**A chip off the (im)moral block? Lay beliefs about genetic heritability predicts whether
family members' actions affect self-judgments**

Johanna Peetz ^a

Michael J. A. Wohl ^a

Anne E. Wilson ^b

Andrew Dawson ^b

^a Carleton University (ON, Canada)

^b Wilfrid Laurier University (ON, Canada)

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Please address correspondence to Johanna Peetz, Psychology Department, Carleton University, 1125 Colonel By Drive, Ottawa, K1S5B6. Email: johanna.peetz@carleton.ca

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Abstract

The idea of heritability may have consequences for individuals' sense of self by connecting identity to the actions of others who happen to share genetic ties. Across seven experimental studies (total $N=2,628$), recalling morally bad or good actions by family members influenced individuals' moral self among those who endorse a lay belief that moral character is genetically heritable, but not among those who did not endorse this belief (Study 1-5). In contrast, recalling actions by unrelated individuals had no effect, regardless of lay beliefs (Study 2, 5), the endorsement of other relevant lay beliefs did not moderate the effect of parent's actions on self-judgments (Study 3). Individuals who endorsed heritability beliefs also chose less helpful responses to hypothetical helping scenarios if they had recalled unhelpful (vs. helpful) acts by a genetically-related family member (Study 5). Taken together, these studies suggest that lay beliefs in the role of genetics are important for self-perceptions.

Keywords: Moral Identity; Self; Family; Lay theories; Pro-social Behavior; Parents

“Parents are not to be put to death for their children, nor children put to death for their parents; each will die for their own sin.”

Deuteronomy 24:16

“Prepare a place to slaughter his children for the sins of their ancestors.”

Isaiah 14:21

(Bible, NIV)

The extent to which a child inherits characteristics from their parents has been debated across the centuries (see Bouchard, 2004, for an overview). This debate can become especially heated when the heritability of moral behavior is in focus. Although some studies have found that honesty or duplicity (Loewen et al., 2013) as well as selfless or antisocial behavior (Koenig, et al., 2007;) are to some extent heritable, others have emphasized the important role of upbringing or external factors (e.g., peer groups; Brody & Shaffer, 1982; Grusec & Goodnow, 1994; van Hoorn et al., 2016; Yu et al., 2018). To be sure, the heritability of morality is likely to be a complex, context-dependent matter of degree; the current research does not adjudicate that debate. Instead, the intent of the current research was to answer an adjacent question: how do people’s *beliefs* about genetic heritability (i.e., whether characteristics are passed genetically from parent to child) shape their moral self-concept, particularly when faced with the moral or immoral acts of kin? Specifically, we hypothesized that (some) people draw a direct link from their parents’ (or other genetically related family members’) morality to their own morality. This suggests that those who believe morality is genetically determined (i.e., those who hold lay beliefs that morality is heritable) will have a moral self-concept that is determined not only by personal choices but also by the acts of genetically-related others. We tested this general

hypothesis in the domain of moral identity across multiple experimental studies with adult samples.

What determines people's sense of moral self?

A significant body of research has shown that past personal actions directly inform a person's moral self-view and subsequent behavior (Aquino & Reed, 2002; Hardy & Carlo, 2005; Kruger & Gilovich, 2004; Reed & Aquino, 2003). Less obvious, however, is whether the actions of other people in one's personal sphere can also affect either moral self-concept or associated emotional reactions. Theory and research from the social identity tradition suggests people feel self-conscious moral emotions on account of the actions of others in their social groups, even if they were not a direct participant in the action (Smith, 1999; Tajfel & Turner, 1986). For example, people express guilt for historical wrongs committed by fellow group members of yesteryear (see Wohl et al., 2006 for a review) and pride when members of one's in-group succeed (Cialdini et al., 1976; Miller, 2009; Ugwu & Ugwu, 2013). In a similar vein, people experience vicarious guilt or shame when recalling a close other's immoral action (Fortune & Newby-Clark, 2008; Lickel et al., 2005; Müller-Pinzler et al., 2015; Scarnier et al., 2009; Welten et al., 2012), and the closer a person feels to a misbehaving other, the more personal guilt is reported (Chen et al., 2018; Lickel et al., 2005). However, none of this work has examined how a single action by a related other might influence own *self-judgments*.

Moreover, research on romantic relationships has shown that significant others can be included in one's sense of self (Aron et al., 1992), sometimes resulting in difficulty distinguishing a partner's and one's own traits (Aron et al., 1991; Mashek et al., 2003; Smith et al., 1999). This work has focused on the overlap between judgments of other and self traits rather than focusing on specific actions by the other person. Herein, we examined whether actions by a

related other might affect individuals' self-judgments, especially among those who believe that character is passed genetically between generations.

Beliefs about heritability

Lay theories about the nature of personal characteristics shape how people understand and incorporate information in their social worlds, fairly independent of the factual truth of those beliefs (Plaks et al., 2009). For instance, believing that intelligence is changeable versus fixed can affect academic effort after failure (Dweck, 1986; 2000) and the belief that willpower is unlimited predicts persistence after effort (Job et al., 2010). We contend that people likely hold lay theories about the heritability of moral character. That is, we propose that some people believe that moral character is a personal characteristic partly inherited from one's parents or earlier generations and/or determined by one's genes—a belief that should have implication for self-perception when the immoral or moral behavior of one's parents is brought to mind.

A relevant, but distinct, body of research shows that some people are genetic essentialists who consider genes the determinants ("essence") of someone's personal characteristics (see Heine et al., 2017 for a discussion of essentialist beliefs). Those who endorse such essentialist beliefs believe that behavior is influenced by something immutable and internal, deep within the person, rather than their circumstances or personal responsibility (see Dar-Nimrod & Heine, 2011; Gould & Heine, 2012; Heine et al., 2017; Keller, 2005). One consequence of essentialist beliefs is a reduced belief in personal control over outcomes, which may undermine efforts to change. For instance, in one lab study, people who read about the genetic components of obesity consumed more cookies than those who read about the effects of social networks on obesity (see Dar-Nimrod et al., 2014). We postulated that lay beliefs about heritability of moral character is a type of essentialist belief. However, the implications should extend beyond the question of how

people believe genes are expressed within one individual. They should have implication for moral self-judgment, especially when a person who shares their gene acts morally or immorally.

The role of heritability beliefs in self-judgments

In the current research, we focused on lay beliefs about heritability of moral character as moderator. When people believe that morality is genetically determined, the actions (moral or immoral) of genetically linked others may manifest in judgments about one's own morality. For instance, a person who believes that traits are inherited may have their own self-perception as an honest person shaken if they learn of a parent's cheating behavior. Of course, heritability is not only a lay theory: people do share genes with related family members that do often determine some similarities (e.g., reading abilities, Gayán, & Olson, 2001; antisociality, Koenig et al., 2007). We contend that a strong belief in heritability could have an effect on self-concept that goes well beyond what may be expected simply from observing family members' behaviors over time and noting similarities (which could well be partly genetic). When a single action of any one family member is salient, that action may be more likely to affect the self-concept to the extent an individual believes in heritability. Of course, even if a trait is partly genetic, any singular action of a family member could have multiple causes beyond genetic propensity. We expected that a strong belief in heritability could lead people to interpret family members' actions as more diagnostic of their own characteristics, resulting in an individual feeling rather moral when they observe a family member behaving charitably yet feeling immoral after observing a family member behaving selfishly.

Importantly, we make predictions only about people's *beliefs* about genetic heritability, not the effects of genes themselves. The current studies were not designed to address the debate about how much of one's moral character is actually heritable or not. Surely some proportion of

variance in personality and character are heritable (Koenig et al., 2007; Olson et al., 2001) and the rest is contingent on some combination of socialization, peers, and life circumstances. The specific balance of these factors is not relevant to our research question; instead, we focused on people's *beliefs* about these factors. Specifically, we hypothesized beliefs should have an influence irrespective of what “true” proportion of morality is heritable versus socially acquired.

Overview of the present research

Across seven studies, we examined the effects of thinking of another person's acts on participants' self-concept. Specifically, we focused on the consequences of thinking of family members' acts – family members share various group identities (e.g., ethnicity, culture) but are unique in that they also share a genetic link. We examined whether individuals shift (even temporarily) their own self-concept when confronted with the action of a family member as a function of how strongly they believe in genetic heritability.

First, we examined acts by family members, broadly defined, on moral self-judgments (Study 1a) and helpful self-judgments (Study 1b). Next, we examined acts by parents, compared to friends or strangers (Study 2a) or compared to friends (Study 2b). Across these studies we expected that the possible effect of recalling a family members' or a parents' act on one's self-concept depends on individuals' lay beliefs about heritability. We predicted that those who believe in genetic heritability of moral character will be more susceptible to change their self-judgements due to a family member's act than those who do not believe in genetic heritability. We expected that individuals who believe in genetic heritability of moral character would report more moral self-judgments themselves after recalling a moral act by a family member, and vice versa after recalling immoral acts. In Study 3, we compared lay beliefs about heritability with beliefs about socialization and entity mindset beliefs, and in Study 4 we experimentally

manipulated lay beliefs about heritability. Finally, in Study 5, we assessed not only self-judgments but also hypothetical willingness to help as a function of recalled acts by genetically related or unrelated family members and lay beliefs in heritability.

Reflecting a commitment to open science and transparency, we confirm that the current manuscript reports on all studies conducted in our lab to date testing the moderating effect of heritability beliefs on the effect of others' actions on one's own moral self-concept.

Study 1: Effect of family members' past acts on self-judgments as a function of heritability beliefs

The purpose of the initial studies (Study 1a and 1b) was to examine the influence of family members' actions on the way people see themselves, and whether any influence is a function of their lay beliefs about the heritability of moral character. We expected that a family member's past acts would affect participants' own moral self especially if they believed strongly in genetic heritability of moral character and less so if they did not believe in genetic heritability of moral character. Thus, we expected an interaction between the act condition and participants' beliefs.¹

We examined a variety of moral acts and moral self-judgments (Study 1a) as well as a specific domain: helpful acts and helpful self-judgments (Study 1b). Both studies were preregistered (Study 1a: <http://aspredicted.org/blind.php?x=mi84kw>; Study 1b: <https://aspredicted.org/blind.php?x=85yi9e>). Unabbreviated materials and data for Studies 1a and 1b are available here: https://osf.io/5vkgt/?view_only=0540b75fdcfb48c689a175344fafb3f3)

¹ Note that this interaction was only expected for Study 1a. Thereafter, we only expected and preregistered the simple effect of recalling a past act on self-judgments for those individuals who strongly believe in heritability. However, the expectation of a simple effect implies an interaction.

Study 1a

Participants. We posted 400 slots and recruited 406 American MTurk workers. Participants were asked to recall a past (im)moral action committed by a family member. In this, and all other studies, we excluded participants who did not recall the past behavior as instructed (i.e., a nonsense response was provided, response field left blank, or recalled something they themselves did rather than something someone else did). Thirty-nine participants did not recall the past behavior as instructed and 33 participants recalled a behavior by genetically-unrelated family members (e.g., in-laws, spouses). These participants were removed, leaving a final sample of 334 participants ($M_{\text{age}}=35.24$, $SD=10.66$, 20-72 years; 40% female). Sensitivity analyses indicate that the sample size is sufficient to detect a small-medium effect size ($f=.15$ or $d=.30$) in a two-way ANOVA with 80% power.²

Procedure. Participants first responded to a demographic survey. Next, a single item measured the extent to which participants believed moral traits are heritable (“Moral Character is mostly genetically determined.”). The item was embedded in a larger scale on other beliefs about moral character. Response options ranged from *Strongly Disagree (1)* to *Strongly Agree (7)*. Agreement with this statement ranged from 1 to 6 ($M=2.38$, $SD=1.28$). Thus, overall participants did not believe strongly in heritability of morality (below the midpoint), although there was considerable variability.

Participants were randomly assigned to consider either eight immoral behaviors ($n=163$; e.g., “act uncaring towards a person who is sad”) or moral behaviors ($n=171$; e.g., “act caring towards a person who is sad”). Behavioral descriptions were designed to exemplify the moral

² We calculated power sensitivity with G*Power. As G*Power does not have a function for estimating continuous moderators, we estimated the continuous heritability beliefs variable as dichotomous groups in this and all other power sensitivity analyses.

characteristics in Aquino and Reed (2002). Participants read “Here are some behaviors that a person might do,” followed by the list of actions. Behaviors were not labeled “moral” or immoral.” Then, participants read:

“All of us act this way sometimes. For this study, we would like you to think about a time when one of your family members did one of these behaviors. They might have acted this way towards you or towards someone else. You might have seen them act this way or only heard about them acting this way. Take a moment to recall a memory.”

They described the behavior briefly (e.g., “Mom took dinner to a church member who was dying of cancer. This was one of her friends, so not only did she take a hot meal but she also sat with her, fellowshiped (sic) with her, and laughed with her”, “When we passed by a homeless person asking for a change at a freeway exit, my parents never gave them money, no matter what the situation they claimed to be in. Sometimes I would see a homeless mother with her child begging for money, or a homeless veteran”). Participants recalled incidents by their parents (44.6%), their siblings (34.1%), their aunts/uncles/cousins (12.3%), their grandparents (2.7%), their children (6.3%).

Participants then rated how much each of nine characteristics (*caring, compassionate, fair, friendly, generous, hardworking, helpful, honest, kind*) describe they themselves as a person. Responses were anchored at 1 (*Does not describe me at all*) and 5 (*Describes me very well*). These nine characteristics have been validated as moral exemplars (Aquino & Reed, 2002). Items were averaged to create an index of moral self-judgment ($\alpha=.89$, $M=4.06$, $SD=0.66$), which served as the dependent variable. Although our hypotheses primarily centered on people’s moral self-judgements, we also included a related scale assessing moral identity which captures the degree to which people value and want to have these characteristics. In this

10-item scale (Aquino & Reed, 2002) participants reported how much they desire to have these nine characteristics (e.g., “It would make me feel good to be a person who has these characteristics”), and how much they publicly express these characteristics (e.g., “I sometimes wear clothes that identify me as having these characteristics”) on scales from *strongly disagree* (1) to *strongly agree* (5). Items were averaged into a moral identity score ($\alpha=.89$, $M=3.67$, $SD=0.66$), which correlated with the moral self-judgments, $r(330) = .56$, $p < .001$.

Results. Using multiple regression (PROCESS V3.2, Model 1, Hayes, 2018), we entered act condition (0=*moral*, 1=*immoral*), genetic heritability beliefs, and their interaction term as predictors variables, and helpful self-rating as outcome variable. All predictors were centered before analysis. See Table 1 for effect coefficients.

Table 1.

Effect of recalling a family member’s act on moral self-judgments (Study 1a) or Helpful Self-judgments (Study 1b) as a function of heritability beliefs.

Study		<i>B</i> 95% <i>CI</i> [<i>LL</i> ; <i>UL</i>]	<i>t</i> , <i>p</i>	η^2_p
1a	<i>DV: Moral Self-Judgment</i>			
	Act condition	-.10 [-.24;.04]	$t(326) = -1.39$, $p = .165$	.002
	Heritability beliefs	-.07 [-.12;-.01]	$t(326) = -2.34$, $p = .020$	.017
	Act $\times$ Heritability beliefs	-.09 [-.20;.02]	$t(326) = -1.58$, $p = .116$	.008
	<i>DV: Moral Identity Score</i>			
	Act condition	.09 [-.05;.23]	$t(326) = 1.26$, $p = .209$	.011
	Heritability beliefs	-.03 [-.09;.02]	$t(326) = -1.15$, $p = .250$	.004
	Act $\times$ Heritability beliefs	-.08 [-.19;.03]	$t(326) = -1.46$, $p = .147$	.006
	<i>DV: Helpful Self-judgment</i>			
	Act condition	-.17 [-.36;.02]	$t(331) = -1.79$, $p = .075$	.002
1b	Heritability beliefs	.03 [-.05;.12]	$t(331) = 0.81$, $p = .419$	.002
	Act $\times$ Heritability beliefs	-.13 [-.30;.03]	$t(331) = -1.50$, $p = .134$	.007

Note. Low heritability beliefs estimated at 1 standard deviations below the mean, high heritability beliefs estimated at 1 standard deviation above the mean. Act coded as 1=immoral/unhelpful act, 0 = moral/helpful act.

There was no main effect of act but a main effect of heritability beliefs, indicating that people with high heritability beliefs felt slightly less moral on average. We had hypothesized an interaction of act and beliefs, but this interaction did not reach statistical significance. However, we had also planned to test the specified simple effects because they provide a more targeted test of the hypothesis than the interaction itself. As hypothesized, recalling an immoral (vs. a moral) act by a family member significantly decreased participants' moral self-judgments at high levels (+1SD) of heritability beliefs, $B = -.21$ 95%CI[-.41;-.01], $t(326) = -2.10$, $p = .036$, but not at low levels (-1SD) of heritability beliefs, $B = .01$ 95%CI[-.19;.21], $t(326) = .14$, $p = .892$ (Figure 1).

Figure 1. Estimated means for moral (Study 1a) or helpful (Study 1b) self-judgments after recalling a moral/immoral (Study 1a) or helpful/unhelpful (Study 1b) act by a family member at high levels (+1SD) and low levels (-1SD) of genetic heritability beliefs. Standard errors represent the 95% confidence interval.

We also examined the moral identity scale as alternative outcome variable. We had hypothesized an interaction of act and beliefs, but this interaction did not reach statistical significance. Further, the hypothesized simple effects also did not emerge: recalling an immoral (vs. a moral) act by a family member did not decrease participants' moral identity score significantly at high levels of heritability beliefs, $B = -.01$ 95%CI[-.22;-.19], $t(326) = -0.14$, $p = .886$, but marginally increased it at low levels of heritability beliefs, $B = .20$ 95%CI[.05;.40], $t(326) = 1.92$, $p = .056$. It may be that the moral identity scale is not an optimal test of the hypothesis that people's moral self-judgements will be affected by relatives' actions, because people may value even traits they don't think they possess. In subsequent studies we focused on the measures that assessed possession of moral characteristics directly.

Study 1b

Participants. We posted 400 slots and recruited 403 American MTurk workers. We excluded 68 participants who did not recall the past behavior as instructed, leaving a final sample of 335 participants ($M_{\text{age}} = 38.00$, $SD = 11.30$, 20-74 years; 50% female). Sensitivity analyses indicate that the sample size is sufficient to detect a medium effect size ($f = .20$ or $d = .4$) in a two-way ANOVA with 95% power and a small effect size ($f = .10$ or $d = .20$) with 50% power.

Procedure. Genetic heritability beliefs were assessed with three items: "Moral character is mostly genetically determined," "Some of a person's moral character is likely inherited from the person's parents and grandparents," and "A person's moral character has nothing to do with their genetics. [reversed].", embedded in a larger scale. Response options ranged from *Strongly Disagree (1)* to *Strongly Agree (7)*. These three items were averaged to create an index of heritability beliefs ($\alpha = .72$, $M = 3.01$, $SD = 1.14$).

Participants were then randomly assigned to describe an *unhelpful* behavior ($n=167$) or a *helpful* behavior ($n=168$) one of their family members did in the past, using similar wording as the previous study. Participants recalled incidents by their parents (48.2%), their siblings (21.9%), their aunts/uncles/cousins (20.9%), their grandparents (8.3%), or their children (0.7%).

Participants then rated how *helpful* they themselves are as a person (embedded in the larger scale of several moral adjectives used in the previous study). Responses were anchored at 1 (*Does not describe me at all*) and 5 (*Describes me very well*).

Results. Using multiple regression (PROCESS V3.2, Model 1, Hayes, 2018), we entered act condition (0 = *helpful*, 1 = *unhelpful*), genetic heritability beliefs, and their interaction term as predictors variable, and helpful self-rating as outcome variable. All predictors were centered before analysis. There was no significant main effect of act condition and of heritability beliefs (Table 1). However, we had preregistered that the simple effect of act for those high in heritability beliefs would provide a more targeted test of the hypothesis than the interaction itself. This contrast revealed that, as predicted, recalling an unhelpful (vs. a helpful) act by a family member decreased participants' helpful self-judgments at high levels (+1SD) of heritability beliefs, $B = -.32$ 95%CI[-.59;-.05], $t(331) = -2.33$, $p = .021$, but not at low levels (-1SD) of heritability beliefs, $B = -.03$ 95%CI[-.30;.24], $t(331) = -0.20$, $p = .841$ (Figure 1).

Discussion

Studies 1a and 1b provided some support for our hypothesis that people with strong beliefs in heritability of moral character viewed themselves as significantly more helpful or moral after recalling a helpful or moral act by a family member versus a unhelpful or immoral act. Although a post-hoc reading of these results may suggest that it is obvious that participants with high heritability beliefs would perceive more correspondence with relatives, it is important

to underscore that participants only recalled a *single* (randomly assigned) act by a family member. Even among people who perceive more family resemblance in general, it is notable that their moral self-view would shift on the basis of a single act by a family member.

One important limitation of the first studies was that because we only elicited the acts of family members, we cannot be certain that people who believe in genetic heritability would be especially affected by family relative to the acts of *other* people. Specifically, we cannot rule out the possibility that those who believe in genetic heritability of moral character are simply more susceptible to being primed with thoughts of (im)morality – perhaps writing about a family member’s act reminded participants of similar such acts they committed themselves. It is possible that writing about anyone’s moral actions – even someone not genetically related – would have had a similar impact on self-concept. We addressed this limitation in the subsequent study.

Study 2: Effect of parents’ versus friends’ or strangers’ past acts on self-judgments as a function of heritability beliefs

In Study 2, we included control groups in which participants were asked to recall a friends’ past act or a strangers’ past act. Doing so helped us determine whether an unrelated close other’s actions influences self-judgments. It is possible that friends’ actions will have some impact on self-judgments akin to how close others’ actions affected emotions in past research (see Fortune & Newby-Clark, 2008; Müller-Pinzler et al., 2015). Although family members are also (sometimes) close others, they are distinct in that genetically related family members are not chosen in the way friends are.

In this study, we asked participants to recall a past act by their parents (rather than family members more general), narrowing the focus and selecting for a more consistent degree of

genetic relatedness. We again predict that family members' actions will affect self-concept particularly for people high – but not low – in heritability beliefs. In contrast, beliefs about genetic heritability of moral character should not moderate moral self-judgment following recall of an act committed by a friend or a stranger. This study was not preregistered. All data analyses were conducted after data collection was complete. All conditions and dependent variables are reported. Unabbreviated materials and data can be found here:

https://osf.io/5vkgt/?view_only=d6bb905b0e7f426a952d83942ffbadbc.

Study 2a

Participants. We posted 600 participation slots and recruited 609 American MTurk workers. We excluded 62 participants who did not recall a past behavior as instructed, leaving a final sample of 547 participants ($M_{\text{age}}=39.52$, $SD=12.71$, 18-84 years; 53% female). Sensitivity analyses indicate that the sample size is sufficient to detect a small-medium effect size ($f=.14$ or $d=.28$) in a three-way ANOVA with 80% power.

Procedure. Genetic heritability beliefs were assessed with the same three items as in the previous study ($\alpha=.71$, $M=2.86$, $SD=1.07$). Participants were randomly assigned to one of six conditions of the 3 (actor condition: parents vs. friends vs. strangers) $\times$ 2 (act condition: immoral vs. moral behavior) between-subjects design. In the parents' condition they were asked to think about their parents. In the friends' condition they were asked to think about two close friends. They were asked to consider either moral behaviors or mildly immoral behaviors (as in Study 1a). They described a time when either one of their parents ($n=94$ for moral and $n=95$ for immoral condition), one of the friends they listed earlier ($n=86$ for moral and $n=88$ for immoral condition), or a stranger behaved this way in the last year ($n=92$ for moral and $n=92$ for immoral condition). They described the behavior briefly and then rated the morality of the behavior on a

scale from *Extremely immoral* (1) over *Neither moral nor immoral* (5) to *Extremely moral* (9).

Participants assigned to the moral behavior condition rated the recalled behavior as more moral ($M=8.23$, $SD=1.32$) than participants assigned to the immoral behavior condition ($M=3.76$, $SD=1.80$), $t(543)=32.949$, $p<.001$, $d=2.80$, indicating that the manipulation was successful.

Lastly, participants rated how much each of nine moral characteristics describe them as a person on the same scale as in Study 1a ($\alpha=.90$, $M=4.11$, $SD=.65$), which served as the dependent variable.

Results. A multiple regression (PROCESS V3.2, Model 3, Hayes, 2018) was conducted by entering the continuous heritability beliefs measure, the act condition (0 = *moral*, 1 = *immoral*) and the actor condition as predictor variables. Because the actor condition had more than two levels, we used PROCESS' multi-categorical effect coding function, and compared the parent condition to the friend condition in the first effect code Z1 (-1=*parents*, 1=*friends*, 0=*strangers*) and to strangers in the second effect code Z2 (-1=*parents*, 0=*friends*, 1=*strangers*). The act $\times$ heritability beliefs $\times$ Z1 interaction failed to reach statistical significance, whereas the act $\times$ heritability beliefs $\times$ Z2 interaction was significant. See Table 2 for all effect coefficients.

Table 2.

Effect of recalling a parent's or a friend's or a stranger's act on moral self-judgments (Study 2) as a function of genetic beliefs.

Study		<i>B</i> 95% <i>CI</i> [<i>LL</i> ; <i>UL</i>]	<i>t</i> , <i>p</i>	η^2_p
2a	Act condition	-.04 [-.15; .07]	<i>t</i> (533) = -0.68, <i>p</i> = .493	.006
	Genetic Beliefs	-.03 [-.08; .02]	<i>t</i> (533) = -1.18, <i>p</i> = .237	.004
	Z 1 (friends vs. parents)	-.07 [-.15; .008]	<i>t</i> (533) = -1.76, <i>p</i> = .079	.028
	Z 2 (strangers vs. parents)	-.003 [-.08; .07]	<i>t</i> (533) = -0.07, <i>p</i> = .941	.000
	Act × Heritability Beliefs	-.04 [-.14; .06]	<i>t</i> (533) = -0.80, <i>p</i> = .425	.008
	Act × Z 1	.05 [-.11; .20]	<i>t</i> (533) = 0.58, <i>p</i> = .565	.009
	Act × Z 2	.10 [-.06; .25]	<i>t</i> (533) = 1.24, <i>p</i> = .215	.017
	Heritability Beliefs × Z 1	-.01 [-.08; .07]	<i>t</i> (533) = -0.14, <i>p</i> = .889	.000
	Heritability Beliefs × Z 2	.02 [-.05; .09]	<i>t</i> (533) = 0.62, <i>p</i> = .537	.009
	Act × Heritability Beliefs × Z 1	-.09 [-.24; .06]	<i>t</i> (533) = -1.22, <i>p</i> = .223	.019
	Act × Heritability Beliefs × Z 2	.16 [.02; .31]	<i>t</i> (533) = 2.23, <i>p</i> = .026	.046
2b	Act condition	-.13 [-.30; .05]	<i>t</i> (341) = -1.42, <i>p</i> = .156	.001
	Genetic Beliefs	-.03 [-.10; .03]	<i>t</i> (341) = -0.96, <i>p</i> = .339	.004
	Actor (friends vs. parents)	.09 [-.09; .26]	<i>t</i> (341) = 0.97, <i>p</i> = .330	.015
	Act × Heritability Beliefs	-.10 [-.24; .03]	<i>t</i> (341) = -1.52, <i>p</i> = .130	.007
	Heritability Beliefs × Actor	-.13 [-.26; .003]	<i>t</i> (341) = -1.93, <i>p</i> = .055	.011
	Act × Actor	-.27 [-.63; .08]	<i>t</i> (341) = -1.52, <i>p</i> = .129	.000
	Act × Heritability Beliefs × Actor	-.07 [-.34; .20]	<i>t</i> (341) = -0.51, <i>p</i> = .609	.001

Note. Low heritability beliefs estimated at 1 standard deviations below the mean, high heritability beliefs estimated at 1 standard deviation above the mean. Act coded as 1 = immoral/unhelpful act, 0 = moral/helpful act.

Specific hypotheses focused again on targeted simple effects. The hypothesized pattern for parents was supported. For those thinking about a parent's act, recalling an immoral (vs. moral) act decreased participants' moral self-judgement at high levels (+1SD) of heritability beliefs, $B = -.30$ 95% *CI*[-.57; -.04], $t(533) = -2.24$, $p = .026$, but not at low levels (-1SD) of heritability beliefs, $B = -.06$ 95% *CI*[-.32; .20], $t(533) = -.46$, $p = .646$. In contrast, and as expected, among those who thought about a friend's act, recalling an immoral (vs. moral) act did not affect participants' moral self-judgement at low levels of heritability beliefs, $B = .15$ 95% *CI*[-.13; .43], $t(533) = 1.07$, $p = .285$, or at high levels of heritability beliefs, $B = -.14$ 95% *CI*[-.42; .14], $t(533) = -$

0.95, $p = .340$. Among those who thought about a stranger's act, recalling an immoral (vs. moral) act did not affect participants' moral self-judgment at low levels of heritability beliefs, $B = -.07$ 95%CI[-.34;.20], $t(533) = -0.52$, $p = .602$, or high levels of heritability beliefs, $B = .19$ 95%CI[.07;.45], $t(533) = 1.43$, $p = .154$.

Study 2b

We replicated Study 2a in the domain of helpfulness, examining the difference between parent's and friends' past acts, specifically. This replication study was preregistered (<http://aspredicted.org/blind.php?x=qk5zf8>).

Participants. We posted 500 participation slots and recruited 500 American MTurk workers. These were all collected in one day in one wave and we did not analyze data before stopping data collection. This sample size differed from the preregistered sample of 400 participants due to an error when posting the study but all data was collected at once and before data analysis commenced. A total of 150 participants were excluded from analyses because they either did not recall a past behavior ($n=120$) or did not list the correct person ($n=30$), leaving a final sample of 350 participants ($M_{age} = 36.76$, $SD = 11.56$, 60.3% male).

Procedure. Participants were randomly assigned to one of four condition of the 2 (actor condition: parents vs. friends) $\times$ 2 (act condition: helpful vs. unhelpful behavior) between participants design. All participants listed the name/nickname of their mother, their father, and a close friend. They then described a time when either one of their parents, or the friend they listed earlier acted helpfully or unhelpfully (as in Study 1b). Genetic heritability beliefs were assessed with the same item as in Study 1a ($M = 2.50$, $SD = 1.32$). We planned to use the three-item measure but instead only the one item was programmed due to a mistake in communication. Participants rated their own helpfulness on a single item as in Study 1b ($M = 4.12$, $SD = .84$).

Results. A multiple regression (PROCESS V3.2, Model 3, Hayes, 2018) was conducted by entering the continuous genetic beliefs measure, the act condition (0 = *helpful*, 1 = *unhelpful*) and the actor condition (0 = *friend*, 1 = *parent*) as predictor variables. The three-way act×actor×beliefs interaction was not significant (Table 2). However, the key, preregistered, hypothesis focused again on the predicted contrast in the parent condition: we expected that act condition should have an effect among those high but not lower in belief in heritability of morality. No specific patterns or contrasts were predicted for the friend condition. As expected, for those thinking about a parent’s act, recalling an unhelpful act (vs. a helpful act) significantly decreased participants’ helpful self-judgment at high levels (+1SD) of genetic heritability beliefs, $B = -.46$ 95%CI[-.82; -.09], $t(341) = -2.45$, $p = .015$, but not at low levels (-1SD) of heritability beliefs, $B = -.09$ 95%CI[-.43; .26], $t(341) = -0.49$, $p = .625$. For those thinking about a friend’s act, recalling an unhelpful act (vs. a helpful act) did not affect participants’ helpful self-judgment at low levels of heritability beliefs, $B = 0.09$ 95%CI[-.26; .45], $t(341) = 0.52$, $p = .602$, nor at high levels of genetic heritability beliefs about morality, $B = -0.09$ 95%CI[-.43; .26], $t(341) = -0.49$, $p = .625$.

Discussion

Study 2a and 2b replicated the results observed in Studies 1a and 1b. Across all four studies, the interactions were not significant, although the same pattern in simple effects emerged: Participants high in self-reported genetic heritability beliefs reported a self-concept that was more in line with a highlighted parents’ past act: feeling more helpful or moral after simply recalling a single helpful or moral act their parent committed than after recalling an unhelpful or immoral act. Study 2a and 2b showed that this pattern did not occur when participants brought to

mind a friend's or a stranger's past act, suggesting that the role of genetic heritability beliefs regulates only the impact of genetically related others.

Study 3: Comparing heritability beliefs to other types of lay beliefs

Across the previous studies, using different types of actions, family relations, and controls, the hypothesized pattern of simple effects consistently emerged: people who are high in the belief that morality is genetically heritable make moral self-judgments that are contingent on a single recalled (im)moral act committed by a family member (but not for non-family actors). Regardless of any *actual* effect of genetic heritability on morality, this effect of people's *beliefs* about heritability is striking: it leads those high in heritability belief to report a different moral self-concept simply due to the salience of a single act another person has committed. Paradoxically, then, people who believe strongly that genes determine their traits might on one hand believe their qualities to be more immutable (Heine et al., 2017) and on the other hand may have more fluid moral self-concepts that can shift after exposure to a family member engaging in a single act of kindness or callousness.

However, family members' actions could be diagnostic for reasons other than heritability. People may also envision other mechanisms by which family members, especially parents, influence an individual's moral self. For instance, people may have lay beliefs about the influence of family socialization on morality that also moderate the link between parents' behavior and self-perceptions about one's morality. Although we have little doubt that many people hold socialization beliefs as well, it is less clear that a single (im)moral behavior enacted by a parent would be seen as emblematic of that socialization and diagnostic of one's own morality. To examine both lay theories, we included a parallel measure of socialization belief in Study 3, in addition to heritability beliefs. We also measured a conceptually related lay belief—

the extent to which people believe that moral character is stable and unchangeable (moral entity beliefs, Dweck, 2000). This belief may be a component of genetic heritability beliefs, and we included it to examine discriminant validity.

In line with previous studies, we again expected that a parent's past act would affect participants' moral self-judgment particularly if they believed strongly in genetic heritability of moral character. We had no predictions for the role of socialization beliefs. As noted earlier, we suspected that a single act may be deemed as a less meaningful indicator of socialization than, for instance, sustained behavioral patterns over time. Second, in reading through the kinds of actions mentioned, many appear to be relatively recent (i.e., adults observing their parents' recent actions, not recollections of long-past childhood experiences. It may be unlikely for adult participants to reflect on a recent (im)moral act of a family member and consider themselves socialized by it. Although we do not measure or test event recency in the current studies, it is conceivable that socialization lay theories would be more likely to moderate memories of childhood formative experiences than the kind of sampling of (im)moral actions we obtained in these studies. In contrast, people high in genetic heritability beliefs may well deem any parental action to be diagnostic.

This study was not preregistered. The original purpose of the study was to test the causal impact of heritability theories.³ We attempted to manipulate heritability beliefs via an "news"

³ Participants read one of two articles that emphasized , emphasizing either the contribution of genes (e.g., 41% of antisocial behavior can be explained by genes) or the contribution of environmental factors (e.g., 59% can be explained by environmental factors) on prosocial and antisocial behavior. They were based on previously published research (Koenig et al., 2007). In the first sample, both articles included a picture of twin babies. In the, in a second sample, the article did not include a picture. This manipulation was very subtle (reframing the original numbers but not the relative impacts themselves) and did not shift genetic heritability beliefs significantly.

article. In a first sample we collected, this article included the same picture (of twin babies) in both conditions. The only analyses conducted after the first sample collection was a test of the manipulation, revealing that the manipulation was unsuccessful. We collected another sample with the identical manipulation, excluding the picture. The manipulation was again unsuccessful. Thus, we aggregated across conditions and examined the relative moderating effect of heritability, socialization, and entity beliefs. All analyses were conducted after both samples had been collected. All conditions and outcomes are reported. Unabbreviated materials and data can be found here: https://osf.io/5vkgt/?view_only=5b88e7b6b6094633ae6ca64d0333749b.

Method

Participants. Because we used the same procedure with both samples (apart from the inclusion of a picture in the unsuccessful article manipulation) and the samples were collected only two weeks apart, we decided to combine the two samples ($N=407$ and $N=407$) to permit a higher-powered test of the act $\times$ beliefs interaction than previous studies. Of the initial 814 U.S. adults recruited via MTurk, we excluded 76 participants who did not recall the past behavior as instructed and 53 who did not list the correct person when recalling the past act (a parent), leaving a final sample of 685 participants ($M_{\text{age}}=36.08$, $SD=11.38$, 18-78 years; 49.7% female). Sensitivity analyses indicate that the sample size is sufficient to detect a small effect size ($f=.11$ or $d=.22$) in a two-way ANOVA with 80% power.

Procedure. Heritability beliefs were assessed with the same three item measure as in previous studies ($\alpha=.61$, $M=3.33$, $SD=1.02$). Participants also rated their socialization beliefs on three items (“Moral character is mostly determined by someone's upbringing.”, “Some of a person's moral character is likely taught by the person's parents.”, and “A person's moral character has little to do with this person's personal experiences. [reversed]”). Response options

ranged from *Strongly Disagree* (1) to *Strongly Agree* (7). These three items were averaged into an index of socialization beliefs ($\alpha=.53$, $M=4.52$, $SD=0.84$). Participants also rated the extent to which they believe moral traits are stable and unchangeable (adapted from previous items assessing incremental and entity beliefs in general, Dweck, 2000; “A person's moral character is something very basic about them and it can't be changed much.”, “Whether a person is responsible and sincere or not is deeply ingrained in their personality. It cannot be changed very much.”, and “There is not much that can be done to change a person's moral traits (e.g., conscientiousness, uprightness, and honesty).”). Response options ranged from *Strongly Disagree* (1) to *Strongly Agree* (7). These three items were averaged into an index of entity beliefs ($\alpha=.92$, $M=3.28$, $SD=1.29$).

Participants were then randomly assigned to recall an immoral act ($n=337$) or a moral act ($n=348$) by a parent, as in Study 1a. They also rated the morality of the recalled behavior on a scale from *Extremely immoral* (1) over *Neither moral nor immoral* (5) to *Extremely moral* (9). Participants assigned to the moral condition did rate the recalled behavior as more moral ($M=8.12$, $SD=1.56$) than participants assigned to the immoral condition ($M=4.19$, $SD=2.07$), $t(682)= 28.17$, $p<.001$, $d= 2.15$, indicating that the manipulation was successful. As in Studies 1a and 2, participants rated how much each of nine moral characteristics describe them as a person ($\alpha=.91$, $M=4.05$, $SD=0.71$), which served as the dependent variable.

Results. Participants reported agreeing with socialization beliefs more than with genetic heritability beliefs, $t(684)= 20.84$, $p<.001$, and these beliefs correlated moderately negatively, $r(683)= -.29$, $p<.001$. Participants reported agreeing with entity beliefs even less than with genetic heritability beliefs, $t(683)= 4.93$, $p<.001$, although these beliefs were positively correlated, $r(683)=.53$, $p < .001$; this correlation was low enough to suggest that the two beliefs

are not identical concepts. Entity and socialization beliefs were correlated at $r(683) = -.32$, $p < .001$.

Using multiple regression (PROCESS V3.2, Model 1, Hayes, 2018), we entered act condition (0 = *moral*, 1 = *immoral*), heritability beliefs, and their interaction term as predictors variables, and moral self-judgments as outcome variable. All predictors were centered before analysis. See Table 3 for effect coefficients. The act $\times$ heritability beliefs interaction was significant. The simple effects again showed that recalling an immoral (vs. a moral) act by a parent led participants to judge themselves as marginally less moral at high levels (+1SD) of heritability beliefs, $B = -.22$ 95%CI[-.37; -.07], $t(681) = -2.85$, $p = .005$, but not at low levels (-1SD) of heritability beliefs, $B = .06$ 95%CI[-.09; .21], $t(681) = .75$, $p = .457$.

Table 3.

Effect of recalling a parent's act on moral self-judgments as a function of heritability beliefs, socialization beliefs, or entity beliefs (Study 3).

	Predictors	B 95%CI[LL;UL]	t , p	η^2_p
<i>Model 1</i>	Act condition	-.08 [-.19;.03]	$t(681) = -1.48$, $p = .138$	.007
	Heritability Beliefs	-.002 [-.07;.06]	$t(681) = -0.08$, $p = .938$	.000
	Act $\times$ Heritability Beliefs	-.18[-.31;-.04]	$t(681) = -2.54$, $p = .011$	.009
<i>Model 2</i>	Act condition	-.07 [-.17;.04]	$t(681) = -1.27$, $p = .205$	.001
	Socialization Beliefs	.22 [.16;.28]	$t(681) = 7.07$, $p < .001$	.069
	Act $\times$ Socialization Beliefs	.03 [-.09;.16]	$t(681) = 0.56$, $p = .578$	.000
<i>Model 3</i>	Act condition	-.07 [-.18; .03]	$t(681) = -1.38$, $p = .167$	.001
	Entity Beliefs	-.08 [-.12; -.04]	$t(681) = -3.77$, $p < .001$	.021
	Act $\times$ Entity Beliefs	-.06 [-.16; .02]	$t(681) = -1.52$, $p = .128$	.003

Note. Low heritability beliefs estimated at 1 standard deviations below the mean, high heritability beliefs estimated at 1 standard deviation above the mean. Act coded as 1= immoral/unhelpful act, 0 = moral/helpful act.

Socialization beliefs. In a separate model, we entered act condition, socialization beliefs, and their interaction term as predictor variables, and moral self-judgments as outcome variable. The act×socialization beliefs interaction was not significant (Table 3). Recalling an immoral (vs. moral) act by a parent had no effect on participants' self-judgments at high levels (+1SD) of socialization beliefs, $B = -.04$ 95%CI[-.18; .11], $t(681) = -.49$, $p = .627$, or at low levels (-1SD) of socialization beliefs, $B = .10$ 95%CI[-.24; .05], $t(681) = 1.30$, $p = .194$ (Figure 3).

Entity beliefs. In a separate model, we entered act condition, entity beliefs, and their interaction term as predictor variables, and moral self-judgments as outcome variable. The act×entity beliefs interaction was not significant (Table 3). Recalling an immoral (vs. moral) act by a parent had no effect on participants' self-judgments at low levels (-1SD) of entity beliefs, $B = .01$ 95%CI[-.14;.16], $t(681) = 0.10$, $p = .921$ but was significant at high levels (-1SD) of entity beliefs, $B = -.16$ 95%CI[-.31;-.08], $t(681) = -2.06$, $p = .040$, which suggests that believing in the immutability of moral characteristics also leads individuals to shift their self-judgments after recalling a parent's act (Figure 3). Indeed, believing in both heritability of moral characteristics and the immutability of characteristics might result in the strongest effects. In exploratory analyses we entered act condition, heritability beliefs, entity beliefs, and their interaction terms as predictors of moral self-judgments. The act×heritability beliefs interaction remained significant, $B = -.18$ 95%CI[-.34;-.02], $t(677) = -2.16$, $p = .032$, the act×entity beliefs interaction did not, $B = -.02$ 95%CI[-.12;.07], $t(677) = -0.46$, $p = .646$. The three-way interaction did not become significant, $B = .07$ 95%CI[-.02;.16], $t(677) = 1.50$, $p = .135$. Similarly, the act×heritability beliefs interaction remained significant, $B = -.16$ 95%CI[-.30;-.03], $t(680) = -2.33$, $p = .020$ in a model that entered act condition, heritability beliefs, their interaction term, and entity beliefs as simple covariate.

Discussion

Study 3 was the highest-powered study of all the previous studies. It was also the first study in which we were able to detect a significant interaction between past act and heritability beliefs. Once again, we found that parents' acts influenced moral self-judgment *if* people subscribe to beliefs in the genetic heritability of moral character. The results of Study 3 also suggest that the moderating effect of heritability beliefs was distinct from socialization beliefs or predicted variance over and above general entity beliefs (Dweck, 2000). Notably, the parent's acts did not influence participants' self-concept for those who strongly believed in the role of socialization as determining moral character. It may be that a parent's genetic influence seems more absolute than their influence through teachings and upbringing (i.e., many others might also convey information, but only parents convey genes). It is also possible that a single instance of past behavior is not as meaningful when believing that moral character is made up from upbringing (extensive, diverse teachings) as when believing that moral character is something essential within people—so the single moral or immoral act described as part of the study may be seen as more diagnostic by those who believe in genetic heritability of moral character.

Study 4: Can heritability beliefs be temporarily shifted?

In Study 4, we experimentally manipulated beliefs about genetic heritability of moral character. Learning from the (failed) manipulation attempt in Study 3, we attempted to strengthen the manipulation by taking a two-pronged approach. We first asked participants to read about the strong (vs. weak) influence genes may have and then asked them to explain in their own words why genes may matter a lot (or little) to moral character. The manipulation used anecdotal stories (rather than statistics, cf. Study 3), explicitly argued in favor of strong or weak role of genes, respectively (rather than slightly reframing the same finding, cf. Study 3), and also

explicitly mentioned moral character (rather than general personality traits, cf. Study 3). Then, participants described an immoral or moral behavior of one of their parents and reported moral self-judgments. We expected that a parent's act would influence moral self-judgments *only* after reading and writing about the importance of genetics but not after reading and writing about the unimportance of genetics. Thus, we expected an interaction effect between act condition and the beliefs manipulation condition, and a simple effect of act within the high beliefs condition. This study was preregistered (<http://aspredicted.org/blind.php?x=3z3u2s>). Unabbreviated materials and data can be found here:

https://osf.io/5vkgt/?view_only=b9df32180d6842dd9b433b4c3fbce50b.

Method

Participants. We posted 400 participation slots and recruited 408 American MTurk workers. We excluded 25 participants who did not recall the past behavior as instructed and seven who did not complete the manipulation, leaving a final sample of 376 participants ($M_{\text{age}}=39.11$, $SD=11.32$, 18-70 years; 51.7% female). Sensitivity analyses indicate that the sample size is sufficient to detect a small-medium effect size ($f=.14$ or $d=.28$) in a two-way ANOVA with 80% power.

Procedure. Participants were randomly assigned to the high heritability beliefs ($n=192$) or low heritability beliefs ($n=184$) conditions in a between-subjects design. In both conditions they saw a picture of pairs of twins and read a story about twin research as a “window into the role of genes” (about 160 words long). In the high heritability beliefs condition, participants read about genetics’ “remarkable impact on behavior” and read about similarities between two twins. The article ended with a quote from a researcher emphasizing that “individuals have biological

predispositions to behave in certain ways” (for the full materials, see online supplements). In a subsequent writing exercise, participants were instructed to:

“Please explain in your own words why a person’s genes might have a strong influence on moral character. For instance, basic personality and orientations (like kindness, empathy) inherited from parents might underlie a person’s moral behavior.”

In the low heritability beliefs condition, participants read about how genetics have “remarkably little impact on behavior” and read about dissimilarities between twins. The article ended with a quote from a researcher emphasizing that “there is of course no specific gene for any behavior”.

In the writing exercise, participants were instructed to:

“Please explain in your own words why a person’s genes might have little or no influence on moral character. For instance, life experiences might influence basic personality and orientations (like kindness, empathy) that underlie a person’s moral behavior.”

Participants rated heritability beliefs on the same three items as in previous studies, as a manipulation check ($\alpha=.67$). As in previous studies, participants were then asked to consider immoral ($n=181$) or moral ($n=195$) acts and described a time where one of their parents behaved this way. Participants rated how much each of nine moral characteristics describe them as a person, as in previous studies ($\alpha=.89$, $M=4.12$, $SD=0.62$), which served as dependent variable.

Results

Change in beliefs. Participants assigned to the high heritability beliefs condition reported greater belief in genetic heritability ($M = 3.71$, $SD = 0.94$) than participants assigned to the low heritability beliefs condition ($M = 2.86$, $SD = 0.93$), $t(372)= 8.74$, $p<.001$, $d= 0.91$, indicating that the manipulation was successful.

Effect of others' past act on self. A 2 between-participants (act condition) by 2 between-participants (heritability beliefs condition) ANOVA showed a significant main effect of act condition, $F(1, 370) = 3.93, p = .048, \eta^2_p = .010$, no significant effect of heritability beliefs condition, $F(1, 370) = 0.95, p = .331, \eta^2_p = .003$. The hypothesized interaction term was not significant, $F(1, 370) = 0.89, p = .346, \eta^2_p = .002$ (Figure 2). Next, we tested the preregistered contrast, examining the effect of act condition in the high and low heritability beliefs condition separately. As predicted, the effect of act condition was significant in the high heritability beliefs condition, $t(182) = 2.02, p = .045, d = 0.30$, but not in the low heritability beliefs condition, $t(188) = 0.75, p = .452, d = 0.12$.

Figure 2. Means by conditions (Study 4). Standard errors represent the 95% confidence interval.

Discussion

Results of Study 4 suggest that people's beliefs about genetic heritability of moral character can be influenced at least temporarily by reading a newspaper article and writing from the perspective of high or low heritability beliefs. Lay beliefs are notoriously difficult to shift (Heine et al., 2017; Plaks et al., 2009), and although the manipulation used in this study did shift

participants' self-reported heritability beliefs, the difference was small (about one point on a seven-point scale). Perhaps because of this small effect, the predicted moderation of heritability beliefs condition was not significant. It is worth noting, however, that parents' acts significantly influenced participants' moral self-judgment only among those whose heritability beliefs were temporarily increased. Thus, this study suggests some preliminary evidence that there might be times where people are relatively more 'vulnerable' to influences of parents' actions.

Despite the relative consistent findings across previous studies on self-judgments, what we have yet to examine in any of the reported studies is whether this phenomenon has implications beyond a shift in self-judgment. We address this gap in Study 5.

Study 5: Effect of family member's past acts on hypothetical helping willingness as a function of heritability beliefs

In the final study, we assessed participants' reported willingness to help others in need. Thus, we again shifted to a more specific aspect of moral characteristics: helpfulness (as in Study 1b). Helpfulness is one of the adjectives commonly ascribed to moral individuals (Aquino & Reed, 2002). Across four scenarios of everyday situations that may require prosocial behavior, we asked participants to indicate their most likely action on responses that ranged from very helpful to not helpful at all. This allowed us to test whether the hypothesized pattern (that participants high in heritability belief would be more affected by genetically related family members' actions) would also be evident when people considered moral (i.e., helping) behaviors they may enact.

Although we have used two control groups (friends and strangers) and demonstrated that the predicted effects emerge only with parents, we have not ruled out the possibility that people would show a similar pattern for any family member, regardless of actual genetic relatedness. In

Study 5, we included a control group in which the (un)helpful person was a genetically unrelated family member. We expected that effects of act condition on self-judgments and willingness to help would be restricted to genetically related family members. This study was preregistered (<http://aspredicted.org/blind.php?x=2iy62s>). Unabbreviated materials and data can be found here: https://osf.io/5vkgt/?view_only=c676b499d8ac40ae95a4bf84bf377947.

Method

Participants. We posted 500 slots and recruited 501 American MTurk workers. We excluded 47 participants who did not recall the past behavior as instructed, leaving a final sample of 454 participants ($M_{\text{age}}=37.34$, $SD=11.62$, 19-87 years; 50% female). Sensitivity analyses indicate that the sample size is sufficient to detect a small-medium effect size ($f=.13$ or $d=.26$) in a three-way ANOVA with 80% power.

Procedure. Heritability beliefs were assessed with three items as in previous studies ($\alpha=.66$, $M=3.00$, $SD=1.11$). The study adopted a between-participants design and participants were randomly assigned to the 2 (actor condition: related family member vs. unrelated family member) $\times$ 2 (act condition: unhelpful vs. helpful act) design. Participants listed either family members they are genetically related to (e.g., Mother, Brother) and either described an unhelpful ($n=107$) or a helpful ($n=125$) behavior of these family members, or they listed family members they are not genetically related to (e.g., Mother-in-law, Brother-in-law) and either described an unhelpful ($n=111$) or a helpful ($n=111$) behavior of these family members.

Participants rated how *helpful* they themselves are as a person (as in Study 1b, embedded in the larger scale of several moral adjectives). Responses were anchored at 1 (*Does not describe me at all*) and 5 (*Describes me very well*). Next, participants also rated the importance of being helpful to their identity on four items (adapted from Doosje, Ellemers, & Spears, 1995; e.g., “I

am pleased to be a helpful person.”) on scales from *strongly disagree* (1) to *strongly agree* (5). These items were averaged to form a Helpful Identity score ($\alpha=.87$, $M=4.07$, $SD=0.72$), which correlated with the single item helpfulness self-judgment, $r(452) = .60$, $p < .001$.

Participants also rated their hypothetical willingness to help across four scenarios in which a neighbor, a stranger, a colleague, and a friend needed a favor. These scenarios were designed based on responses by participants in a diary study on prosocial behavior (Peetz & Howard, 2020) and represent typical helping situations in daily life. For example, the scenario for the colleague read:

“Imagine that one of your co-workers tells you she needs to deliver a large heavy parcel to the local post office. She does not have a car, but you do, so she asks if you would mind dropping it off for her. The post office is in the opposite direction as your home, so driving there will add at least 15 minutes to your evening commute, plus the time you would stand in line to drop off the parcel.”

For each scenario, participants were asked to choose their most likely response which varied from least helpful (1: “You tell her off for asking others to run errands for her”) to increasingly more helpful (2: “You politely decline to take the parcel”; 3: “You ask around at the office if someone else drives in that direction and is able to help her out”; 4: “You offer to drive her to the post office so she can drop off the parcel there herself (and make her own way home)”; 5: “You agree to drop off the parcel for her at the post office”). Responses were averaged across the four scenarios ($\alpha=.66$, $M=4.11$, $SD=0.67$). Helpful self-judgments were moderately correlated with hypothetical helpfulness, $r(452)= .26$, $p<.001$.

Results

Helpful self-judgments. Using multiple regression (PROCESS V3.2, Model 3, Hayes, 2018), we entered the heritability beliefs measure, the act condition (0=*helpful*, 1=*unhelpful*) and the actor condition (0=*friend*, 1=*parent*) as predictor variables and self-rated helpfulness as outcome variable. All predictors were centered before analysis, effect coefficients are presented in Table 4.

Table 4.

Effect of recalling a related or unrelated family member's act on helpful self-judgments, importance of helpfulness to identity, and on willingness to help as a function of heritability beliefs (Study 5)

	<i>B</i> 95% <i>CI</i> [<i>LL</i> ; <i>UL</i>]	<i>t</i> , <i>p</i>	η^2_p
<i>DV: Helpful Self-judgments</i>			
Act condition	-.19 [-.33; -.05]	<i>t</i> (446) = -2.59, <i>p</i> = .010	.000
Heritability Beliefs	-.03 [-.10; .03]	<i>t</i> (446) = -1.01, <i>p</i> = .312	.002
Actor (unrelated vs. related)	.06 [-.08; .20]	<i>t</i> (446) = 0.81, <i>p</i> = .420	.001
Act × Heritability Beliefs	-.08 [-.21; .05]	<i>t</i> (446) = -1.16, <i>p</i> = .245	.003
Actor × Heritability Beliefs	.07 [-.06; .20]	<i>t</i> (446) = 1.04, <i>p</i> = .298	.002
Actor × Act	-.01 [-.30; .27]	<i>t</i> (446) = -0.08, <i>p</i> = .936	.002
Actor × Act × Heritability Beliefs	-.12 [-.38; .14]	<i>t</i> (446) = -0.90, <i>p</i> = .370	.002
<i>DV: Helpful Identity</i>			
Act condition	-.06 [-.19; .08]	<i>t</i> (446) = -0.81, <i>p</i> = .414	.001
Heritability Beliefs	-.08 [-.14; -.02]	<i>t</i> (446) = -2.53, <i>p</i> = .012	.014
Actor (unrelated vs. related)	.10 [-.03; .23]	<i>t</i> (446) = 1.45, <i>p</i> = .147	.002
Act × Heritability Beliefs	-.05 [-.17; .07]	<i>t</i> (446) = -0.82, <i>p</i> = .171	.002
Actor × Heritability Beliefs	.09 [-.03; .21]	<i>t</i> (446) = 1.48, <i>p</i> = .140	.005
Actor × Act	-.15 [-.41; .12]	<i>t</i> (446) = -1.09, <i>p</i> = .278	.001
Actor × Act × Heritability Beliefs	-.12 [-.36; .12]	<i>t</i> (446) = -1.00, <i>p</i> = .319	.002
<i>DV: Willingness to Help</i>			
Act condition	-.08 [-.21; .04]	<i>t</i> (446) = -1.36, <i>p</i> = .175	.000
Heritability Beliefs	-.06 [-.12; -.01]	<i>t</i> (446) = -2.25, <i>p</i> = .025	.011
Actor (unrelated vs. related)	-.06 [-.18; .06]	<i>t</i> (446) = -0.97, <i>p</i> = .333	.001
Act × Heritability Beliefs	.0 [-.11; .11]	<i>t</i> (446) = 0.001, <i>p</i> = .999	.000
Actor × Heritability Beliefs	-.05 [-.16; .06]	<i>t</i> (446) = -0.87, <i>p</i> = .384	.002
Actor × Act	-.26 [-.51; -.02]	<i>t</i> (446) = -2.12, <i>p</i> = .034	.005
Actor × Act × Heritability Beliefs	-.11 [-.50; -.05]	<i>t</i> (446) = -2.42, <i>p</i> = .016	.013

Note. Low beliefs estimated at 1 standard deviations below the mean, high beliefs estimated at 1 standard deviation above the mean. Act coded as 1= immoral/unhelpful act, 0 = moral/helpful act

Although the three-way interaction was not significant, we again examined the simple effects specified in the preregistered hypothesis. As predicted, for those thinking about a genetically related family member's act, recalling an unhelpful act (vs. a helpful act) decreased participants' helpful self-judgment at high levels (+1SD) of heritability beliefs, $B = -.34$ 95%CI[-.65;-.04], $t(446) = -2.25$, $p = .025$, but not at low levels (-1SD) of heritability beliefs, $B = -.04$ 95%CI[-.33;.22], $t(446) = -0.28$, $p = .781$. For those thinking about an unrelated family member's act, recalling an unhelpful act (vs. a helpful act) did not affect participants' helpful self-judgment at low levels of heritability beliefs, $B = -0.16$ 95%CI[-.44;.12], $t(446) = -1.14$, $p = .255$, or high levels of heritability beliefs, $B = -0.21$ 95%CI[-.47;.07], $t(446) = -1.46$, $p = .146$ (Figure 3).

Figure 3. Estimated means for moral self-judgments after recalling a moral/immoral act by a related or an unrelated family member at high levels (+1SD) and low levels (-1SD) of genetic heritability beliefs. Standard errors represent the 95% confidence interval.

Helpful identity. Next, we examined the averaged helpful identity as outcome variable. All predictors were centered before analysis, effect coefficients are presented in Table 4. The three-way interaction was marginally significant. For those thinking about a genetically related

family member's act, recalling an unhelpful act (vs. a helpful act) marginally decreased participants' helpful identity score at high levels of heritability beliefs, $B = -.25$ 95%CI[-.54;.03], $t(446) = -1.78$, $p = .075$, but not at low levels of heritability beliefs, $B = -.004$ 95%CI[-.27;.27], $t(446) = -0.03$, $p = .976$. For those thinking about an unrelated family member's act, recalling an unhelpful act (vs. a helpful act) did not affect participants' willingness to help at low levels of heritability beliefs, $B = 0.06$ 95%CI[-.25;.26], $t(446) = -0.04$, $p = .966$, or high levels of heritability beliefs, $B = 0.03$ 95%CI[-.23;.28], $t(446) = -0.21$, $p = .834$.

Hypothetical helpfulness. Next, we examined the averaged scenario response indicating willingness to help as outcome variable. All predictors were centered before analysis, effect coefficients are presented in Table 4. The three-way interaction was significant, and we again examined the simple effects specified in the preregistered hypothesis. For those thinking about a genetically related family member's act, recalling an unhelpful act (vs. a helpful act) decreased participants' willingness to help at high levels (+1SD) of heritability beliefs, $B = -.38$ 95%CI[-.64;-.12], $t(446) = -2.84$, $p = .005$, but not at low levels (-1SD) of heritability beliefs, $B = -.06$ 95%CI[-.31;.19], $t(446) = -0.50$, $p = .618$. For those thinking about an unrelated family member's act, recalling an unhelpful act (vs. a helpful act) did not affect participants' willingness to help at low levels of heritability beliefs, $B = -0.10$ 95%CI[-.34;.13], $t(446) = -0.86$, $p = .390$, or high levels of heritability beliefs, $B = 0.19$ 95%CI[-.04;.43], $t(446) = -1.62$, $p = .105$.

Discussion

The results of Study 5 replicated and extended the previously reported studies. Participants who reported strong belief in the genetic heritability of moral character once again showed assimilation of their own self to the related family members' actions (i.e., feeling like a less helpful person after recalling a single unhelpful act committed by a genetically related

family member). As in Study 2a and 2b, this effect did not extend to a control group, in this case genetically *unrelated* family members – although people’s emotions are sometimes affected by the actions of others (e.g., Fortune & Newby-Clark, 2008; Lickel et al., 2005; Peetz et al., 2010), we found no evidence that a single action by a genetically unrelated other systematically affects moral self-judgement or expectation to engage in moral behaviors. This study also demonstrated that not only did recalling a related family member’s past unhelpful (vs helpful) actions affect how helpful they regarded themselves, but it also affected their hypothetical helpfulness across four helping scenarios in which a neighbor, a stranger, a colleague and a friend needed help.

Internal Meta-analysis

Our pattern of results across seven studies revealed consistent patterns of predicted simple effects in spite of our failure to observe a consistent interaction effect (significant interactions were only observed in two cases whereas the pattern of simple effects at high and low levels of heritability belief emerged in all studies). To further summarize and evaluate results across our seven studies, we conducted an internal mini-meta analysis (Goh, Hall, & Rosenthal, 2016). We converted η^2_p values of estimated marginal means analysis into d , which we then used as the basis of the meta-analysis (see Table 5).

Table 5

Effect of recalling related family members' (Study 1a, 1b, 5) or parents' (Study 2a, 2b, 3, 4) moral/helpful versus immoral/unhelpful past acts on self-judgments

Study	DV	N	Beliefs×Act interaction		Low Beliefs in Heritability		High Beliefs in Heritability	
			<i>d</i>	η^2_p	<i>d</i>	η^2	<i>d</i>	η^2_p
1a	Moral Self ¹	330	0.19	.009	0.13	.004	0.15	.005
1b	Helpful Self-judgment	335	0.17	.007	0.02	<.001	0.26	.016
2a	Moral Self-judgment	188	0.20	.010	0.06	.001	0.36	.031
2b	Helpful Self-judgment	347	0.22	.012	0.06	.001	0.38	.034
3	Moral Self-judgment	685	0.19	.009	0.06	.001	0.22	.012
4	Moral Self-judgment	374	0.09	.002	0.06	.001	0.21	.011
5	Helpful Self ²	222	0.19	.009	0.02	<.001	0.29	.021
<i>avg d</i>			0.17 [0.09;0.26]		0.07 [-0.01;0.15]		0.24 [0.16;0.32]	
<i>Z</i>			4.16*		1.68		5.78*	

Note. *N*'s vary from overall *N*'s because we only considered conditions where participants were reminded of family members' or parents' acts in the meta-analysis. Heritability beliefs were measured in all studies (low beliefs estimated at -1SD, high beliefs estimated at +1SD) except Study 4 where low and high heritability beliefs were manipulated.

¹ Averaged across 9-item self-judgment scale and 10-item moral identity scale (standardized before averaging).

² Averaged across a single item helpful self-judgment and the 4-item helpful identity scale (standardized before averaging).

The meta-analysis showed that for participants who reported high beliefs in genetic heritability recalling a single moral versus immoral acts by their family members or parents had a small to medium significant effect on their own moral self-judgments, $Z=5.78$, $p<.001$. The effect for those who reported low beliefs in genetic heritability was not significant, $Z=1.68$, $p=.085$.⁴ In sum, the acts of the parents really do appear to reflect on the child – but only among

⁴ Throughout the paper we only reported the preregistered simple effects. In exploratory analyses we also broke down the simple effects of heritability beliefs by act condition. Across

people who believe in heritability of moral character. There was an unreliable and overall nonsignificant effect in the same direction for those with low heritability beliefs. The fact that the influence of parental behavior at both low and high ends of the genetic heritability beliefs distribution pointed in the same direction may account for the inconsistent emergence of the interaction term. Indeed, the highest order interaction term was significant in only two of the studies (Study 2a and 3). Interaction terms, especially v-shaped interactions where one group's effect is attenuated rather than reversed, require very large samples or very large effects to reach significance levels (Da Silva Frost & Ledgerwood, 2020). For this reason, we focused on preregistering and testing the relevant simple effects of the interactions that tested our hypothesis directly. In each study, in the spirit of open and transparent science, we report both the (often) non-significant interaction and the consistently significant simple effects supporting *a priori* preregistered expectations. We report all studies that were conducted.

General Discussion

In the present research, we examined whether a person's convictions about their own moral character might be shaped, in part, by the actions of others. Across seven studies, we found evidence that past actions by genetically related family members, and specifically parents, can influence an individual's sense of moral self – but only if that individual believes that the critical aspect of the self (in our studies, moral character) is genetically inherited (Study 1-5). Past actions by genetically unrelated individuals such as friends or strangers (Study 2), and unrelated family members (Study 5) did not affect participants' moral self-judgment in the same

studies, higher heritability beliefs were significantly linked to decreased moral self-judgments after recalling immoral acts by family members, $Z=5.64$, $p<.001$, and were linked to significantly increased moral self-judgments after recalling moral acts by family members, $Z=2.41$, $p=.016$. Detailed results are available online at https://osf.io/94czj/?view_only=addec916ead940e8b8ea60c39e931701

way, and other lay beliefs (i.e., socialization and the malleability of morality) did not moderate the influence of parents' actions in the same way (Study 3).

Theoretical Contributions

Self and Identity. This research helps disentangle some of the questions about whether and when other people's action may influence individuals' self-concept. Although the existing literature has demonstrated that the actions of others can indeed have an impact on the self (e.g., people may feel threatened, embarrassed, proud or guilty when reminded of the actions of others and may sometimes believe they will be judged on the basis of others' actions), past work has not focused on how actions of others might affect self-concept. Further, prior research in this vein has not typically systematically considered whether the effects of others' actions on the self is the result of that relation being chosen (i.e., friendship), being due to group membership, or being due to genetics (i.e., family). We extend past knowledge in this field by examining whether people's beliefs about genetic heritability can determine the degree to which family members' actions predict one's own self-judgments.

Lay beliefs. The current research also contributes to the extensive literature on the power of lay beliefs (for a review of this literature see Heine et al., 2017; Plaks et al., 2009). Specifically, we identify a particular lay belief about genetics as a causal mechanism by which (related) others' actions pertain to the self. Lay beliefs about genetic heritability of moral character fit under the umbrella of essentialist beliefs (Haslam et al., 2006; Heine et al., 2017; Medin & Ortony, 1989). However, although past research has examined genetic essentialism as it manifests within an individual (e.g., people perceive less control over traits they believe to be genetically determined, e.g., Dar-Nimrod et al., 2014), the causal links between the actions of one family member and the traits of another (in this case, the self) have not been explored

extensively. We also explored an alternative lay theory (socialization of morality) and showed that it did not predict the same links between parents' actions and moral self-judgment. Also consistent with the literature on lay theories, these beliefs can be altered, but chronic beliefs are difficult to move dramatically (Heine et al., 2017). We attempted to manipulate lay beliefs. We were successful doing so when taking a two-pronged approach: providing participants with external lay theory information and then asking them to argue in favor or against heritability (Study 4).

Limitations

Although our findings suggest a consistent pattern across multiple replications, it is also important to acknowledge the effects are small. Observing a single (im)moral act of a family member is not transforming anyone's entire moral self-concept; further because all studies are conducted in a single session we cannot draw conclusions about how long-lived these effects would be. It seems likely that outside the lab, the effect of any single act by a parent or relative would also be relatively minor. However, in daily life, these acts may be experienced much more proximally (e.g., observed rather than recalled) and repeatedly. It is plausible that – especially in cases where people are exposed to repeated instances of good or bad behavior from a relative – that these small isolated effects accumulate over time in a meaningful way. Future research is needed to determine how fleeting, or lasting, these effects might be.

Across all studies, participants rated their heritability beliefs before recalling a (im)moral or (un)helpful act and rating their own moral character. This design might have created demand characteristics: participants might have responded in a consistent way to justify their earlier responses. We attempted to reduce demand characteristics by phrasing heritability beliefs in terms of “moral character” whereas this term was not mentioned in the behavior recall or self-

judgment scale (there, we focused on specific moral characteristics such as honesty or helpfulness). However, demand characteristics remain a concern, and future studies might temporally separate the measure of heritability beliefs and the recall of past acts, to address this issue.

Finally, none of the studies employed a control condition in which participants did not recall a morally relevant action. Thus, we cannot draw conclusions about whether the recall of a relative's action resulted in an increased or decreased moral judgments of the self relative to such a control condition. Exploratory simple effects in the meta-analyses suggest that heritability beliefs were overall more impactful when recalling immoral rather than moral past acts, i.e., decreasing moral self-judgments more than increasing them. People have a strong tendency towards self-enhancement (e.g., Sedikides et al., 2003), and likely exaggerate their own morality under normal circumstances. It is possible that the recall of past immoral acts was more disruptive to this self-view than the potential for recalling past moral acts to boost an already inflated self-view. Relatedly, it is important to note that participants, by and large, recalled mundane actions (e.g., giving vs. not giving a stranger small amounts of money). It is possible that more extremely (im)moral past acts by a relative (e.g., dedicating one's life to charity vs. committing a serious crime) might result in stronger effects.

Future directions

Although we focused on the domain of morality, and thus contribute to the extensive literature on the moral self (for a review see Mullen & Monin, 2016), we expect that lay beliefs about intergenerational transfer would apply to other domains as well. For example, lay beliefs about genetic heritability of intelligence may determine whether children of professors and valedictorians feel personally smarter when reminded of their parents' academic achievements or

conversely, if first-generation university students (with strong heritability beliefs) experience self-doubt if they reflect on an absence of parental pedigree. In such a domain, heritability beliefs could affect a person's decision to aim for a top school or set their sights lower. Future research might more deeply integrate past research on lay beliefs about entity/incrementalism (Dweck, 2000), essentialist beliefs (Heine et al., 2017), mind-body dualism beliefs (Forstman & Burgmer, 2017) and beliefs about intergenerational transfer reflected in lay beliefs about heritability or socialization (Furnham, 1994; Paulhus & Carey, 2011).

Participants in our studies were adults ranging in age from 18 to 85 years of age (average was mid-thirties), hence they were all beyond the time of life when parents' behavior might be considered particularly formative. It is possible that lay beliefs about socialization are sensitive to parental behavior in early life, whereas heritability beliefs are insensitive to timing. Although the current studies were not designed to disentangle those complexities, it would be a fruitful direction for future research. Exploratory analyses showed that age was not related to lay beliefs about genetic heritability and did not moderate the results in any of the current studies. This age-insensitivity is consistent with a genetic mechanism: whether a parent's kindness or callousness of character is revealed early or later in life, if an individual believes the characteristic to be heritable, they should be more apt to see it in themselves.

It has been argued that lay beliefs function to help people maintain a positive self-view and defend against self-threats (e.g., Christandl, 2013; Hafer & Bègue, 2005; Leith et al., 2014). In this light, when people recall particular actions committed by family members, they may shift their lay beliefs about heritability in ways that allow them to vicariously benefit from others' achievements while severing their perceived connection to others' misdeeds. For example, after a child wins a musical award, her mother might feel there's some latent musical talent in herself

even if she never played an instrument herself. Someone recalling his grandfather participating in the Olympics might feel like a more capable athlete himself. Future research could examine whether people are more likely to boost their belief in genetic heritability when considering family members' musical or athletic ability, but instead downplay genetics when contemplating an uncle's criminal history or a sister's repeated failure to pass her driving test. How people explain generational patterns may shift in line with maintaining a self-view - sometimes they might latch on to beliefs in genetic heritability and sometimes they might prefer socialization beliefs.

Lastly, lay beliefs about the genetic heritability of moral character may affect person perception. For example, in the context of relationship initiation, information about a dating prospect's *parents'* history of fidelity or divorce might affect willingness to date. In the context of hiring decisions, a faculty member might accept a prospective student because their *brother* is an exceptional candidate in the program. In a political context, voters might be more likely to vote for a political candidate related to a well-loved politician, not only because of their association but because of lay beliefs in the genetic heritability of traits relevant to governing.

Conclusion

The idea of heritability is universal, as evident in expressions such as “the apple doesn’t fall far from the tree” (British), “the woodchip doesn’t jump far from the trunk” (Romanian) or “like river like water” (Catalan). To be sure, some traits are indeed inherited, and genes do account for some amount of variance in character traits and attitudes (Olson et al., 2001).

However, irrespective of the extent to which traits (and more general constructs such as moral character) are *actually* inherited from parents, we suggest *beliefs* about the extent to which they are inherited matter. We contend that the idea of heritability has consequences, shaping our sense

of self and by connecting identity, unbidden, to the actions of others who happen to share genetic ties.

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