Intuitions about personal identity are rooted in essentialist thinking across development

Zachary Horne⁎, Andrei Cimpian

A R T I C L E  I N F O

Keywords:
Essentialism
Identity
Development
Self
Philosophy

A B S T R A C T

What aspects of a person determine whether they are the same person they were in the past? This is one of the fundamental questions of research on personal identity. To date, this literature has focused on identifying the psychological states (e.g., moral beliefs, memories) that people rely on when making identity judgments. But the notion of personal identity depends on more than just psychological states. Most people also believe that the physical matter that makes up an individual is an important criterion for judging identity; changes to the physical stuff in a person's body, even if they are not accompanied by any psychological changes, are judged to change who the person is at some level. Here, we investigate the sources of these beliefs and propose that they stem from the broader cognitive tendency to assume that unseen physical essences make things what they are—psychological essentialism. Four studies provided support for this claim. In Studies 1 and 2, exposing participants to essentialist reasoning led to stronger endorsement of physical continuity as a criterion for personal identity. Similarly, individual differences in participants' essentialist thinking predicted the extent of their reliance on physical continuity (Study 3), and this relationship was observed even among 6- to 9-year-old children (Study 4). These studies advance theory on the psychology of personal identity by identifying a reason why people assign a central role to physical composition when judging identity.

1. Introduction

What makes someone the same person they were 10 years ago? Questions such as this, which concern personal identity over time, have long been of interest to psychologists and philosophers (e.g., Parfit, 1971; Schechtman, 1990; Sider, 1996; Strohminger, Knobe, & Newman, 2017) and are also involved in public debates about moral and legal responsibility (e.g., Schechtman, 1990; Taylor, 1976). For example, when we decide whether a person, Smith, is culpable for a crime, we must determine whether they are the same person as the person who committed the crime. This matter is not always straightforward. While it may seem obvious that a person is responsible only if they act of their own will, people are sometimes willing to hold others responsible even when their will has been co-opted (Nichols & Knobe, 2007). If a traumatic event affects Smith's state of mind and causes them to commit a crime, for instance, many think it is still acceptable to blame them for the crime (e.g., Schechtman, 1990). This intuition suggests that, despite the altered state of mind of the person who committed the crime, we assume that they are still Smith, perhaps in part because they have the same body as Smith. Here, we explore the roots of these intuitions about physical continuity as key to personal identity and argue that they stem from a psychological tendency known as psychological essentialism—the common assumption that unseen internal essences make things what they are (e.g., Bastian & Haslam, 2006; Gelman, 2003; Hood & Bloom, 2008; Newman & Bloom, 2014; Prentice & Miller, 2007).

To clarify, in the present research the term identity is used to refer to sameness.¹ If we encounter a person at time 1, how do we decide...
whether we have re-encountered the same person at time 2? In addition, the present research is concerned with numerical identity rather than with qualitative identity (i.e., identity of properties; Noonan & Curtis, 2017; Sider, 1996). For example, if the person at time 1 and the person at time 2 differ in their physical (e.g., weight) or psychological (e.g., mood) features, they are not qualitatively identical. However, they may still be numerically identical—the same person. How do we decide whether they in fact are? Here, we investigate the concepts with which people reason about this question.

The question of numerical personal identity can be decomposed into two distinct questions: The persistence of (1) which psychological states or processes, if any, and (2) which (non-psychological) physical states or processes, if any, is deemed necessary for personal identity to be preserved? Recently, many psychologists have taken an interest in the first question, aiming to identify which psychological states or processes are most central to the concept of personal identity (Strohminger et al., 2017). We briefly summarize these findings and then go on to discuss the second question (concerning physical continuity), which is the focus of our studies.

One answer to the question of psychological continuity dates back to as early as Locke (1841). Locke argued that an agent's memories and phenomenology (what he called "consciousness") are most central to a person's identity. In contrast to this historical view, more recent empirical investigations of personal identity have revealed that—even more so than one's memory—one's moral beliefs are deemed necessary for continuity in personal identity. For instance, Strohminger and Nichols (2014, 2015) have shown that substantive changes in a person's moral beliefs and behaviors lead others to judge that they are now a different person, even if their memories remain intact. In contrast, a person with degraded memories but the same moral beliefs is often judged to be the same person they were before (e.g., Heiphetz, Strohminger, & Young, 2017; Strohminger & Nichols, 2015).

Although there is no question that psychological continuity is an important criterion of personal identity, it alone does not fully explain people's identity judgments. People also appear to believe that one must be composed of the same matter in order to be the same person (physical continuity). For example, in a study by Blok, Newman, and Rips (2005), participants who heard that a character, Jim, had his brain transplanted into a new body (and his original body destroyed) were more likely to say that the transplant recipient was a person (that is, the same type of entity as before the transplant) than they were to say that the recipient was still Jim (that is, the same token of the type PERSON)—even though the procedure was said to have preserved Jim's psychology. In other words, psychological continuity was not sufficient in this case for participants to judge that personal identity was fully preserved; some degree of physical continuity was deemed necessary as well (see also Nichols & Bruno, 2010; Rips, Blok, & Newman, 2006, pp. 7–8). In a follow-up study, Blok and colleagues also found that participants were more likely to think that a psychological “copy” of Jim was still Jim when a larger percentage of the particles that made up Jim's body were carried over in the copy. This result provides further support for the claim that physical continuity is an important component of identity judgments.

To make another terminological clarification, we use the term physical continuity to refer specifically to continuity in material composition—in the stuff that makes up a person's body. We do not use it to refer to spatiotemporal continuity. That is, if a person's body were broken down and then reconstructed from the exact same molecules, this sequence of events would preserve physical continuity in our sense of the term (but would disrupt spatiotemporal continuity). Although there are many interesting questions to be asked regarding the role of spatiotemporal continuity in judgments of identity (e.g., Sider, 1996), here we focus on physical continuity as a criterion of numerical identity.

Although people commonly attend to physical continuity when judging whether a person's identity has changed, these judgments are arguably at odds with scientific knowledge. For example, the belief that the amount of matter carried over in a body swap affects who you are (e.g., Blok et al., 2005) is akin to the common pseudoscientific idea that the cells throughout our bodies, not just in the brain, contain information and aspects of our identity such as our memories, personal- ities, etc. This discredited phenomenon is known as "cellular memory," and belief in its existence is arguably a form of magical thinking (Hood, Gjersoe, Donnelly, Byers, & Itajkura, 2011; Meyer, Leslie, Gelman, & Stilwell, 2013). Similarly, many people report they would not want to receive an organ transplant from a person with negative traits, as if the negative traits of the donor could change their own traits (Meyer et al., 2013; see also Meyer, Gelman, Roberts, & Leslie, 2017). Despite the scientific implausibility of psychological traits being passed on via an organ donation, people are nonetheless worried that the physical matter that makes up a person somehow contains aspects of their identity and could thus be transferred.

1.1. Why is physical continuity a factor in identity judgments? The role of essentialism

These considerations raise a question: What explains people's reliance on physical continuity to judge personal identity? Our proposal, which we describe in detail below, is that these intuitions stem from a broad cognitive bias to understand the world in terms of internal, causally-potent, physical "essences" (e.g., Cimpian & Salomon, 2014; Dar-Nimrod & Heine, 2011; Gelman, 2003). Much research has documented that, from a young age, people assume that an individual (e.g., Pablo Picasso) belongs to a particular category (e.g., men) because he possesses a physical substance inside him that makes him that kind of individual. Although most of the classic work on this topic has examined category essences, there is also evidence that people assume individuals (e.g., Pablo Picasso) have their own unique essences, and moreover that these physical essences can "ooze" out of them and onto objects with which they have been in contact (e.g., Newman & Bloom, 2014; Newman, Diesendruck, & Bloom, 2011). For instance, many believe that an artist's essence somehow imbues the matter that composes their works of art, and, for this reason, originals are strongly preferred over perfect copies (e.g., Newman & Bloom, 2012; Newman, Bloom, & Knobe, 2014). Similarly, the price at which celebrity memorabilia are sold in auctions is positively correlated with the amount of physical contact their previous owner is assumed to have had with them; conversely, telling potential buyers that an item previously owned by a celebrity has been sterilized lowers its perceived value (e.g., Newman & Bloom, 2014). Or, to take a negatively valenced example, people feel uncomfortable wearing items of clothing previously worn by individuals they think were evil (such as Hitler; e.g., Nemeroff & Rozin, 1994; Rozin, Millman, & Nemeroff, 1986). However, when told that the clothing had been sterilized, they felt comfortable wearing the items.

2 We should also note that relying on physical continuity to judge personal identity is not equivalent to endorsing a materialist or physicalist view of personal identity (namely, the view that facts about personal identity are facts about material rather than immaterial entities such as souls). Physicalism is broader than the physical-continuity view, which makes the much narrower—and stronger—claim that a person's identity depends on the extent to which the specific bits of matter that make them up at time 1 are carried forward in time. To illustrate, it would not be inconsistent for someone with a physicalist view of personal identity to judge that "copying" someone's brain into a new brain (placed in a stock body) would preserve their identity: As long as all the original neural properties and connections were duplicated perfectly, the copy and the original would be identical with respect to an important set of physical facts relevant to identity. However, many people do not reason this way (e.g., Blok et al., 2005), suggesting that they are not mere physicalists about identity but rather endorse the stronger view that personal identity depends on the specific atoms, molecules, etc., that make up a person.
been thoroughly sterilized, people are somewhat more willing to wear it (Nemeroff & Rozin, 1994), speaking to the fact that individual essences are at least partly physical. Children also reason along these lines: Hood and Bloom (2008) found that when participating children’s toys were placed in a machine that could ostensibly make perfect replicas of them, children preferred their own toys to the replicas, as if their essence had somehow rubbed off on the original toys (see also Frazier & Gelman, 2009; Gelman, 2013; Meyer et al., 2017).

This evidence motivates our main hypothesis: namely, that the reliance on physical continuity in judging personal identity is a byproduct of the bias to think that individuals have unique essences that permeate their bodies. If people believe (1) that individuals have essences and (2) that these essences are a physical part of them, then it follows that changes to an individual’s physical composition could affect people’s beliefs about who that individual is. From this perspective, judgments of personal identity may be unduly influenced by a cognitive bias that should not, in principle, play a role in generating these judgments. Although others have speculated about a link between essentialist thinking and concepts of personal identity before (e.g., Hood, Gjerse, & Bloom, 2012; Newman, Bartels, & Smith, 2014), this hypothesis has not yet been tested. Thus, our goal here is to investigate whether essentialist thinking is indeed part of the reason why people think that a person’s identity depends on the specific bits of matter of which they are composed.

1.2. Concepts of personal identity across development

Understanding how intuitions about personal identity develop can also shed light on the cognitive processes underlying people’s endorsement of physical continuity as a criterion for identity. For example, finding that even young children take physical continuity into account when reasoning about a person’s numerical identity would suggest that this is an intuitive judgment (much like essentialism) rather than a product of formal education or extensive experience with the world. Consequently, we will investigate intuitions about personal identity—and their hypothesized connection with essentialism—not just in adults but across development as well. Even very young children track the numerical identity of objects in their environments (e.g., Gelman, Manzack, & Noles, 2012; Gutheil, Gelman, Klein, Michos, & Kelaita, 2008; Hall, Lee, & Bélanger, 2001; Liittschwager, 1995; Xu & Carey, 1996), using spatiotemporal information as a primary cue but also, when the latter is ambiguous or unavailable, featural information: For example, 12-month-olds who saw a duck and a truck emerge in alternation from behind an opaque screen—an event whose spatiotemporal properties are not sufficient to determine whether there are two objects behind the screen or just one—infers that two objects must be present (e.g., Xu & Carey, 1996; for a review, see Baillargeon et al., 2012). However, there are important differences between the criteria for numerical identity in the case of objects vs. persons. If, for instance, an individual is in a car crash that leaves them in a permanent coma, their numerical identity as a physical object is maintained across this event, but their numerical identity as a person is arguably not.

We know relatively little about the developmental course of concepts of personal identity—about the psychological and physical states that children view as necessary for a person’s numerical identity to be maintained across time (for some initial evidence, see Heiphetz, Strohminger, Gelman, & Young, 2018; Johnson, 1990; and Liittschwager, 1995). One recent study found that 8- to 10-year-old children expect that changes in moral beliefs are more likely to cause a change in identity than are changes in other psychological states or processes (Heiphetz et al., 2018). In combination with studies reviewed earlier (e.g., Strohminger & Nichols, 2014), this evidence suggests that morality is key to judgments of psychological continuity, and thereby personal identity, across the lifespan. Here, we will provide the first test of whether, like adults (Bloks et al., 2005), children see physical continuity as necessary for personal identity.

A priori, it is unclear how much weight children assign to the material stuff that makes up a person when judging their identity (e.g., Starmans, 2017). On the one hand, some evidence suggests that children might discount physical continuity. For example, when kindergarteners and first graders in a previous study (Gottfried, Gelman, & Schultz, 1999) heard that all the insides of one animal (e.g., a skunk) were replaced with those of another animal (e.g., a rabbit), they did not systematically judge that the animal’s identity was disrupted—despite the gross violation of physical continuity. On the other hand, even preschoolers seem to imbue individuals with distinctive physical essences, much like adults do (e.g., Hood & Bloom, 2008; Meyer et al., 2017). This essentialist way of thinking may lead children to take physical continuity into account when judging whether an individual’s identity as a person is maintained or disrupted. If so, we might also expect that individual differences in children’s reliance on physical continuity as a criterion for judging personal identity will be predicted by the strength of their essentialist beliefs.

1.3. The present studies

Four studies using a diverse set of methods tested the hypothesis that, across development, essentialist thinking promotes reliance on physical continuity to judge personal identity. We first tested an important prediction of our account: If intuitions about the role of physical continuity in maintaining personal identity stem from essentialism, then exposing people to essentialist reasoning should lead to a corresponding increase in the intuition that physical continuity is crucial to personal identity (Studies 1 and 2). In Study 3, we introduced a more precise measure of intuitions about personal identity and switched to a different, correlational design to explore the robustness and generalizability of our findings. Finally, Study 4 tested whether 6- to 9-year-old children systematically factor physical continuity into their judgments of personal identity and, moreover, whether the extent to which they rely on physical continuity is predicted by the strength of their essentialist tendencies.

2. Study 1

To investigate the hypothesis that essentialist thinking is a source of the intuition that physical continuity matters for personal identity, we tested a prediction that follows from it: namely, that increasing essentialist thinking would increase participants’ endorsement of physical continuity as a criterion for personal identity.

2.1. Method

2.1.1. Participants

Participants in Study 1 were 536 Amazon Mechanical Turk workers recruited from the United States and English-speaking Canadian provinces (53% women, M_age = 34.6 years, Mechanical Turk approval rate > 80%) who were paid $0.50 for participating in the study. We sought to collect approximately 500 participants in order to be powered at 80% to detect a small effect (Cohen’s $d \approx 0.25$); we expected that the effect size would be small given the subtlety of our manipulation. We oversampled relative to the planned sample size in order to account for

---

3 There is some debate as to whether this and other studies in the literature speak to numerical identity per se or instead to qualitative identity (e.g., Starmans, 2017; Starmans & Bloom, 2018).

4 In this and all subsequent studies, our main analyses are Bayesian rather than frequentist. However, we know of no widely-accepted methods for calculating power in the context of mixed-effects Bayesian regression models. In light of this fact, we opted to conduct conventional (frequentist) analyses of power, even though they are only an approximate solution here.
exclusions. However, we did not ultimately exclude any participants from our analyses—excluding participants who missed more than one comprehension question did not affect our parameter estimates, so we opted to retain them.

2.1.2. Open data and analytic syntax

The raw data and analytic syntax for this and all subsequent studies are available on Open Science Framework: https://osf.io/7x2j6.

2.1.3. Materials and procedure

To manipulate participants' essentialist tendencies, we instructed participants to read a real-life (but discredited) story about Claire Sylvia, a woman who underwent a heart transplant and then reported increases in her confidence and self-esteem ostensibly caused by a transfer of the donor's traits via his heart (Gelman, 2003; see Table S1 of the Supplementary Online Materials [SOM]). This vignette was intended to highlight the idea that individuals have physical essences that permeate their entire bodies; however, we told participants that they were completing a reading comprehension task to minimize the task demands.

Participants randomly assigned to the experimental condition read the story about Claire Sylvia. In the control condition, participants read a story that was similar except that the protagonist instead received dental implants that increased her confidence and self-esteem. Although superficially similar to the vignette in the experimental condition, the control vignette should not increase essentialist thinking, both because there is no transfer of essence-carrying body matter from one person to another and because the mechanism of change is social rather than biological (presumably, the increase in confidence is due to people’s reaction to her new appearance).

After reading the relevant vignette, participants completed (1) a manipulation check and (2) a measure of personal identity judgments (randomly ordered). After completing these measures, participants answered some demographic questions and were debriefed. During the debriefing portion of the study, we asked participants if they had any guesses about what we were studying. Only five participants (<1%) correctly guessed the hypothesis of the study. Because our results held whether or not these participants were excluded, we opted to keep them in the sample. Most participants wrote that the goal was to see how well they remembered the vignettes or that we were interested in the medical ethics of organ donation.

2.1.3.1. Essentialism manipulation check. To check whether the manipulation influenced essentialist thinking about individuals as intended, we administered 10 items such as “Receiving a pancreas transplant from someone who was obsessive-compulsive might make me ever so slightly more obsessive-compulsive” or “Trying on a sweater that Hitler wore, even if it was washed thoroughly beforehand, would make me very uncomfortable” (1 = Strongly Disagree to 6 = Strongly Agree; Cronbach’s α = 0.65). Some of these items were about the potential effects of organ transplants, and thus mapped directly onto the topic of the manipulation vignettes; others (such as the one above about Hitler’s sweater) were unrelated to the specific content of the manipulation vignettes, while also tapping the idea that individuals have essences that permeate their bodies and spill out onto the objects they touch (see Table S2 in the SOM for the full list; e.g., Meyer et al., 2013; Rozin & Royzman, 2001).3

2.1.3.2. Measure of personal identity judgments. To measure participants’ reliance on physical continuity as a criterion for personal identity, we adapted an item from Blok et al. (2005) that asks participants to judge whether someone is still the same person after undergoing an operation. Specifically, participants read a story about a patient (Jim, Sally, or Eric, randomly assigned) who underwent an operation to save their life in the year 2140. Participants were told that the only way for this patient to survive was by having their brain copied and placed into a new, “stock” body. The operation was said to have successfully preserved the original brain’s neural connections and mental states (i.e., psychological continuity was maintained).

After reading this vignette (see Table S3 in the SOM for the full text), participants were asked to judge whether the person who came out of the operation was the same person as the person who went into the operation. Participants rated their agreement with the statement, “The person who the doctors have finished operating on is still [Jim/ Sally/Eric]” on a seven-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). The wording of this question, which is the same as in Blok et al. (2005), was intended to measure participants’ intuitions about numerical identity per se (i.e., the question of whether the patient is one and the same person before and after the operation) rather than merely a judgment of qualitative similarity (i.e., whether the person exiting the operating room has the same features as the patient who underwent the operation). The more reliant participants are on physical continuity as a criterion for personal identity, the less likely they should be to say that the person who left the operation was the same person.

2.1.4. Analytic approach

To test our hypothesis, we performed Bayesian mixed-effects modeling using the R package brms (Buerkner, 2017). We set weakly informative priors for all fixed effects in our models: namely, a normal distribution with a mean of 0 (i.e., no effect) and a standard deviation of 1. Weakly informative priors are recommended because they are conservative, discount unreasonably large effect sizes, and make estimation more computationally tractable but otherwise have only a weak effect on the posterior distribution (i.e., the probability of the hypothesis given the data), letting the posterior reflect the data (Gelman, Lee, & Guo, 2015). All other priors were set by default in brms. Alternative analyses using maximum likelihood estimation are available in a folder labeled “Supplemental Analyses” on the OSF page for this project, https://osf.io/7x2j6/. The results of these analyses are in agreement with the Bayesian analyses we report in the main text.

Throughout the paper, we report 95% credible intervals, which indicate the most probable values of a parameter given the data. Values at the center of the interval are more credible than those at the tails, so whether an interval crosses zero is of less concern than the precision of an estimate (McShane, Gal, Gelman, Robert, & Tackett, 2017). For each analysis, we used various diagnostics (e.g., posterior predictive checks that compare the data generated by the model against the actual data), as recommended by Buerkner (2017), to decide whether to use a linear or ordinal regression model; in most cases, an ordinal model was preferred. (Even in cases where the analyses treat the dependent variable as ordinal rather than continuous, we report means and standard deviations for simplicity and convenience.) All models included cross-classified random intercepts for item and participant. The same analytic approach was adopted for all subsequent studies.

2.2. Results and discussion

The goal of Study 1 was to examine whether a manipulation of essentialist thinking would affect the extent to which participants factor physical continuity into their judgments of personal identity. We predicted that participants in the experimental (heart-transplant) condition, who read a vignette designed to increase essentialist thinking, would be less likely to think that someone composed of new matter (but with the same psychology) was the same person compared to
Throughout the paper, we will focus on relative comparisons between hypothesis, the increase in reliance on physical continuity when physical composition in judging their identity. Consistent with our plants) vignette (1) agreed more with the essentialist statements in our manipulation influenced participants’ essentialist attitudes as intended.

2.2.1. Manipulation check: effects on essentialism

We first performed a manipulation check, examining whether the manipulation influenced participants’ essentialist attitudes as intended. Indeed, the heart-transplant vignette in the experimental condition (M = 2.83, SD = 0.73) led participants to adopt more essentialist attitudes than the dental-implants control vignette (M = 2.60, SD = 0.67), b = 0.40 [0.19, 0.60].

2.2.2. Effects on personal identity judgments

Did our manipulation of essentialism affect people’s personal identity judgments? We tested this question by comparing the identity judgments of participants in the experimental and control conditions. Exposing participants to essentialist ideas in the experimental (heart-transplant) condition (M = 4.27, SD = 1.79) reduced their willingness to say the patient's identity was maintained when physical continuity was disrupted compared to the control (dental-implants) condition (M = 4.60, SD = 1.68), b = −0.31 [−0.60, −0.01] (see Fig. 1).²

2.2.3. Mediation model

Participants exposed to the heart-transplant (vs. the dental-implants) vignette (1) agreed more with the essentialist statements in our manipulation check, and (2) assigned more importance to a person’s physical composition in judging their identity. Consistent with our hypothesis, the increase in reliance on physical continuity when judging personal identity was explained by the increase in essentialist thinking: A mediation analysis revealed a credible indirect effect of our manipulation on participants’ identity judgments via their essentialism, ab = −0.04 [−0.101, 0.001].

In sum, these results provide initial evidence for the predicted relationship between essentialist thinking and common intuitions about personal identity. We found that participants who were exposed to essentialist reasoning were subsequently more likely to use physical continuity as a criterion for personal identity, and this effect occurred in part by way of their increased endorsement of essentialist ideas.

3. Study 2

In Study 1, we found that exposing participants to a story that featured essentialist reasoning also made them more likely to think that the specific bits of matter that make up a person are important for maintaining their identity. An alternative possibility, however, is that the effects on identity judgments were driven by aspects of our vignettes that were unrelated to essentialism. For instance, because the heart is associated with one’s identity in popular culture, people’s identity judgments may have been affected by this association rather than by essentialist thinking per se. (We note, however, that this explanation cannot account for the increased endorsement of essentialist ideas in the experimental condition or for the fact that endorsement of essentialist beliefs mediated the effect of the manipulation on identity judgments.) To address this possibility, in Study 2 we described Claire Sylvia as receiving a bone marrow transplant instead.

3.1. Method

3.1.1. Participants

Participants were 641 Amazon Mechanical Turk workers recruited from the United States and English-speaking Canadian provinces (58% women, M_age = 33.7 years, Mechanical Turk approval rate > 80%) who were paid $0.50 for participating in the study. We sought to recruit approximately 100 more participants than in Study 1 because we anticipated that the effect of our manipulation might be weaker than in that study, due to switching from a heart to a bone marrow transplant. We prevented Mechanical Turk workers from participating more than once in the studies in this paper by using TurkGate (Goldin & Darlow, 2013). We did not exclude any participants in our analyses; excluding participants who missed more than one comprehension question does not affect our parameter estimates.

3.1.2. Materials and procedure

Aside from the change from a heart transplant to a bone marrow transplant in the vignette for the experimental condition (see Table S4 in the SOM), the materials and procedure were identical to those of Study 1.

3.2. Results and discussion

We predicted that participants would show stronger reliance on physical continuity in their identity judgments when assigned to the experimental (marrow-transplant) condition than the control (dental-implants) condition, replicating the results of Study 1. Further, we predicted that this effect would be explained by an increased tendency to agree with essentialist ideas, also as in Study 1.

3.2.1. Manipulation check: effects on essentialism

Participants in the experimental (marrow-transplant) condition exhibited more essentialist attitudes (M = 2.76, SD = 0.70) than did participants in the control (dental-implants) condition (M = 2.63, SD = 0.66), b = 0.28 [0.09, 0.47].

² Throughout the paper, we will focus on relative comparisons between conditions since these comparisons map most directly onto the design of the study. However, we will also report whether participants judged the person’s identity to be maintained in an absolute sense by comparing participants’ judgments in each condition against the midpoint of the scale (namely, 4) with a one-sample Bayesian t test. In this study, participants judged that the patient’s identity was preserved overall in both conditions: Bayes Factor (BF_{10}) = 5.12 in the experimental condition and BF_{10} > 1000 in the control condition. Conventionally, values of BF_{10} greater than 3 indicate some support for the alternative hypothesis of a mean difference (H₁) over the null hypothesis (H₀; e.g., Dienes, 2014), though Bayes Factors are better interpreted as a continuous measure of relative evidence. When computing the BFₜ, we assumed a small effect size (d = 0.20) as a prior for the alternative hypothesis (H₁).
two consequences: First, it raises the possibility that participants’ identity judgments did not track just numerical identity. If participants assumed that the original and stock bodies differed in their physical features, participants could have interpreted the question about whether the person who left the operation was “still Jim” as asking about the qualitative similarity of the individual before and after the operation (see Starmans & Bloom, 2018). Second, the ambiguity in the vignettes used in Studies 1 and 2 raises the possibility that participants’ identity judgments were not driven by the disruption in physical continuity per se. In principle, participants could have also based their judgments about whether the person who left the operation was “still Jim” on the inferred differences in physical features between the original and stock body.

To address these issues, we introduced two changes in the vignettes used in Study 3. First, the operation was now said to preserve both the psychological and the physical features of the patient. If qualitative identity from time 1 to time 2 is stipulated, participants should be more likely interpret questions about (e.g.) whether the person at time 2 is “still Jim” as being about numerical identity. The second change was that we now varied whether the operation preserved physical continuity. The participants read two vignettes: In one vignette, the operation was said to rebuild the patient’s body using the molecules that made up the original body; thus, physical continuity was preserved in this *same-stuff* vignette. In the other vignette, the operation was said to rebuild the patient’s body using new molecules synthesized in a lab; thus, physical continuity was disrupted in this *new-stuff* vignette. By comparing responses across these two vignettes, we were able to more precisely assess the role of physical continuity in participants’ identity judgments (see also Studies 4a and 4b in Forstmann & Bürgem, 2015, for a similar test).

Our second goal in designing Study 3 was to explore the generalizability and robustness of the effects identified so far. One means of doing so was to switch to a correlational design. In the first two studies, we found that experimentally increasing essentialist beliefs led to an increase in participants’ reliance on physical continuity as a criterion for personal identity. In Study 3, we tested the hypothesized relationship between essentialism and identity judgments by assessing individual differences in essentialism. Specifically, we devised a new measure of individual differences in endorsement of essentialist beliefs (see below) and tested whether it predicts participants’ reliance on physical continuity. We expected that participants who endorse essentialist beliefs more strongly would also weigh physical continuity more heavily in their identity judgments. That is, high-essentialism (vs. low-essentialism) participants should differentiate more strongly between the same- and new-molecules vignettes, being particularly confident that identity was preserved when the body was reconstructed out of the same molecules. Correlational evidence of this sort would help to triangulate on the idea of a link between essentialism and identity judgments.

4. Method

4.1. Participants

Participants were 227 Amazon Mechanical Turk workers recruited from the United States and English-speaking Canadian provinces (48% women, \( M_{\text{age}} = 34.7 \) years, Mechanical Turk approval rate > 80%) who were paid $0.50 for participating in the study. We were uncertain about the size of the predicted relationships because Study 3 used new stimuli, measures, and relied on a correlational design. Consequently, we sought to collect 200 participants in light of prior research showing that for typical effect sizes in psychology correlations stabilize at this sample size (Schönbrodt & Perugini, 2013). We oversampled relative to the planned sample size in order to account for exclusions but did not exclude any participants in our analyses; excluding participants who missed more than one comprehension question did not affect our parameter estimates. We also conducted a sensitivity power analysis on

---

7 As in Study 1, participants judged that the patient’s identity was preserved overall in both conditions: \( BF_{10} = 10.02 \) in the experimental condition and \( BF_{10} > 1000 \) in the control condition on one-sample Bayesian t tests against the midpoint of the scale.
this design, which determined that this design provided 80% power to detect a standardized regression coefficient as small as 0.18 for the interaction between participants’ essentialism and their identity judgments on the same- vs. new-molecules vignettes.

4.1.2. Revised measure of identity judgments

The two vignettes used in this study stated that a severely injured patient in the future needed an operation and their only chance for survival was a machine that reconstructed their body from a “precise blueprint” using either the same matter that composed them (physical continuity preserved; same-stuff vignette) or different matter (physical continuity disrupted; new-stuff vignette) (see Table S5 in the SOM for the full text of the vignettes). Each participant read both vignettes, in random order.

After reading each vignette, participants rated three items tapping intuitions about identity (rather than a single item, as in the first two studies): “The person that exited the machine is still Jim,” “Despite undergoing this procedure, the person that went into the machine is the same as the person that came out of the machine,” and “The procedure didn’t change any essential aspects of Jim as a person” (1 = Strongly Disagree, 7 = Strongly Agree). Using three items instead of one provides a more solid basis for drawing conclusions about the phenomenon of interest because it makes the results less vulnerable to idiosyncratic problems with any one of the items.8 The three items were internally consistent (Cronbach’s α = 0.93); however, we did not average across them in our models but rather included the data at the item level in a mixed-effects model.

4.1.3. Measure of individual differences in essentialist beliefs

After completing the measure of identity judgments, participants completed a measure of essentialist beliefs. We developed a set of four items to measure individual differences in endorsement of the belief that individuals have physical essences that permeate their bodies (e.g., “Throughout life, a person’s thoughts and actions leave traces that permeate their body, making them unique”; 1 = Strongly Disagree, 6 = Strongly Agree) (see Table S6 in the SOM for the full list of items). These items were averaged into an overall essentialism score (Cronbach’s α = 0.72).

These items are face-valid, but we also wanted to confirm that they in fact measured essentialism rather than a more sophisticated, materialist view of individuals (e.g., that it is physical features such as DNA or neural connections that make an individual unique). To assess the validity of our scale as a measure of essentialism, we computed its correlations with a measure of participants’ education (1 = some high school, no diploma to 8 = doctorate degree), as well as two items about participants’ belief in souls, which were asked in the demographic block of questions at the end of the study: “Do you believe that people have souls?” (0 = no, 1 = yes) and “Ultimately, someone is the same person so long as they have the same soul. Your soul is who you truly are” (1 = strongly disagree to 5 = strongly agree). If the items in our measure track essentialism, which is an intuitive, non-scientific perspective on the world, endorsement of these items should be negatively correlated with education (e.g., Singer et al., 2007) and positively correlated with endorsement of beliefs about souls (e.g., Evans & Poling, 2004). If, instead, these items track a type of materialist belief, which is consistent with current scientific knowledge, the opposite pattern of correlations should be observed. Endorsement of the items on this scale was weaker among participants with more education, Bayesian Kendall’s τb = −0.15, BF10 = 32.11, and higher among participants who endorsed other non-scientific beliefs (in this case, about souls), Bayesian Kendall’s τb = 0.11, BF10 = 3.79, and Bayesian Kendall’s τb = 0.14, BF10 = 20.82, for the two questions above, respectively. These results provide evidence for the validity of our scale as a measure of essentialism.

4.2. Results and discussion

We predicted that participants with stronger essentialist beliefs will be more likely to think that physical continuity is key to maintaining personal identity. That is, we predicted an interaction between the type of identity vignette (0 = same-stuff vs. 1 = new-stuff) and participants’ essentialism: High-essentialism participants should differentiate between the same- and new-stuff vignettes more strongly than low-essentialism participants. All predictors were centered or effects-coded in our model. We also increased the standard deviation of the priors on the fixed effects in the model from 1 to 3 to reflect our uncertainty about the size of the predicted relationship. Changing these priors did not materially alter the parameter estimates of the model.

Replicating prior work (e.g., Blok et al., 2005; Forstmann & Burgmer, 2015), people judged that an operation that disrupts (vs. preserves) physical continuity is more likely to induce a change in identity (Mnew-stuff = 4.35, SD = 1.85; Msame-stuff = 5.28, SD = 1.61), b = 2.07 [1.83, 2.32].9 We also found an overall relationship between essentialism and identity judgments, such that higher essentialism predicted lower identity judgments regardless of vignette, b = −0.76 [−1.39, −0.11]; that is, high-essentialism participants were less likely to think that the protagonist’s identity was maintained regardless of whether the operation preserved or disrupted physical continuity.

Importantly, however, we also observed the predicted interaction: As shown in Fig. 3, high-essentialism participants differentiated more strongly between the same- and new-stuff vignettes than low-essentialism participants did, b = 0.44 [0.13, 0.75]. Essentialism was a stronger predictor of identity judgments about the new-stuff vignette, where physical continuity was disrupted, b = −0.97 [−1.62, −0.34], than about the same-stuff vignette, where physical continuity was preserved, b = −0.53 [−1.18, 0.10].

With its correlational design, Study 3 complements Studies 1 and 2 by providing a different type of evidence for the hypothesized connection between essentialist thinking and the common reliance on physical continuity as a criterion for personal identity. We found that use of this criterion in one’s identity judgments, measured more precisely than in Studies 1 and 2, was stronger among participants who also endorsed essentialist beliefs more strongly.

5. Study 4

In Study 4, we turned to a developmental exploration of concepts of personal identity. Our first goal was to test whether children factor physical continuity into their identity judgments. To our knowledge, this is the first test of this question. The second goal was to test whether children’s reliance on physical continuity in their identity judgments is predicted by the strength of their essentialist beliefs. Finding an early relationship between personal identity concepts and essentialist reasoning would be consistent with our broader claim that judgments about personal identity are influenced by essentialist biases.

---

8 It is possible that, in isolation, some of these items could also be interpreted as asking about qualitative identity. However, recall that the revised vignettes stipulated that qualitative identity was preserved from time 1 to time 2. Pragmatically, this should prompt participants to interpret these items as asking about numerical identity. Consistent with the idea that the items were interpreted in the same way, analyses performed separately on each item showed nearly identical results. These analyses can be found in the folder labeled “Study 3” on the project’s Open Science Framework page: https://osf.io/7x2j6/.

9 Participants judged that the patient’s identity was preserved overall in both vignettes: BF10 = 14.49 in the new-stuff vignette and BF10 > 1000 in the same-stuff vignette on one-sample Bayesian t tests against the midpoint of the scale.
Although we did not average these responses in our models, the three
girls, M

5.1.1. Participants

Participants were 60 children between 6 and 9 years of age (48% girls, M

was 8.08 years), recruited in a small city in the Midwestern United States. Children younger than 6 were not included in this study because pilot testing indicated that younger children had considerable difficulty understanding the tasks, which involved relatively complex scenarios and language. A sensitivity power analysis revealed that this design provided 80% power to detect a standardized regression coefficient of 0.35 for the interaction between children’s essentialism and their identity judgments on the same- vs. new-stuff vignettes (see below).

5.1.2. Materials and procedure

Where possible, we adapted the materials and procedure from Study 3 to make them suitable for children. We describe our adapted materials and procedure below.

5.1.2.1. Child-friendly measure of personal identity concepts

In each of two stories, children were told about a child from the future (e.g., Kyle) who was in an accident and needed an operation to make them healthy again (see Table S7 in the SOM for the full text). Children were told that this operation involved a machine that “is able to rebuild people’s bodies” using “their own blood and bones and stuff like that” (same-stuff vignette) or “brand new blood and bones and stuff like that” (new-stuff vignette).

Children were then asked three questions to assess if they thought that the protagonist’s identity was preserved: (1) “Who came out of the machine? Was it Kyle, or was it someone like Kyle but who isn’t actually Kyle?” (2) “What do you think, is the kid that went into the machine the same as the kid that came out of the machine, or are they different kids?” and (3) “Here’s what Kyle looked like before, and here’s the kid that came out of the machine [children were shown two copies of the same picture]: Deep down, do you think they are the same person?” Children’s answers were scored as 1 if they indicated that personal identity was maintained and 0 otherwise.10

After answering the identity-related questions for each vignette, children were also asked two questions to check their memory for the crucial details of the vignette: (1) whether the machine broke down the child’s body or left it as it was, and (2) whether the machine used the child’s own “stuff” or new “stuff.” Children’s memory for these details was very good (M = 86.2% correct). To be conservative, and because children’s performance on the memory check was excellent overall, we did not exclude any children on the basis of this check.

5.1.2.2. Child-friendly measure of individual differences in essentialist beliefs

The items in the individual-differences measure of essentialism from Study 3 (e.g., “Throughout life, a person’s thoughts and actions leave traces that permeate their body, making them unique”) were too abstract to adapt for use with children. As a result, we tapped a more concrete manifestation of the belief that individuals have physical essences that can be transferred to other individuals or objects: children’s preference for original artifacts—which are arguably imbued with their owners’ or creators’ essences—compared to perfect replicas of those artifacts (e.g., Hood & Bloom, 2008).

Children were provided with paper “coins” (pictures of US quarters) and asked to decide how much they would “pay” for each of a pair of objects: “I am going to give you 10 coins, and then you have to tell me how you would divide these coins to get two different things based on how much you want these two things.” The task started with a demonstration trial by the experimenter, followed by a practice trial for the child. These introductory trials were intended to familiarize children with the task but did not involve the key contrast between original artifacts and replicas. On the demonstration trial, the experimenter explained how they would divide their coins between a silver watch and a plastic watch. The experimenter said, “I want the silver watch a lot more than the plastic watch, so I will pay a lot more for it,” and then proceeded to place 9 of their coins on the (picture of a) silver watch and 1 coin on the (picture of a) plastic watch. On the practice trial, children were asked to divide their coins between a ring made of wood and a ring made of gold, and were reminded that “the more you want one of them, the more coins you will want to pay for it.” Children understood the task, paying more for the gold ring on this practice trial, M = 7.65 coins out of 10, SD = 1.72, BF

10 > 1,000 on a one-sample Bayesian t test against 5.

The measure of individual differences consisted of four items in which children divided a set of 10 coins (one set per trial) between an original artifact (e.g., Abraham Lincoln’s original hat) and a replica of it (see Table S8 in the SOM for the full text). We made it clear to children that the replica was perfect (e.g., the copy of the hat “looks and feels like the original—no one can tell the difference between the copy and the original”). This message was reinforced by showing children two copies of the exact same picture (e.g., Lincoln’s top hat), one of which was said to be the original and the other the copy. Finally, children were asked, “How would you spend your 10 coins?” and the experimenter recorded how the children divided their coins. On two of the trials, the original artifact was introduced first, and on the other two trials the replica was introduced first. The order of the four original/replica pairs was counterbalanced across participants. We averaged the number of coins spent on the original object across the four trials and used it as a measure of individual differences in children’s essentialism (Cronbach’s α = 0.77).

Children paid more for the original artifacts than for perfect replicas of these artifacts (M = 6.55 coins out of 10 paid for originals, SD = 2.09, BF

10 > 1000 on a one-sample Bayesian t test against chance [5 coins]), replicating previous results (e.g., Hood & Bloom, 2008). Importantly, children’s responses showed a substantial amount of variability as well (SD = 2.09), which is desirable in a measure of individual differences. Altogether, these results provide evidence for the validity of our child-friendly measure of essentialism.
We analyzed children's responses to the identity questions with a Bayesian mixed-effects logistic regression that included the following predictors: children's age, the type of identity vignette (same-stuff = 1 vs. new-stuff = 0), essentialism scores (a continuous variable ranging between 0 and 10), and the interaction between type of identity vignette and essentialism scores. This analysis indicated, first, that even children take physical continuity into account when judging personal identity. Children judged that, after the operation, the protagonist was less likely to be the same person in the new-stuff vignette than in the same-stuff vignette. This result should be interpreted with some caution, however, because the 95% credible interval is also consistent with small effects in the unpredicted direction. To follow up on this interaction, we computed the relationship between essentialism scores and identity judgments separately for the new-stuff and the same-stuff vignettes. As predicted, and as observed in adults in Study 3, essentialism was credibly related to children's identity judgments about the new-stuff vignettes, in which physical continuity was disrupted, $b = -0.82 [-1.48, -0.28]$, but this relationship was attenuated when physical continuity was preserved, $b = -0.52 [-1.15, 0.03]$.

The results of this study suggest an important fact about the development of children's concepts of personal identity: Similar to adults, children assume that a person's identity is tied in part to the specific bits of matter that make them up. Moreover, this intuition is somewhat stronger among children who believe that individuals have physical essences that permeate their bodies and that can be transferred to the objects with which they interact, as measured by the extent to which children prefer originals over copies. These results are consistent with the findings of Studies 1–3 and suggest that the link between essentialism and concepts of personal identity is in place early in life.

Note. Essentialism was mean-centered. Type of Identity Vignette was effect-coded.

### 5.2. Results and discussion

The present studies contribute to the literature on the development of concepts of personal identity. Although a considerable amount of research has examined the criteria children use to reason about the numerical identity of objects (e.g., Baillargeon et al., 2012; Gelman et al., 2012), recent work on children's concepts of numerical identity as applied to persons has focused exclusively on psychological continuity (Heiphetz et al., 2018)—on identifying which psychological continuity was preserved overall in both vignettes, $BF_{10} > 1000$ on one-sample Bayesian $t$ tests against chance (0.50). Although it is difficult to compare responses across studies given the many differences in the way we measured identity judgments, it did seem that children in this study were more likely to judge that the protagonist's identity was preserved—despite disruptions in spatiotemporal continuity and physical continuity—relative to the adults in Study 3. This difference may suggest that children assign less importance to the body (specifically, its continuity and composition) in judging personal identity, which is consistent with at least some findings in the developmental literature (e.g., Gottfried et al., 1999).

### Table 1

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Estimate</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.86</td>
<td>0.88</td>
</tr>
<tr>
<td>Age</td>
<td>0.38</td>
<td>−0.52</td>
</tr>
<tr>
<td>Type of Identity Vignette (same- vs. new-stuff)</td>
<td>0.78</td>
<td>0.04</td>
</tr>
<tr>
<td>Essentialism</td>
<td>−0.67</td>
<td>−1.30</td>
</tr>
<tr>
<td>Type of Identity Vignette × Essentialism</td>
<td>0.30</td>
<td>−0.09</td>
</tr>
</tbody>
</table>

### 6. General discussion

While prior research has established the centrality of psychological continuity to judgments of personal identity, physical continuity is also an important factor in adults' identity judgments (e.g., Rips et al., 2006; Hood et al., 2012). The present research sheds some light on this puzzle. Four studies provided experimental and correlational evidence for the hypothesis that the use of physical continuity as a criterion for personal identity is rooted in, and early emerging, bias—psychological essentialism. This bias predisposes people to understand identity (whether at the category or the individual level) as a result of causally powerful, physical "stuff" usually found on the inside; the role assigned to the physical matter of one's body in judgments of identity may be in part a result of this essentialist assumption.

In support of this claim, we found that participants who were exposed to essentialist ideas were more likely to take physical continuity into account when judging personal identity, and this tendency was mediated by a corresponding increase in essentialist thinking (Studies 1 and 2). Studies 3 and 4, which used correlational designs, provided converging evidence for this conclusion: Both adults (Study 3) and 6- to 9-year-olds (Study 4) who had stronger essentialist tendencies were less likely to judge that a patient who underwent a procedure that reconstructed their body out of “new” matter was the same person afterward relative to a case in which the procedure used the patient's “original” matter. However, it should also be noted that in all four studies, participants generally judged that the transformations preserved the protagonists' identity. Because (by design) all transformations preserved psychological continuity, these judgments suggest that people view physical continuity as less critical to personal identity than psychological continuity. We return to this point below.

The present studies contribute to the literature on the development of concepts of personal identity. Although a considerable amount of research has examined the criteria children use to reason about the numerical identity of objects (e.g., Heiphetz et al., 2018)—on identifying which psychological continuity...
states and processes children view as necessary for maintaining one’s identity as a person. The present research complements Heiphetz and colleagues’ findings by revealing that children, like adults, also use the physical composition of the body as a criterion for personal identity. Moreover, the fact that reliance on this criterion was predicted by children’s essentialist tendencies (measured as a preference for authentic objects; e.g., Hood & Bloom, 2008) begins to uncover the reasons why children attach importance to the specific bits of physical matter that make up an individual when judging whether their identity as a person is preserved across time.

We interpret our findings across these four studies as consistent with a causal influence of essentialism on concepts of personal identity. A premise underlying this interpretation is that essentialist reasoning and concepts of personal identity, though in causal interaction, are nevertheless distinct psychological entities and processes. However, our data are equally consistent with another interpretation—namely, that personal identity concepts are simply an instance of essentialism. Essentialism manifests broadly across a range of domains (e.g., Cimpian & Salomon, 2014; Gelman, 2003), and perhaps people’s intuitions about personal identity are simply a domain-specific manifestation of these broad essentialist tendencies. This perspective could also explain our results (e.g., increasing essentialist thinking in one domain could “spill over” into another (Studies 1 and 2)). In fact, it is unclear to us what sorts of empirical data (if any) would be able to differentiate between these two theoretical possibilities. The central point, however, is that—regardless of which of these perspectives one adopts—the present studies provide new insights into why people reason about personal identity as they do. Whether one comes down on the side of identity concepts being influenced by essentialism vs. an instance of essentialism is, to our mind, of secondary importance.

The evidence that essentialism is in part why people use physical continuity as a criterion for personal identity suggests a further, more speculative possibility: that physical continuity is factored into identity judgments not for its own sake but rather simply because it ensures psychological continuity. The essence of an individual is assumed to cause (and, as a result, carry) some of the individual’s psychological properties, as evidenced by the fact that people expect an organ transplant to affect the psychology of the recipient (e.g., Meyer et al., 2013, 2017). Thus, it is possible that people weigh physical continuity in their identity judgments because they think that the bits of matter that make up a person somehow store psychologically relevant material (akin to the “cellular memory” idea). Under this assumption, if a body was made of different bits of matter at time 1 and time 2, that body could not possibly be psychologically identical at time 1 and time 2 and thus could not belong to the same person. Participants’ overall tendency to judge that personal identity was maintained across the transformations in our studies (all of which preserved psychological continuity) is consistent with this argument. Nevertheless, direct tests of whether physical continuity is indeed subordinate to psychological continuity when it comes to judgments of personal identity must be left for future research.

Aside from their contributions to theory, these findings have implications for questions of societal importance. For example, to hold someone responsible under the law, we must establish under what conditions the person on trial is the same person who committed the crime (e.g., Schechtman, 1990). Prior research suggests that jurors are often tempted to hold defendants responsible even if at the time of the crime they were in an altered psychological state—for example, because of temporary mental illness (e.g., German & Singer, 1977). To the extent that this judgment is based on intuitions about the physical continuity between the person who committed the crime and the person standing trial, the present work may cast doubt on the validity of this judgment: The belief that physical continuity is a criterion for personal identity is due in part to a psychological bias—a bias that can be observed in children as young as six. While the fact that children reason this way does not in and of itself invalidate the judgment of culpability, it does suggest that additional scrutiny may be warranted, especially when also considering the family resemblance of these judgments with a host of pseudo-scientific beliefs.

The present studies also highlight fruitful directions for future work. An emerging literature suggests that people’s intuitions about psychological continuity—specifically, about the key role of moral traits—may also be rooted in essentialist reasoning (e.g., Newman et al., 2014; Strohminger et al., 2017). The argument is that people see morally good traits as the essence of the self and therefore as crucial to maintaining one’s identity as a person (e.g., De Freitas, Cicara, Grossmann, & Schlegel, 2017). This raises the question of whether the essence that is preserved via physical continuity is the same as the essence that is preserved via psychological continuity. They may not be: It is possible that qualitatively different types of essences are involved in reasoning about physical and psychological continuity. With respect to physical continuity, our studies suggest that the essences involved are physical and causal. This work is consistent with the prior literature showing that such essences explain a range of intuitions about natural and social categories, as well as individual members of these categories (e.g., Gelman, 2003; Newman & Bloom, 2014). In contrast, research on psychological continuity has often invoked a non-physical, value-laden notion of an essence akin to Platonic ideals (e.g., Knobe, Prasada, & Newman, 2013). On this notion of essence, for example, a poem is a poem by virtue of embodying some (non-physical, aesthetic) value, which serves as the essence; losing this value-laden essence would mean that the poem ceases to be a poem. In the same way, a person is no longer judged to be the same person they were before if their moral “essence” is somehow corrupted, which signals a break in psychological continuity (e.g., Strohminger & Nichols, 2015).

Understanding the interplay between these two notions of essentialism, people’s intuitions about physical and psychological continuity, and their judgments of personal identity is an important topic for future work. For example, researchers may want to explore whether individual differences in reasoning about non-physical, value-laden essences track the extent to which people take psychological continuity into account when judging identity (similar to how we explored the relationship between physical, causal essences and intuitions about physical continuity in the present studies). In addition, it would be important to explore how these two notions of essentialism relate to identity judgments across development. For instance, perhaps children believe that physical and non-physical essences are equally important to who a person is, but as they grow older, they increasingly weigh the non-physical essences (and psychological continuity) over the physical ones (and physical continuity)—while still exhibiting vestiges of their earlier intuitions about the importance of physical continuity.

To conclude, the four studies reported here advance theory on the lay concept of personal identity. Specifically, we investigated why personal identity judgments rely on the continuity of the specific bits of physical matter that make up an individual, and we uncovered an important explanation of this phenomenon—namely, people’s more-generally tendency to understand the world in terms of causally powerful, physical essences.

Acknowledgements

We are grateful to the participants in these studies; to the research assistants in the Cognitive Development Lab at the University of Illinois for their help with data collection; and to Joshua Knobe, Patricia Mirabile, and the members of the Cognition Computation and Development Lab at Arizona State University, the Cognitive Development Labs at the University of Illinois and New York University, and the Mind and Development Lab at Yale University for helpful discussion and comments on previous drafts of this manuscript. The Department of Psychology at the University of Illinois provided funds that made this research possible.
Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cognition.2019.05.018.

References


