; Lloyd & Hastings, 2009). We included this measure to explore how parents' genetic essentialism beliefs related to how much control they perceived they have over their child's behavior. Because our primary aim was to assess how genetic essentialism relates to parental practices, we do not discuss this variable further. The data are available on OSF.
2. Ages were selected based on our desire to limit some of the variability in parent report (e.g., parents of infants versus parents of adolescents) because we did not have the resources required to collect a large enough sample to meaningfully test potential differences across a full spectrum of child ages. We suspected that there may be more variability in the child problems and parenting behaviors for older children and adolescents, so we focused on this age range. The 8-to 16-year-old range was also determined based on evidence from the paneling service that indicated this age range would likely support our targeted sample based on the population of responders we were recruiting from. We recognize the age restriction is a limitation, but we reasoned that this approach maximized the potential success of our recruitment needs and offered a useful starting point for addressing our primary research questions.
3. As in Study 1, this age range was selected based on our desire to focus on older children and adolescents and to maximize the eligible sample available to us in the Prime Panels Service (a different service than that used in Study 1).

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