Beyond the surface: A multi-disciplinary investigation of essentialism

BEYOND THE SURFACE: A MULT-DISCIPLINARY INVESTIGATION OF ESSENTIALISM

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Lay Abstract

Essentialism is the human intuition that category membership is caused by an internal, invisible, source. Humans treat category members as if there is something deep inside them that makes them who they are. Across three chapters, we investigated whether people are essentialist about social categories, and the subsequent consequences. In the first study, we showed that younger children, more than older children, believed in an internal, Canadian, essence. There was no difference between Canadian and American children in how they viewed national identity. Next, we demonstrated that adults are more essentialist about social categories like national identity and gender when they are under time pressure. Finally, we showed that thinking about addiction as a biologically based and distinct category is associated with addiction stigma.

Abstract

Essentialist thinking refers to the intuition that category membership and category-specific features are caused by an internal, invisible, essence. Across three studies, we investigated essentialism from a developmental, a cognitive, and a social perspective. In the first study, using a structured interview, we investigated whether Canadian children aged 5-to-8 hold an essentialist view of national identity, and whether their view differs from that of American children. Compared to older children, younger Canadian children were more likely to believe that Canadian identity was biologically based, and that traits associated with Canadian identity were heritable. However, we found no differences between Canadian and American children in terms of essentialist thinking. In the next study, we tested whether adults obscure their essentialist thinking and whether it may be unveiled by cognitive demand. We presented participants with a switched-at-birth paradigm where some participants were under time pressure and others were not. We found that adults under time pressure were more essentialist about national identity and gender than adults not under time pressure, though we saw no effect on race. This suggests that adults obscure their essentialist thinking, but it can be unveiled during cognitive demand. Finally, we assessed whether essentialist thinking is associated with addiction stigma. We presented participants with fictional news articles about scientific studies to prime either essentialist or anti-essentialist views about addiction. Both participants' biological and non-biological essentialism were associated with addiction stigma, with the latter being a stronger correlate. This suggests that the extent to which

individuals view addiction as a fundamentally distinct category has more impact on stigma than whether adults view addiction as genetically based.

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List of Abbreviations and Symbols

α, Cronbach's alpha

Δ*ELPD*, differences in expected log pointwise predictive density

ANOVA, analysis of variance

b, standardized beta coefficients

CFI, comparative fit index

CI, confidence interval

d, Cohen's *d*

EEA, Environment of Evolutionary Adaptedness

F, F ratio

f, Cohen's *f*

k, number of groups

M, mean

MTurk, Amazon Mechanical Turk, an online participant pool

N, number of participants

p, p value, probability

r, correlation coefficient

s, seconds

t, test statistic from a *t*-test

TLI, Tucker-Lewis Index

SD, standard deviation

SE, standard error

U.S., United States

χ^2, Wald's Chi-squared statistic

z, test statistic from a Fisher's *z*-test

Declaration of Academic Achievement

Chapter 2: Dr. M.D. Rutherford and I adapted the materials from Hussak & Cimpian (2019), with guidance from Dr. Andrei Cimpian. Jocelyn Van Dyke, Patrick Angara, Sarra Jiwa, and I recruited participants. I collected and input the data. I conducted the analysis and prepared the figures with guidance from Dr. M.D. Rutherford and Dr. Andrei Cimpian. I prepared the initial draft of the manuscript, which was then edited by Dr. M.D. Rutherford and Dr. Andrei Cimpian. All three of us also collaborated on revisions.

Chapter 3: Dr. M.D. Rutherford and I designed the 3 experiments. I programmed the experiment and collected the data. I conducted all data analysis and created all figures. I prepared the manuscript for publication, which was edited by Dr. M.D. Rutherford. Dr. M.D. Rutherford and I collaborated on revisions.

Chapter 4: Dr. Mel Rutherford and I designed the experiment. I adapted the stimuli from Williams & Eberhardt (2008). Isaac Kinley, a fellow PhD student, programmed the online study. I collected the data and performed all data analyses. I prepared the figures. I prepared the manuscript for publication, which was edited by Dr. M.D. Rutherford. Dr. M.D. Rutherford and I collaborated on revisions.

Chapter 1: Introduction

The human mind creates categories that make it easier for us to behave adaptively in the world around us. This process is automatic and invisible to us, so it is difficult for us to appreciate that the categories we perceive are not necessarily how the world is organized, rather these categories are created by our brains. How do human brains construct categories, and what makes them so compelling? An essentialist understanding of categories may be the answer (Carey, 2009; Gelman, 2003; Hirschfeld & Gelman, 1994).

The Function of Categorization

Categorization helps humans navigate their environment in a number of ways. Firstly, categorization allows us to conserve cognitive resources while still accessing crucial information (Rosch, 2002). Rather than considering every feature of an entity, we can classify the entity as part of a given category. This lets us know two things: 1) that this entity is similar to others within its category and 2) that this entity is dissimilar from members of other categories (Rosch, 2002). This information alone may be enough to help us successfully traverse the world, while allowing us to not be bogged down by the infinite similarities or differences that may exist between entities (Goodman, 1972; Rosch, 2002). Additionally, categorization provides a perception of structure for the world that helps facilitate decision-making (Rosch, 2002).

The most valuable function of categories is induction (Goodman, 1955; Pinker, 1997; Rehder & Hastie, 2001; Shipley, 1993). Individuals make inferences about an entity's properties based on the properties held by members of the same category. This is especially true if category-membership is perceived as causally related to the presence of those properties (Rehder & Hastie, 2001). This facilitates learning: Humans can witness one instantiation of a given property in a category member and make reliable, effective inferences about the presence of that property in other category members (Cohen & Lefebvre, 2005; Goodman, 1955). Therefore, even though our categories may not be indicative of a "true" organization of the world, they are still useful because they inform behavioural decisions that pertain to the ways humans interact with the world. To help facilitate this function, our category representations are tied to invisible, internal, properties, henceforth called "essences", that reinforce in our brain that our categories are real and thus worthy of supporting induction.

Essentialism: A Causal Source for Categorization

Essentialism refers to the psychological perception or intuition that category membership is *caused* by an internal, invisible, essence (Carey, 2009; Gelman, 2003; Medin & Ortony, 1989). This essence grants an entity its category membership, as well as its category-specific features. For example, rather than defining a tiger by its orange-and-black stripes, a tiger is defined by it having an innate "tiger-ness" (Gelman, 2003, 2004). This tiger-ness grants it membership

into the category “tiger”, as well as granting the tiger its tiger-like features. Rather than defining a category based on external similarities, essentialist categories are defined by a (perceived or inferred) internal source. There is no metaphysical argument to psychological essentialism: at no point are we arguing that an essence actually exists (Gelman, 2003; Medin & Ortony, 1989), nor are we arguing that humans have strong beliefs or theories about what the essence is (Barrett, 2001; Carey, 2009). Rather, we are arguing that people’s everyday representations of categories appear to be tied to perceived essences (Gelman, 2003). While the idea that we perceive “essences” as the basis of categories may seem farfetched, it may be easier to accept essentialism when we consider the various forms an essence can take. For example, while most people are unfamiliar with essences, they likely are familiar with concepts like souls, or spirits, that people say exist within individuals and makes them who they are. These cultural concepts reinforce essentialist views of categories by providing an internal source for identity and category membership (Haslam, 2017). Indeed, anything can take on the role of an “essence” so long as it is an internal, nonobvious, property that we perceive as causally related to category membership. Again, we are not arguing that anything presented as an essence actually exists. However, our brain readily accepts internal causal sources, in whatever form, and ties them to category representations (Haslam, 2017). As a result, when we reason about categories, we behave as though category membership is a permanent, unchanging, and fundamental aspect of individuals.

Essentialist categories are perceived as stable, immutable, impermeable, informative, discrete, biologically based, and heritable (Bastian & Haslam, 2006; Haslam et al., 2002). Using the tiger example from earlier, an essentialist view of the category tiger is associated with the belief that the tiger's identity will remain stable despite any property changes that may occur (Keil, 1989). Additionally, any characteristics that are associated with the category "tiger" are immutable, and knowing that an entity belongs to the category tiger informs us of many other characteristics of the entity (Gelman, 2004; Haslam et al., 2000). Finally, an essentialist view of tigers would be associated with the belief that the tiger essence can in some way be traced back to the tiger's biological makeup. This tiger essence, and any tiger characteristics associated with it, is heritable and present at birth (Bastian & Haslam, 2006). Different categories are essentialized to varying degrees. This can include some categories being overall essentialized more than others, like in the case of criminality, where sex crimes are essentialized more than other crimes (de Vel-Palumbo et al., 2019). Alternatively, some categories are essentialized more than others on specific subfactors. For example, categories like natural kinds and gender are perceived as more biological than other categories like race or national identity (Gil-White, 2001; Kenrick, 1994; Martin & Parker, 1995).

As a result of this variance, essentialism has been characterized as a domain-general way of understanding categories that is recruited for and employed differently for different domains (Hirschfeld & Gelman, 1994). This

means that any category can be understood in essentialist terms, but categories vary in the extent to which they are essentialized. The base domain of essentialism has been theorized to be biology (Gelman & Hirschfeld, 1999; Hirschfeld, 1995). This is supported by the fact that biological categories like species or plants, are universally essentialized by people of all ages, while other categories are not (Barrett, 2001; Gelman & Hirschfeld, 1999; Gelman & Markman, 1986; Keil, 1989; Rothbart & Taylor, 1992). Children and adults support essentialist explanations for natural kinds categories, while denying essentialist views of artifact categories in the same context (Keil, 1989). In a series of experiments, Keil showed that children and adults believed that the identity of animals would remain constant despite numerous physical and functional changes. When considering artifact categories, like teapots or chairs, both children and adults rejected the idea that category membership would remain stable through external changes (Keil, 1989). However, essentialism is not exclusively tied to biology. People are essentialist about social categories as well (Eidson & Coley, 2014; Hirschfeld, 1995; Hussak & Cimpian, 2019; Taylor et al., 2009; Williams & Eberhardt, 2008).

The Function of Essentialism

An essentialist view of categories supports category-based induction. In contrast, categorization based on external properties has limited inductive potential. It can only inform someone about the presence or absence of a property

within that limited temporal moment (Carey, 2009). Essentialist views of categories identify a causal source for a category or concept. This causal source is ever-present, and facilitates inferences even in the absence of common external traits, as well as supporting inferences about nonobvious, internal, qualities (Carey, 2009; Gelman, 2003). The existence of this causal source provides a strong theoretical framework for induction (Carey, 2009; Gelman & Markman, 1986; Medin & Ortony, 1989). It is *because* we perceive that category members share an essence that we infer that category members share characteristics.

Additionally, by not being tied to specific properties, essentialist views of categories more easily reconcile the existence of non-prototypical category members. For example, based on external properties alone, a whale is not obviously a mammal. However, when we shift our view to internal essences, we can reconcile that a whale, despite looking more like a fish, still holds a mammalian essence and therefore fits in the category "mammal". The presence of the essence alone is enough to reconcile any external anomalies (Medin & Ortony, 1989). Therefore, an essentialist view of categories is not bound by external features (Gelman, 2003; Medin & Ortony, 1989). On top of reconciling non-prototypical members, essentialist accounts of categories are able to reconcile atypical individual category members. For example, we may have a list of features that we believe are necessary for something to be classified as a tiger. This list may include orange-and-black stripes, the ability to eat meat, having four legs, etc. However, we are easily able to understand that a tiger that lacks any or

all of the above features is still a tiger (Gelman, 2003). A three-legged tiger is a tiger, even without the "necessary" fourth leg. Essentialism is not bound to external characteristics, and therefore, essentialist conceptualizations of categories are better able to handle atypical category members.

Essentialism may have evolved as a strategy to support inductive inferences specifically about natural kinds (Barrett, 2001). In our environment of evolutionary adaptedness (EEA), individuals who held essentialized representations may have been better at identifying different natural kinds and restricting the inductions they made about kinds to be more appropriate for their category membership (Barrett, 2001). This reasoning about natural kinds may have been overextended to include other categories, thus making essentialism a domain-general way of understanding categories, as mentioned earlier (Dewar & Xu, 2010; Gelman, 1999; Hirschfeld & Gelman, 1994).

Additionally, having an essentialist view of categories may have made it easier to navigate social group boundaries (Gil-White, 2001). In the EEA, intergroup competition was especially intense and so individuals who were better at navigating that competition may have been more likely to survive and reproduce (Richerson & Boyd, 2001; Van Vugt & Park, 2010). An essentialist view of categories may have accentuated key group differences and maintenance of group boundaries, which may have promoted competitive intergroup behaviour (Gil-White, 2001).

An alternative evolutionary explanation for essentialism focuses on how other evolved cognitive capacities may coalesce to allow for essentialist representations of categories (Gelman, 2003). Gelman (2003) argues that other cognitive capacities like the ability to distinguish between appearance and reality or the ability to track identity over time have evolved independently and are now co-opted by essentialism. For example, the ability to track identity over time helped us recognize individuals in the EEA. Within an essentialist framework, the ability to track identities over time allows us to understand category stability despite external changes (Gelman, 2003). Various other cognitive capacities may have similarly served other adaptive functions, but now also support essentialist thinking.

Eidson & Coley (2014) conducted empirical work supporting the notion that essentialism operates as a heuristic. They used a switched-at-birth paradigm investigating essentialist views of gender in adults (Eidson & Coley, 2014). In this paradigm, participants are presented with a story about a member of one social group who is adopted and raised exclusively by members of another social group (e.g., a baby girl being adopted and raised exclusively by males). Participants are then asked about how the baby will behave when they grow up (Gelman, 2004). The essentialist response is that the baby will grow up and maintain qualities and behaviours stereotypically associated with their original social group (e.g., the baby girl, despite being raised by males, will grow up and develop stereotypically feminine preferences and behaviours). The non-essentialist response is that the

baby will grow up and develop behaviours and preferences typical of the group they are socialized by (Gelman, 2004). Eidson & Coley (2014) presented participants with switched-at-birth paradigms, while also manipulating how quickly participants were encouraged to respond. Participants were randomly assigned to either a fast condition or a slow condition. Participants in the fast condition were prompted to respond more quickly to the switched-at-birth paradigm. Participants in the slow condition had to wait 10 seconds before being able to respond, reducing feelings of cognitive demand (Eidson & Coley, 2014). Participants in the fast condition were more essentialist than participants in the slow condition, suggesting that adults may use essentialism to reason about categories during periods of high cognitive demand (Eidson & Coley, 2014). This is consistent with how other heuristics, like stereotyping, are often more heavily recruited during periods of cognitive demand (Kaplan et al., 1993; Svenson & Edland, 1987).

The Development of Essentialism

Children show evidence of essentialist views of categories as early as 3-years-old (Gelman, 1999, 2004; Hirschfeld, 1995). Children show strong essentialist intuitions for both natural kinds categories (Gelman & Wellman, 1991) and social categories (Chalik et al., 2017; Hussak & Cimpian, 2019; Taylor et al., 2009). Essentialism may develop in children in the form of two separate assumptions: a kinds assumption, and an essence assumption (Gelman, 1999). The

kinds assumption, which develops first, is the assumption that kinds are categories and that similar kinds will share common properties, including nonobvious properties (Gelman, 1999, 2004). The essence assumption refers to the assumption that there is an invisible essence or internal source that causes category membership (Gelman, 1999). The inherence heuristic may be a cognitive precursor to the essence assumption, specifically. Children are already biased to seek internal, causal, explanations for phenomenon, and in the context of categorization this may take the form of the essence assumption (Cimpian & Salomon, 2014).

One key contributor to essentialism development may be parents' use of generic language. Generic language refers to when individuals describe category members as generally sharing some characteristic (e.g., "Tigers have stripes") rather than describing individuals as having that trait ("This tiger has stripes"). The use of generic language highlights the importance of categories, and emphasizes their enduring and homogenous nature, all of which promote essentialist thinking (Liberman et al., 2017). In recorded conversations, mothers use generic language specifically to describe natural kinds categories (e.g., cats), but not artifact categories (e.g., chairs, Gelman et al., 1998).. This is later reflected by children who preferentially use generic language to describe biological categories more than other, non-essentialized, categories (Gelman, 1999). Use of generic language by parents and their children is associated with the parents' essentialist thinking, suggesting that generic language may be an inadvertent

method of passing on essentialist views (Gelman et al., 2014). This seems to work, as children are more essentialist about novel social categories when the categories are presented to them in generic terms, rather than non-generic terms (Rhodes et al., 2018). Ultimately, it seems as though generic language is a key input for essentialism development.

Generic language represents an inexplicit developmental input for essentialism development. Conversely, cultural traditions may more explicitly promote essentialist thinking in children (Haslam, 2017). Cultures often provide internal, enduring explanations for differences between people. This can include citing a "soul" for differences in moral behaviour, or highlight differences in genetics as a cause for differences in category-relevant characteristics (Haslam, 2017). Even in adults, providing articles that promotes a genetically deterministic explanation for category membership is associated with increased essentialist thinking (No et al., 2008; Williams & Eberhardt, 2008).

Social Consequences of Essentialism

Past research supports the conclusion that essentialism is associated with increased prejudice (Haslam et al., 2002; No et al., 2008; Rhodes et al., 2018; Williams & Eberhardt, 2008) and stereotyping (Bastian & Haslam, 2006). Theoretically, this could be due to the fact that essentialist concepts encourage the view that categories are rigid, impermeable, and discrete (Bastian & Haslam, 2006; Demoulin et al., 2006). Most empirical research supports this conclusion.

Priming participants to take an essentialist view of race is associated with increased prejudice towards race outgroup members (Williams & Eberhardt, 2008).

However, essentialism can have positive social consequences as well. For example, essentialism can enhance group identification, and strengthen the positive gains associated with social group membership (Morton et al., 2009; Verkuyten, 2003). Additionally, marginalized groups can redefine the "essential" characteristics of their identity as a way of coping through social oppression (Mahalingam, 2007). For example, both slave-owners and enslaved people in the United States exhibited essentialist views of race, but the specific views of the "Black essence" differed. Slave owners used their essentialist perception to reinforce the social hierarchy. Black individuals instead viewed the Black essence as symbolizing the fact they were one of God's chosen (Mahalingam, 2007; Sanger, 1995). This cognitive reappraisal aided in resisting psychological oppression (Sanger, 1995). Therefore, while essentialism has traditionally been associated with prejudice toward others (Bastian & Haslam, 2006), there is also research showing how individuals can use essentialist definitions of their own identity to improve their self-concept (for a review, see Mandalaywala, 2020).

Impact

This thesis demonstrates the value of taking a multifactor approach when studying essentialism. While it is well-established that essentialism is a

multifactored construct (Bastian & Haslam, 2006; Gelman et al., 2007), much of the essentialism literature continues to treat essentialism as a monolithic psychological construct. This includes testing how essentialism as a whole contributes to stigma, or how essentialism develops generally. This can be challenging, especially in a developmental context, as essentialism's various subfactors do not always cohere (Gelman et al., 2007). Additionally, different essentialism subfactors may interact with other constructs differently (Berryessa, 2020; J. W. Martin & Heiphetz, 2021). Throughout this thesis, we have been careful to investigate essentialism's different subfactors, and by doing so, have found stronger effects and more interesting results than if we had investigated essentialism as a unified concept. In Chapter 2, we found differing developmental trends for different essentialism subfactors in the context of national identity essentialism. In Chapter 3, by breaking the switched-at-birth paradigm questions into different subtypes, we saw how cognitive demand affected some, but not all, essentialist ways of thinking. Lastly, in Chapter 4, we found that biological and non-biological essentialism were each strongly correlated with addiction stigma, but that the latter was a stronger correlate. This indicates that some essentialism subfactors may be more valuable than others when discussing stigma.

Additionally, Chapters 2 and 3 both serve as replications and extensions of prior research. In Chapter 2, we replicated the findings of Hussak & Cimpian (2019) while also adding a cross-cultural comparison. In Chapter 3, using the methods of Eidson & Coley (2014), we replicated their findings about gender

essentialism in adults under cognitive demand, while also including studies examining the same effect for national identity and race essentialism.

This thesis also furthered the essentialism literature by examining social categories that have otherwise not received much study. Both Chapters 2 and 3 contribute to a new, but growing, literature on national identity essentialism. Prior to the publication of Chapter 2, only two other studies had examined national identity essentialism (Davoodi et al., 2020; Hussak & Cimpian, 2019). Chapter 2 provides valuable insight on national identity essentialism in the context of Canadian identity, as well as assessing for differences between Canadians and Americans. Both of these insights were novel to the literature. Chapter 3 was the first study to investigate national identity essentialism in adults. Similarly, Chapter 4 provides novel insight for how essentialism affects addiction stigma. Prior to the publication of Chapter 4, research had examined essentialism in the context of mental health (Haslam et al., 2002), but not addiction specifically.

Current Studies

Chapter 2 of this thesis examines the development of national identity essentialism in children. Specifically, it assessed the open question of how Canadian children essentialize national identity. We also conducted a cross-cultural comparison, investigating how national identity essentialism may differ in Canadian versus American children. To do this, we used materials adapted from Hussak & Cimpian (2019) and asked Canadian children aged 5 to 8 about

Canadian identity related to various subfactors of essentialism, including stability, heritability, inductive potential, and more. We found a negative developmental trend: older children were less essentialist than younger children. This effect was especially true for measures of biological basis and heredity. However, older Canadian children were more likely to make inferences on the basis of national identity than younger children. To conduct the cross-cultural comparison, we compared our data to data from Hussak & Cimpian (2019). We found no significant differences in national identity essentialism between the Canadian and American sample at any age, suggesting that national identity essentialism may develop similarly across cultural contexts.

Chapter 3 of this dissertation tested the assertion that essentialism operates as a heuristic. Replicating the methods from Eidson & Coley (2014), we extended their work by investigating how cognitive demand influenced adults' essentialism about national identity, race, and gender. We also conducted a comparison across all three studies to assess differences in the extent to which adults essentialize these categories. To assess the effect of cognitive demand, we randomly assigned participants to a "fast" or "slow" condition. In the fast condition, participants were prompted to "GO FASTER" every 2 seconds when answering questions from a switched-at-birth paradigm. In the slow condition, participants were given 10 seconds for each question before they were able to respond. We found that participants under cognitive demand were more essentialist about national identity and gender than participants not under cognitive demand. There was no effect of

cognitive demand on race essentialism. Additionally, we found that essentialism was highest for gender, followed by race, followed by national identity. This may reflect the extent to which these categories are perceived as biological (Gelman & Hirschfeld, 1999).

Chapter 4 reports an investigation of the role of essentialism in prejudice toward individuals with addiction. While research has investigated essentialism's role in prejudice related to race (No et al., 2008; Williams & Eberhardt, 2008), gender (Rhodes & Gelman, 2009), and even mental illness (Haslam, 2011; Haslam et al., 2002), no research had investigated the consequences of an essentialist view of addiction. Addiction is a good candidate for an essentialist stance, since part of essentialism is the belief that category membership is biologically based (Bastian & Haslam, 2006; Gelman & Hirschfeld, 1999), and there is an ongoing debate about whether a biological view of addiction would lead to more or less prejudice (Richter et al., 2019). We used an essentialism priming method developed by Williams & Eberhardt (2008). Participants were randomly assigned to either a pro-essentialism, anti-essentialism, or control condition. In the pro-essentialism condition, participants read an article that claimed scientists had identified the genetic basis for addiction. In the anti-essentialism condition, participants read an article that claimed scientists had definitively found that addiction had no genetic basis. Participants then filled out scales related to essentialism and addiction stigma. We assessed how different subfactors of essentialism were associated with addiction stigma. We found that

belief in a biological basis was significantly positively associated with anti-addiction stigma, but that belief in discrete category boundaries was a significantly stronger correlate. We replicated this finding with both opioid addiction and methamphetamine addiction stigma.

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Chapter 2:

Canadian children's concepts of national groups: A comparison with children from the United States.

Siddiqui, H., Cimpian, A., Rutherford, M.D. (2020). Canadian children's concepts of national groups: A comparison with children from the United States. *Developmental Psychology, 56*(11), 2102–2109. https://doi-org.libaccess.lib.mcmaster.ca/10.1037/dev0001103.

Preface

From an early age, children have concepts of their own national identity, including stereotypes and cultural traditions (Barrett & Short, 1992; Piaget & Weil, 1951). However, we do not know how children reason about national identity. Recent research has tested whether essentialism may be a viable candidate for understanding how children conceptualize national identity (Davoodi et al., 2020; Hussak & Cimpian, 2019).

Essentialism refers to the perception that categories are based on an internal, invisible, all-or-nothing essence. These essences are perceived as causally responsible for category membership and category-specific features (Medin & Ortony, 1989). In 2019, Hussak & Cimpian asked American children aged 5-to-8 questions probing their essentialist reasoning about national identity. They found that compared to older children, younger children were more likely to believe that national identity had a biological basis, and that traits associated with

national identity were heritable. They concluded that early in development, children have essentialist representations of national identity (Hussak & Cimpian, 2019). Turkish children also have essentialist representations of national identity (Davoodi et al., 2020). We became interested in investigating whether Canadian children also hold essentialist representations of national identity, and whether the degree of essentialism differs between American and Canadian children. While Canada and the United States have similar cultures overall, they differ in how they discuss their national identity (Janzen, 1994). Therefore, it may be that children from Canada would have different strategies for representing national identity than American children. The goals of this study were two-fold: 1) Assess whether Canadian children hold essentialist views of national identity, and how essentialism changes with age; and 2) Assess differences in national identity essentialism between Canadian and American children.

We collected data from 79 Canadian children aged 5- to 8-years old. Using a structured interview adapted from Hussak & Cimpian (2019), we asked children questions about their representations of national identity. This included forced-choice questions assessing whether children viewed national identity as stable, heritable, biologically based, and inductively useful. We also included open-ended questions asking children to explain common Canadian traditions, asking what it means to be Canadian, and asking how someone becomes Canadian. We found, similar to the American study, that younger Canadian children were more likely to believe that national identity was biologically based and heritable than

older children. Conversely, we found that older children made inferences based on national identity more than younger children.

Next, we assessed if there were differences in overall essentialist thinking between Canadian and American children, using data from Hussak & Cimpian (2019) for comparison. We found no significant differences in national identity essentialism between Canadian and American children. To assess support for the null hypothesis, we conducted Bayesian leave-one-out cross-validation analysis. The analysis supported the null hypothesis, that Canadian and American children do not have different representations of national identity.

Taken together, our findings support a growing literature that children, especially younger children, have essentialist representations of national identity (Davoodi et al., 2020; Hussak & Cimpian, 2019). However, essentialism decreases with age, specifically in terms of how biological children view national identity. Additionally, national identity essentialism does not seem to differ across North American cultures.

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Abstract

Understanding the development and structure of people's concepts of national groups can contribute to an understanding of their behavior in the political arena, including perhaps the recent rise in nationalism and anti-immigrant sentiment. Here, we provide a developmental investigation of concepts of national groups in a sample of 5- to 8-year-old Canadian children ($N = 79$). Using an extensive battery of measures, we assessed the extent to which children conceive of national groups as socially constructed vs. as having deeper, perhaps biological, "essences" that shape their members' physical and psychological makeup. At younger ages, Canadian children tended to essentialize national groups, including in a biological sense. At older ages, the biological conception of national groups subsided, but children continued to view these groups as meaningful and informative. A statistical comparison with 5- to 8-year-old American children's responses to the same measures ($N = 70$; using data from Hussak & Cimpian, 2019) revealed a great degree of overlap, despite substantial differences between the two countries in how national identity is conceived and described. These findings add an important piece to our understanding of the development of concepts of national groups.

Keywords*: social perception; essentialism; concept development; social categorization*

Introduction

How do children reason about national groups? Classic work on this topic has focused on the development of children's awareness of their own and other national groups (e.g., Carrington & Short, 1995, 1996; Jahoda, 1962; Piaget & Weil, 1951), their stereotypes about national groups (e.g., Barrett & Short, 1992; Meltzer, 1941), and their affective responses to these groups (e.g., Jahoda, 1962; Meltzer, 1941; Piaget & Weil, 1951; for a review, see Barrett, 2007). This work has suggested, for instance, that children are already familiar with some national stereotypes by age 5 (Barrett & Short, 1992) and develop a sense of national pride by age 7 (Piaget & Weil, 1951). However, only recently has research begun to focus on the *causal-explanatory beliefs* that guide children's reasoning about national groups. In particular, a key open question is whether children conceive of national groups as socially constructed, institutional entities (Noyes & Keil, 2019), which would be consistent with their actual structure, or whether children instead attribute a deeper underlying reality to these groups. Since "essentialist" (e.g., Gelman, 2003; Medin & Ortony, 1989) views of national groups—that these groups have deeper, perhaps biological, essences that define group boundaries—predict a range of negative attitudes toward national outgroups and immigrants (e.g., Falomir-Pichastor & Frederic, 2013; Hussak & Cimpian, 2019; Kunovich, 2009; Meeus, Duriez, Vanbeselaere, & Boen, 2010), it is important to understand whether and to what extent national group concepts are essentialized across development.

Here, we report a test of this question in a sample of children from Canada, which has a distinctive cultural discourse around issues of national identity and immigration (e.g., Janzen, 1994; Peach, 2005; Palmer, 1976), as well as a comparison of Canadian children's concepts of national groups (i.e., the present study) with the responses of a sample of American children on the same battery of questions (from Hussak & Cimpian, 2019).

Children often misconstrue phenomena that have historical, socially constructed origins as instead being the products of intrinsic causal forces (e.g. Cimpian & Salomon, 2014a, 2014b; Cimpian & Steinberg, 2014; Sutherland & Cimpian, 2015). The two papers we know of that have reported data on young children's causal-explanatory reasoning about national groups echo this conclusion. First, Hussak and Cimpian (2019) found that younger (vs. older) American children were more likely to assume that being an American is reflected in a person's biology. In one of their tasks, Hussak and Cimpian showed children two similar-looking individuals and told them that only one of the individuals was an American. Five-year-olds were considerably more likely than 8-year-olds to think "looking inside" at their brain, blood, or bones would inform them of the individuals' nationality. Second, Davoodi, Soley, Harris, and Blake (2020) found evidence of essentialist beliefs about nationality in both American and Turkish children. Nearly two-thirds of children in their study thought that, in the future, scientists will be able to tell an individual's nationality by looking at their blood under a microscope. Interestingly, Davoodi and her colleagues did not observe an

age-related decrease in children's essentialist beliefs about nationality (between the ages of 5 and 10), suggesting that these beliefs perhaps persist later into development than indicated by Hussak and Cimpian's data.

Building on this work, here we investigated the extent to which essentialist beliefs about nationality vary across cultures. The evidence to date suggests that cultural input shapes the extent to which children essentialize some, but not all, social groups. For instance, gender seems to be consistently essentialized across a variety of cultural contexts, whereas race, ethnicity, and religion are more variable: Children essentialize these groups earlier and more strongly to the extent that they are salient in children's environments (e.g., Birnbaum, Deeb, Segall, Ben-Eliyahu, & Diesendruck, 2010; Chalik, Leslie, & Rhodes, 2017; Diesendruck, Goldfein-Elbaz, Rhodes, Gelman, & Neumark, 2013; Kinzler & Dautel, 2012; Rhodes & Gelman, 2009). What about national groups? How malleable is children's essentialist reasoning on this topic in response to cultural input? From a theoretical standpoint, answering this question would contribute to the growing literature on the development of national group concepts, and more broadly to theory on the role of culture in shaping essentialist reasoning across development (e.g., identifying the factors that determine whether a group is essentialized similarly vs. differently across cultures). From a practical standpoint, examining the role of culture in children's reasoning about national groups is important because the correlates of essentialism in this domain include, even among children, nationalist views that portray the national ingroup as superior to

others and as deserving of this superior status (Hussak & Cimpian, 2019). If educators and policymakers wish to shape these attitudes, information about the malleability of their sources—which likely include children's essentialist views about national groups—will be useful.

So far, the only evidence comparing children's tendency to essentialize national groups across cultures comes from Davoodi and colleagues' (2020) studies. They compared children's reasoning about national groups in two cultures, Turkey and the US, and found almost identical patterns of responding. Children in both countries were relatively high in their endorsement of essentialist views of national groups (e.g., *M*s = 3.25 and 3.24 on a 0–5 scale for 5- and 6-year-olds from Turkey and the US, respectively). Thus, the evidence so far suggests that children's essentialist views of national groups may not vary as a function of culture.

The goal of the present study is to further explore potential cross-cultural variability in concepts of national groups. For a maximally informative comparison, we recruited children from a country whose discourse about national identity is markedly different from that of the US (and, arguably, that of Turkey as well; Kaya, 2009): Canada. In what follows, we first outline the differences between Canada and the US with respect to how national identity is typically conceived and portrayed. We then describe (1) the study we conducted on a sample of Canadian children, and (2) a statistical comparison of Canadian children's reasoning about national groups (i.e., the present sample) with US

children's reasoning, using the data from Hussak and Cimpian (2019; available on the Open Science Framework).

A salient aspect of the differences between Canada and the United States in their attitudes toward national identity is reflected in these countries' expectations of immigrants. Canada is frequently described as a "cultural mosaic" (e.g., Janzen, 1994; Palmer, 1976; Peach, 2005). This metaphor suggests that retention of one's other social identities (e.g., national, ethnic) is compatible with being a Canadian; there is no singular "Canadian" identity that overrides all others. Indeed, two-thirds of Canadians believe that it is worse for Canadian culture if everyone holds the same customs or ideals (Berry & Kalin, 1995; Wilkes & Corrigall-Brown, 2011; Soroka & Roberton, 2010). Importantly, this pluralistic perspective is conveyed to children. The 2018 social studies curriculum for the province of Ontario, where our sample is from, lists multiculturalism as one of the "key components of the Canadian identity" that students are expected to have learned by the end of third grade (The Ontario Ministry of Education, 2018, p. 88). In contrast, the metaphor that describes American attitudes toward immigrants is a "melting pot." This metaphor suggests that immigrants are encouraged to assimilate into a unified, all-encompassing "American" culture (e.g., Janzen, 1994; Mobasher, 2006; Palmer, 1976; Souto-Manning, 2007), the assumption being that American identity should supplant whatever identities immigrants had in their countries of origin.

In light of these considerations, it is likely that an examination of

Canadian children's reasoning about national groups, as well as a comparison with children from the US, will provide valuable new information about cross-cultural variation in the degree to which concepts of national groups are essentialized. Given the differences in how national identity is conceived and discussed in these two countries, we might expect children's concepts to differ as well. In particular, the emphasis on Canada as a multicultural mosaic might lead children growing up in this society to infer that membership in their national group is not tied to a particular set of features or to an underlying similarity. As a result, Canadian children may espouse more flexible, less essentialist views of national groups than US children. However, it is also possible that the differences between the "cultural mosaic" and "melting pot" ways of conceiving national identity are too nuanced for young children to understand and incorporate into their concepts. In an absolute sense, talk of nationality and national identity is prominent in the cultural discourse of both countries; if young children's tendency to essentialize national group membership is more dependent on this overall degree of cultural salience or prominence (rather than the specifics of each culture's beliefs), then we might expect Canadian and US children's reasoning about national groups to be similar.

Methods

Participants

Seventy-nine children between five and eight years of age (40 girls and 39

boys; *M* = 6.65 years, *SD* = 1.18) participated in this study. Participants were recruited through a research database at a large public university in Southern Ontario, Canada. Of the 97.5% of children whose parents reported ethnic heritage information, 70.1% were Caucasian, 13.0% were Mixed, 6.5% were Southeast Asian, 3.9% were Indigenous Canadian, 2.6% were Asian or Pacific Asian, 1.3% were African Canadian, and 2.6% "Other." All but one of the children had been born in Canada. Most participants (63.3%) had primary caregivers with at least a bachelor's degree. Median reported income was between 100,000-119,999 Canadian dollars (CAD). Participants were provided 10 CAD as compensation for their time. The procedures reported below were approved by a university-affiliated Institutional Research Ethics Board.

The sample size was chosen to roughly match that of Hussak and Cimpian's (2019) Study 1 (*N* = 70; available at https://osf.io/qh2my/?view_only=8026414039ec48b3bf6a6d75c660a517), with which we will quantitatively compare the present data. A sensitivity power analysis revealed that the combined sample (*N* = 149) had 80% power to detect cross-cultural differences of *d* = .46 or greater.

We also note that the demographic characteristics of the present Canadian sample and the comparison US sample were similar. For instance, the US sample consisted of 70 children between the ages of five and eight (35 girls, 35 boys; *M* = 7.12 years, *SD* = 1.26); like the Canadian sample, the US sample was also recruited from a university town; the majority of the children in the US sample

were also Caucasian (82%); and the US sample was also highly educated (79% of caregivers had at least a bachelor's degree). In light of these similarities, we can be more confident that the cross-country comparison is not confounded by demographic differences.

Open Data and Analysis Scripts

The raw data, analytic syntax, and the full output of the statistical models reported below are available publicly on the Open Science Framework (OSF): https://osf.io/vmrq3/?view_only=a2d0d281035a473e897e04a4dbc89890.

Procedure and Materials

The sessions started with a few warm-up questions, which were followed by five measures of essentialist thinking, administered in counterbalanced order. Two additional, open-ended measures of essentialism were administered at the end of the sessions. All warm-up questions and essentialism measures were the same as in Hussak and Cimpian's (2019) Study 1, except that they were adapted to ask about Canadians rather than Americans. The close parallel was intended to facilitate comparison between Canadian and American children's views of their national ingroups.

Warm-up Questions. The three warm-up questions were intended to gauge children's knowledge of basic facts about Canada and Canadians. The three questions were asked in a fixed order. First, children were shown a map of Canada and asked what country it depicted (open-ended). Second, children were asked

what someone from Canada is called (open-ended). Third, children were shown two flags (the Canadian and Argentinian flags) and were asked to point to the Canadian flag. If children answered a question incorrectly, they were informed of the correct answer. Children generally did well on these questions: The average percentage of correct answers was 61.7, and 97.5% of children gave at least one correct answer. More details about children's performance on the three questions, split by age group, can be found in Table S1 in the Supplementary Online Materials (SOM).[1] Since children's performance on these warm-up questions did not relate to their responses on the main task ($b = -0.01$, $SE = 0.02$, $p = .78$; see OSF for details), no children were excluded on the basis of this measure.

Stability. If children assume that national groups have essences, they should also perceive membership in these groups as stable and unchanging (e.g., Keil, 1989; Gelman, 2003). Children were shown an image of a five-year-old Canadian girl ("Lucy") and asked if she had always been Canadian (1 = *yes*, 0 = *no*). Next, children were asked if Lucy would always be Canadian, and—if they said "yes"—whether she would still be Canadian even if she moved "far, far, away" (0 = *no, she won't always be Canadian*, 0.50 = *yes, she will always be Canadian, but not if she moves far away*, and 1 = *yes, she will always be*

[1] Hussak and Cimpian (2019) asked the same three questions: "Can you tell me what country this is?" [*pointing to a map of the US*], "Do you know what we call someone who's from America?", and "One of these is the American flag. Can you point to the American flag?" Because Hussak and Cimpian did not report descriptive statistics on children's warm-up responses, we report these statistics here: The average percentage of correct answers was 72.4, and 98.6% of children gave at least one correct answer (see Table S1 in the SOM for additional details).

Canadian, even if she moves far away). Lastly, children were asked if Lucy would still be Canadian even if she did not want to be anymore (1 = *yes*, 0 = *no*). Children's answers were averaged across these questions to create a composite *stability* score, with higher scores indicating that children view national group membership as more stable.

Heritability. To assess whether children view national group membership and the traits associated with it as being heritable—another hallmark of essentialism—we used a switched-at-birth paradigm (e.g., Gelman & Wellman, 1991). Children were shown a picture of a Canadian couple and told that the couple had had a baby and that, as soon as the baby was born, it was adopted by a couple from an unfamiliar national group (Andorrans) and never interacted with any Canadians ever again. Here and in other measures below, we used unfamiliar national groups (e.g., Andorrans) as comparisons so that we can tap children's abstract expectations about these scenarios rather than their prior knowledge or stereotypes about specific national groups (Barrett, 2007). To highlight the contrasting national group membership of the two couples, as well as lessen the memory load for children, the pictures of the Canadian and Andorran couples were accompanied by pictures of the Canadian and Andorran flags, respectively.

Children were first asked if the baby would grow up to be Canadian, like their birth family, or Andorran, like their adoptive family. Then, they were asked two more questions, in counterbalanced order: if the baby would grow up to like the same foods as the birth family or as the adoptive family, and speak English,

like the birth family, or the Andorran language, like the adoptive family. The order of the two response options (birth vs. adoptive family) was counterbalanced across children. Responses indicating the baby would grow up to be Canadian (vs. Andorran) and display Canadian (vs. Andorran) preferences or behaviours, like their birth (vs. adoptive) family, were scored as 1 (vs. 0). Scores were averaged across the three questions to create a composite *heritability* score for each participant, with higher scores indicating a stronger assumption that nationality and associated traits are heritable.

Inductive Potential. When a category is understood to have an essence, its members are often assumed to be alike in many ways (Medin & Ortony, 1989). Here, we asked whether children would generalize preferences from one individual to another based on their shared nationality, even if alternative gender or race matches were available. For example, children heard that a Canadian girl likes to play *gorp* at recess and that an Estonian boy likes to play *quid*, and they were then asked which of the two games a Canadian boy would like to play (e.g., Gelman & Markman, 1986). If children select the game preferred by the Canadian girl, that would suggest they view nationality as a more potent basis for generalization than gender; in contrast, if children select the game preferred by the Estonian boy, that would suggest they view gender as more informative than nationality. One trial contrasted nationality with gender (see above) and another trial contrasted nationality with race. The order of the two response options and of the questions themselves was counterbalanced across children. Inferences based

on national identity were given a score of 1, while inferences based on race or gender were given a score of 0. Scores were averaged across the two questions to create a composite *inductive potential* score for each participant, with higher scores indicating a stronger assumption that national group membership is informative.[2]

Insides. Essentialist views about category membership are associated with the belief that category membership is in some way encoded in an individual's biology (e.g., Gelman, Heyman, & Legare, 2007). Thus, we assessed whether children assume nationality to have a biological basis. Children were shown a picture of two similar-looking individuals and were told that one was Canadian while the other was not. They were then asked if they could tell who is a Canadian by looking at the individuals' (1) blood, (2) brain, or (3) bones (1 = *yes*, 0 = *no*), in counterbalanced order. Scores were averaged across the three questions to create a composite *insides* score for each participant, with higher scores indicating a stronger assumption that nationality is biological.[3]

Traditions. An essentialist view of nationality may lead children to understand common national traditions as being due to some inherent feature of

[2] This task also included two control trials that used non-generalizable properties (Gelman, 1998): being left- vs. right-handed and having a brother vs. a sister. Appropriately, children were less likely to generalize these properties to same-nationality individuals relative to the preferences used in the main trials (*M*s = 64.6% vs. 77.2%, respectively), $t(78) = 2.47$, $p = .016$.

[3] Two control questions were designed to test response sets (e.g., "yes" bias). Children responded appropriately to these questions: 86.1% said they could tell who is a Canadian by asking questions of the individuals in the pictures, compared to only 24.1% who said that they could tell who is a Canadian by finding out the age of the individuals in the pictures, $p < .001$ by a sign test.

the national group. Thus, we asked children to explain Canadian traditions (e.g., eating maple syrup) to a puppet "from a place far, far away." Three such open-ended explanation questions were asked in counterbalanced order. If children answered a question by relating Canadian traditions to some inherent feature or preference of Canadians (e.g., "because they like it"), they were given a score of 1. If they related Canadian traditions to external, historical, or environmental factors, they were given a score of 0 (e.g., "because there's more maple trees there"). For this and all other open-ended measures, children's responses were coded by two independent raters (see Appendix S1 in the SOM for coding scheme). Neither of the raters was on the author team, and both were blind to the research questions. Inter-rater agreement was 78.1%, and disagreements were resolved by the first author (here and for all other open-ended measures). "I don't know" and unintelligible responses were scored as missing for this and all other open-ended questions. Scores were averaged across the three questions to create a composite *traditions* score for each participant.

Meaning. The second-to-last question assessed whether children essentialized being Canadian by asking them what it means to be Canadian ("What do you think it means to be a Canadian?"). Responses that equated the meaning of being Canadian with a trait, behavior, or internal state (e.g., "to be polite," "to be kind") or that referred to nationality as being inherited were given a score of 1. In contrast, responses that equated the meaning of being Canadian with historical or external factors (e.g., "to live in Canada") were given a score of 0.

Inter-rater agreement was 79.7%.

Acquisition. The final question was, "How do you become a Canadian?" Responses suggesting that becoming Canadian depends on acquiring a specific behaviour, trait, or internal state (e.g., "picking good choices") or that referred to nationality as being inherited were given a score of 1; responses that appealed to circumstances or other non-inherent factors (e.g., "you move to Canada") were given a score of 0. Inter-rater agreement was 83.5%.

Results

Analytic Strategy

Consistent with other work on the development of essentialism (e.g., Gelman et al., 2007; Hussak & Cimpian, 2019), the different facets of essentialist reasoning that we measured here did not cohere (Cronbach's $\alpha = .09$; average inter-measure correlation = .01; range = −.18 to .20). Thus, we did not average these measures into a composite index of essentialism but rather included them separately into a mixed-effects linear model with *measure* as a categorical predictor. We used a linear rather than logistic model because the data for five of the seven measures consisted of quasi-continuous averages of binary responses. (Some have suggested that linear models may in fact be the optimal modeling strategy for binary outcomes as well—for a number of reasons, including that they provide more interpretable interaction effects [e.g., Gomila, 2019].) The model also included children's age as a continuous predictor, as well as the interaction

between measure and age. In models that compared the responses of Canadian and US children, we also included nationality as a categorical predictor, along with all its interactions with measure and age. All models included a random intercept for participant to account for repeated-measures nature of the data (i.e., each participant provided seven data points, one per measure of essentialism). These analyses were conducted in Stata 16 (StataCorp, 2019). The mixed-effects models were computed with the *mixed* command; marginal tests that followed up on these models were computed with the *margins* and *contrast* commands. Figures were plotted using the *ggplot2* command in R, version 3.5.2.

Canadian Children's Concepts of National Groups

Table 1 and Figure 1 contain descriptive statistics on Canadian children's concepts of national groups. A mixed-effects model on the Canadian sample revealed several significant results.

First, there was a significant main effect of task, Wald χ^2 (6) = 202.3, $p <$ .001, suggesting that some of our measures revealed stronger evidence of essentialism than others. In particular, children judged national groups to be highly informative (*inductive potential*; $M = 0.77$), and they often explained what it means to be a Canadian by appealing to inherent traits, such as being polite (*meaning*; $M = 0.78$). Scores on these two measures were not significantly different from each other but were significantly higher than scores on the other measures, ps $\leq .011$ (see Table 1 and output on OSF for full results of Bonferroni-

adjusted pairwise marginal comparisons).

Although we did not average the seven measures into a single essentialism composite, the mixed-effects model does estimate a term for the overall relationship between age and essentialism (across measures). This term indicated that children's tendency to essentialize national groups decreased significantly with age, $b = -0.03$, $SE = 0.01$, $p = .029$. However, this average tendency was not observed across all measures. Only four measures had negative slopes with age, and only three of these four negative slopes were significant: *heritability*, $b = -0.09$, $SE = 0.03$, $p = .009$; *insides*, $b = -0.07$, $SE = 0.03$, $p = .024$; and *traditions*, $b = -0.09$, $SE = 0.03$, $p = .011$ (see Figure 1 as well). Thus, older (vs. younger) children were less likely to conceive of national groups as having a biological basis (*heritability* and *insides*), and they were also more likely to explain national traditions as a function of context and circumstances (e.g., Canadians play hockey "because it snows a lot here") rather than inherent features (*traditions*).

Comparison of Canadian and American Children's Concepts of National Groups

An informal comparison of the descriptive statistics in Table 1 and Figure 1 suggests that Canadian and American children's concepts of national groups were similar. A mixed-effects model that included *sample* (Canadian vs. American) alongside *measure* and *age*, plus all their interactions, confirmed this impression (for details, see output on OSF). Canadian and American children did

not differ significantly in the extent to which they essentialized national groups, either in the aggregate, Wald χ^2 (1) = 0.54, p = .46, or when considering the seven measures separately, Wald χ^2 (6) = 6.10, p = .41, and the negative relationship of essentialism with age did not differ significantly across the two samples either, b = −0.01, SE = 0.02, p = .48.

Note, however, that the logic of null-hypothesis significance testing does not allow us to interpret these non-significant results as favoring the conclusion that the Canadian and US samples are *not different* (e.g., Dienes, 2014). To quantify the evidence for this conclusion, we relied on a recently developed statistical method: model comparison via Bayesian leave-one-out cross-validation (Vehtari, A. Gelman, & Gabry, 2017; Vasishth, Nicenboim, Beckman, Li, & Kong, 2018; for a brief description, see Appendix S2 in the SOM). Specifically, we compared two models: a model that includes the *sample* variable (Canadian vs. American) along with *measure* and *age* (plus all interactions) vs. a model that omits the *sample* variable. The results of the model comparison analysis favored the simpler model without the *sample* variable, $\Delta ELPD$ = −8.25 [−15.61, −0.89], consistent with the claim that Canadian and American children's concepts of national groups do not differ (for full results, see Appendix S2 and OSF).

Discussion

Using an extensive battery of closed- and open-ended measures, we found that Canadian children's concepts of national groups are substantively similar to

those of children from the United States, despite the differences between the two countries in their discourse on nationality and national identity. This evidence is consistent with the previously documented parallels between American and Turkish children's national group concepts (Davoodi et al., 2020), providing further support for the conclusion of cross-cultural consistency in the extent to which children essentialize national groups. Thus, these findings add an important piece to our understanding of the development of concepts of national groups.

A key open question concerns the reason for the cross-cultural consistency in children's concepts of national groups, despite what are often widely discrepant cultural beliefs on this topic. One possibility, foreshadowed above, is that the differences in the content of cultural beliefs about nationality are too abstract and/or complex for young children to fully understand and incorporate into their reasoning about national groups. The core of the "cultural mosaic" metaphor of national identity that is prevalent in Canada is that individuals contribute their own cultural perspective to the broader national identity (Peach, 2005). Children's open-ended responses did not reflect this message. For example, 43% of the children viewed being born in Canada as necessary for becoming Canadian. In contrast, only 12% mentioned that one could acquire Canadian national identity by moving to Canada. These answers suggest that young children have not fully incorporated the "cultural mosaic" metaphor into their naive concepts of national identity. Early on, perhaps it is simply the overall extent to which a particular social dimension is mentioned and used functionally in a culture (e.g., Bigler,

Jones, & Lobliner, 1997) that determines whether children are prone to essentialize it. This could explain the cross-cultural similarities in reasoning about national groups. Children in most countries are likely to be exposed from an early age to the idea that they are members of a national group and that this membership has functional consequences.

An alternative reason why children's concepts of national groups are similar across cultures may be that these concepts co-opt naturally selected, module-like cognitive mechanisms for reasoning about coalitions and alliances (e.g., Cosmides, Tooby, & Kurzban, 2003). While national groups per se have only existed for several centuries, which is far too brief a period for natural selection to have directly shaped reasoning about these groups, perhaps they resemble the bands in which our ancestors lived for most of their evolutionary history, such that whatever cognitive mechanisms our species has evolved in this domain would be automatically applied to national groups as well, regardless of the cultural context. (It is unclear, however, why national groups would more easily and reliably co-opt these evolved mechanisms relative to other social categories, such as race and religion, which show substantial cross-cultural variation in the extent to which they are essentialized.) In future research, it will be important to devise ways of differentiating between these alternatives.

When discussing expectations of cross-cultural differences, it is important to keep in mind that individuals actively engage in and interpret culture when developing their cultural identity (e.g., Wainryb, 2006). Future work should

consider how children's engagement with their culture's practices and discourse around their national group, be it their personal engagement or their families' (e.g., does the family celebrate Canada Day?), affects the development of their concepts of nationality and their national identity. Within both Canada and the United States, there are regions that more strongly associate with their respective national identity than others (Cameron & Berry, 2008; Ishio, 2004). Given that even subtle aspects of a person's experiences (e.g., exposure to national symbols) can affect how much they identify with their national culture (No et al., 2008), these intra-national differences seem as important to study as differences between countries.

Another open question concerns the developmental trajectory of children's essentialist reasoning about national groups. The present data on Canadian children replicated Hussak and Cimpian's (2019) finding that children's reasoning about nationality as a biological category declines with age. However, these findings contrast with Davoodi and colleagues' (2020) findings, according to which this biological way of thinking about national groups does not decrease over the same age range. We suspect that this contrast is a by-product of the methodological differences between these studies. The focus of the present work and of Hussak and Cimpian (2019) was exclusively on concepts of national groups. As a result, these studies included a more extensive set of measures on this topic than Davoodi et al. (2020), who examined five different social categories. Given the finer-grained data at our disposal, we may have been in a

better position to capture developmental trends. In fact, Davoodi and colleagues' own adult participants showed markedly lower levels of essentialism about national groups relative to their child participants, which indicates an age-related decrease in essentialism similar to that observed in the present data and in Hussak and Cimpian (2019), except over a broader temporal scale.

Developmental science has much to contribute to our understanding of sociopolitical behavior, such as the current rise of nationalism in countries all over the world. The present findings take a step toward this goal. We found that, like American children, Canadian children's early concepts of national groups tend to posit a biological essence that is reflected in the physical and psychological makeup of these groups' members. With age, this biological conception of national groups subsides, but children continue to view these groups as meaningful and informative.

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Table 1
Means (and standard deviations) for the measures of national group essentialism, by sample (Canadian vs. American)

	Canadian sample	American sample
Stability	0.58[c] (0.31)	0.62 (0.30)
Heritability	0.45[bc] (0.38)	0.40 (0.31)
Inductive Potential	0.77[d] (0.32)	0.78 (0.30)
Insides	0.30[ab] (0.34)	0.30 (0.35)
Traditions	0.27[a] (0.33)	0.35 (0.32)
Meaning	0.78[d] (0.42)	0.68 (0.47)
Acquisition	0.19[a] (0.40)	0.21 (0.41)

Note. All scores are on a scale from 0 to 1, with higher values indicating higher levels of essentialism. Means sharing a superscript letter are not significantly different at $p < .05$ (Bonferroni-adjusted).

Table S1

Frequency (and percentage) of correct answers on the warm-up questions, by age group and sample

Age group	Can you tell me what country this is?	Do you know what we call someone who's from [Canada/America]?	Can you point to the [Canadian/American] flag?
Canadian sample			
5-year-olds	9 out of 19 (47%)	2 out of 19 (11%)	13 out of 19 (68%)
6-year-olds	14 out of 20 (70%)	2 out of 20 (10%)	20 out of 20 (100%)
7-year-olds	10 out of 20 (50%)	6 out of 20 (30%)	20 out of 20 (100%)
8-year-olds	14 out of 20 (70%)	16 out of 20 (80%)	20 out of 20 (100%)
American sample (from Hussak & Cimpian, 2019)			
5-year-olds	6 out of 17 (35%)	4 out of 17 (24%)	16 out of 17 (94%)
6-year-olds	10 out of 15 (67%)	7 out of 15 (47%)	15 out of 15 (100%)
7-year-olds	17 out of 18 (94%)	9 out of 18 (50%)	18 out of 18 (100%)
8-year-olds	18 out of 20 (90%)	12 out of 20 (60%)	20 out of 20 (100%)

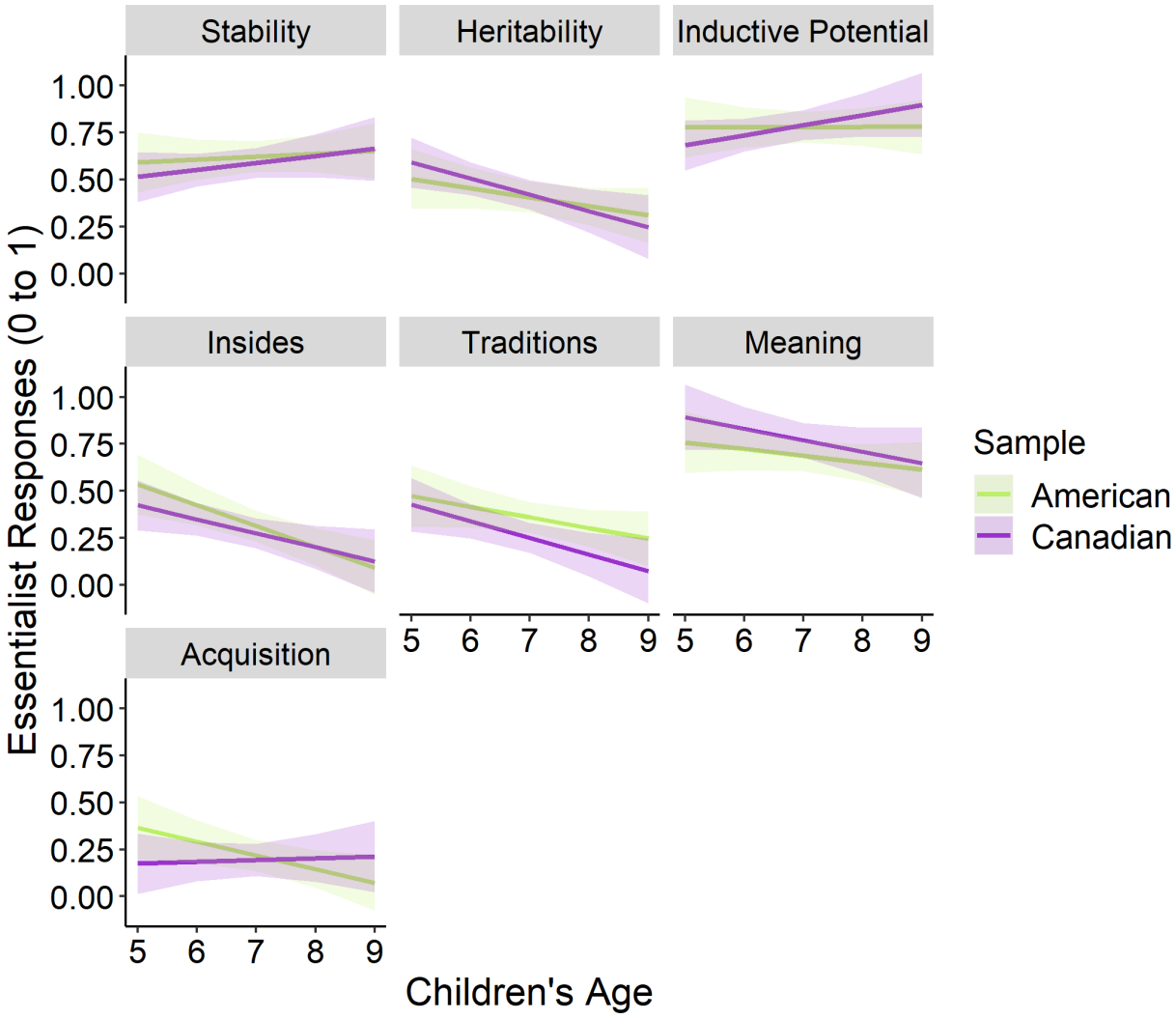

Figure 1. Canadian (purple lines) and American (green lines) children's reasoning about national groups as a function of age.

Appendix S1: Coding Instructions

For the three Traditions questions (maple syrup/hockey/playing in the snow):

- If the child describes Canadians liking maple syrup, or hockey, or playing in the snow, in terms of extrinsic factors (historical, environmental, etc.) you score it as 0.
    - For example (maple syrup), "They like maple syrup because it is yummy"
    - For example (hockey): “we have more ice rinks here”.
    - For example (playing in the snow): “we just have more snow here”.
- If they use intrinsic factors/internal beliefs, or suggest that the preference is inherent to all Canadians, then you would score it as 1.
    - For example, "Canadians like maple syrup because they're Canadian and that's what all Canadians like" or “Canadians are born liking hockey”.

For the Meaning question:

- If they describe it via external or environmental factors, then rate as 0.
    - For example, "You live here".
- If they describe it using a *trait, behaviour,* or *intrinsic factor*, you rate it as a 1.
    - For example: "It means to be nice" or “it means to speak English” or “it means to feel Canadian” as an example of a trait, behaviour, or intrinsic factor, respectively.

For the Acquisition question:

- If they describe it using environmental, or otherwise external, factors, and not about something inherent, rate it as 0.
    - Examples of common *external factors* includes something like “Moving here” or “choosing to live in Canada”
- If they describe it using a *behaviour*, or *trait*, or indicating that national identity is an inherent feature, rate it as 1.
    - For example, "It means to know English" or "It means to be a good person", etc.

Appendix S2: Description of Model Comparison Method; Additional Results

Essentially, model comparison via Bayesian leave-one-out (LOO) cross-validation (Vehtari et al., 2017; Vasishth et al., 2018) compares two competing models by iteratively leaving out one data point and calculating how closely each of the models (fit on the rest of the data) can predict the left-out data point. The model that systematically minimizes prediction error is deemed superior. The differences in predictive accuracy between models are reported as differences in expected log pointwise predictive density ($\Delta ELPD$; Vehtari et al., 2017); if the 95% confidence interval of $\Delta ELPD$ does not cross zero, the model comparison provides reliable evidence for one model over the other. These analyses were performed in version 3.5.2 of R with the *loo* command from the *brms* package.

The results reported in the main text use normal(0,10) as the prior for the fixed-effects coefficients, but the results were not sensitive to our choice of (weakly informative) priors for the Bayesian mixed-effects models. For example, analyses using normal(0,1) priors also favored the simpler model without the *sample* variable, $\Delta ELPD = -7.00$ [−13.99, −0.01].

It is also worth noting that this model-comparison technique is not biased in favor of simpler models: For example, when comparing models that included vs. omitted the *measure* variable, the evidence clearly favored the more complex model that included this variable: $\Delta ELPD = 142.5$ [104.2, 180.8].

Chapter 3:

"Go Faster!": Adults' essentialist representation of gender and national identity, but not race, is revealed by cognitive demand.

Siddiqui, H., & Rutherford, M.D. (2021). "Go Faster!": Adults' essentialist representation of gender and national identity, but not race, is revealed by cognitive demand. *Journal of Cognition and Development 23*(1) 20–39. DOI: 10.1080/15248372.2021.1956932.

Preface

Essentialism, the notion that category membership and category-specific features are caused by a specific essence, plays a significant role in children's representations of social categories (Gelman, 1999, 2004, p. 200). One method of studying essentialism is through a switched-at-birth paradigm (Gelman, 2004). In a switched-at-birth paradigm, participants are presented with characters who are born to one social group (e.g., Canadians) but are adopted and raised by a different social group (e.g., Americans). Participants are then asked if they believe the baby will grow up and develop behaviours and preferences stereotypically associated with their birth group or their adopted group (Gelman, 2004). Across categories including race, species and national identity, young children respond in an essentialist manner, indicating that they believe that the baby will grow up and retain behaviours associated with their birth group, regardless of who they are socialized by (Chao et al., 2013; Hussak & Cimpian, 2019; Taylor et al., 2009).

However, older children and adults deny this, instead responding that they believe the baby will grow up and develop traits representative of the environment they are raised in (Taylor et al., 2009). As a result, researchers have concluded that the switched-at-birth paradigm is not sensitive enough to measure adults' essentialism , and that other methodologies must be used to measure essentialism in adults.

Eidson & Coley (2014) challenged the notion that adults do not hold essentialist representations that can be measured through a switched-at-birth paradigm. They argue instead that adults are obscuring their essentialism through deliberate processing, likely because essentialist views are not socially acceptable (Eidson & Coley, 2014). To test this, they had adults take part in a switched-at-birth paradigm. Some adults were placed under time pressure while others were not. Adults under time pressure had more essentialist responses than adults not under time pressure. This suggests that adults may be masking their essentialist heuristics, but during periods of cognitive demand, essentialism is used to reason about social categories (Eidson & Coley, 2014).

We were interested in replicating and extending Eidson & Coley (2014). Across three studies, we assessed adults' essentialist beliefs about national identity, race, and gender, through a switched-at-birth paradigm. In each study, adults were either assigned to a "fast" or "slow" condition. In the fast condition, adults were prompted to "GO FASTER" every 2 seconds when answering questions about switched-at-birth scenarios. In the slow condition, adults were made to wait 10 seconds before they were able to respond. These methods were

adapted from Eidson & Coley (2014), with the goal of creating cognitive demand in the fast condition but not the slow condition.

We found that adults under time pressure appeared more essentialist about national identity and gender, but not race. This supports the conclusion that adults may be obscuring their essentialist beliefs about social groups, but that they can be unveiled through cognitive demand. When adults have opportunities to engage in deliberate processing, they can answer questions about social categories without relying on essentialism. However, even for adults, essentialism is a valuable cognitive strategy when reasoning about social groups. Like stereotyping and other heuristics (Kaplan et al., 1993; Svenson & Edland, 1987), essentialism may be recruited especially during periods of demand.

Lastly, we compared essentialism scores across all three studies to see which social category adults essentialize the most. We found that adults were most essentialist about gender, followed by race, followed by national identity. This may reflect the extent to which these categories are perceived as biological (GilWhite et al., 2001; Kenrick, 1994).

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Abstract

Essentialism is the intuition that category membership relies on an invisible essence. Essentialist thinking about social categories is most evident in young children, while comparable methods do not reveal essentialist thinking about social groups in adult participants. However, Eidson & Coley (2014) found that essentialist thinking about gender was measurable in adults who experienced cognitive demand. We replicated Eidson & Coley's methods to study adults' essentialist intuitions about national identity, race, and gender. We found that adults under cognitive demand essentialized national identity and gender more than adults who had time to deliberate, though cognitive demand had no effect on essentialist intuitions about race. Additionally, we found evidence that adults' essentialist intuitions were strongest for gender, followed by race, and then national identity. The asymmetry in essentialism levels across the three studies suggests that there may be different mental representations for different social categories.

Keywords: *essentialism; national identity; race; gender; social cognition*

Introduction

Essentialism is the notion that category membership is defined by an inherent essence, rather than by a list of features (Gelman, 2004; Medin & Ortony, 1989). For example, rather than defining a tiger's category membership by its orange and black stripes, its membership in the category "tiger" is defined by an inherent but invisible tiger-ness. Our psychological representations of natural categories are essentialist (Medin & Ortony, 1989). This essentialism is functional, as concepts that rely on essences allow people to parse the world into functional categories (Carey, 2009; Cimpian & Salomon, 2014; Gelman, 2003; Medin & Ortony, 1989; Rutherford, 2019). If humans understand that perceptually similar natural kinds groups like tigers and lions have distinct essences, they will then better be able to discriminate the groups, and make effective inferences about these groups.

Much of the research into essentialism has investigated its role in children's category development. Children readily perceive an essence as a source of both category membership and of category-specific features across social categories (Gelman, 2003). Children's open-ended responses to questions about sources for category membership (e.g., How does someone become Canadian?) reveal that they believe there is an internal source for national identity (Hussak & Cimpian, 2019; Siddiqui et al., 2020). Additionally, children are likely to believe that there is an inherent source for category-specific features for both race

(Hirschfeld, 1995) and gender (Taylor et al., 2009), and that this source is present at birth (Gelman, 2004). Taylor and colleagues (2009) reported that children believed that behavioural traits associated with gender would be stable across a switched-at-birth paradigm. In this paradigm, participants are told about a baby that is born to a member of one social group (e.g., males) but is immediately adopted and raised by members of another group (e.g., females) (Gelman, 2004). Essentialism is evident when participants predict that the baby will grow up to develop behaviours typical of their birth group, rather than their adoptive group. For example, 5- or 6-year-old children believed that a baby boy would maintain stereotypically male behaviours (e.g., prefer playing with a toy truck) once they grew up even if they were raised and socialized only by females. This reflects an intuition that the baby maintains the original group's essence, and that this essence is what determines behaviour (Gelman, 2004). Adults and 10-year-old children did not believe this (Taylor et al., 2009). Adults are more likely to believe that behaviours stereotypically associated with social categories are a result of environmental or situational factors (Chao, Hong, & Chiu, 2013; Hussak & Cimpian, 2019; Taylor et al., 2009; Siddiqui et al., 2020). This has led researchers to conclude that the switched-at-birth paradigm may be ill-suited for studying adult essentialism.

Adults however still do exhibit essentialist thinking across a number of social domains. Bastian & Haslam (2006) created an essentialism scale and found that adults' essentialist beliefs could be explained by three factors: discreteness

(how mutually exclusive category membership is), biological basis (how much human attributes could be understood in biological terms), and informativeness (how many inferences can be drawn from category membership). Using this scale, Bastian & Haslam (2006) were able to assess levels of race essentialism in adults. Other studies have used explicit priming methods to elicit essentialist beliefs about race in adults (No et al, 2008; Williams & Eberhardt, 2008). Similarly, gender essentialism has been assessed in adults with scales (Smiler & Gelman, 2008) or in the form of induction-based studies where adults must make inferences within category domains (Prentice & Miller, 2006; Rhodes & Gelman, 2009). While fewer studies exist with national identity essentialism, asking questions about biological bases of category membership (e.g., does blood carry information about national identity?) reveals national identity essentialism in adults in both Turkey and the United States (Davoodi et al., 2020). Researchers now choose methods like scales or primes over the switched-at-birth paradigm to assess adult essentialism. However, the switched-at-birth paradigm continues to be used in many recent essentialism studies (Gülgöz et al., 2019; Hussak & Cimpian, 2019; Siddiqui et al., 2020), so it would be useful to adapt the switched-at-birth paradigm for adults. Developmentally, the switched-at-birth paradigm provides some of the earliest evidence of children linking kinds with essences, starting from 4 years of age (Gelman, 2004). This makes it an especially relevant task. For developmental studies that measure essentialism from young childhood

to adulthood, adapting the switched-at-birth paradigm for adults would allow a developmental comparison.

To this end, Eidson and Coley (2014) investigated essentialist thinking about gender in adults using a switched-at-birth paradigm. Adults were presented with scenarios where either a male or female baby was adopted and raised on an island exclusively populated by members of the other gender group. Participants were then asked questions about the baby's behavioural and physical traits once they grew up. In a between-subjects design, some adults were placed under time pressure while other adults were not. Eidson and Coley found that participants who responded under time pressure were significantly more likely than the control group to answer that the baby would grow up to show behaviours consistent with their birth gender, not the gender group that had raised them. This suggests that adults still hold essentialist views that can be measured by a switched-at-birth paradigm. In previous studies, essentialist thinking in this paradigm may have been obscured by more deliberate thinking. Essentialist intuitions may be revealed by placing adults under cognitive pressure while participating in a switched-at-birth paradigm.

The Current Work

In this paper, we adapt the methods of Eidson and Coley (2014) to investigate adults' essentialist perceptions of national identity, race, and gender. This paradigm may reveal essentialist intuitions that are usually masked when

adults have time to deliberate. We made two predictions: 1) Following Eidson and Coley's findings, we predicted that essentialist representations of social categories persist into adulthood, and that under cognitive demand, adults would give more essentialist responses about national identity, race, and gender than adults not under cognitive demand; 2) Not all social categories have the same psychological representation, and adults would be most essentialist about gender, followed by race, and then national identity. There is a large literature on adult essentialism about both gender (e.g., Prentice & Miller, 2006; Smiler & Gelman, 2008) and race (e.g., Williams & Eberhardt, 2008), and previous studies have indicated that gender essentialism is more consistent cross-culturally than race essentialism is (Rhodes & Gelman, 2009). Adults may understand gender in more biological terms than race (Martin & Parker, 1995), which may contribute to adults essentializing gender more. Less evidence exists about national identity essentialism in adults, but studies indicate that adults do essentialize national identity, although less than they essentialize gender (Davoodi et al., 2020). We predict that essentialism about national identity will be weakest in adults overall because it is not as easily seen in biological terms, which is a key factor of essentialism (Bastian & Haslam, 2006; Haslam et al., 2000).

Study 1: Adults' Essentialist Perceptions About National Identity

Five-year-olds tend to believe that national identity is both biologically based and heritable, but these intuitions decrease by age 8 (Hussak & Cimpian,

2019; Siddiqui et al., 2020). Adult participants show less essentialist thinking about national identity compared to child participants (Davoodi et al., 2020), suggesting that adults are not essentialist about national identity. However, other studies with adult participants link individual differences in essentialism with nationalist ideals (Keller, 2005), suggesting that there may be some association between essentialism and national identity even in adults.

Methods

Participants

Sixty undergraduates (42 females; *M* age = 18.5 years, *SD* = 1.2) participated in this study. Of the 59 participants who provided their ethnic heritage, 31% were Southeast Asian (18), 22% were East Asian or a Pacific Islander (13), 19% were Caucasian (11), 10% were African or African Canadian (6), 10% were Middle Eastern (10%), 7% were Mixed (4), and 1.6% identified as Other (1). A majority of participants (73%) had lived in Canada for at least 15 years. The sample size was determined by a power analysis based on the effect size for the property x condition interaction reported in Eidson and Coley (2014). The effect size was converted to Cohen's *f* using the *eta2_to_f* function in the *effectsize* package to prepare it for the power analysis. The power analysis was conducted using *pwr.anova.test* function in the *pwr* package on R 3.6.0.and indicated we needed a sample of 30 participants per group to achieve 80% power.

Participants were recruited from an undergraduate subject pool and received course credit for participating.

Materials and Design

Participants were presented with six switched-at-birth scenarios like those presented in Eidson and Coley (2014), except instead of describing gender categories, they described national identity. Of the six switched-at-birth scenarios, two involved a Canadian baby being adopted by American parents, two involved an American baby being adopted by Canadian parents, and two acted as controls where a Canadian or American baby was adopted by parents of the same national identity. An example scenario was as follows: “Aaron was born to Canadian parents. As soon as he was born, Aaron was adopted by an American family in the United States. Aaron's new parents took very good care of him. Aaron had a good life, but during his time in the United States, Aaron never met his birth parents or any Canadians ever again.” An example of a control scenario was as follows: “Riley was born in Canada. Upon being born, Riley was adopted by another Canadian family. Riley loved his new family. Riley grew up in Canada and continued to stay in Canada his entire life. Riley loved his life with his new family.” The wording of the scenarios roughly matched the wording of the scenarios in Eidson and Coley (2014).

After each scenario, participants were presented with 16 two-option, forced-choice questions (see Table 1 for a full list of questions). Each question

asked about a trait or behaviour of the main character once they had grown up. The two options represented one stereotypically Canadian option, and one stereotypically American option. The 16 questions were divided into four question types that assessed different aspects of essentialism: three question types that asked about behaviour (Cultural, Category-specific, and Preferences) and one question type that asked about physical traits (Biological). Cultural items included behaviours that would be stereotypically tied to either the adopted or birth group (e.g., Wanting to be a hockey player (Canadian) vs. wanting to be a baseball player (American); these were originally called "Behavioural items" in Eidson & Coley (2014). Category-specific items referred to behaviours that would be exclusive to either the birth or adopted group (e.g., Voting for Prime Minister vs. Voting for President; it would be nonsensical to expect a Canadian to vote for President). Preferences items asked about stereotypical liking behaviour (e.g., Liking Tim Horton's vs Liking Dunkin Donuts). Biological items asked about physical traits exclusively (e.g., would the child grow up to have Canadian blood inside or American blood inside?). These four question types were used to match the procedure in Eidson & Coley (2014).

Participants were assigned to one of two conditions: The Fast or the Slow condition. In the Fast condition, participants were given two seconds to respond, then presented with a prompt that told them: "GO FASTER!" The prompt was presented in red text and replaced the question on screen. Participants could not respond while the "GO FASTER!" prompt was displayed. The screen then

returned to the question so that participants could provide a response. This cycle repeated every two seconds until the participant provided a key response. In the Slow condition, participants had to wait ten seconds after the presentation of the question before their response would be registered. After 10 seconds, a prompt appeared in green text above the question telling the participant: "YOU CAN ANSWER NOW". The participant could then provide a key response.

Procedure

All participants completed the task in a lab at McMaster University on a 15.5" Dell laptop. Prior to entering the room, participants were assigned to either the Fast or Slow condition via a randomized order. Participants filled out a consent form and were asked their age and gender before beginning the experiment. Participants then heard instructions read by the experimenter. The experiment began with a practice scenario, which described a character's favourite animals. Participants then answered questions about which animal the character would prefer. The presentation of the practice scenario mimicked the condition the participant was assigned to, either Fast or Slow.

Participants were then presented the six test scenarios in a randomized order. Following the presentation of each scenario, the 16 questions (see Table 1) were presented in a randomized order. The question was centered near the top of the screen, with one response option on the left-bottom side of the screen and one option on the right-bottom side of the screen. Participants were told to click "F" if

they agreed with the option on the left and click "J" if they agreed with the option on the right. Left or right presentation of the Canadian and American option was counterbalanced across participants. All participants answered every question for all six scenarios. They were then provided with a demographic questionnaire where they were asked about their time spent in Canada and their ethnic heritage. Participants were then debriefed and thanked for their time.

Results

Scoring

Participants received a score of 1 or 0 for every question, depending on if they gave an essentialist or non-essentialist response, respectively. If participants answered that the character would grow up and develop characteristics similar to their birth group, the response was considered essentialist and scored as 1. If participants answered that the character would develop characteristics similar to their adopted group, these non-essentialist responses were scored as 0. Therefore, higher scores corresponded to more essentialist thinking.

Analytic Strategy

We conducted a mixed-effects logistic regression which is more appropriate for categorical data than an ANOVA (Jaeger, 2008). The model included *condition* (Fast vs. Slow) and *question type* as fixed effects, as well as the interaction between them. Biological items were used as the reference level for *question type* to compare the essentialism scores on the biological domain to

scores on the three behavioural domains (Cultural, Category-specific, and Preference items). The model also included a random intercept for subject. All analyses were conducted using the *glmer* command from *lme4* on R version 4.0.0. (The default optimizer was used.) Plots were completed using the *ggplot2* command. Control scenarios were not included in analyses, to match the analyses of Eidson & Coley (2014).

Findings

There was no significant effect of condition (Fast v. Slow), Wald $\chi^2(1) = 0.28$, $p = 0.60$, suggesting that overall, participants were similarly essentialist in the Fast and Slow condition. However, there was a significant effect of question type, Wald $\chi^2(3) = 658.05$, $p < 0.001$. In particular, participants were significantly more essentialist when responding to Biological items compared to Cultural ($b = -2.50$, $p < 0.001$), Category-specific ($b = -2.19$, $p < 0.001$), and Preference items ($b = -2.44$, $p < 0.001$). Participants were more likely to believe that individuals in the scenario would retain physical traits consistent with their birth group across a switched-at-birth paradigm compared to behavioural traits.

Critically, we found a significant interaction between condition and question type (see Figure 1). Participants in the Fast condition provided more essentialist responses on Cultural ($b = -0.79$, $p = 0.02$), Category-specific ($b = -1.14$, $p < 0.001$), and Preference ($b = -0.65$, $p = 0.04$) items than participants in the Slow condition. When participants were given less time to answer, they were

more likely to respond that individuals would maintain behaviours, preferences, and category-based behaviours, stereotypically associated with their birth national group compared to their adopted national group across a switched-at-birth paradigm. There was no significant difference ($p = 0.65$) in how participants responded to Biological Items between the Fast and Slow conditions. Participants in either condition were similarly likely to answer that an individual's biological traits would remain stable, across a switched-at-birth paradigm.

Discussion

We found evidence of more essentialist thinking about national identity in adults challenged by cognitive demand compared to adults not challenged by cognitive demand. Participants under time pressure were more essentialist when answering behaviour-based questions than participants who were not under time pressure. For example, participants under time pressure would be more likely to say that a Canadian baby raised exclusively by Americans would still prefer Tim Horton's over Dunkin Donuts. Our results support Eidson and Coley's proposal that essentialist intuitions persist in adulthood but are masked by more deliberate processing.

This suggests that in previous studies with a switched-at-birth paradigm adults may have obscured their essentialist intuitions about social categories (e.g., Taylor et al., 2009). It may be that adults are aware that essentialist intuitions about social groups can be harmful or stereotypical (e.g., see the results of Bastian

& Haslam, 2006) and so when given time to deliberate, they respond in non-essentialist ways. However, when under cognitive demand, essentialism may still act as a valuable heuristic that provides intuitions about social categories like national identity and this is reflected in the greater number of essentialist responses.

Like Eidson and Coley, we found that levels of essentialism differ by question type. In the current study, adults were more essentialist when answering questions about physical traits compared to behavioural traits. This is consistent with studies about adults' essentialist perceptions in other domains, like gender (Taylor et al., 2009). Study 2 is designed to test this pattern of results using a similar methodology but with race as the social category of interest.

Study 2: Adults' Essentialist Perceptions of Race

Compared to essentialist beliefs about national identity, there is a far richer literature identifying essentialist beliefs about race. Hirschfeld (1995) found that 3-year-olds believed individuals were more likely to inherit their parents' race identity than to inherit their occupation. Additionally, 3-year-olds believe that an individual's race identity is fixed at birth (Hirschfeld, 1996). Unlike with national identity, there is evidence of race essentialism in adulthood. Williams & Eberhardt (2008) found that presenting adults with fake scientific articles that discussed race as genetic or otherwise biological promoted essentialism in adults. (For other studies with similar methods, see No et al., 2008.) Bastian & Haslam (2006) were

able to measure race essentialism in adults by developing a scale and testing how it related to stereotype endorsement. Additionally, race essentialism in adults has been measured in the contexts of diversity training (Wilton et al., 2019) and hierarchy endorsement (Mandalaywala et al., 2017). Overall, this suggests that adults are essentialist about race.

Methods

Participants

A new sample of 60 undergraduates (43 females; *M* age = 18.6 years, *SD* = 1.1) participated in this study. Of the 59 participants who reported their ethnic heritage, 34% were Caucasian (20), 24% were Mixed (14), 22% were Southeast Asian (13), 12% were Asian or a Pacific Islander (7), 3% were African or African Canadian (2), and 5% identified as Other (3). A majority of participants (81%) had lived in Canada for 15 years or more. Participants were recruited via an undergraduate subject pool and received course credit for participating.

Materials

Like in Study 1, participants were presented with six switched-at-birth scenarios. However, instead of describing national identity, the scenarios described racial identity, with Caucasian and East Asian characters. We chose these two race identities because both races are associated with a wide variety of national identities rather than a single national identity, and we wanted to measure perceptions of race exclusive of national identity.

Of the six switched-at-birth scenarios, two involved East Asian babies being adopted into a Caucasian family, two involved Caucasian babies being adopted into an East Asian family, and two were control scenarios, where an East Asian or Caucasian baby was adopted by a family of the same race. An example scenario was: “Aaron was born to East Asian parents. As soon as he was born, Aaron was adopted by a Caucasian family. Aaron's new parents took very good care of him. Aaron had a good life, but during his time with his new family, Aaron never met his birth parents or anyone else of East Asian origin ever again.” An example control scenario was: “Riley was born to East Asian parents. Upon being born, Riley was adopted by another East Asian family. Riley grew up with them and continued to stay with them her entire life. Riley loved her life with her new family.” The wording and names used in the scenarios matched those used in Study 1.

Stimulus Development

Again, participants were presented with 16 questions after each scenario, divided into four question types: Behavioural, Biological, Category-specific behaviours, and Preferences. The question list was originally created by the authors but was then rated and modified by ten raters. Of the raters, five were East Asian (*M* age = 26.2 years, *SD* = 2.2). The East Asian raters born in different countries, with one each from China, Philippines, Japan, South Korea, and Singapore. The other five raters were Caucasian (*M* age = 24.4 years, *SD* = 1.95).

All Caucasian raters were of European descent. All raters provided independent feedback on the question list. Raters either deemed the options as satisfactory or unsatisfactory, and then could provide more specific feedback. If raters considered any of the options in the question list to be inaccurate or irrelevant to either cultural context, they were asked to provide a replacement[4]. If more than one rater considered the same option unsatisfactory, it was replaced. In cases where multiple raters suggested the same replacement for an option, their suggestion was used. In cases where there was no consensus on a replacement, the authors provided the replacement. Additionally, we did not ask any questions about skin colour to avoid asking too directly about racial identity. We also chose not to include questions about skin colour or other external physical traits to create a question list that more closely matched the question list in Study 1. All ten raters agreed that the question list was representative of differences between the two race groups. For a full list of questions, see Table 2.

Procedure

The procedure for the study, and presentation of the stimuli matched Study 1. Left or right presentation of the East Asian and Caucasian option was counterbalanced across participants. All participants answered every question for all six scenarios. They were then provided with a demographic questionnaire

[4] For example, the options "Write using Roman characters" versus "Write using Chinese characters" were originally phrased as "Writing goes left to right" (Caucasian) versus "Writing does not go left to right" (East Asian). Multiple raters considered this distinction no longer relevant, and so it was replaced.

where they were asked about their time spent in Canada and their ethnic heritage. Participants were then debriefed and thanked for their time.

Results

Analytic Strategy

We conducted a mixed-effects logistic regression to analyze the data. As in Study 1, this model included *condition* (Fast vs. Slow) and *question type* (Biological vs. Cultural vs. Category-specific vs. Preference) as fixed effects and included a random intercept for subject. However, the model did not include the interaction between condition and question type because the model with the interaction term did not converge. The model had Biological items as a reference level for *question type* to be able to compare participants' essentialism scores on the biological domain to the behavioural domain. Participants' responses were scored the same as in Study 1. Control scenarios were removed prior to all analyses, to match the analyses of Eidson & Coley (2014).

Findings

Again, there was no significant effect of condition, Wald $\chi^2(1) = 0.049$, $p = 0.82$, suggesting participants were similarly essentialist regardless of the amount of time they were given to answer. However, there was a significant effect of question type, Wald $\chi^2(3) = 1417.2$, $p < 0.001$ (See Figure 2). Participants were more essentialist about Biological items than Cultural ($b = -3.57$, $p < 0.001$), Category-specific ($b = -3.50$, $p < 0.001$), and Preference ($b = -3.55$, $p < 0.001$)

items. Participants were more likely to believe that an individual's physical traits would match their birth group in a race switched-at-birth paradigm, compared to their behavioural traits.

To test the interaction between condition and question type an ANOVA was conducted. The ANOVA revealed no interaction between condition and question type ($F(1.2, 68.4) = 0.99$, $p = 0.40$). This result does not match the trend that Eidson and Coley (2014) found with gender or that Study 1 found with national identity.

Discussion

We did not find an interaction between condition and question type, suggesting that essentialism about race did not increase when adults were placed under cognitive demand. It is unclear why we did not find increased levels of behavioural essentialism for race in the Fast condition compared to the Slow condition, like we did for national identity. However, it is important to interpret these results with caution because an ANOVA was not ideal to interpret this data (Jaeger, 2008). Future studies should be conducted, potentially with larger sample sizes, such that a logistic model can be conducted that includes the interaction between condition and question type.

Our inability to unmask essentialist intuitions may be because race essentialism is not masked to begin with. Future studies could incorporate a within-subjects design to measure participants' baseline levels of essentialism

before having them participate in the speeded task. If future studies find that participants' baseline essentialism levels do not differ from their essentialism levels during the speeded-up task, that might suggest that adults do not mask their race essentialism.

Additionally, we found that question type impacted essentialist thinking, as Eidson and Coley reported. This is consistent with other studies on adult essentialism (Solomon et al., 1996; Taylor, 1996; Taylor et al., 2009). It is also consistent with accounts that suggest that humans in general represent race as a biological category (Gil-White et al., 2001). It is important to note here that our decision not to use external physical traits as part of our question list for the race essentialism studies may have impacted the results. Traits like hair, eyes, skin colour all play an important role in how race is essentialized (cf. Gil-White et al., 2001). We made this decision to allow a direct comparison to Study 1, but including external physical traits may have led to different results. Future studies should consider assessing the effect of time pressure on race essentialism while using more physical traits, to see if the pattern of results change.

Study 3: Adults' Essentialist Perceptions of Gender

The third study was designed to replicate Eidson and Coley's original experiment, attempting to unmask essentialist conceptions of gender by placing adults under time pressure. Adults show strong essentialist beliefs about gender. Davoodi et al. (2020) measured essentialism about many social categories in

adults and found that adults in both the U.S. and Turkey were most essentialist about gender. Gender essentialism is also consistent across both rural and urban communities (Rhodes & Gelman, 2009). Smiler and Gelman (2008) found evidence of gender essentialism, especially among men who held more traditional beliefs about gender roles. Rhodes & Mandalaywala (2017) in their review argue that gender is a "specially essentialist" category due to environmental cues that promote essentialist beliefs about gender, like the use of gendered language by mothers (Gelman et al., 2004). Meyer & Gelman (2016) also found evidence of gender essentialism in both adults and children.

Along with assessing the effect of time pressure on adults' essentialist beliefs about gender, we compared essentialism levels across all three studies. We expected that essentialism levels would be higher for gender than race or national identity in part due to the wealth of evidence for gender essentialism compared to the other two categories (Rhodes & Mandalaywala, 2017) and the cross-cultural consistency in gender essentialism (Davoodi et al., 2020; Rhodes & Gelman, 2009).

Methods

Participants

A new sample of sixty undergraduates (38 females; *M* age = 20 years, *SD* = 2.46) participated in this study. Of the 60 participants, 33% were Caucasian (20), 32% were Asian or East Asian (19), 25% were Southeast Asian (15), 5%

were Middle Eastern (3), 3% were Mixed (2) and one participant reported "Indian". Participants were recruited via an undergraduate participant pool and received course credit for participating.

Materials

Instead of six switched-at-birth paradigms there were four, to match Eidson and Coley's (2014) design. Of the four switched-at-birth scenarios, one involved a female baby being adopted and raised by males, one involved a male baby being adopted and raised by females, and two were controls where a baby was adopted and raised by members of the same gender (e.g., a male character raised only by males). An example experimental scenario was: "As a baby boy, upon being born, Aaron was adopted by and sent to live with his aunt on an island. On this island, there were only girls and women. Aaron was the only boy. Aaron's aunt loved him and took very good care of him. Aaron had a happy life with his new family on the island with only girls and women, but Aaron never got to see another boy or man." An example control scenario was: "As a baby girl, upon being born, Sarah was adopted by and sent to live with her aunt on an island. On this island, there were only girls and women. Sarah's aunt loved her and took very good care of her. Sarah had a happy life with her new family on the island with only girls and women." The names used in this study matched those in Study 1 and Study 2.

The question list used in this study replicated Eidson and Coley's (2014) study except for one (see Table 3). In the biological items, we replaced the question "Has a girl's/boy's body" with "Has a girl's/boy's bones". This was to match the items used in the previous two studies. We did not use the term "body" in the previous two studies to avoid directly asking questions about race identity, which was relevant in the previous studies, especially Study 2. Otherwise, all other items were exactly as those in Eidson and Coley (2014). A key difference between this question list and the question list from Study 1 and 2 was that the Category-specific questions also asked about physical traits. This means that there are more question types related to biological essentialism (Biological and Category-specific questions) than in Study 1 or 2.

Procedure

Participants completed this study online, using an online experiment portal. Upon clicking the experiment link, participants were randomly assigned into either the Fast or Slow condition. Participants filled out a consent form and were asked their age, gender, and ethnicity before beginning the experiment. Participants then read the instructions and completed the same practice scenario as Study 1 and 2 before beginning the main study.

Participants were presented the four scenarios in a random order. After the presentation of each scenario, participants were presented with the 16 questions in a random order. Presentation of the question was the same as Study 1. Participants

were told to click "F" if they agreed with the option on the left and click "J" if they agreed with the option on the right. Left or right presentation of the male and female option was counterbalanced across participants. All participants answered every question for all four scenarios. Upon completion of the experiment, participants were debriefed and thanked for their time.

Results

Analytic Strategy

We conducted a mixed-effects logistic regression to analyze the data. The model included *condition* (Fast vs. Slow) and *question type* (Biological vs. Cultural vs. Category-specific vs. Preference) as fixed effects, as well as the interactions between them. There was a random intercept for subject. Participants' responses were scored the same as in the previous studies. Control scenarios were removed prior to all analyses, to match the analyses of Eidson & Coley (2014).

Findings

Like in the previous two studies, there was no significant effect of condition, Wald $\chi^2(1) = 0.035$, $p = 0.85$. There was a significant effect of question type, Wald $\chi^2(3) = 595.8$, $p < 0.001$. In this study, participants were significantly more likely to respond in an essentialist manner to Biological items than Cultural ($b = -2.09$, $p < 0.001$) and Preference ($b = -1.91$, $p < 0.001$) questions but not more than Category-specific items ($b = 0.03$, $p = 0.90$). There was also a significant condition by question type interaction (See Figure 3). Participants in

the Fast condition were significantly more essentialist than participants in the Slow condition on Cultural items (b = -2.29, $p < 0.001$) and Preference items (b = -2.17, $p < 0.001$). Participants in the Fast condition were more likely to respond that the child would grow up to maintain their original gender group's stereotypical behavioural mannerisms despite being raised exclusively by the opposite gender group.

When changing the reference level to Cultural questions, we found that participants in the Slow condition were more essentialist about Biological questions than participants in the Fast condition (b = -5.61, $p < 0.001$) but we still found no effect for Category-based questions (b = -1.25, p = 0.21). These results provide mixed evidence for differences in biological essentialism between conditions.

Comparing essentialist intuitions across categories

We conducted another mixed-effects logistic regression that included data from all three studies. This model included *category* as a fixed effect (Gender vs. Race vs. National Identity) to see if participants' essentialism scores differed by social category and *condition* as a fixed effect (Fast vs. Slow). The model also included the interaction between the two. The model included a random intercept for subject. There was no fixed effect for *question type* because the model with *question type* did not converge.

We found a significant effect of category, Wald $\chi^2(2) = 1972.4$, $p < 0.001$. Participants in the gender study were significantly more essentialist than participants in the race ($b = -2.08$, $p < 0.001$) and national identity ($b = -2.91$, $p < 0.001$) studies. Participants in the race study were also significantly more essentialist than participants in the national identity study ($b = -0.88$, $p < 0.001$). The condition by category interaction was not significant (ps > 0.609; See Figure 4), suggesting that the effect of condition did not significantly differ across the three studies.

Discussion

Study 3 replicated Eidson and Coley (2014). Participants under time pressure were significantly more essentialist about behavioural traits associated with gender than participants not under time pressure. Specifically, participants in the Fast condition on average were more likely to say that a male baby adopted and raised only by females would retain stereotypically male behaviours and preferences (e.g., play with a toy truck over a tea set). This suggests that essentialism about gender in a switched-at-birth paradigm does not disappear in adulthood, but rather, is masked by more deliberate processes.

Like in Study 1, this result suggests that adults' essentialist intuitions during previous switched-at-birth paradigms may have been obscured by more deliberate thinking. When given time, adults are aware that essentialist intuitions

about gender may not be appropriate, and so provide non-essentialist responses. However, adults may still rely on essentialism when under cognitive demand.

We found mixed evidence of greater biological essentialism in participants in the Slow condition compared to Fast condition. Participants in the Slow condition were more essentialist about Biological items, but not Category-based items (both of which in this study were biological in nature). Additionally, in Study 1, we did not see significantly more essentialism on Biological items in either condition. Future work with this paradigm could include more biological items, or a more sensitive measure of biological essentialism to conclusively determine how biological essentialism is influenced by cognitive demand. Additionally, we were able to replicate Eidson and Coley's effect of question type. Participants were more likely to respond that physical traits would remain similar compared to behavioural traits across the switched-at-birth paradigm. This matches the pattern observed in Study 1 and 2, as well as a general pattern noted in the essentialism literature (Gelman & Wellman, 1991; Solomon et al., 1996; Taylor et al., 2009).

Comparing essentialist intuitions across categories

Additionally, we were able to compare participants' responses across the three experiments to understand the extent to which adults are essentialist about gender compared to race and national identity. The participants in the gender study were the most essentialist, followed by the participants in the race study,

followed by participants in the national identity study. This supports Rhodes & Mandalaywala's (2017) assertion that gender, exclusively, is a "specially essentialist" category.

One caveat to this comparison is that the items on the gender study were not identical to those in the national identity and race study. The Category-specific questions for the gender study were more biologically based than the for the other two social categories. Given that across all three studies adults' essentialism was highest for biological question types, it is possible that the higher essentialism scores in the gender study were just a by-product of more question types of biological essentialism. However, conducting another mixed-effects logistic regression comparing the essentialism levels of all three studies after having removed the responses for Category-specific questions still reveals that essentialism levels are highest for gender compared to the other two social categories (vs. race: $b = -1.60$, $p < 0.001$; vs. national identity: $b = -2.48$, $p < 0.001$). This suggests that the difference in essentialism scores across the three studies is not merely a by-product of differences in the question list.

General Discussion

Our results suggest that essentialist representations of social categories do not disappear in adulthood but may be obscured by more deliberate cognitive processing. When examining adults' essentialist concepts of national identity and gender, adults under time pressure provided more essentialist responses about

behavioural traits than participants not under time pressure. When testing essentialist conceptions of race, there was no significant effect of time pressure on essentialist responses to any question types. The current results provide evidence that the switched-at-birth paradigm may still have some utility for assessing adult essentialism when combined with the speeded procedure.

These findings contribute to our understanding of the cognitive underpinnings of essentialism. That essentialism becomes more evident when participants are faced with cognitive demand is consistent with research on time pressure and other heuristic-based thinking like stereotyping. Previous studies have reported that participants are more likely to stereotype when under time pressure (Kaplan et al., 1993; Svenson & Edland, 1987). Like stereotyping, essentialism may be a cognitive heuristic for understanding social groups that is masked when adults have time to deliberate. It would make sense then that essentialism is replaced but not completely overwritten, as it still represents some intuition about a category.

Additionally, it would be interesting to see how time pressure could be used alongside other experimental methods for studying essentialism in adults. For example, priming methods are often used to elicit essentialism about social categories like race (e.g., Williams & Eberhardt, 2008). Even though these studies consistently find evidence of essentialism in adults it might still be possible that adults are obscuring their essentialism during these studies. Using the prime

alongside the speeded paradigm might result in even higher levels of essentialism in these studies. This possibility warrants future study.

The current study compared essentialism levels across three different social categories. Our results suggest that gender is represented as the most essentialized social category, followed by race, and then national identity. The level of essentialism may reflect the extent to which these categories are represented as biological. Compared to gender, race may be understood as less biologically based (cf. Kenrick, 1994; Martin and Parker, 1995). However, even race has been argued to be represented as biological (GilWhite et al., 2001; Williams & Eberhardt, 2008), while national identity may not be represented as biological at all. In Haslam and colleagues' work developing essentialism scales, *biological basis* was one key factor of essentialism alongside *entitavity* (Haslam et al., 2000) or alongside *discreteness* and *informativeness* (Bastian & Haslam, 2006; Haslam et al., 2000). The extent to which social categories are understood as natural kinds could account for the differences in how social categories are represented as essentialist. Ultimately, comparing essentialist conceptions of social categories may require a within-subjects design. It is possible that some samples may in general be more or less essentialist (e.g., Lindquist et al., 2013), which could have affected our results.

Limitations

The current study does not provide any insight as to why essentialism would be masked by more deliberate processing in adulthood. Eidson and Coley (2014) offered two explanations: 1) essentialism is replaced due to more knowledge of the category or 2) essentialism is replaced by executive functioning processes. The first conclusion is difficult to assess as it would require testing an individual's total knowledge of a social category and then using that as a predictor for essentialism. The second theory may be more testable. It is likely that essentialism, in the adult brain, represents intuitions that are not socially acceptable (i.e., essentialism inherently is associated with stereotyped beliefs (Bastian & Haslam, 2006; Yzerbyt et al., 2001)). A comparison across cultures with different expectations of social sensitivity (i.e., a culture that actively discourages the use of stereotypes versus a culture that does not) could help answer this question. We have already seen work suggesting that essentialist thinking is more common in certain cultures (Rhodes & Gelman, 2009) but work using this speeded paradigm across cultures would be able to test if the extent to which essentialism is suppressed is a function of the culture's disapproval of antisocial beliefs. More experimental and theoretical work is required to understand exactly why essentialism is masked in adult social cognition.

Conclusion

Across three studies, we found evidence in support of Eidson and Coley's (2014) hypothesis that essentialist intuitions about social categories persist into adulthood but are obscured by more deliberate processing: Adults under cognitive demand were more essentialist about behavioural traits associated with national identity and gender, but not race, compared to participants not experiencing cognitive demand. A comparison across the three studies suggests that not all social categories are equally represented as essentialist. Overall, adults were most essentialist about gender, followed by race, and then national identity.

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Table 1

List of questions from Study 1.

Question Type	Canadian Option	American Option
Cultural	Want to be a hockey player	Want to be a baseball player
	Speak English and French	Speak English and Spanish
	Speak with a Canadian accent	Speak with an American accent
	Spell it like "behaviour"	Spell it like "behavior"
Biological	Have Canadian blood inside	Have American blood inside
	Have a Canadian brain	Have an American brain
	Have Canadian bones	Have American bones
	Have a Canadian heart	Have an American heart
Category-specific	Grow up to celebrate Canada Day	Grow up to celebrate the 4th of July
	Grow up to vote for Prime Minister	Grow up to vote for President
	Use kilometres	Use miles
	Use Celsius	Use Fahrenheit

Preferences	Enjoy playing in the snow	Enjoy watching fireworks
	Like maple syrup	Like apple pie
	Like Tim Horton's	Like Dunkin Donuts
	Like poutine	Like Southern barbecue

Table 2

List of questions from Study 2.

Question Type	Caucasian Option	East Asian Option
Cultural	Want to play tennis	Want to play badminton
	Eat with a fork	Eat with chopsticks
	Write using Roman characters	Write using Chinese characters
	Drink coffee	Drink green tea
Biological	Have Caucasian blood inside	Have East Asian blood inside
	Have a Caucasian brain	Have an East Asian brain
	Have Caucasian bones	Have East Asian bones
	Have a Caucasian heart	Have an East Asian heart
Category-specific	Grow up to celebrate Christmas	Grow up to worship their Ancestors
	Celebrate New Years in Early January	Celebrate New Years in late January or Early February

	Try Advil to cure pain	Try acupuncture to cure pain
	Follow Aristotle's philosophy	Follow Confucius' philosophy
Preferences	Like billiards	Like table tennis
	Like cheeseburgers	Like steamed pork buns
	Like strawberries	Like lychees
	Like macaroni and cheese	Like noodles

Table 3

List of questions from Study 3

Question Type	Male Option	Female Option
Cultural	Play with a toy truck	Play with a tea set
	Play with baseball cards	Play dress-up
	Collect tools and nails	Collect dolls
	Will be a construction worker	Will be a nursery school teacher
Biological	Have boy blood inside	Have girl blood inside
	Have a boy's brain	Have a girl's brain
	Have a boy's bones	Have a girl's bones
	Have a boy's heart	Have a girl's heart
Category-specific	Grow up to be a daddy	Grow up to be a mommy
	Grow up to be a husband	Grow up to be a wife
	Grow up to have a beard	Grow up to have breasts
	Have a low and deep voice	Have the same voice
Preferences	Like to build things	Like to sew
	Like to go fishing	Like to put on makeup
	Want to be a firefighter	Want to be a nurse

	Want to be a football player	Want to be a ballet dancer

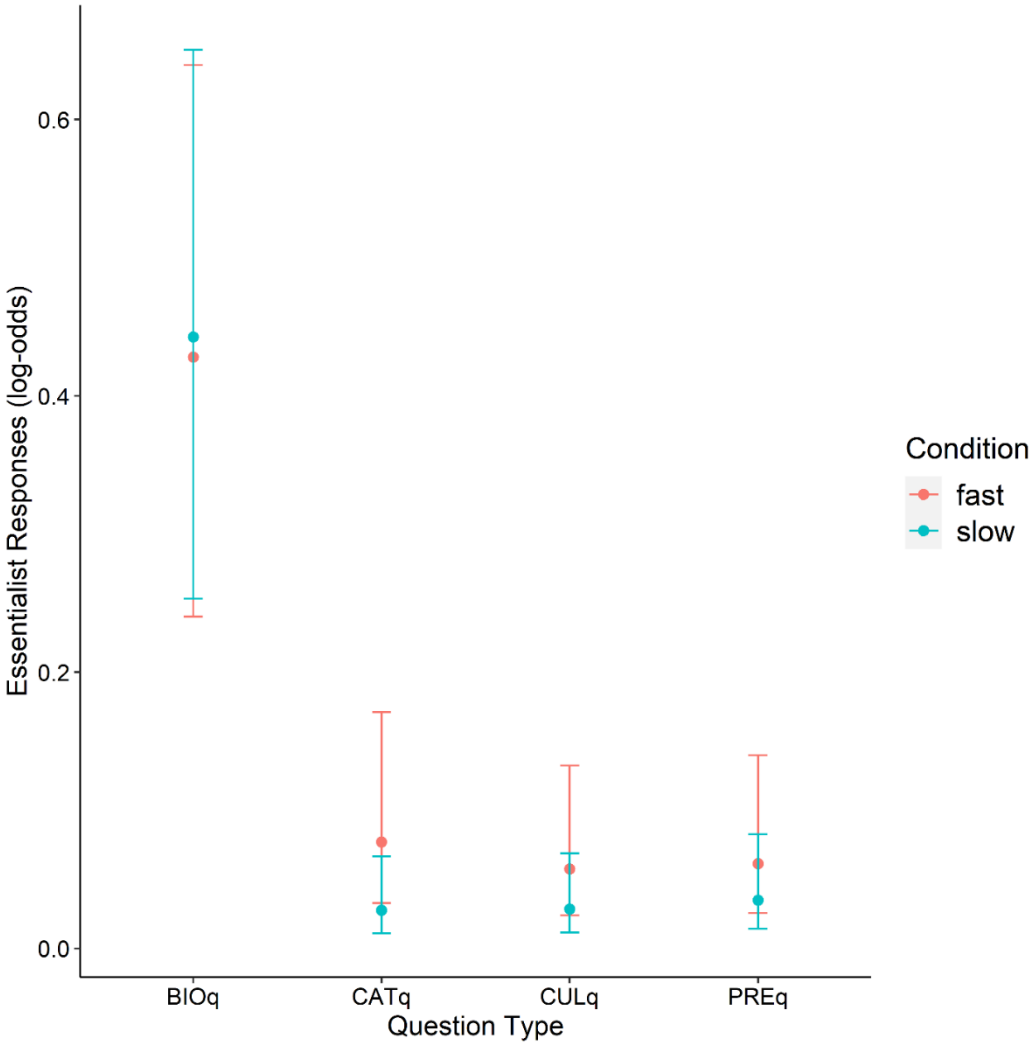

Figure 1. The mean essentialism scores for National Identity separated by question type and condition for Study 1. Error bars represent 95% confidence intervals. Horizontal axis should be read as: BIOq: Biological items; CATq: Category-specific items; CULq: Cultural items; PREq: Preferences items.

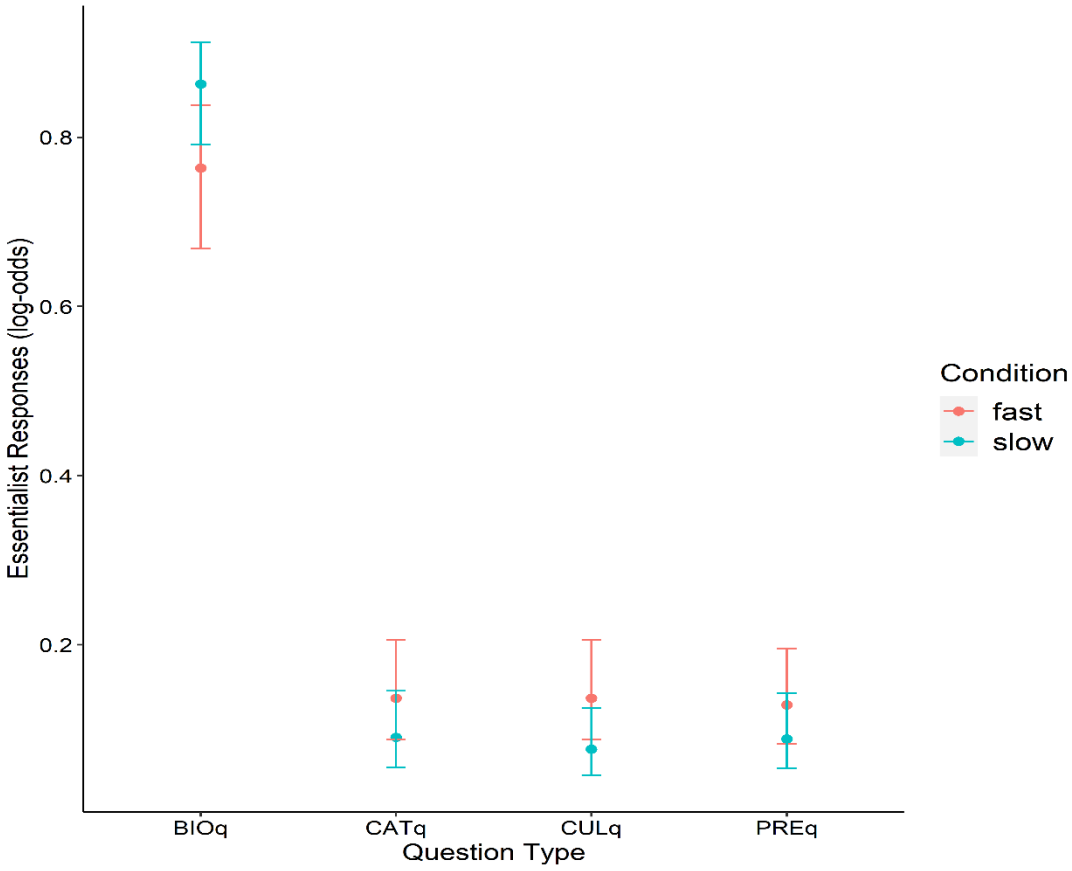

Figure 2. The mean essentialism scores for Race separated by question type and condition for Study 2. Error bars represent 95% confidence intervals. Horizontal axis should be read as: BIOq: Biological items; CATq: Category-specific items; CULq: Cultural items; PREq: Preferences items.

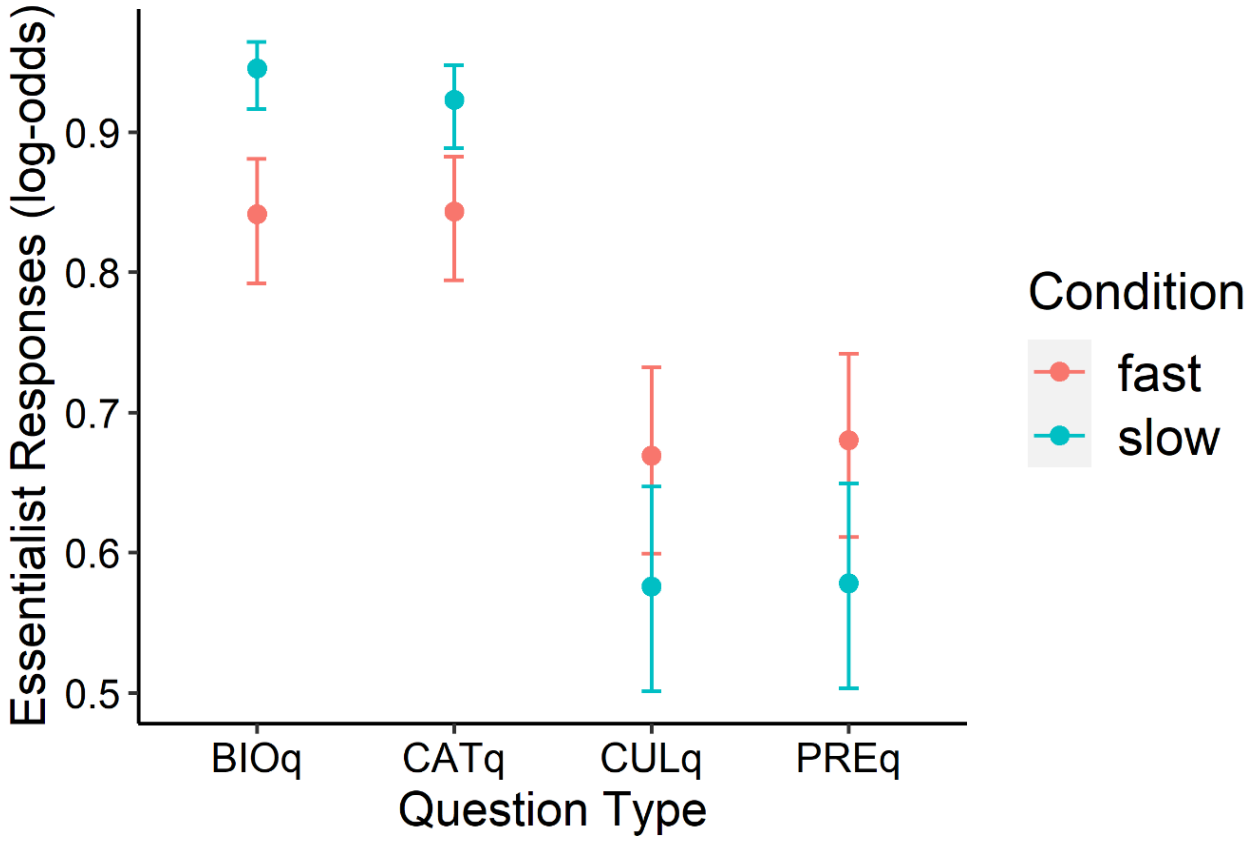

Figure 3. The mean essentialism scores for Gender separated by question type and condition for Study 3. Error bars represent 95% confidence intervals. Horizontal axis should be read as: BIOq: Biological items; CATq: Category-specific items; CULq: Cultural items; PREq: Preferences items.

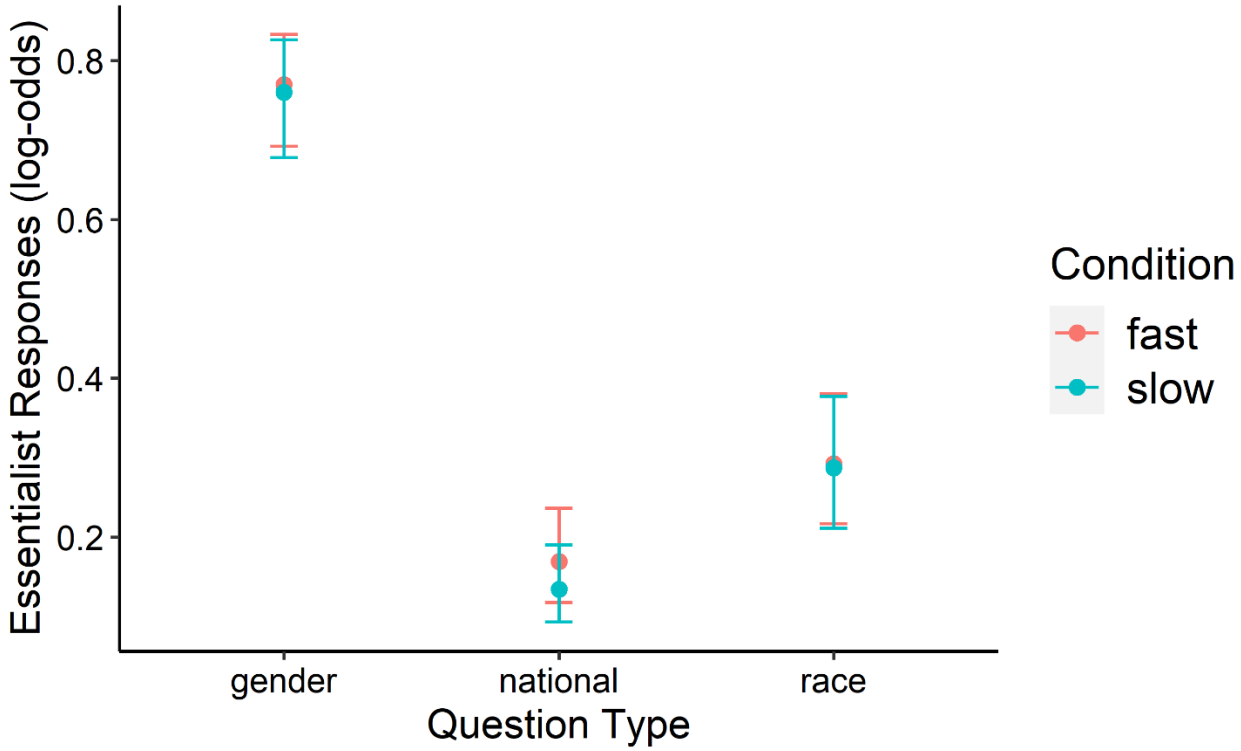

Figure 4. The mean essentialism scores collapsed across question type for all three studies, separated by condition. Error bars represent 95% confidence intervals.

Chapter 4:

Belief that addiction is a discrete category is a stronger correlate with stigma than the belief that addiction is biologically based.

Siddiqui, H., & Rutherford, M.D. (2023). Belief that addiction is a discrete category is a stronger correlate with stigma than the belief that addiction is biologically based. *Substance Abuse Treatment, Prevention, and Policy*, *18*(1), 3. https://doi.org/10.1186/s13011-022-00512-z

Preface

Stigma against individuals with drug addiction is common (Avery & Avery, 2019; Earnshaw et al., 2013; Goodyear et al., 2018). One common form of addiction stigma is social stigma, where individuals without an addiction partake in "us vs. them" labeling, viewing individuals with an addiction as outgroup members (Link & Phelan, 2001). This stigmatization can lead to substantial harm, since individuals who feel stigmatized are less likely to seek treatment (Earnshaw et al., 2013). Addiction researchers have conducted research on how to reduce stigma, with special focus being given to studying how education about the biological causes of addiction might reduce stigma. Some researchers argue that informing others about biological causes of addiction will lead to increased advocacy for health-based treatments (Richter et al., 2019). However, related research in the essentialism literature contradicts this conclusion. Research on mental illness essentialism consistently finds that belief in a biological basis for

mental illness is associated with increased prejudice (Haslam, 2011; Haslam et al., 2002). While research with mental illness represents a relevant, related, topic, there is still an open question about how essentialist views of addiction may relate to stigma.

To test how an essentialist view of addiction impacts the stigmatization of addiction, we conducted two studies investigating the relationship between essentialism and anti-addiction stigma in the contexts of opioid and methamphetamine addiction. Participants were randomly assigned to one of three conditions: a pro-essentialism, anti-essentialism, or control condition (based on Williams & Eberhardt, 2008). In the pro-essentialism condition, participants read a fictional news article that stated scientists had found the genetic basis for addiction. In the anti-essentialism condition, participants read a fictional news article that stated scientists found conclusive evidence that there was no genetic basis for addiction. Lastly, the control article had nothing to do with addiction or essentialism. After reading the assigned article, participants completed an addiction stigma and an essentialism questionnaire.

Condition weakly affected participants' biological essentialism scores but had no effect on stigma. As a result, we collapsed data across all three conditions, and measured correlations between participants' addiction stigma and essentialism scores. We found that biological essentialism scores significantly correlated with addiction stigma. This supports the conclusion that belief in a biological basis of addiction is harmful with respect to stigma. However, we

found that participants' non-biological essentialism was a significantly stronger correlate with stigma in the context of both opioid and methamphetamine addiction. Non-biological essentialism in our study referred to the belief that addiction represented a discrete category boundary, and that individuals with an addiction are fundamentally different from those without an addiction. The belief in discrete category boundaries may map more strongly onto social stigma (Link & Phelan, 2001), and this connection may be why non-biological essentialism was a stronger correlate with stigma. While this study initially focused on the role biological essentialism plays on stigma, it became clear that other essentialism subfactors were more impactful. Future research on addiction stigma may benefit from taking a multifactor essentialism approach to better understand what beliefs may contribute to stigma.

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Abstract

Background: Drug addiction is stigmatized, and this stigma contributes to poor outcomes for individuals with addiction. Researchers have argued that providing genetic explanations of addiction will reduce stigma, but there has been limited research testing this prediction. **Methods:** We presented participants (N = 252) with news articles that either provided genetic or anti-genetic explanations of addiction. **Results:** There was no effect of article condition on stigma. Participants' biological essentialism correlated with stigma in the context of both opioid and methamphetamine addiction. However, participants' non-biological essentialism was a significantly stronger correlate with stigma. **Conclusions:** This suggests that other essentialist beliefs, like belief that categories are discrete, may be more useful than biological essentialism for understanding addiction stigma.

Keywords: *essentialism; stigma; addiction*

Introduction

Substance use disorders, commonly called drug addictions, are defined by persistent use of a substance, and impairment resulting from the substance[1]. Despite differences in symptomatology, it appears as though most drug addictions are related to the same brain system dysfunction [2]. Additionally, twin studies suggest that a predisposition towards addiction is heritable[3,4]. Social factors, like income inequality, also contribute to addiction. Low income is often associated with addiction [5,6]. Individuals living in chronically stressful environments often turn to drug consumption as a coping strategy[7]. Having a supportive family environment can also be a key factor in predicting whether someone will develop an addiction[5].

Stigma against individuals with addictions is common[8]. While there are many types of stigma, we define three here: social stigma, self-stigma, and structural stigma[8]. Social stigma refers to the stigma that individuals face from others. Specifically, this takes the form of differentiating between "us" and "them", where individuals with an addiction are perceived as an outgroup [8,9]. While anyone can engage in an "us" versus "them" dichotomization, stigma is primarily maintained and created by individuals in power [9]. By labelling individuals as "addicts", one emphasizes the distinction between us and them, and maintains a social structure where individuals with addiction have less power, and remain disadvantaged [8,9]. Self-stigma refers to individuals disparagingly labelling themselves [8]. In the context of addiction, this can include referring to themselves

as a failure due to their diagnosis, as well as internalizing negative stereotypes of individuals with addiction [8,10]. It can also lead to self-handicapping, where individuals prevent themselves from trying to accomplish personal goals due to the internalized belief that they are incapable [10]. Finally, structural stigma refers to how our social structures, policies, and common practices restrict individuals [8]. This can include landlords declining to rent out to individuals with a history of addiction.

Stigma can directly lead to discriminatory behaviour [8], and individuals with addiction are often subject to negative prejudice from their family, friends, coworkers, and even healthcare workers [11]. Depictions of addiction in the media contribute to this stigma [12,13]. In media, addiction is often depicted as affecting individuals who are violent or criminal, reducing sympathy toward individuals with addiction [13]. Addiction is also often framed as a choice which increases the perception that addiction is a sign of weak character [13]. The insinuation that addiction is a personal failing is often internalized by individuals with addiction [14]. Individuals who self-stigmatize feel deep shame about their condition, and may pursue drugs to avoid feelings of shame, exacerbating the addiction [14]. Additionally, people who self-stigmatize are less likely to seek treatment[11]. Taken together, it is clear that addressing addiction stigma is an important part of improving health outcomes for people with addiction.

An open question is how beliefs about the biological bases of addiction contribute to or mitigate addiction stigma. Addiction specialists have argued that

knowledge of the biological bases of addiction will increase advocacy for evidence-based medical treatment for addiction [15]. However, research has not tested how believing in a biological basis to addiction affects stigma. To address this question, we take an essentialist perspective.

Essentialism as a Mechanism for Understanding Addiction Stigma

Essentialism is the perception that category membership is caused by an inherent invisible essence [16,17]. This essence grants individuals' category membership and category-specific features [17]. For example, when thinking of a "tiger", it is not the orange-and-black stripes that cause a tiger to be a tiger. Rather, it is an invisible tiger essence that grants category membership, and is also causally responsible for the orange-and-black stripes (Gelman, 2004). Our representations of categories are tied to essences [17]. Haslam et al. (2000, 2002) divided essentialism into two subfactors: entitavity and natural kindness. Entitavity refers to how coherent categories are. Entitative categories are uniform, informative, and exclusive [19]. Natural kindness refers to how biological a category is perceived to be. Natural kind categories are perceived as immutable, natural, and discrete [19]. Essentialism maps well onto Link & Phelan's (2001) description of stigma. By creating exclusive, rigid, and discrete, category boundaries we highlight the "us" versus "them" distinction that is an important part of stigma. Additionally, essentialism can make this "us" versus "them" distinction appear natural by making categories appear biologically based [20]. According to social

identity theory, people's readiness to accept us vs. them dichotomies is, in part, because they gain self-esteem and positive affect from being part of a group[21]. Essentialism creates the perception of stable category membership, so people feel confident that once they are a member of a group, they will always be a member of that group. As such, people may be motivated to be essentialist about social groups in order to retain that self-esteem boost long-term.

The biological basis subfactor of essentialism has been causally implicated in prejudice. In a study by Williams & Eberhardt (2008), participants read one of two news articles that detailed a fake, recent scientific study. In the essentialism condition, they read about a study that found the genetic basis of race. In the anti-essentialism condition, they read about a study that definitively found that there was no genetic basis to race. Participants who read the essentialist article were less willing to interact with Black individuals, and were more willing to accept racial inequities [22]. Biological essentialism is associated with stigma for mental illness. Participants who received neurogenetic explanations of mental illness were more likely to advocate for social distance between them and a person suffering from a mental illness. Additionally, various studies have found correlations between mental illness stigma and essentialism [23]. Many researchers argue that essentialism increases stigma against mental illness by highlighting differences between individuals with a mental illness and those without one, and therefore promoting social segregation [23]. However, it is unknown whether this extends to individuals with addiction, especially given that addiction researchers

have argued that a biological view of addiction reduces stigma about addiction and its treatment [15].

The Current Study

The current study adopts an essentialist framework for understanding how a biological view of addiction affects addiction stigma. The key research question is: Does having an essentialist view of addiction affect stigma against individuals with addiction? The null hypothesis is that essentialism does not have any effect on stigma, while the alternative hypothesis is that essentialism has some effect on stigma. Using fictional news articles modified from Williams & Eberhardt (2008), participants either read an article highlighting a genetic explanation for opioid or methamphetamine addiction (*pro-essentialism),* denying a genetic explanation for opioid or methamphetamine addiction (*anti-essentialism),* or a control article. Participants then completed an essentialism scale adapted from Bastian & Haslam (2006) as well as an addiction stigma scale based on items from Kennedy-Hendricks et al. (2017) and Barry et al. (2014). If having a biological view of addiction increases stigma, participants in the *pro-essentialism* condition will have the highest stigma scores, and participants in the *anti-essentialism* condition will have the lowest stigma scores. If having a biological view of addiction decreases stigma, participants in the *pro-essentialism* condition will have the lowest stigma scores, and participants in the *anti-essentialism* condition will have the highest stigma scores. We considered both opioid addiction and

methamphetamine addiction because there are key differences between the two. Stigma against individuals with an opioid addiction is dependent on many factors, including how the individual acquired their addiction[24]. For example, participants show less stigma toward individuals with an opioid addiction if the individual first acquired opioids from their doctor, compared to if they acquired opioids through a friend[24]. Methamphetamine stigma is relatively less impacted by factors about the individual using the drug[25]. This means that the social, biological, or personal circumstances that may lead someone to use methamphetamine are not typically considered by individuals who hold stigma against individuals with a methamphetamine addiction[24]. Additionally, individuals with a methamphetamine addiction are often portrayed as dangerous, which heightens stigma[12]. Due to these differences, we might find a different pattern of results across these two types of addiction, which would suggest that essentialism affects addiction stigma differently based on the specific drug. If we find similar results between both the opioid and methamphetamine conditions, essentialism might influence stigma against all drug addictions similarly.

Methods

Participants

We collected data from two separate samples of 126 participants recruited via Amazon Mechanical Turk. One sample participated in the opioid condition, and one sample participated in the methamphetamine condition. The sample size

was determined by a power analysis based on the effect size for the effect of article type on interrace contact motivation scores reported in Williams & Eberhardt (2008). A power analysis was conducted on *GPower* 3.1 for a one-way ANOVA testing differences between 3 groups (pro-essentialism vs. anti-essentialism vs. control article). The power analysis determined that a sample size of 126 was required to achieve 80% power. The procedures reported below were approved by the McMaster University Research Ethics Board (project ID: 5593). Studies documenting demographics of MTurk workers consistently find that the slight majority of MTurk workers are female [26–28], primarily Caucasian [27], earn typically below US average income [26,27(p)],and are typically younger than the average US population [26,28]. Additionally, these demographics appear to be relatively stable over time [26,27].

Materials

Participants read one of six news articles (see Appendix A and B). In the *pro-essentialism* condition, participants read a news report about a scientific study that had discovered the genetic basis of opioid or methamphetamine addiction. In the *anti-essentialism* condition, participants read a news report about a scientific study that had determined there was definitively no genetic basis of opioid or methamphetamine addiction. These two articles were modified articles from Williams & Eberhardt (2008). Additionally, there was a control article, about the

discovery of new dinosaur fossils completely unrelated to addiction or essentialism.

After reading the articles, participants completed three questionnaires. The first questionnaire (see Table 1) was an essentialism questionnaire based on Bastian & Haslam (2006) that we adapted to be about addiction rather than a general essentialism questionnaire. The second questionnaire was an addiction stigma questionnaire, which combined items from Kennedy-Hendricks et al. (2017) and Barry et al. (2014). Items adapted from Kennedy-Hendricks et al. (2017) addressed social stigma by asking about perception of people with addiction (e.g., "People with an addiction are more dangerous than the general population"). Items adapted from Barry et al. (2014) addressed both social stigma, by asking about interacting with people with addictions (e.g., "Would you be willing to have a person with drug addiction work closely with you on a job?"), as well as structural stigma by asking participants about their beliefs about structural supports for people with addiction(e.g., "I am in favour of increasing government spending on the treatment of addiction.") See Table 2 for the full addiction stigma questionnaire. Lastly, there was a personality questionnaire that included items based on the Big 5 personality structure. These items were filler items to obscure the true nature of the study.

Procedure

Participants completed the study online via Amazon MTurk. They clicked a link in the study description and were sent to a page that hosted a consent form. Participants were informed in the study description that the study was a memory experiment, where they would read a news article, then complete a questionnaire, before completing a memory check. Upon clicking "Continue" on the consent form, participants were randomly assigned to either the *pro-essentialism, anti-essentialism,* or *control* news article. Participants could spend as much time as they needed to read the article and could read it as many times as they wished. Once they were done reading the article, participants began the questionnaires. Questions from all three questionnaires were intermixed and presented in a random order. Each question was presented with a 7-point Likert scale where participants clicked the option they agreed with (there was no starting point). Participants had the option to skip questions they were uncomfortable with. (This occurred on less than 2% of trials.) After completing the questionnaire, participants were presented with two memory check questions asking about the general topic of the article. Only data from participants who passed the memory check were included. Participants were then presented with a reconsent form where they were informed of the true purpose of the study and had the option to reconsent or withdraw. Participants were paid $7.50 CAD for their participation.

Data Availability Statement

The data that support the findings are openly available on the Open Science Framework (OSF): https://osf.io/ny7dq/?view_only=6a5e3d86239246a8bb93b6e2811f7557.

Results

Scale Assessment

We assessed the internal reliability for our essentialism scale and our stigma scale for both the opioid sample and the methamphetamine sample. For the opioid sample, the essentialism scale had good internal reliability (α = 0.89) while the stigma scale had acceptable internal reliability (α = 0.79). For our analyses below, we split the essentialism scale into a biological essentialism scale and a non-biological essentialism scale. The non-biological essentialism scale had better internal consistency (α = 0.89) than the biological essentialism scale (α = 0.75). A confirmatory factor analysis confirmed that our scale had two latent variables in accordance with the split between biological and non-biological essentialism (*CFI* = 0.90; *TLI* = 0.88).

For the methamphetamine sample, the essentialism scale had good internal reliability (α = 0.87) while the stigma scale had acceptable internal reliability (α = 0.77). Again, when we split up the essentialism scale into subscales, the non-biological essentialism scale had better internal reliability (α = 0.83) than the non-biological essentialism subscale (α = 0.77) although the reliabilities were more

similar in this sample. As with the opioid sample, we conducted a confirmatory factor analysis on our essentialism scale and found two latent variables consistent with our biological and nonbiological essentialism subfactors (*CFI* = 0.97; *TLI* = 0.97). See Table 3 for a full list of factor loadings with each item.

Opioid Condition

Prior to analysis, 5 participants' data were removed due to missing responses. As a manipulation check, we assessed the effect of article type on participants' biological essentialism scores. We found that article type had a marginal effect on biological essentialism ($F(2, 118) = 2.94$, $p = 0.056$). Mean biological essentialism scores were highest for the *pro-essentialism* condition ($M = 4.05$, $SD = 0.93$) relative to the *anti-essentialism* ($M = 3.57$, $SD = 1.45$) or *control* ($M = 3.41$, $SD = 1.27$) conditions. To assess the effect of article type on addiction stigma, we conducted a one-way ANOVA. There was no significant effect of article type on stigma scores ($F(2, 118) = 0.692$, $p = 0.50$). As there was no significant effect of article type on either variable, the rest of the analyses collapses the data across conditions.

We broke down participants' essentialism scores into biological essentialism and non-biological essentialism. Participants' biological essentialism significantly correlated with their stigma toward individuals with opioid addiction ($r = 0.31$, $p < 0.001$, 95% CI [0.14, 0.46], see Figure 1). However, participants' non-biological essentialism and addiction stigma was 2.92 times more strongly

correlated (r = 0.53, p < 0.001, 95% CI [0.39, 0.65], see Figure 2). To test if there was a significant difference between the strength of the two correlations, we conducted a Fisher's z-test for dependent correlations. The correlation between non-biological essentialism and stigma was significantly stronger than the correlation between biological essentialism and stigma (z = 3.029, p = 0.001).

Methamphetamine Condition

Prior to analysis, 1 participant was removed due to insufficient data. Additionally, 7 participants did not respond to the biological essentialism questions, so they were removed from any analysis with biological essentialism.

As a manipulation check, we assessed the effect of article type on participants' biological essentialism scores. We found that article type did not have a significant effect on biological essentialism (F(2, 115) = 0.70, p = 0.50). To assess the effect of article type on addiction stigma, we conducted a one-way ANOVA. There was no significant effect of article type on stigma (F(2, 122) = 1.13, p = 0.33). Again, as the article manipulation had no effect on either variable, we collapsed the data across conditions when analyzing correlations.

Next, we tested how both biological and non-biological essentialism correlated with participants' stigma scores. Biological essentialism was significantly correlated with participants' stigma toward individuals with methamphetamine addiction (r = 0.21, p = 0.02, 95% CI [0.03, 0.37], see Figure 3). However, like in the opioid condition, participants' non-biological

essentialism correlated 4 times more strongly with their stigma scores ($r = 0.42$, $p < 0.001$, 95% CI [0.26, 0.56], see Figure 4). To test if there was a significant difference between the strength of the two correlations, we conducted a Fisher's *z*-test for dependent correlations. The correlation between non-biological essentialism and stigma was significantly stronger than the correlation between biological essentialism and stigma ($z = 2.58$, $p = 0.005$).

Discussion

We found that priming participants with articles that promoted either biologically essentialist or anti-essentialist views about addiction did not affect levels of stigma around opioid addiction or methamphetamine addiction. Participants' biological essentialism scores were significantly associated with their addiction stigma scores. However, participants' non-biological essentialism scores were even more strongly correlated with stigma. Taken together, this suggests that focusing on essentialist views of addiction generally may be more fruitful for understanding stigma than focusing on biological beliefs about addiction on their own.

The relationship between essentialism and stigma has been documented in a number of domains including race [20,22], sexual orientation [30], and mental illness [23]. However, this is the first study to look at how essentialism is associated with stigma toward addiction. As in other domains, we found that higher levels of essentialism are generally associated with more stigma against addiction.

Essentialism is associated with the perception that category membership is discrete and immutable [19]. The perception of addiction as immutable is a hallmark belief of addiction stigma [15,31]. This view may motivate punishment rather than health-based treatment [15]. Additionally, the belief that addiction is a discrete category highlights the difference between individuals with addiction disorders and individuals without, creating a clear "us" versus "them". In Link & Phelan's (2001) stigma model, separating between "us" and "them" dehumanizes the stigmatized group, and is a key component of stigma. Essentialist beliefs of categories makes this separation easier. Future anti-stigma efforts could make use of methods to reduce dehumanization. This includes increasing meaningful interpersonal contact between individuals with an addiction and individuals without[32,33]. Another strategy is to highlight similarities between individuals with and without addiction, especially on an emotional level[34,35]. Finally, actively challenging stereotypes associated with addiction can also be a viable tactic for reducing dehumanization, and consequently, stigma[36].

Additionally, Link & Phelan (2001) comment on how power is a key aspect of creating and maintaining stigma against certain groups. Essentialism is also related to power. High-power individuals are more essentialist than low-power individuals [37]. High-power individuals are more motivated to promote essentialist views of categories because it establishes a permanent divide between them and lower-status individuals [38]. Essentialism can be used as a tool by high-power individuals to establish social hierarchies, and this is a necessary pre-requisite for

stigma [9,38] Taken together, this suggests that a general essentialist framework accounts for many of the key aspects of stigma against individuals with addiction. Additionally, it may be more important to focus on essentialist views of addiction generally rather than focusing specifically on the effect of biological explanations of addiction when trying to understand sources of prejudicial beliefs. A considerable amount of addiction research is related to investigating biological causes for addiction and finding biologically based solutions. While this research is no doubt important, it may be valuable to look at social and structural causes of stigma, which include the use of power imbalances to disadvantage the stigmatized group[9]. By focusing on biological explanations and solutions for addiction, we fail to address, and potentially delegitimize, systemic challenges that lead to drug-based coping strategies. Future work should address not just biological sources of addiction and addiction stigma, but also social and systemic sources.

The main aim of the study was to prime participants with pro- or anti-essentialist articles to investigate how that would affect stigma. We found no evidence that providing genetic or anti-genetic explanations of addiction reduced stigma toward addiction. There has been a debate in the literature about whether providing genetic explanations for addiction will increase or decrease stigma surrounding mental illness[29]. Those arguing that genetic explanations will decrease stigma surrounding mental illness and addiction argue that it will decrease culpability[29]. Additionally, they argue that having information about the

biological nature of addiction will suggest that addiction is treatable, and will lead people to advocate for more health-based treatment [15]. Others argue that spreading information about the biological nature of addiction will lead to increased stigma because it makes addiction seem unchangeable [29]. Our results, however, are unable to conclusively argue either way. We found no impact of providing genetic explanations on changing addiction stigma. This might indicate that stigma toward addiction is relatively stable, so focusing on education about biological explanations for addiction may not be effective in reducing stigma. This replicates prior work that has found that education about addiction does not influence stigma [39]. Our research indicates that essentialism generally may be a better framework for understanding addiction stigma than studying participants' belief in a biological basis for addiction. Our non-biological essentialism items generally surrounded beliefs that category boundaries are discrete (e.g., "The boundaries that define the differences between addicts and non-addicts are clear-cut"). It might be that, while biological beliefs of addiction still relate to stigma, other factors like beliefs that individuals with addiction are fundamentally different are better predictors of stigma. To this end, using essentialism primes that focus on discreteness rather than biological basis may be more effective in changing addiction stigma.

Limitations & Future Directions

In both studies, we were unable to detect a difference in the overall stigma against individuals with addiction across our three conditions. It may be that participants' stigma toward addictions may be relatively stable, and unlikely to be dramatically changed by the content of one news article. In an Australian study, education about the biological aspect of addiction did not change people's stigma toward individuals with addiction [39]. In other domains, prejudice is also stable [40,41], with some arguing that it may be better understood as a personality trait [42]. Thus, our manipulation may not have been enough to cause changes in addiction stigma. Additionally, our research only involved the presentation of one news article per participant. As mentioned earlier, one news article may not be enough to cause any substantial change in participants' perceptions of addiction, especially given that most participants are exposed to widespread negative media about individuals with addiction already (Jones et al., 2020). Future research should focus on creating stronger manipulations to better influence participants' beliefs about addiction.

Our main finding was that the correlation between stigma and essentialism was stronger for non-biological essentialism than biological essentialism. It is important to consider other potential causes for this. For example, it is known that measures with higher internal consistency tend to have stronger correlations with other measures. In both studies, our non-biological essentialism measure had higher internal reliability than our biological essentialism measure. However,

when investigating the 95% confidence intervals of our Cronbach's alpha measures, we see that they overlap in the methamphetamine study (biological essentialism 95% CI [0.65; 0.85]; non-biological essentialism 95% CI [0.75; 0.88]) but not the opioid study (biological essentialism 95% CI [0.61; 0.86]; non-biological essentialism 95% CI [0.84; 0.92]). This is important to consider, because the differences in correlation were even stronger in the methamphetamine condition, where the reliabilities of our two subscales did not differ by much. However, it is important for future work to include measures with more consistent reliability across subscales. Using a biological essentialism subscale with more items, or not allowing participants to skip items, may enhance reliability.

It is also possible that our findings might be peculiar to our sample. In previous research with news article manipulations (e.g., No et al., 2008; Williams & Eberhardt, 2008), participants were typically university students. Our population was from MTurk, and it may be that there are differences in education-level that contributed to how easily participants were able to understand the article. Additionally, they may be less motivated to read the article carefully compared to participants in the lab. Future research could attempt to repeat this study with university students to see if there are differences in the effects of the manipulation.

Another limitation could be the disconnect between the article content and our stigma scales. Participants read news articles that addressed specific drug addictions (either opioid or methamphetamine) but then completed questionnaires

that addressed general perceptions of addiction, both in the stigma and the essentialism questionnaire. We did this so we could study the relationship between stigma and essentialism more generally, however, future research could use measures of specific addiction stigmas (e.g., a scale that addresses just opioid addiction) to get a clearer picture of how such manipulations affect specific stigmas. We also did this to avoid altering the stigma scales too much. As we were already combining two scales in the literature, any further alterations may have limited the reliability or validity of the scales. Another limitation of our stigma scale is that it is unable to address any questions related to self-stigma. A future study with participants who have addictions could better test how essentialism relates to self-stigma in either a positive or negative manner.

Conclusions

Across our two studies, we found evidence that non-biological essentialism was more strongly associated with addiction stigma than biological essentialism was. Providing participants with information about the genetic basis for addiction did not affect their stigma. In general, it may be that other aspects of essentialism, like beliefs in discrete category boundaries, are better associates of addiction stigma than belief in a biological basis for addiction.

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Table 1. Essentialism questionnaire adapted from Bastian & Haslam (2006). Reverse scored items are denoted by (R). Questions related to biological essentialism are denoted by an asterisk (*). Participants responded to each item with a 1-7 Likert scale.
The boundaries that define the differences between addicts and non-addicts are clear-cut.
A person either has addictive tendencies, or they do not.
There are different types of people (i.e., addicts or non-addicts) and those types can be easily defined and are relatively clear-cut.
The kind of person someone is, is clearly defined, they either are an addict or they are not.
People fall into distinct personality ‘types’.
Generally speaking, once you know someone in one or two contexts, it is possible to predict how they will behave in most other contexts.
It is possible to know about many aspects of a person once you learn they are an addict.
When getting to know a person, it is possible to determine if they are an addict or not very quickly.
Knowing that someone is an addict can lead to accurate predictions of their future behaviour.
Everyone is either an addict or not.
Although addicts may have some basic identifiable traits, it is never easy to make accurate judgments about how they will behave in different situations (R).
With enough scientific knowledge, addiction can be traced back to genetic causes. *
Whether someone is an addict or not can be determined by their biological make-up. *
With enough scientific knowledge, the basic qualities of addicts can be traced back to, and explained by, their biological make-up. *
A person being an addict can largely be attributed to their genetic inheritance. *

Table 2. The addiction stigma questionnaire adapted from Kennedy-Hendricks et al. (2017) and Barry et al. (2014). Reverse scored items are denoted by (R). Participants responded to each item with a 1-7 Likert scale.
Individuals with an addiction are to blame for the problem.
Some people lack the self-discipline to use drugs without becoming addicted.
I am unwilling to have a person with an addiction marry into the family.
I am unwilling to work closely with a person with an addiction.
Discrimination against people with drug addiction is a serious problem. (R)
Employers should be allowed to deny employment to a person with drug addiction.
People with an addiction are more dangerous than the general population.
Landlords should be able to deny housing to a person with drug addiction.
The treatment options for persons with drug addiction are effective at controlling symptoms. (R)
Most people with drug addiction can, with treatment, get well and return to productive lives. (R)
I am in favour of requiring insurance companies to offer benefits for the treatment of drug addiction that are equivalent to benefits for other medical services. (R)
I am in favour of increasing government spending on the treatment of drug addiction. (R)
I am in favour of increasing government spending on programs that help people with drug addiction find jobs and provide on-the-job support as needed. (R)
I am in favour of increasing government spending on programs to subsidize housing costs for people with drug addiction. (R)

Table 3. Factor loadings for the two essentialism subscales. Factor loadings are presented for both the opioid and methamphetamine sample.

	Factor Loadings: Opioid Sample	**Factor Loadings: Methamphetamine Sample**
Factor 1: Biological Essentialism		
A person being an addict can largely be attributed to their genetic inheritance.	1.00	1.00
With enough scientific knowledge, the basic qualities of addicts can be traced back to, and explained by, their biological make-up.	1.03	0.71
Whether someone is an addict or not can be determined by their biological make-up.	0.95	0.97
With enough scientific knowledge, addiction can be traced back to genetic causes.	0.85	1.24
Factor 2: Non-Biological Essentialism		
The boundaries that define the differences between addicts and non-addicts are clear-cut.	1.06	0.98
A person either has addictive tendencies, or they do not.	0.70	0.52
There are different types of people (i.e., addicts or non-addicts) and those types can be easily defined and are relatively clear-cut.	1.11	1.06
The kind of person someone is, is clearly defined, they either are an addict or they are not.	1.08	1.28
People fall into distinct personality ‘types’.	0.850	0.70

Generally speaking, once you know someone in one or two contexts, it is possible to predict how they will behave in most other contexts.	0.98	0.94
It is possible to know about many aspects of a person once you learn they are an addict.	0.79	0.98
When getting to know a person, it is possible to determine if they are an addict or not very quickly.	1.00	1.00
Knowing that someone is an addict can lead to accurate predictions of their future behaviour.	0.66	0.66
Everyone is either an addict or not.	0.78	1.01
Although addicts may have some basic identifiable traits, it is never easy to make accurate judgments about how they will behave in different situations (R).	0.22	0.90

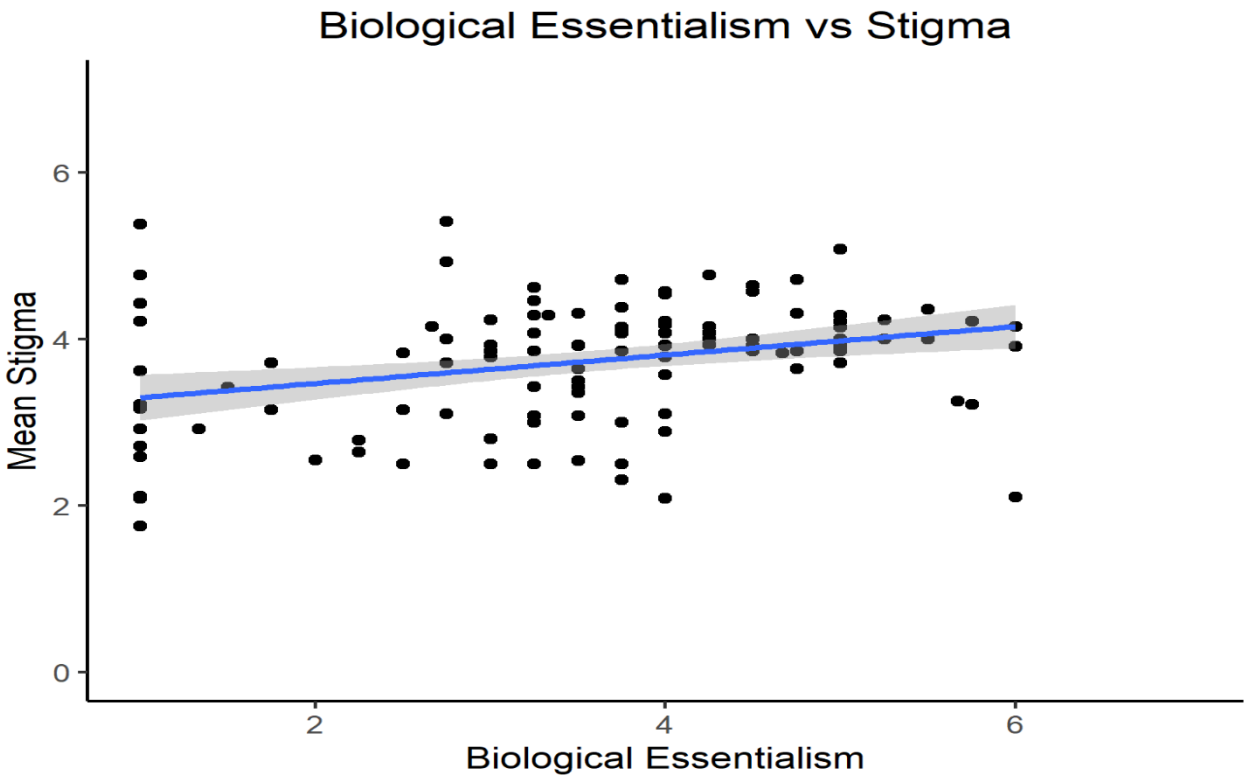

Figure 1. Participants' mean stigma scores plotted against their mean biological essentialism scores for participants in the opioid condition. Minimum and maximum scores for the x- and y-axis are 1 and 7, respectively.

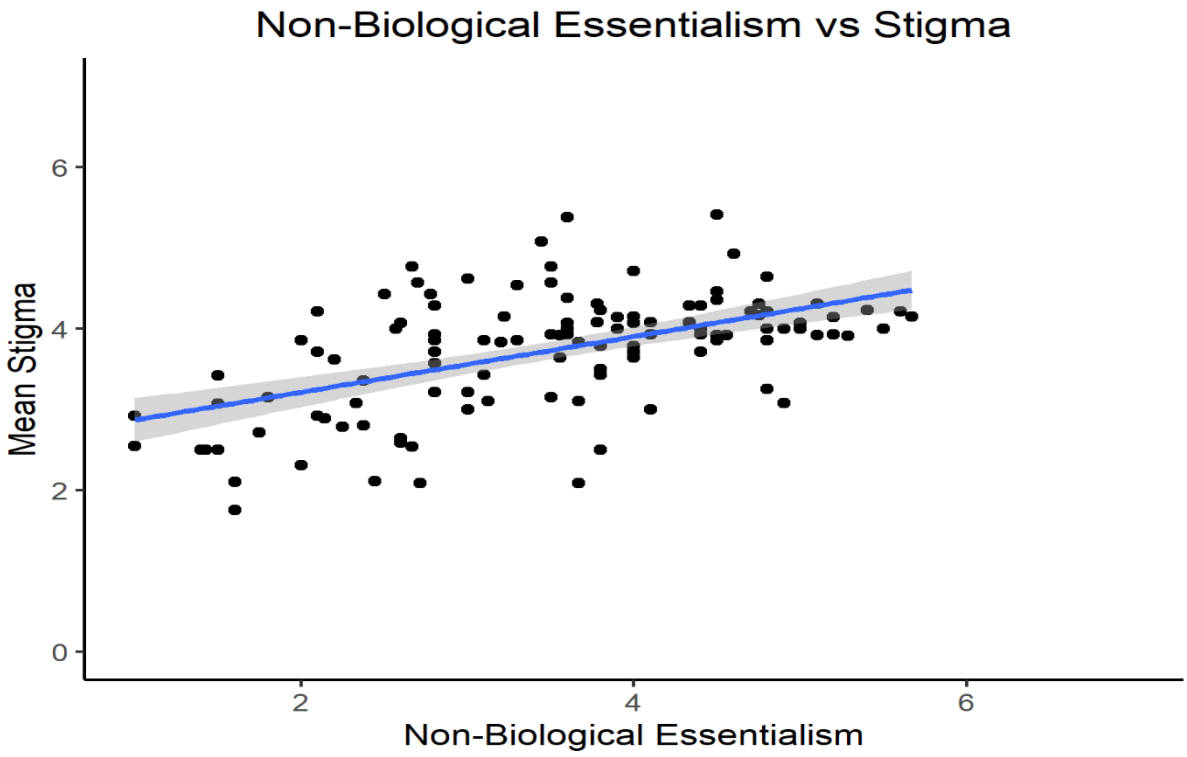

Figure 2. Participants' mean stigma scores plotted against their mean non-biological essentialism scores for participants in the opioid condition. Minimum and maximum scores for the x- and y-axis are 1 and 7, respectively.

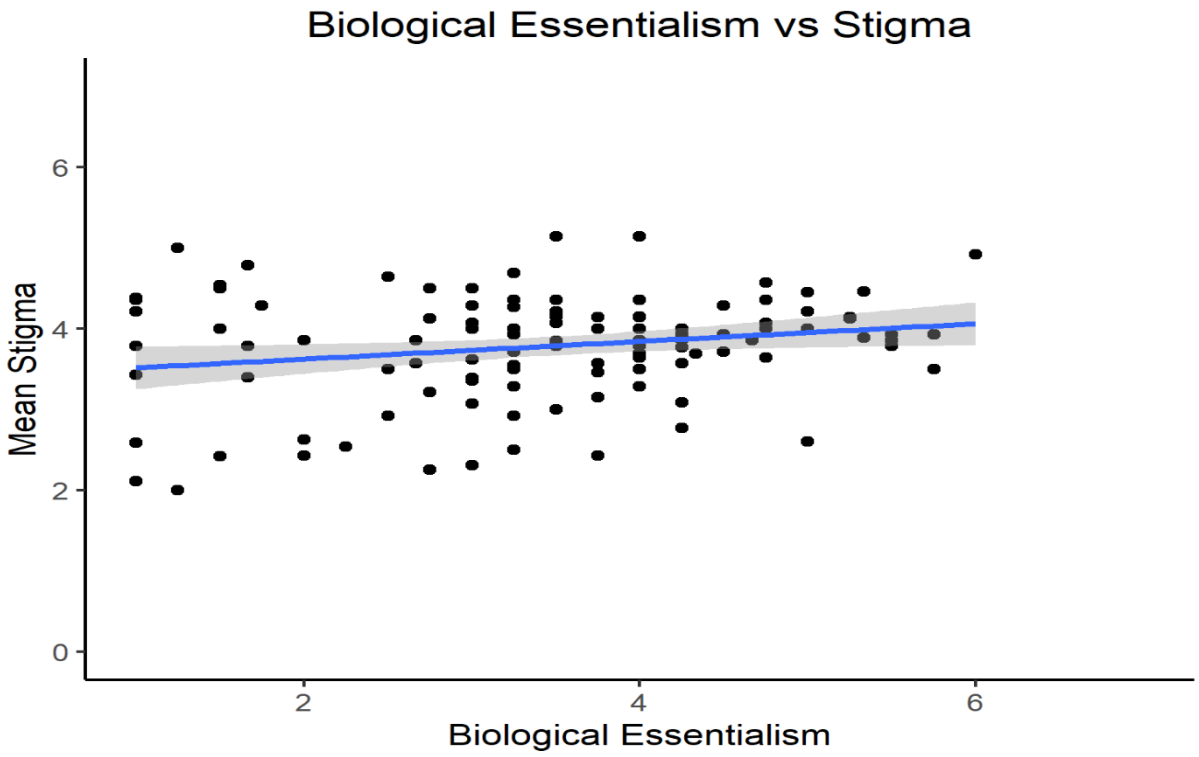

Figure 3. Participants' mean stigma scores plotted against their mean biological essentialism scores for participants in the methamphetamine condition. Minimum and maximum scores for the x- and y-axis are 1 and 7, respectively.

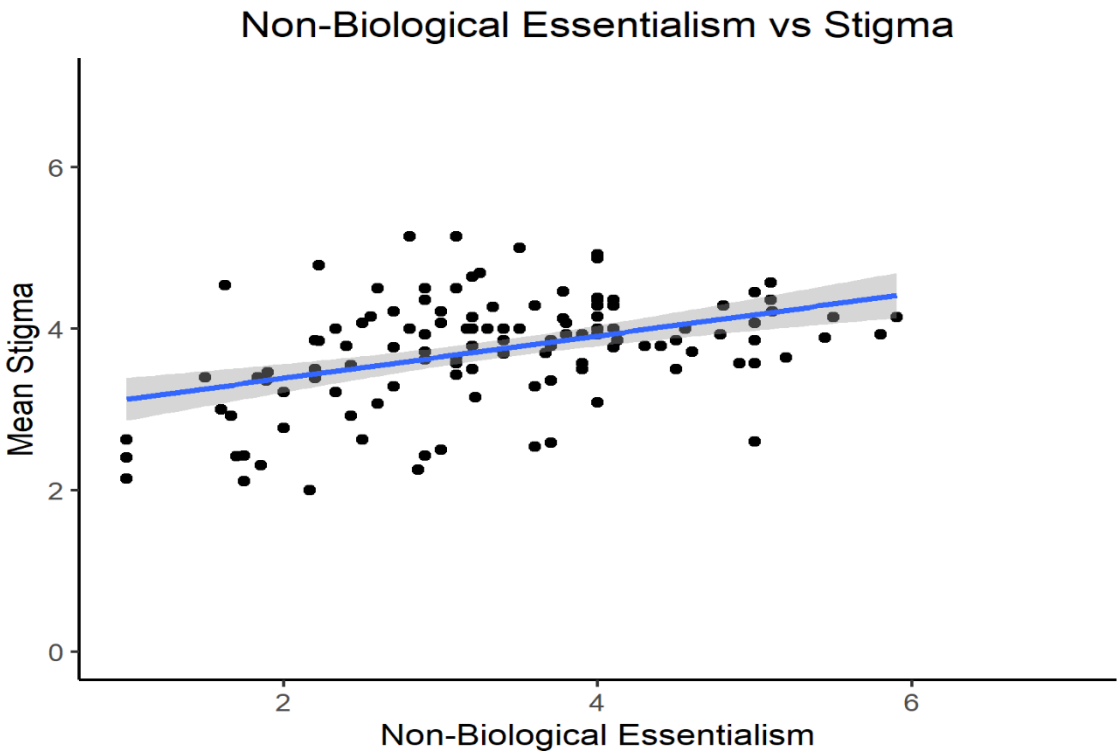

Figure 4. Participants' mean stigma scores plotted against their mean non-biological essentialism scores for participants in the methamphetamine condition. Minimum and maximum scores for the x- and y-axis are 1 and 7, respectively.

Appendix A: Materials from Study 1

Essentialism Condition Article in Study 1

"Scientists Pinpoint Genetic Underpinnings of Prescription Opioid Addiction"

CHARLOTTESVILLE—Scientists working on mapping the origins of substance abuse disorders through the Human Genome Project have uncovered some genetic codes that they believe can be used as indicators of prescription opioid addiction.

"Up till now, [we] weren't able to determine if someone was likely to be a prescription opioid addict based just on DNA," said Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal *Gene*. "But now we're able to use some of the genetic cues to obsessive behaviour and other personality features to guess at whether someone is a prescription opioid addict, based on a very small genetic sample."

Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Medical Center, have been working for several years on mapping the genotypic expressions involved in addiction and other mental health disorders. They have focused particularly on the melanocortin 1 receptor (MCR1) gene, which is implicated most powerfully in obsessive tendencies. The present study explores the link between this gene and the phenylalanine hydroxylase protein, which is involved in risk-taking behaviour, in varying amounts for addicts compared to non-addicts.

The researchers used skin, blood, and other tissue samples from hospital patients whose opioid addiction was indicated in their charts, but was kept hidden from lab members until the genetic analyses were complete.

"We found that once we had a good idea of where the genetic components to some of these key behavioural features were located, we were able to correctly guess whether the patient was an opioid addict 69% of the time, which is well above chance rate," Dr. Kaminsky said. "This was especially true of patients with long-term addictions."

Their results add to the growing body of evidence that so much of who we are as people can be traced to our genetic origins— including addiction.

"This doesn't mean that there aren't environmental influences on opioid addiction, just like everything else," Dr. Kaminsky cautioned. "But in the end, we obtain our genetic material from our parents, so we generally inherit their addictive tendencies along with everything else.

He pointed to evolutionary theories as to why humans might have evolved opioid addiction or addiction-related behaviours. For example, opium would have been a valuable early form of medicine in our evolutionary

environment, where other medicines were not available. Therefore, individuals who were able to find and intake opium may have been more likely to survive pain-related illness compared to their peers.

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Genome Project with current work on the genetic underpinnings of depression and other mood disorders.

Anti-Essentialism Condition Article in Study 1

"Scientists Reveal That Prescription Opioid Addiction Has No Genetic Basis"
CHARLOTTESVILLE—Scientists working on mapping the origins of life through the Human Genome Project have definitively demonstrated that no genetic codes can be tied to prescription opioid addiction.

"Up till now, there was a big question [in the scientific community] about whether we could determine whether someone was a prescription opioid addict based just on DNA," says Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal *Gene*. "But now we know the answer— there are no genetic markers that indicate whether a person is a prescription opioid addict or not."

Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Medical Center, have been working for several years on mapping the genotypic expressions involved in skin color and other phenotypic physical features. They have focused particularly on the melanocortin 1 receptor (MCR1) gene, which is implicated most powerfully in obsessive tendencies. The present study explores the link between this gene and the phenylalanine hydroxylase protein, which is involved in risk-taking behaviour, in varying amounts for different people.

The researchers used skin, blood, and other tissue samples from hospital patients whose prescription opioid addiction was indicated in their charts, but was kept hidden from lab members until the genetic analyses were complete.

"We found that even when we had a good idea of where the genetic components to some of these key behavioural features were located, we were able to correctly guess whether the patient was a prescription opioid addict only 27% of the time, which is really no better than chance rate," Dr. Kaminsky said. "There's just no one cue or set of cues that indicates, say, whether someone is a prescription opioid addict."

Their results add to the growing body of evidence that although genes do play an important role in who we are, social and environmental factors may in many circumstances be even more powerful.

"This doesn't mean that there aren't hereditary components to prescription opioid addiction," Dr. Kaminsky cautioned. "We do inherit our traits from our parents, but the practice of classifying people as prescription opioid addicts or not based on certain patterns of stereotypical behaviour is entirely cultural in origin. There's just no genetic basis for it."

He pointed to evidence that each addiction group has more variability within the group in any given dimension, such as risk-seeking behaviour, than exists between any two groups. He also added that classifying opioid addiction via genetics is a relatively recent development in human history—even though people's addictive behaviours have been relatively stable over time, the categories into which people are classified change constantly according to the political climate.

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Genome Project with current work on the genetic underpinnings of depression and other mood disorders.

Control Condition Article in Study 1 and Study 2

"New Dinosaur Species Found in 2021"

CHARLOTTESVILLE—Scientists working on uncovering new fossil records through the Human Paleontology Project have uncovered new dinosaur fossils that they believe is as large as a blue whale.

"Up till now, [we] have found many land-based dinosaurs, but they are usually dwarfed in size compared to aquatic species", said Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal Paleontology. "But now we've discovered two new species that are similar in size to the blue whale, representing some of the largest land species ever discovered."

Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Science Center, have been working for several years on uncovering new fossils in Northwest China. The researchers discovered a number of fossils in the region, and determined that two of them represented novel species.

The researchers named these species *Silutitan sinensis and Hamititan xinjiangensis. Both names are derived from the areas which the dinosaurs were found. Silu is a Mandarin word that translates to "Silk Road". Xinjiang is the area in China where the new fossils were discovered.*

"The *Silutitan* is over 20 meters long," Dr. Kaminsky said. "While the *Hamititan* was 17 meters long. This makes them almost the size of the blue whale."

Their results add to the growing body of evidence that there are still so many species that are yet to be discovered. Including some that might be larger than we could have ever imagined.

"This doesn't mean that there are other land dinosaurs yet to be discovered that are this size," Dr. Kaminsky cautioned. "But in the end, it's a reminder that even some of nature's largest species have remained a mystery for so long."

He pointed to evolutionary theories as to why these dinosaurs may have been this size. Likely to gain access to taller trees and plant species as a source for food. Additionally, the large size may have helped these species to defend against predators, or at least to ward off potential predators from hunting them.

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Paleontology Project with current work on discovering species in South America.

Appendix B: Materials from Study 2

Essentialism Condition Article in Study 2

"Scientists Pinpoint the Genetic Underpinnings of Methamphetamine Addiction"
CHARLOTTESVILLE—Scientists working on mapping the origins of substance abuse disorders through the Human Genome Project have uncovered some genetic codes that they believe can be used as indicators of methamphetamine addiction.

"Up till now, [we] weren't able to determine if someone was a methamphetamine addict based just on DNA," said Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal *Gene*. "But now we're able to use some of the genetic cues to obsessive behaviour and other personality features to guess at whether someone is a methamphetamine addict, based on a very small genetic sample."

Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Medical Center, have been working for several years on mapping the genotypic expressions involved in addiction and other mental health disorders. They have focused particularly on the melanocortin 1 receptor (MCR1) gene, which is implicated most powerfully in obsessive tendencies. The present study explores the link between this gene and the phenylalanine hydroxylase protein, which is involved in risk-taking behaviour, in varying amounts for addicts compared to non-addicts.

The researchers used skin, blood, and other tissue samples from hospital patients whose methamphetamine addiction was indicated in their charts, but was kept hidden from lab members until the genetic analyses were complete.

"We found that once we had a good idea of where the genetic components to some of these key behavioural features were located, we were able to correctly guess whether the patient was a methamphetamine addict 69% of the time, which is well above chance rate," Dr. Kaminsky said. "This was especially true of patients with long-term addictions."

Their results add to the growing body of evidence that so much of who we are as people can be traced to our genetic origins— including addiction.

"This doesn't mean that there aren't environmental influences on methamphetamine addiction, just like everything else," Dr. Kaminsky cautioned. "But in the end, we obtain our genetic material from our parents, so we generally inherit their addictive tendencies along with everything else.

He pointed to evolutionary theories as to why humans might have evolved methamphetamine addiction or addiction-related behaviours. For example, methamphetamine would have been a valuable stimulant in our

evolutionary environment, where other stimulants like caffeine were not available. Therefore, individuals who were able to find and intake a larger amount of methamphetamine may have been more productive in daily tasks compared to their peers.

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Genome Project with current work on the genetic underpinnings of depression and other mood disorders.

Anti-Essentialism Condition Article in Study 2

"Scientists Reveal That Methamphetamine Addiction Has No Genetic Basis"

CHARLOTTESVILLE—Scientists working on mapping the origins of life through the Human Genome Project have definitively demonstrated that no genetic codes can be tied to methamphetamine addiction.

"Up till now, there was a big question [in the scientific community] about whether we could determine whether someone was a methamphetamine addict based just on DNA," says Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal *Gene*. "But now we know the answer— there are no genetic markers that indicate whether a person is a methamphetamine addict or not."

Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Medical Center, have been working for several years on mapping the genotypic expressions involved in addiction and other mental health disorders. They have focused particularly on the melanocortin 1 receptor (MCR1) gene, which is implicated most powerfully in obsessive tendencies. The present study explores the link between this gene and the phenylalanine hydroxylase protein, which is involved in risk-taking behaviour, in varying amounts for different people.

The researchers used skin, blood, and other tissue samples from hospital patients whose methamphetamine addiction was indicated in their charts, but was kept hidden from lab members until the genetic analyses were complete.

"We found that even when we had a good idea of where the genetic components to some of these key behavioural features were located, we were able to correctly guess whether the patient was a methamphetamine addict only 27% of the time, which is really no better than chance rate," Dr. Kaminsky said. "There's just no one cue or set of cues that indicates, say, whether someone is a methamphetamine addict."

Their results add to the growing body of evidence that although genes do play an important role in who we are, social and environmental factors may in many circumstances be even more powerful.

"This doesn't mean that there aren't hereditary components to methamphetamine addiction," Dr. Kaminsky cautioned. "We do inherit our traits from our parents, but the practice of classifying people as methamphetamine addicts or not based on certain patterns of stereotypical behaviour is entirely cultural in origin. There's just no genetic basis for it."

He pointed to evidence that each addiction group has more variability within the group in any given dimension, such as risk-seeking behaviour, than exists between any two groups. He also added that classifying methamphetamine addiction via genetics is a relatively recent development in human history—even though people's addictive behaviours have been relatively stable over time, the categories into which people are classified change constantly according to the political climate.

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Genome Project with current work on the genetic underpinnings of depression and other mood disorders.

Chapter 5: General Discussion

The studies included in this thesis comprised a multidisciplinary investigation of essentialism. Across three studies, developmental, cognitive, and social psychological perspectives about essentialism were examined. We also took a multifactor approach when studying essentialism. Psychological essentialism is comprised of many, quite different, subfactors (Bastian & Haslam, 2006; Haslam et al., 2000). These factors do not always cohere into one clear concept (Gelman et al., 2007). In this thesis each study examined subfactors of essentialism separately. This came in the form of tracking different developmental trends for different essentialist beliefs in Chapter 2, having different essentialism question types in Chapter 3, and measuring how different essentialism subfactors were associated with prejudice in Chapter 4.

Chapter 2: The development of essentialist thinking

In Chapter 2 we investigated national identity essentialism in a sample of Canadian-born children between ages 5 to 8. We found that younger children were overall more essentialist about national identity than older children. This was particularly true for two of our essentialism subfactors: Heritability and Insides. Younger children, more than older children, believed traits associated with national identity were present at birth and heritable. Younger children were also more likely to believe that a person's national identity could be determined by looking at their internal biology. In contrast, we found that older children

scored higher on our Inductive Potential subfactor compared to younger children. Older children were more likely to make inferences about people's interests on the basis of national identity compared to younger children.

Additionally, we compared essentialism scores between Canadian and American children using data from Hussak & Cimpian (2019). We found that, overall, essentialism scores were similar between the two samples. We also found consistent developmental trends associated with national identity essentialism, namely, the American sample also saw Heritability and Insides scores decreased with age. Using Bayesian leave-one-out cross-validation analysis, we found our data supported the null hypothesis that there was no difference in national identity essentialism between Canadian and American children.

Our findings support a growing literature on national identity essentialism. Not only did we replicate the findings of Hussak & Cimpian (2019), but our findings supported other cross-cultural research that has found that national identity essentialism is consistent across cultures (Davoodi et al., 2020). This is a valuable avenue for research, as essentialism research in other social domains (e.g., race, gender) vary to the extent to which they find cross-cultural consistency. Some studies, especially those examining religion, find a high degree of cross-cultural variation (Chalik et al., 2017; Diesendruck et al., 2013). Other studies, including studies examining race, show more cross-cultural similarity (Kinzler & Dautel, 2012).

Additionally, our study is in accordance with other studies that encourage a multifactor approach to studying essentialism (Gelman et al., 2007; Hussak & Cimpian, 2019). Children's essentialism initially takes the form of distinct, separate, components that cohere later in childhood (Gelman et al., 2007). Therefore, especially in the context of studying development, it may be best for essentialism studies to consider subfactors independently. Within our study, we explicitly assessed the coherence of the subfactors of essentialism in our sample and found that they did not cohere. Accordingly, we assessed each essentialism subfactor separately as other studies have done in the past (Hussak & Cimpian, 2019). Doing so revealed stronger developmental trends than when we looked at all subfactors combined.

Limitations and Future Directions

Our cross-cultural comparison focused on differences at the international level. However, it is important to acknowledge that a great degree of variance exists within each national group (Wainryb, 2006). Future research could investigate within-culture variation and consider how within-culture variation may influence essentialism and its development.

Our research investigated children's national identity essentialism in the context of their own identity. This is consistent with other studies on national identity essentialism (Davoodi et al., 2020; Hussak & Cimpian, 2019). However, future research could focus on the development of national identity essentialism in

the context of other's national identities. There is extensive research that shows divergence in the development of ingroup and outgroup perceptions (Aboud, 2003; Dunham et al., 2006; Qian et al., 2016). Attitudes about one's own group do not necessarily reflect attitudes about an outgroup (Aboud, 2003). Therefore, future research could investigate how children essentialize the national identity of other national groups.

Chapter 3: The cognitive basis of essentialism

In Chapter 3 we investigated the cognitive basis of essentialism, specifically the extent to which essentialism operates as a heuristic. Across three studies, we found that adults under cognitive demand appeared more essentialist about national identity and gender, but not race, compared to adults not under demand. Adults under cognitive demand were more likely to respond that behaviours and preferences would remain consistent with a character's birth group, rather than their adopted group. Previous research has consistently found that adults do not display essentialist intuitions about social categories in a switched-at-birth paradigm (Taylor et al., 2009). This has led some to conclude that adults are not essentialist when reasoning about social categories in the context of a switched-at-birth paradigm (Taylor et al., 2009). Our findings indicate that adults may actually be obscuring their essentialism via more deliberate processing. However, during periods of high cognitive demand,

essentialism may be unveiled due to its role as a valuable cognitive heuristic for reasoning about social categories.

We also compared essentialism scores across all three studies and found that essentialism was highest for gender, followed by race, followed by national identity. We theorized that this may reflect the extent to which these categories are perceived as biological. The more biological a social category is perceived to be, the more likely it maps on to essentialism's base domain of biology (Gelman & Hirschfeld, 1999; Hirschfeld & Gelman, 1994), and the more likely it may be recruited (Barrett, 2001).

Our work replicated the findings presented by Eidson & Coley (2014), and more broadly, supports research with the inherence heuristic and its role as a potential precursor to essentialism (Cimpian & Salomon, 2014b, 2014a). Cimpian & Salomon posit that children may develop essentialist concepts because it is a specific instantiation of the general bias to seek out internal explanations for phenomenon. Previous work has also shown that reducing reliance on the inherence heuristic reduces essentialist thinking (Sutherland & Cimpian, 2019). By providing evidence that essentialism also operates like a heuristic, it adds credence to the link between the inherence heuristic and essentialism, given that they appear to have a similar cognitive basis.

Our work not only provides evidence for how essentialism operates cognitively, but it also illuminates the function of essentialism generally. We opened this thesis discussing the function of categorization, specifically its role in

conserving cognitive resources (Rosch, 2002). Essentialism appears to serve the same function when reasoning about categories. Participants under cognitive demand can use essentialism as a cognitive shortcut for answering questions about categories, allowing them to conserve limited cognitive resources (Eidson & Coley, 2014). This special recruitment for essentialism during cognitive demand was specific for questions about social behaviour and preferences, but we saw no effect of cognitive demand on essentialism when answering questions in the biological domain. Again, as in Chapter 2, by differentiating between essentialism subtypes, we were able to identify stronger effects than by looking at essentialism as a singular concept.

Limitations and Future Directions

One main limitation of Chapter 3 was our inability to use mixed-effects logistic regression to analyze the data from Study 2 on race. We conducted a power analysis based on the data presented in Eidson & Coley (2014), but they had conducted ANOVAs for their analyses. Our power analysis method may not have been able to effectively determine a sample size necessary for mixed-effects models using ANOVA results. Future studies could use more advanced simulation-based power analyses to determine a more suitable sample size.

While we provide an explanation for why essentialism may be especially recruited during periods of high cognitive demand, it is unclear why essentialism may be obscured during non-demanding situations. If essentialism is a cognitive

shortcut, this would add value even outside of times of cognitive duress. We argued that essentialism may be masked in adulthood due to essentialist perceptions being socially unacceptable (Eidson & Coley, 2014). If essentialism is being masked due to social editing, future research could test essentialism in participants from different cultures where social sensitivity is varied. For example, in cultures where gender stereotypes are more readily accepted, essentialism may not be masked as often, and we may see a weaker effect of cognitive demand (Rhodes & Gelman, 2009).

Lastly, we conducted a comparison of essentialism scores across our three studies to see which categories adults essentialize the most. This was a between-groups comparison. It is possible that one of our groups may have just been naturally more essentialist than the others, independent of social category (Lindquist et al., 2013). Therefore, our ranking that gender is the most essentialized category followed by race and then national identity may be due to differences in our samples. Future work could do within-subjects comparisons to better assess how adults differently essentialize social categories. Future studies could also more directly test the hypothesis that the reason for differences in essentialism for different social categories is due to differences in how biological they are perceived.

Chapter 4: Social impacts of essentialist thinking

In chapter 4, we were interested in the negative consequences of an essentialist view of addiction. We primed participants to either take a pro-essentialist or anti-essentialist view of addiction by presenting them with news articles about fictional scientific studies (Williams & Eberhardt, 2008). The priming manipulation increased biological essentialism in the opioid condition, and was associated with a marginal increase of biological essentialism in the methamphetamine condition. However, there was no difference in stigma across article conditions. We then collapsed the data across conditions. Participants' biological essentialism scores significantly correlated with anti-addiction stigma in the context of both opioid and methamphetamine. However, participants' non-biological essentialism scores were a significantly stronger correlate. In the context of both opioid and methamphetamine addiction, the belief that category boundaries were discrete and represented a boundary between two distinct groups was more strongly associated with stigma than the belief that addiction had a biological basis.

This work supports past research in the essentialism literature that indicates essentialism is associated with stigma or prejudice in various domains (Andreychik & Gill, 2015; Bastian & Haslam, 2006; Mandalaywala, 2020; Mandalaywala et al., 2018; Rhodes et al., 2018; Rhodes & Gelman, 2009). In our study, we divided essentialism into two separate subfactors and both were associated with prejudice. Biological essentialism is theoretically associated with

prejudice because it promotes a sense that identity is unchanging (Martin & Heiphetz, 2021). Additionally, perceiving a biological basis to categories provides individuals with an explanatory, causal, source for stereotyped traits (Keller, 2005; Yzerbyt et al., 1997). If addiction has a genetic basis, those same genes that control addiction may control stereotypical traits associated with addiction, like being dangerous (Cohn et al., 2020). In the addiction literature, there has been debate about whether a biological view of addiction is helpful or harmful for individuals with an addiction. Some addictions researchers argue that promoting a biological view of addiction will encourage advocacy for medical treatment of addiction (Richter et al., 2019). Our work supports the opposite conclusion, that a biological view of addiction is harmful for individuals with addiction because it promotes stigma. However, we found that a non-biological essentialist view of addiction was a more meaningful correlate with stigma.

The belief that addiction represents a discrete category boundary, and consequently that individuals with an addiction are fundamentally different from those without an addiction, was strongly associated with stigma. This finding aligns with similar research on race. Wilton et al. (2019) conducted research on the impact of multiculturalism programs on race prejudice. They found that multiculturalism programs that highlight differences between race groups are associated with greater race essentialism and, consequently, less concern for race prejudice (Wilton et al., 2019). Therefore, highlighting differences may be a key link between essentialism and antisocial behaviour (Wilton et al., 2019). Again,

by taking a multifactor approach to studying essentialism, we found that it may be worth focusing on other subfactors of essentialism when studying stigma, rather than just focusing on biological essentialism. As we saw in Chapter 2 and Chapter 3, engaging in a more nuanced investigation of essentialism lead to stronger and more interesting findings than if we just studied essentialism as a monolithic concept.

Limitations and Future Directions

The main findings presented in this chapter were entirely correlational. Future work should try and find other ways to establish a causal relationship between essentialism and stigma. This could be done by targeting the pathways established earlier: either by manipulating the value of a biological view as a causal source for stereotypes, or manipulating the perception of discrete boundaries more directly.

We were unable to use essentialism manipulations to change the level of stigma. One potential reason for this could be that our sample was entirely online. Online participants may be less motivated to fully read the articles, and less able to digest the article information, than in-person samples. Additionally, our article manipulations were about specific addictions, but our stigma scales were about addiction in general. Stigma is already very difficult to change (Akrami et al., 2009; Meurk et al., 2014), and reading one article is likely not enough to change stigma. That our manipulations did not fully map onto our stigma measures may

have made a weak manipulation even less effective. Future work could use more related scales to strengthen the effect of the manipulation. Additionally, stronger manipulations in general may be necessary to assess a causal relationship between essentialism and addiction stigma.

Final Conclusions

In this dissertation, we established that essentialism can be used as a framework for understanding psychological phenomena in a wide variety of circumstances. Specifically, we examined questions related to essentialism that spanned multiple subdisciplines of psychology: developmental (Chapter 2), cognitive (Chapter 3), and social (Chapter 4). Chapter 2 focused on the development of national identity essentialism in a Canadian sample, while also comparing the results of our Canadian sample to a related American sample. National identity essentialism decreased with age, especially in terms of biological essentialism, and essentialist views were similar in the Canadian and American sample. Chapter 3 assessed the extent to which adults obscure their essentialism about social groups, and the extent to which essentialism operates as a heuristic. We found that participants under cognitive demand were more essentialist about national identity and gender, but not race. This evidence supports the notion that essentialism is a valuable cognitive heuristic for understanding social groups that may be obscured by adults during more deliberate processing. Lastly, in Chapter 4 we tested whether essentialism is

associated with antisocial behaviour like addiction stigma. Participants' biological and non-biological essentialism scores each significantly correlated with stigma, with the latter being the strongest correlate.

Along with taking a multidisciplinary approach to studying essentialism, this thesis took a multifactor approach to studying essentialism. Essentialism is made up of many distinct subfactors (Bastian & Haslam, 2006), that do not always cohere (Gelman et al., 2007). Additionally, each subfactor may be differently and independently associated with other variables of interest (Martin & Heiphetz, 2021; Rangel & Keller, 2011). By taking a more nuanced, multifactor approach, we demonstrated findings that would have been obscured if we studied essentialism as a single, unified, concept. In Chapter 2, we saw that different essentialism subfactors had unique developmental trajectories. In Chapter 3, we saw that essentialism scores were higher during cognitive demand, but only for socio-behavioural questions in the switched-at-birth paradigm. In Chapter 4, we found that biological and non-biological essentialism had varying relationships with addiction stigma. Future work in the essentialism literature may benefit from taking a similar multifactor approach, especially when reconciling conflicting results in the past. This is already being done in some literatures (Martin & Heiphetz, 2021), and would no doubt be useful in other domains.

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