ASSESSING A MODEL OF MODERATED RACE CONCEPTS

by

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ABSTRACT OF THE DISSERTATION

Assessing a Model of Moderated Race Concepts

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The psychological study of race has experienced a recent surge of interest in the lay beliefs that individuals hold about the nature of race. In the following paper, I propose a moderated race concepts model, where the effect of race concepts on race-relevant attitudes is moderated by race concept certainty (RCC)—the extent to which an individual is certain in their beliefs about race. Drawing on the attitude strength literature, I develop a measure of RCC in three studies. In the first set of studies, I use a diverse online sample to reduce the number of items (from 25 to 8; Study 1a) and use an undergraduate sample to explore the factor structure of the reduced scale (2 factors; Study 1b). Results from Study 2 confirm that the eight item measure of RCC has 2 factors: Personal and epistemic certainty. Contrary to hypotheses, concept certainty did not moderate the effect of race concepts on measures of racial attitudes (Study 3). However, concept certainty was reliably associated with biological (positively) and social-constructivist (negatively) race concepts across all but the final study. I review the limitations of the correlational test of the expected moderation effect and possible methods for independently manipulating the components of RCC. I discuss the possibility that the RCC scale assesses a factor without parallels to attitude strength.

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Assessing a Model of Moderated Race Concepts

Disagreement on the topic of race is common among scholars of different disciplines. Social researchers largely support a social constructivist view of race, while medical health professionals are more sympathetic towards biological conceptions of race. Lay views of race reflect this ambivalence, with interviews revealing that individuals rely on both cultural and biological explanations in their definitions of race (Morning, 2009). Psychologists have detailed several methods to assess the content of these race-relevant beliefs, but researchers have yet to focus on the certainty with which these beliefs are held. In a scholarly sphere where views of race appear to compete for prominence, it is especially important to understand how uncertainty in one's own views may undermine how indicative those views are of race-relevant attitudes and behavior.

The current paper elaborates on one potentially significant factor contributing to the impact that differing views of race have on attitudes and behavior: How certain one is in what they believe about race. Constructs variously referred to as race concepts (Williams & Eberhardt, 2008) and lay theories of race (No, Hong, Liao, Lee, Wood, & Chao, 2008) have begun to capture the extent to which individuals view race as either an indelible and stable essentialist quality or a contextually defined construction. However, the cognitive components of race are hardly as solidified as those of less politically charged concepts. Not only do findings indicate that the layperson's view of race is sensitive to change by health authorities (Conduit, Parrott, Bates, Bevan, & Achter, 2004), but, in conjunction, scientific researchers themselves do not uniformly support either a biologically determinist or social constructivist view of race (Lee, 2009; Morning, 2011; Williams, 2011). Given the lack of certainty with which individuals

endow their own views of race, it seems appropriate to assess the confidence of these beliefs as one possible moderator of the link between race-relevant cognition and those acts and attitudes more directly indicative of prejudice.

In the current paper, I integrate theory and research on attitude certainty and race concepts and a) propose a model of moderated race concepts, b) develop a measure of the degree to which individuals are certain of their race concepts, c) offer evidence for the validity of the proposed measure of race concept certainty (Studies 1a, 1b, and 2), and d) present the results of an initial assessment the proposed model's assumptions (Study 3). Building on literature from the meta-cognitive study of attitude strength, I argue that race concepts would better predict race-relevant attitudes and behavior if researchers adopt a meta-cognitive perspective that includes conceptual certainty as a moderator of the effect of biological and social-constructivist race concepts. In this thesis, I develop and validate a multidimensional scale of race concept certainty that incorporates research from contemporary attitude strength literature. I review the psychometric properties of the scale (e.g., factor structure, test-retest reliability, and discriminant validity) and assess the relationship between certainty and both biological and social-constructivist race concepts throughout each study. The psychometric validity of the scale is qualified by results from an initial correlational assessment of the proposed model (Study 3), which do not provide support for its hypotheses. In light of these latter findings, I elaborate on the shortcomings of my study design and the importance of further validation studies to establish the utility of the proposed measure.

Meta-Cognitive Certainty and Race

I define the meta-cognitive property of concept certainty as the degree to which an individual is confident in their representation of a concept. This is distinct from earlier meta-cognitive properties studied by race scholars, which revolved around the assessment of individuals' awareness of the link between racial attitudes/cognitions and social desirability (e.g., people's explicit association of the stereotype "Asians are good at math" with the second concept "racism"). Research has indeed shown that both explicit and implicit racial biases are moderated by motives to avoid prejudiced responses (Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002; Dunton & Fazio, 1997; Plant & Devine, 1998). However, concept certainty has been relatively neglected in studies of race-relevant cognition. Certainty in one's race beliefs would, for instance, consider the extent to which a person is confident in their endorsement of the stereotype "Asians are good at math." A number of scholars posit that certainty is distinct from general support for a cognition or attitude (Abelson, 1988; Krosnick & Petty, 1995), and is a multifaceted construct that predicts behavior beyond attitude or cognition alone (Petrocelli, Tormala, & Rucker, 2007). Moreover, assessing the truth of one's beliefs is not the same as assessing whether such beliefs are ethically or socially "good" (see Petty, Brinol, & DeMarree, 2007).

In recent years, scholars have suggested that lay beliefs about the stability of social categories vary in their degree of essentialism. Essentialist beliefs about social categories are characterized by views of category members as fundamentally similar and a belief that category boundaries are non-permeable (Haslam, Rothschild, & Ernst, 2000; Prentice & Miller, 2007). That is, essentialist views of race hold that African-Americans are not merely all fundamentally similar to each other (and different from Whites), but

that the racial categorization of an African-American is stable under situational and historical change. These properties covary with a number of qualities we attribute to natural/biological categories (e.g. homogeneity, immutability, naturalness; Dar-Nimrod & Heine, 2011). Moreover, these essentialist beliefs about race tend to be associated with decreased interest in interracial interaction (Williams & Eberhardt, 2008), though some evidence suggests that the relationship between essentialism and prejudice is specific to race-relevant beliefs, and not beliefs about other social categories (for example, gays and lesbians; Jayaratne et al., 2006; but see Boysen & Vogel, 2007).

Views of race vary greatly in their subjective definitiveness, with much of the public employing complex and partly contradictory explanations for their beliefs in race (Dubriwny, Bates, & Bevan, 2004; Glasgow, Shulman, & Covarrubias, 2009; Morning, 2009). In one large-scale survey, people reported that their ordinary conceptions of race simultaneously included biological *and* social components (Glasgow et al., 2009), suggesting that some measures of race concepts, which position biological and social-constructivist beliefs in opposition to one another (see No et al., 2008), may not capture the ambivalence that individuals hold regarding race. Contemporary psychological assessments may be incapable of capturing the uncertainty inherent in race-relevant beliefs.

The Strength of Attitudes and Cognitions

Attitude scholars frequently consider attitude certainty, or the subjective sense of conviction in one's attitude (Abelson, 1988; Tormala & Rucker, 2007), to be one of the most important facets of attitude strength—the latter of which encompasses those constructs associated with the durability (or stability under attempts towards attitude

change) and impactfulness (or influence on cognition and behavior) of a position (Krosnick & Petty, 1995; see Bassili, 2008 for a recent review). One can consider a negative attitude towards racial minorities (i.e. "Jan does not like immigrants") as having a secondary meta-cognitive component that assesses the certainty of that judgment (i.e. "Jan is certain she dislikes immigrants"). While it may be tempting to view attitude certainty as synonymous with attitude extremity, evidence has repeatedly shown that although they are correlated (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993) each can be independently manipulated (Rucker & Petty, 2004; Tormala & Petty, 2002). For instance, one can perceive new, but confirmatory, evidence as solidifying (making more certain) a previously held attitude without changing the degree to which that attitude deviates from a neutral midpoint.

Recent evidence indicates that attitude certainty is a useful predictor of both the stability of racial attitudes and the impact of these attitudes on related cognitions (Lun, Sinclair, Whitchurch, & Glenn, 2007; Newheiser, Tausch, Dovidio, & Hewstone, 2009). In their research on social tuning—in which an individual's attitudes change to match the attitudes of liked others—Lun and colleagues (2007) have found that racial attitudes are more likely to change when they are held with relatively less certainty (see also Sinclair, Lowery, Hardin, & Colangelo, 2005). Like attitude strength scholars before them, scholars of racial attitudes have found that attitudinal uncertainty decreases the durability of attitudes against change. Additionally, research suggests that racial attitudes held with certainty can potentially impact non-attitudinal beliefs about racial groups. For instance, prejudiced attitudes against South Asians tend to be associated with views of

South Asians as possessing unity, coherence, and organization (i.e., entitativity), but only if those prejudiced attitudes are held with some certainty (Newheiser et al., 2009).

Both the resilience and influence that race scholars have found with highly certain *attitudes* may potentially translate to the effects of highly certain *cognitions*. Attitudes are distinguishable from more general cognitions by the presence of an evaluative (either positive or negative) component, and attitudes, rather than cognitions, have largely been the concern in the social psychological study of certainty. Research on confidence judgments for non-attitudinal cognitions is generally reserved to the study of fact-based knowledge (e.g. how confident one is in the presence of the letter X in a previously learned string of letters; Koriat, 2011; Lories & Schelstraete, 1998). Little empirical research has been conducted on the degree of certainty people attribute to non-evaluative equivocal knowledge (e.g. Whether the Higgs boson exists). Furthermore, there is little to no applicability of the certainty construct to non-attitudinal concepts regarding social category members (but for related metacognitive research see Neel & Shapiro, 2012). The race concepts of individuals, which are a) cognitive in nature, b) not necessarily based on fact, and c) germane to the study of social categories, are a relatively untapped area by scholars of meta-cognition. Much as meta-attitudinal certainty has proven itself a significant predictor of attitude stability and impact (Lun et al., 2007; Newheiser et al., 2009), certainty in one's race-relevant concepts may exhibit similar utility.

The Moderated Race Concepts Model

I posit a model of moderated race concepts, where the effect of biological race concepts on race-relevant outcomes is moderated by race concept certainty (see Figure 1). Previous research has outlined lay theories of race as varying in how stable, essential,

and biologically determined racial categories are believed to be (Haslam, Rothschild, & Ernst, 2002; Jayaratne et al., 2006; No et al., 2008; Williams & Eberhardt, 2008). Based on evidence suggesting that these race concepts are associated with lower interest in interracial interaction (Williams & Eberhardt, 2008) and decreased support for multiculturalism (Verkuyten & Brug, 2004), the model organizes the consequences of adhering to specific race concepts into two classes: Intergroup interaction and race/ethnic policies. Importantly, I hypothesize that high race concept certainty, or high certainty in one's beliefs about race, strengthens the association of race concepts to the above-mentioned consequences. I further hypothesize that race concept certainty is distinct from the race concept itself. That is, that one can believe race is biologically determined, but this does not mean that they have high certainty in that belief.

Race concept certainty.

Four-factor model. The current model hypothesizes that race concept certainty (RCC) is a multidimensional construct, similar in nature to recent findings in the meta-attitudinal literature. While attitude theorists have traditionally considered attitude certainty to be unidimensional (Krosnick & Petty, 1995), recent scholars have proposed that at least two components underlie attitude certainty: Clarity and correctness (Petrocelli, Tormala, & Rucker, 2007). Petrocelli and colleagues (2007) define attitude clarity as the subjective sense of knowing one's own attitude, and attitude correctness as the sense that his or her attitude is correct. Relatedly, I suggest that *race clarity* represents how clear and understandable a perceiver's *personal* conception of race is to

them. Similar to attitude correctness, I suggest that *race accuracy*[1] is the extent to which a perceiver views their own understanding of race as coinciding with experience and reality.

I further propose two original components of RCC—concreteness and objectivism. Due, in part, to the ambivalence of information that individuals receive regarding the nature of race as either social constructivist or biologically determined (Krieger, 2005; Lee, 2009; Morning, 2011), individuals may believe that a clear and accurate concept of race is not possible. Echoing the ambivalence of scientific professionals, people may think that race is inherently abstract and that there exists no real answer to the question, "What is race?" In light of this, I posit that *race concreteness* refers to the extent to which the concept of race is capable of being clear and concrete for anyone, as opposed to unclear and abstract. I consider *race concreteness* as assessing the possibility of any individual to possess race clarity. That is, while race clarity measures the extent to which one's *own* views of race are clear, race concreteness measures the extent to which *anyone's* views of race are clear.

Similarly, I also suggest that people differ in the extent to which they believe a single, definitive, and accurate view of race exists. I refer to this construct as race objectivism, which I hypothesize represents the perceived likelihood that a definitive right and wrong answer to the question of race is possible. Much like race concreteness assesses the possibility of race clarity, race objectivism assesses whether an individual believes that high race accuracy is possible.

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[1] I use the term *accuracy*, as opposed to *correctness*, because of the possible ethnical connotations of the latter term. An ethnical interpretation of the construct has more bearing on the social desirability of a belief than its certainty.

Two-factor model. Prior theory and research on meta-cognitive constructs also suggests that two, rather than four, factors may underlie concept certainty. Kitchener (1983) has proposed that epistemic cognition is a distinct level of cognitive processing in which individuals consider, "the limits of knowing, the certainty of knowing, and the criteria of knowing" (Kitchener, 1983, p. 222). Broadly speaking, concreteness and objectivism assess facets of the limits of knowledge—specifically, whether one is capable of having concrete and true beliefs, respectively. In this alternative two-factor model, both concreteness and objectivism are primarily associated with *epistemic certainty*, or the degree to which a concept is capable of being known.

The accuracy and clarity factors may alternatively be associated with *personal certainty*, a meta-cognitive property describing how much one believes they know about a concept. In their two-factor measure of attitude certainty, Petrocelli and colleagues' (2007) correctness and clarity measures were highly correlated (r = .68). This may be an indication that concept accuracy and clarity (like correctness and clarity) are not, in fact, distinct factors. Indeed, the factor structure of any measure is a product of the relative difference of subscale items in a measure (Nunnally & Bernstein, 1994; Thompson, 2004). As an analogy, one might consider that two siblings can appear quite distinct from one another until their differences are compared to a third, unrelated, individual. Similarly, if items that are supposed to differ from both accuracy and clarity were to be included in a measure, then the two factors might overlap *even more* than if the previously mentioned items were not included. The theoretical distinctiveness of both constructs from epistemic certainty may emphasize the similarity of accuracy and clarity with each other during factor analysis.

Moderated effects. In the model, I hypothesize that concept certainty moderates the effect of biological and social-constructivist race concepts on outcomes previously studied by race scholars. Strong biological conceptions of social categories have been associated with both the avoidance of outside group members (Bastian, Loughnan, & Koval, 2011) and relatively weaker negative emotions from outgroup compared to ingroup rejection (Bernstein, Sacco, Young, Hugenberg, & Cook, 2010). Additionally, the effects of race biological concepts on policy support have indicated weaker support for multicultural, as opposed to color-blind, initiatives (Rosner & Hong, 2010; Williams & Eberhardt, 2008). While biological race concepts—and race essentialist beliefs more generally—are associated with decreased interest in interracial interaction, I hypothesize that race concept certainty strengthens this association. Furthermore, I hypothesize that greater race concept certainty leads to a stronger negative association between biological race concepts and attitudes towards race-relevant policies like affirmative action.

To understand how concept certainty moderates the effect of biological race conceptions on attitudes and behavior, one can link the specific components of race concept certainty to specific thoughts about what race means. Consider the positive association between biological conceptions of race and decreased motives towards other-race friendships (Williams & Eberhardt, 2008). Should an individual be uncertain as to whether they actually believe that race is biological (clarity), or whether the science behind biological determinism is right or wrong (accuracy), it is unlikely that they trust that two different races are, in fact, different on a biological level. They are therefore less likely to form the negative outgroup attitudes that tend to be associated with

biological/essentialist beliefs (see Newheiser et al., 2009), or to use them to guide behavior in service of this belief.

The racial attitudes held by social-constructivists are less clear, largely because of the methods typically employed by scholars to measure race concepts. Little research has been conducted on the relationship between social-constructivist beliefs and race-relevant attitudes (e.g. attitudes towards interracial interaction or racial outgroups more generally), independent of the relationship between biological beliefs and race-relevant attitudes. As mentioned earlier, contemporary measures of race concepts have generally been one-dimensional in nature (e.g. No et al., 2008; Williams & Eberhardt, 2008), precluding the study of social-constructivism as a predictor of attitudes itself (for discussion, see Shulman & Glasgow, 2010). For example, in the development of their 8 item lay theory of race scale, No and colleagues (2008) explicitly included items assessing biological and social-constructivist views of race, but then note, "we calculated a single index of individuals' theory of race by first reverse scoring the social constructivist items. . . and then averaging each participants' scores across eight items" (p. 994). Considering that both principle components analysis and confirmatory factor analysis of their own data actually indicates the presence of *two negatively correlated factors*, this strongly suggests that current measures of race concepts be amended to accommodate the assessment biological and social-constructivist beliefs as separate constructs. Doing so would allow for a clearer understanding of the link between beliefs in race as socially constructed and racial attitudes.

In light of the negative correlation between biological and social-constructivist beliefs (see No et al., 2008), in the moderated race concepts model, I propose that

increased certainty amplifies the relationship between social-constructivist race concepts and positive interracial attitudes. Some support for the link between social-constructivist views and positive interracial attitudes comes from recent research on the effects of multiculturalism (Tadmor, Hong, Chao, Wiruchnipawan, & Wang, 2012). In one study, Tadmor and colleagues (2012) found that symbolic racism (i.e. believing that discrimination is no longer a serious obstacle for racial minorities; Henry & Sears, 2002) and beliefs in the socially constructed nature of Black stereotypes (e.g. endorsing the statement "Images of Blacks as uneducated are constructed by the ruling class to oppress minority groups") were strongly negatively correlated (r = -.53, p < .001). This comes as no surprise, since stereotypic behavior has long been associated with *internal*, and even genetic, trait attributions (Jackson, Sullivan, Hodge, 1993; Kay, Day, Zanna, & Nussbaum, 2013; Pauker, Ambady, & Apfelbaum, 2012; Steele; 1997; for review see Hilton & Hippel, 1996). Social-constructivist beliefs, by their very nature, hold that stereotypes have no basis in reality, much less biology (Martin & Parker, 1995; Shulman & Glasgow, 2010; but for different view, see Rangel & Keller, 2011). I therefore hypothesized that, contrary to biological beliefs, social-constructivist beliefs held with high certainty would be more strongly associated with positive interracial attitudes than social-constructivist beliefs held with low certainty.

Overview of Studies and Hypotheses

Initial scale development had two goals: 1) To reduce the number of items on a preliminary scale of race concept certainty and 2) to explore the number of components/factors that underlie the reduced set of items. Studies 1a and 1b address these aims.

The purpose of Study 2 was to confirm whether the factors found during initial scale development are replicated in a separate sample. Study 2 therefore employs confirmatory factor analysis (CFA) to replicate the factor structure found in Studies 1a and 1b.

I also hypothesize that the measure of race concept certainty is related to, but distinct, from measures of race concepts and social desirability. That is, I aim to establish discriminant validity—that the test does not correlate highly with measures that it proposes to differ from (Campbell & Fiske, 1959). In regards to the discriminant validity of concept certainty from race concepts, people can be biological essentialists or social constructivists, but this belief should be distinct from how certain they are in these beliefs. In regards to the discriminant relationship between concept certainty and social desirability, it is generally important to establish that a scale measures what it intends to (concept certainty) and not *the individual tendency to portray oneself in a favorable light* (social desirability; see also Campbell, 1960). These hypotheses are assessed in Study 2 by observing the correlations between the proposed measure of race concept certainty, race concepts, and an established measure of social desirability. I reject the claim of discriminant validity if these correlations are statistically significant *and* over .50 (i.e. "large," see Cohen, 1988). High correlations would indicate that race concept certainty is not distinct from particular race concepts or social desirability.

In Study 2, I also aimed to assess the scale's test-retest reliability: the stability of the scale over time. If the scale is a reliable assessment of concept certainty, scores for the same individual—assessed at two different times—should be highly correlated. One of the principle concerns when assessing test-retest reliability lies in the interval between

the first administration of a scale (Time 1) and the second administration of the scale (Time 2). If test-retest intervals are too short, then reliability may be due more to participant recollection of items than to the actual stability of the construct. This is, in essence, a concern that the researcher has found a statistically significant correlation that is *not* actually present in the population (i.e. Type I error; Cohen, 1990). In Study 2, I observe the correlation between the scale during its initial administration (Time 1) and its administration no less than 2 weeks later (Time 2). I hypothesized that the test-retest correlation (the correlation between Time 1 and Time 2) would be *modest,* at $r = .70$ as suggested by Nunnally (1978; but for a discussion of the difference between "modest" and "adequate" reliabilities see Lance, Butts, & Michels, 2006).

Study 3 tests the moderation hypothesis of the moderated race concepts model via correlational analysis. I hypothesized that race concepts that were associated with race-relevant attitudinal and identification variables would be more strongly associated with those variables when individuals had a high degree of certainty in their beliefs.

Initial Scale Development

Study 1a

The primary aim of Study 1a was to *reduce* the number of items on the proposed scale, while a secondary aim was to observe the number of components that explain the variance in the items. Prior to data collection, I created a list of 25 items intended to measure certainty in beliefs about race (for full list of items and their associated factors, see Appendix A). While the development of the items was informed by my proposed model and through prior theory on attitude certainty, the ultimate purpose of the scale is for use in the empirical study of concept certainty. To that end, a relatively short scale—16 items or less—promotes the practicality of using the measure when considering the use of other measures in a study of moderate length. To address the secondary aim of Study 1a, I used principal components analysis to observe the number of components that explained the most significant amount of variance in the items.

The tertiary goal of Study 1a was to explore the correlation of the certainty subscales with both biological and social-constructivist race concepts. I expected race concept certainty to remain distinct from particular race concepts, but some research has suggested that certainty may correlate positively with biological race concepts. Belief in the biological underpinnings of social category membership tends to be associated with perceived group similarity (Dar-Nimrod & Heine, 2011), which has been shown to enhance the certainty associated with outgroup perceptions. Ryan and colleagues (2000), for instance, found that when participants believed Blacks were more varied in their trait attributes (i.e. were more different from one another), they expressed greater uncertainty about the possible responses that Blacks would give them after a short participant-created

survey. Not only might biological beliefs enhance certainty through perceived group similarity, but the simple ease with which biological race concepts are retrieved may engender concept certainty. Lay views of race tend to lean more toward biological, than social-constructivist, explanations (Morning, 2011) suggesting that the former beliefs are easier to conjure up from memory than the latter. As in the attitude strength literature, this increased accessibility may itself herald greater certainty (Holland, Verplanken, & van Knippenberg, 2003; Krosnick & Petty, 1995; Young & Fazio, 2013).

Given these past findings, I expected positive weak (r = .10) to moderate correlations (around r = .30; Cohen, 1988) between the race concept certainty subscales on the one hand and the measure of biological race concepts on the other hand. Given the scant evidence linking social-constructivist views to certainty, I made no predictions about the relationship between social-constructivist race concepts and race concept certainty. I used zero-order (bivariate) correlations to assess the general relationship between race concepts and each of the race concept certainty variables. I was also interested in the *independent* relationship between the certainty subscales (if the scale is unidimensional) and the race concept variables. In order to assess whether the each of the certainty subscales were associated with biological and social-constructivist race concepts, when controlling for the other subscales, I conducted partial correlations. For instance, a significant partial correlation between personal certainty and biological race concepts, when partialling out the other certainty subscale, would suggest that personal certainty is correlated with biological race beliefs, *independent* of other types of certainty. Such analyses can be used to establish the discriminant validity of subscales in a measure

from each other, even if these subscales are highly correlated (see Petrocelli, Tormala, & Rucker, 2007, for an example).

Methods.

Filtering and participants. Participants accessed the survey through Amazon's Mechanical Turk (MTurk) online task distribution service, which distributes tasks—in this case, an online survey—to sample of U.S. internet users, in exchange for compensation—in this case, $0.15. Once they agreed to take part in the study, participants were directed to an external website to complete the survey on Qualtrics online survey platform. The generalization of psychometric results to samples *outside* of the traditional college sample is an important aspect of psychometric validation (Nunnally & Bernstein, 1994). MTurk allows social scientists to survey from a sample that is significantly more diverse and representative than typical American college samples (Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010). For these reasons, I chose to conduct Study 1a using the online service.

Participants answered two instructional manipulation checks (IMCs) which, if answered incorrectly, indicated that they did not attend to the survey (see Appendix B). For instance, one of the IMCs asked participants, "While watching television, have you ever had a fatal heart attack?" While participants are given the option to choose *Never*, *Rarely*, *Sometimes*, *Often*, or *All of the Time*, passing the IMC requires that they answer *Never*, as a check on their attentiveness (see Oppenheimer, Meyvis, & Davidenko, 2009). Of the 81 individuals who completed the survey, 9 respondents incorrectly answered at least one IMC. The inclusion of these 9 respondents significantly affected the output of

both the pattern and structure matrices, therefore the following results do not include them in the analyses.[2]

A total of 72 participants were included in the analysis of this study. Similar numbers of female (*n* = 37) and male (*n* = 35) participants were included in the analyses. The racial/ethnic background of participants was as follows: White/Caucasians (*n* = 58), Black/African American (*n* = 6), Hispanic/Latino (*n* = 1), Middle Eastern/North African (*n* = 1), South Asian (*n* = 1), East Asian (*n* = 2), Multiracial (*n* = 2), and not specified (*n* = 1). The following income brackets were represented: Less than $30,000 (*n* = 17), $30,000 - $39,999 (*n* = 14), $40,000 - $49,999 (*n* = 15), $50,000 - $59,999 (*n* = 2), $60,000 - $69,999 (*n* = 9), $70,000 - $79,999 (*n* = 6), $80,000 - $89,999 (*n* = 2), $90,000 - $99,999 (*n* = 1), and $100,000 and more (*n* = 6). The education level of participants was as follows: High school, G.E.D., or some college (*n* = 24), associate's degree (*n* = 7), bachelor's degree (*n* = 36), and graduate, doctorate, or professional degree (*n* = 5). All participants were between 18 and 66 years of age (*M* = 31.93 years, *SD* = 12.43 years).

Materials and procedures. Once participants were directed to the survey, an informed consent screen explained to them that the purpose of the study was to develop a new measure of cognitive certainty. Participants then completed a series of measures (in the order presented below) to assess both their race concept certainty and their race concepts. Participant demographic information (age, gender, race/ethnicity, education, and combined household income) was assessed just prior to debriefing.

Preliminary race concept certainty scale (PRCC). This scale assessed how certain participants were about the concept of race. Due to an error during survey

[2] I used the pattern and structure matrices to determine which items to retain—the purpose of this study. Inclusion of inattentive participants changed which items were retained versus discarded.

creation, participants were presented with 1 item from the 25 item scale twice (i.e. they answered 26 items), so to resolve this problem, the second instance of that item was eliminated from analyses. Participants responded to each of the 25 statements by marking one of five uniquely labeled scale anchors (for full list of items and labeled scale anchors, see Appendix A). For instance, the anchor labels of the item "How certain are you that you have the most correct view of race?" varied from 1 (Completely uncertain) to 5 (Completely certain). The anchor labels of the item "Which choice best describes how you think of individuals' answers to the question, 'What is race?'" varied from 1 (There is definitely no right or wrong answer) to 5 (There is definitely a right and a wrong answer). Characteristics of this scale (reliability and factor structure) are described in the results section of this paper.

Biological and social-constructivist race concepts. Participants responded from 1 (Disagree Strongly) to 7 (Agree Strongly) to ten items adapted from earlier research (see No et al., 2008; Williams & Eberhardt, 2008) assessing the extent to which they believe race was either a biological property or social construction (5 items each). Prior research has generally conflated biological and social-constructionist race concepts (see above introductory discussion on Moderated Effects). Thus, this new scale was created. Initial reliability analyses on each set of 5 items indicated that one of the five initial items on the biological race concepts measure was not sufficiently correlated with the other four (for that item, all inter-item $r < .3$). This item was dropped from further analyses (see Appendix C for list of items, including dropped item).

Considering that these items have not previously been used to assess two separate dimensions of race concepts, I submitted the 9 items to principal axis factoring with a

Varimax rotation. Two factors were extracted with eigenvalues greater than one (factor 1: 4.55; factor 2: 1.62) and explained 69% of the variance in the 9 items. The eigenvalue cutoff method asserts that components/factors with eigenvalues greater than 1 are to be retained (see Kaiser, 1960). However, accepting only components/factors with eigenvalues > 1, while popular, is a highly criticized method in the literature on factor analysis (Costello & Osborne, 2005; Velicer & Jackson, 1990). In fact, Costello and Osborne (2005) suggest that it is "among the least accurate methods for selecting the number of factors to retain" (p. 2). Specifically, researchers have noted that using the > 1 eigenvalue cutoff generally overestimates the number of factors in a dataset (Costello & Osborne, 2005; Zwick & Velicer, 1986; but for evidence of underestimation see Humphreys, 1964; Mote, 1970). One common alternative for assessing the number of components/factors is the scree plot method, where the eigenvalues of each factor are plotted and the number of factors *before* the last substantial drop in eigenvalues is the number of factors retained. Despite the inherent subjectivity of determining what a *substantial* drop is (see Kaiser, 1970 for this criticism), this method is generally preferred to the eigenvalue cutoff method as it tends to be a more accurate reflection of the number of factors in a dataset (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Henson & Roberts, 2006; Russell, 2002; for review and comparison with other methods see Zwick & Velicer, 1986).

Operationalizing a substantial drop as occurring when the slope between two points on the scree plot appeared more vertical than horizontal (i.e. appeared to be greater than a 45 degree angle from the horizontal axis), I found that the scree plot of the eigenvalues for the 9 factors indicated a substantial drop from factor 1 to factor 2 and

from factor 2 to factor 3, but not from factor 3 onwards (see Figure 2). This yielded converging evidence with the eigenvalue cutoff method that 2 factors best explained the variance in the 9 items.

I expected the two factors to negatively correlate (see No et al., 2008), and therefore conducted a Promax rotation (kappa = 4) on the two factors (Hendrickson & White, 1964; for a comparison of different rotation methods, see Fabrigar et al., 1999). This indicated that four items loaded highly on the first factor (biological race concept), and five items loaded highly on the second factor (social-constructivist race concept; see Table 1 for items and factor loadings). A sample item from the biological race concepts scale was "Race has a strong biological basis, and thus cannot be changed." A sample item from the social-constructivist race concepts scale was "Racial categories are fluid, malleable ideas that come from society." Both the biological race concepts ($\alpha = .91$) and the social-constructivist race concepts scale ($\alpha = .82$) had good reliability.

Results.

Principal components analysis. I submitted the 25 items of the preliminary race concept certainty measure to a principal components analysis to first assess the number of components that explained the variance of the observed variables. Three components yielded eigenvalues greater than 1 and cumulatively explained 72% of the variance in the data; however, the scree plot indicated substantial drops from component 1 (14.00) to component 2 (3.05), and from component 2 to component 3 (1.10), but not from component 3 to component 4 (.81; see Figure 3). I therefore retained the first two components (68% variance explained) for further analysis.

Given the expected correlation between the components, I followed the principal components analysis with a Promax rotation (kappa = 4) to assess the relationship between the 25 items and each of the two components. An item was retained if (1) the pattern coefficient for one component was greater than .5, (2) the pattern coefficient for the remaining component was less than .30, and (3) the structure coefficient[3] of the primary component, or component on which the item loaded highest on, was greater than .60 (see Thompson, 2004). To facilitate the use of the scale by researchers and completion of the scale by participants, I also sought to have (a) an equal number of items devoted to each subscale, (b) no more than ten items in the total scale, and (c) items that varied in their phrasing (i.e. were not repetitive). Using these guidelines, I retained 4 items loading primarily on the first component and 4 items on the second. Of the original 25 items of the preliminary race concept certainty measure, a total of 8 were retained (see Table 2).

I computed two separate scales from the sets of items retained from the PRCC that loaded on separate components. I mean scaled the 4 items loading primarily on the first component to create a scale assessing *personal certainty.* The 4 items loading on the second component were mean scaled to create a scale for *epistemic certainty*. Both scales had good reliability (both αs = .90) and correlated highly with one another (r = .52, $p < .001$)

Concept correlations. To observe the initial relationship between the two components of certainty and biological versus social-constructivist race concepts, I

[3] Pattern coefficients can be thought of as beta weights in a multiple regression equation where each predictor is a component and the criterion is the item score. Structure coefficients can be thought of as zero-order correlations between the item and component. That is, pattern coefficients control for relationships among components and structure coefficients do not. Considering both coefficients is important when conducting either a factor or component analysis (see Courville & Thompson, 2001).

conducted bivariate and partial correlations on the measures (see Table 3). Biological and social constructivist race concepts were significantly and negatively correlated with each other, r = -.47, p < .001, thus, partial correlations examines the independent predictive utility of the certainty measures. Furthermore, since the certainty subscales correlated highly with one another (see above), partial correlations can address the discriminant validity of each scale. Personal certainty was significantly and positively correlated with biological race concepts (r = .41, p < .001), but negatively correlated with social constructivist race concepts (r = -.25, p = .03). After partialling out the variance in race concepts explained by epistemic certainty, personal certainty remained significantly correlated with biological race concepts[4] ($r_{brc\ pc\text{-}ec}$ = .27, p = .02), but was no longer significantly correlated with social-constructivist race concepts ($r_{src\ pc\text{-}ec}$ = -.09, p = .46).

Epistemic certainty was significantly positively correlated with biological race concepts (r = .37, p = .002), and negatively correlated with social constructivist race concepts (r = -.35, p = .003). Partialling out the relationship of the variables with personal certainty, epistemic certainty was no longer significantly correlated with biological race concepts ($r_{brc\ ec\text{-}pc}$ = .20, p = .10), but remained negatively correlated with social constructivist race concepts ($r_{src\ ec\text{-}pc}$ = -.27, p = .03).

Study 1b

Study 1a provided some initial support for the coherence of eight items onto two interrelated components of race concept certainty, but principal components analysis is not well equipped to explore the factor structure of a set of items. While principal

[4] Partial correlations are signified throughout this paper with an *r* followed by subscripts for the two focal variables and a dash and subscript for the partialled variable. The subscripts brc, src, pc, and ec designate biological race concepts, social-constructivist race concepts, personal certainty, and epistemic certainty, respectively. Therefore $r_{brc\ pc\text{-}ec}$ signifies the correlation between biological race concepts and personal certainty, when partialling out epistemic certainty.

components analysis in Study 1a is well suited for the purpose of item reduction (Bentler & Kano, 1990) it may not provide adequate estimates of the underlying factor structure of a set of items. Many psychometricians do not classify principle components analysis as *factor* analysis since, unlike the common factor model (on which factor analysis is based), it assumes that items are perfect measures of their underlying components—that there is *no* measurement error (Fabrigar et al., 1990).

The primary purpose of Study 1b was to explore the underlying factor structure of the eight items of the race concept certainty scale by using exploratory factor analysis. Exploratory factor analysis models the latent (unobserved) variables that explain a set of items and assumes that while one cannot directly measure the latent variable (of, say, personal certainty), if a set of items all covary highly with each other, a single unobserved variable may explain why they all covary (for discussion of the common factor model on which factor analysis is based see Fabrigar et al., 1990; Russell, 2002).

Statistics that model latent variables generally require large samples of approximately 200 cases (Bollen, 1989) and the method used to analyze the data partly depend on whether the data deviates from normality (Costello & Osborne, 2005). For Study 1b, I collected data from a larger sample of participants than the previous study. I also assessed the normality of the eight items of the race concept certainty scale before selecting the method of factor analysis to employ.

As in Study 1a, in Study 1b I report correlational analyses to observe the relationship between the certainty subscales and race concepts. Based on the results of Study 1a, I expected the certainty subscales to correlate positively with biological race concepts and negatively with social-constructivist race concepts.

Methods.

Filtering and participants. As in Study 1a, Amazon's Mechanical Turk (MTurk) service was used to collect data from participants, and the survey was hosted on Qualtrics online survey platform. All participants who completed the study received $0.15 in compensation. Three types of filters were included to verify the validity of participant responses (see Appendix B). In order to be included in analyses, respondents were required to (a) correctly answer two IMCs (n_{pass} = 228), (b) be native English speakers (n_{pass} = 254), and (c) speak English fluently (n_{pass} = 269).

Of the 272 participants who completed the survey, 214 participants (79%) were included in analyses. From this valid pool, more women (*n* = 128) than men (*n* = 86) participated. The racial/ethnic background of participants included White/Caucasian (*n* = 167), Black/African-American (*n* = 18), Hispanic/Latino (*n* = 12), South Asian (*n* = 1), East Asian (*n* = 5), Southeast Asian (*n* = 3), Other Asian (*n* = 1), and Multiracial (*n* = 7). A majority of participants fell in the "less than $30,000" income bracket (*n* = 93), though participants included those from the $30,000 (*n* = 33), $40,000 (*n* = 14), $50,000 (*n* = 23), $60,000 (*n* = 13), $70,000 (*n* = 15), $80,000 (*n* = 6), $90,000 (*n* = 8), and $100,000 and more (*n* = 9) income brackets. The education level of participants was as follows: Less than high school (*n* = 3), high school, G.E.D., or some college (*n* = 94), associate's degree (*n* = 28), bachelor's degree (*n* = 64), and graduate, doctorate, or professional degree (*n* = 25). Participants ranged from 19 to 74 years of age (*M* = 37.09 years, *SD* = 14.20 years).

Measures (presented in order of appearance).

Biological race concepts (BRC). Participants responded from 1 (Disagree Strongly) to 7 (Agree Strongly) to the same 5 items from Study 1a (see Appendix C). As in Study 1a, one of these items had low inter-item correlations with the other four and this item was dropped from analysis. This scale was reliable (α = .83).

Social-constructivist race concepts (SRC). Participants responded to the same 5 items from Study 1a (see Appendix C). The scale was reliable (α = .87).

Race concept certainty scale (RCC). Participants responded to each of 8 items determined from Study 1a (for list of items retained from Study 1a, see Table 2). Characteristics of this scale (reliability and factor structure) are described in the results section.

Results.

Tests for normality. To understand whether the data was appropriate for a normal factoring method compared to a factoring method that was robust to deviations from normality, I assessed the multivariate normality of the 8 items of the race concept certainty scale. Univariate normality is generally a reliable indicator of multivariate normality (Johnson & Wichern, 1992; Looney, 1995), so I first analyzed whether the skew, kurtosis, and omnibus normality of each item significantly differed from zero (for SPSS macro used, see DeCarlo, 2012). Of the 8 items, 6 were significantly more skewed than normal ($p < .05$) and 6 were significantly more kurtotic than normal ($p < .05$). Consulting omnibus tests for univariate normality, all items evidenced significant K^2 (D'Agostino & Pearson, 1973), LM (Jarque & Bera, 1987), Kolmogorov-Smirnov, and Shapiro-Wilk values ($p < .05$ for all), suggesting that the assumption of multivariate normality was not met. Furthermore, Mardia's tests for multivariate skew (b_{1p} = 16.75)

and kurtosis (b_{2p} = 120.54) indicated a significant multivariate departure from normality ($p < .001$).

Exploratory factor analysis. I performed an exploratory factor analysis (EFA) on the 8 items of the RCC scale (see Table 4 for variance-covariance matrix). Based on the above tests indicating a lack of multivariate normality, I used the principal axis factoring method in SPSS, which is robust to deviations from multivariate normality (Costello & Osborne, 2005; Fabrigar, Wegener, MacCallum, & Strahan, 1999). Because factors were expected to correlate, I submitted the data to a Promax rotation (Hendrickson & White, 1964).

The eigenvalue cutoff method of retaining factors yielded two factors with eigenvalues greater than 1 (factor 1: 4.62, factor 2: 1.21) and explaining 72% of the variance in the items. As mentioned above, the cutoff method is less accurate than the scree plot method for retaining factors. A plot of the eigenvalues of all 8 factors indicated a substantial drop in eigenvalues from factor 1 to factor 2 and factor 2 to factor 3, but no further substantial drops, suggesting that 2 factors best accounted for the variance in the items. A Promax rotation (kappa = 4) was conducted on the two extracted factors. Items 1 through 4 loaded primarily on the first factor (pattern loadings = .88, .85, .73, and .83, respectively) and items 5 through 8 items loaded primarily on the second factor (pattern loadings = .79, .94, .53, and .59, respectively). The two factors correlated .61 with each other.

Items from the RCC that loaded primarily on the same factor were combined to compute each of the RCC subscales. As in Study 1a, the mean of four items loading on the first factor constituted the *personal certainty* subscale, indicating the degree of

conviction that individuals have in their views of race. The mean of the four items loading on the second factor were averaged to form the *epistemic certainty* subscale, indicating the extent to which individuals believed a definitive view of race was possible. Both the personal certainty and epistemic certainty scale had good reliability (αs = .90 and .84, respectively).

Concept correlations. I conducted bivariate and partial correlations to assess the relationship between personal certainty and epistemic certainty with biological and social constructivist race concepts (see Table 3). Personal certainty had a significant positive correlation with biological race concepts (r = .32, p < .001), and a significant negative correlation with social constructivist race concepts (r = -.18, p = .009)[5]. The biological race concepts and social-constructivist race concepts scale were significantly and negatively correlated with each other, r = -.46, p < .001, thus additional partial correlations were conducted. When partialling out the association of epistemic certainty with the focal variables, personal certainty remained significantly correlated with biological ($r_{\text{brc pc-ec}}$ = .14, p = .042) but not social constructivist race concepts ($r_{\text{src pc-ec}}$ < .01, p = .982).

Epistemic certainty was significantly correlated with both biological race concepts (r = .35, p < .001) and social constructivist race concepts (r = -.30, p < .001)[6]. After partialling out the effect of personal certainty, epistemic certainty remained significantly positively correlated with biological race concepts ($r_{\text{brc ec-pc}}$ = .22, p = .001),

[5] I also conducted zero-order correlations between race concepts and the certainty subscales *separately* for racial minorities and Whites. I report these correlations in the footnotes throughout this paper, as they are not the focal analysis. In Study 1b, for racial minorities, personal certainty was significantly associated with both BRC (B = .35, p = .02) and SRC (B = -.36, p = .01). For White participants, personal certainty was significantly associated with BRC (B = .30, p < .001), but not with SRC (B = -.13, p = .09).

[6] For racial minorities, epistemic certainty was significantly correlated with both BRC (B = .41, p < .01) and SRC (B = -.39, p < .01). For White participants, epistemic certainty was also significantly correlated with BRC (B = .36, p < .001) and SRC (B = -.29, p < .001).

and retained its significant negative correlation with social constructivist race concepts ($r_{\text{src ec-pc}} = -.25$, $p < .001$).

Scale Development Discussion.

Principal components analysis was initially conducted to reduce the number of items in the preliminary RCC scale, and exploratory factor analysis was employed to distinguish the number of factors that best fit the data (for a discussion of the difference between the methods, see Costello & Osborne, 2005; Fabrigar et al., 1999; Russell, 2002). Based on the component loadings of the PCA conducted in Study 1a, 8 of the initial 25 items of the RCC were retained. In Study 1b, results from an EFA on the 8 items of the RCC suggested that a two-factor model best explained the variance in the scale. In both the PCA and EFA, 4 items loaded primarily on the first component/factor—identified as *personal certainty*—and 4 items loaded primarily on the second component/factor—identified as *epistemic certainty*.

Both personal certainty and epistemic certainty were positively correlated with each other and biological race concepts, but negatively correlated with social-constructivist race concepts. Biological race concepts were still positively associated with personal certainty, when partialling out the variance shared with epistemic certainty. However, when partialling out personal certainty, epistemic certainty only remained correlated to biological race concepts in Study 1b. Thus, the relationship between epistemic certainty and biological race concepts may not be independent of personal certainty. On the other hand, epistemic certainty was reliably (across Studies 1a and 1b), and negatively, associated with social-constructivist race concepts even when partialling out personal certainty. The bivariate correlation between personal certainty and social-

constructivist race concepts was no longer significant, in either study, when their relation to epistemic certainty was removed.

The above correlations indicate that social-constructivist views of race tend to be associated with a less definitive stance on the nature of race in general (epistemic certainty). This is especially curious, since it suggests that social-constructivists do not necessarily have less conviction in their beliefs—since the its relationship with personal certainty seems somewhat tenuous—but that they simply believe that race is less defined. That is, they may believe that race is fundamentally difficult, if not incapable, of being completely understood. Considering that social-constructivist views of race hold that the concept of race itself is a function of socio-political trends and hierarchical structures (Smedley & Smedley 2005), this comes as no surprise. A concept in constant flux is, by its very nature, not definitive. I do, however, wish to highlight that these are preliminary results from two studies whose primary aim was scale development. Further studies are needed to assess whether the association of social-constructive race concepts with low certainty is a reliable effect.

Studies 1a and 1b provide initial support for a two-factor model of race concept certainty using exploratory factor analysis, where personal and epistemic certainty adequately explain the variance in the eight items of the RCC scale. However, this finding, like all exploratory models, is a post-hoc assessment and indeed I have noted earlier the possibility that a one-, two-, or four-factor model might explain the variance in the items of the race concept certainty scale. Comparing one- and four-factor models to the two-factor model using confirmatory factor analysis will lend further support to a two factor model of race concept certainty.

Furthermore, these initial studies do not adequately test whether the RCC scale is a reliable measure of concept certainty within a person. Establishing that a person's score on a psychological measure remains consistent at different time points is a key facet of psychometric testing (Nunnally, 1978). If we assume that an individual's personality structure remains reasonably consistent over time (for this argument see McCrae & Costa, 1994; see also Caspi & Roberts, 2001; Roberts, Caspi, & Moffitt, 2001), and that this personality structure is a partial determinant of scores on a psychological measure, then it follows that scores on this measure remain consistent as well. While the current measure of race concept certainty is not a trait-like measure, I do suggest that the same person will yield similar scores on the RCC scale in repeated assessments, controlling for recall of item. Assessing test-retest reliability—or the correlation between two separate administrations of a test—is one way that researchers have used to assess the general reliability of a proposed measure, and in the next study I sought to establish adequate test-retest reliability (but for alternatives, see Heise, 1969; McDonald, 1999).

Study 2

Guided by the findings of Studies 1a and 1b, the purpose of Study 2 was to confirm the two-factor structure of the 8 item measure of race concept certainty, to assess its relationship with biological and social-constructivist race concepts, and to verify the within-person reliability of the RCC scale over a short period of time (less than 3 months). To facilitate the use of the scale in research, I also aimed to assess whether responses to the RCC scale were conflated with social desirability.

In Study 2, participants provided responses to the items of the RCC scale in two sessions. Session 1 responses were submitted to confirmatory factor analyses and correlational analyses. In session 2, however, due to the high attrition rate that yielded a sample size below 100, I only conducted correlation analyses. Latent variable modeling (of which confirmatory factor analysis is a subset) requires a large sample size, generally around 200 cases (Bollen, 1989; DiStephano & Hess, 2005) and at least 100 (Russell, 2002; see MacCallum, Browne, & Sugawara, 1996 for discussion). Therefore, session 2 did not have an adequate sample size for confirmatory factor analysis (see below).

In this study, I also investigated whether concept certainty correlates with the time it takes participants to respond to race-relevant questions. Some evidence suggests that attitude accessibility, as measured through response latencies when answering an attitude inquiry (Powell & Fazio, 1984), is one correlate of attitude certainty (Holland, Verplanken, & Knippenberg, 2003). Simply speaking, the easier a concept is to bring up from memory, 1) the faster one can answer a questionnaire asking them about this concept and 2) the more certain someone is about this concept. In the attitude strength literature, this relationship is so strong, that some scholars have suggested questionnaire

reaction time be measured *instead* of participant self-reports of attitude certainty (Bassili, 1993; Bassili, 1996; see also Bassili & Krosnick, 2000). Because the current model of concept certainty is so heavily based on models of attitude certainty and strength, I hypothesized that longer response latencies for the race concept measures would be associated with lower race concept certainty scores. That is, that the correlation between response latencies and the certainty scale would be negative.

Methods

Participants and session description. Participants were undergraduate students from Rutgers University's general psychology participant pool who spoke English fluently. Participants were told that they would need to complete two sessions, at least 14 days apart, in order to receive course credit. Of the 199 participants who took part in session 1, 72 (36%) completed session 2 at least 14 days later. I attribute the high attrition rate to the relatively quick, online nature of the study. Participants completed each survey outside of a psychology lab, and may have felt more comfortable about not following the requirements of the study.

Based on the data from Studies 1a and 1b, filtering procedures were refined so that participants were required to answer 2 instructional manipulation checks (IMCs) correctly *before beginning the study*. Participants were then presented with an *explicit validation question notice*, wherein participants were told that questions similar to the ones they had just completed would be included within the study (see Appendix B). Note that in the scale development studies, 2 IMCs were administered *after* the start of the study and participants who failed these IMCs were excluded from analyses. In Study 2, participants were not allowed to move forward until they answered each introductory

IMC correctly. Only 1 other focal IMC was placed *within* each of the session 1 and session 2 surveys. On this IMC, participants responded to the question "In the directions given at the top of the screen, does the word 'bench' appear at all?" from 1 (Not at all) to 5 (Definitely), and *passed* the IMC if they correctly responded with "1". Of the 199 participants who completed session 1, 177 participants (89%) passed the session 1 IMC. All of the 72 participants in session 2 passed the session 2 IMC.

From this valid pool, session 1 had roughly equal numbers of male (n = 90) and female (n = 87) participants. Session 2 also had similar numbers of males (n = 35) and females (n = 37). The racial/ethnic background of participants in sessions 1 and 2 included White/Caucasian (n_1 = 91, n_2 = 36), Black/African-American (n_1 = 5, n_2 = 2), Hispanic/Latino (n_1 = 11, n_2 = 6), Middle Eastern/North African (n_1 = 3, n_2 = 2), South Asian (n_1 = 32, n_2 = 15), East Asian (n_1 = 21, n_2 = 7), Southeast Asian (n_1 = 4, n_2 = 2), Other Asian (n_1 = 1, n_2 = 2), and Multiracial (n_1 = 9, n_2 = 0). The mean age of participants in session 1 was 18.64 years old (SD = 2.45 years; data not collected for session 2). Session 2 participants completed the second session an average of 30.74 days after session 1 (SD = 13.65 days), with no participant completing the study less than 15 or more than 72 days after session 1.

Materials and procedures. Participants completed both sessions online, outside of a lab, using Qualtrics online survey software. In both sessions, participants completed, in the following order, a measure of biological race concepts, a measure of social-constructivist race concepts, and the race concept certainty scale. In session 1, participants then completed the Balanced Inventory of Desirable Responding (Paulhus, 1991). Participant demographic information was assessed before debriefing.

Biological race concepts (BRC). To assess the extent to which participants believed race was biological in nature, participants responded to the same four items as in Studies 1a and 1b (see Appendix C). In the current study, the scale had good reliability ($\alpha_{session1}$ = .82, $\alpha_{session2}$ = .86).

Social-constructivist race concepts (SRC). To measure the degree to which individuals believed race was a social-construction, participants responded to the same items as in the scale development studies (see Appendix C). The scale had good reliability ($\alpha_{session1}$ = .81, $\alpha_{session2}$ = .87).

BRC and SRC response latency. Following from research on attitude certainty suggesting that reaction time of certainty may assess a similar construct as self-reports of certainty, I measured how long it took each participant to complete each race concept scale. Response latencies (RTs) measured the time between when the questionnaire page was presented for a particular race concept and the last click on the page by the participant. In accordance with earlier literature, I chose to 'Windsorize' the response latencies (Barnett & Lewis, 1973): Latencies that were greater than 2 standard deviations above the mean were *set* to be 2 standard deviations above the mean. This was performed on the BRC RTs in session 1 (M = 38.95 seconds, SD = 25.53) and session 2 (M = 39.11 seconds, SD = 23.29), as well as the SRC RTs in session 1 (M = 44.20 seconds, SD = 27.49) and session 2 (M = 51.65 seconds, SD = 50.22). Each of these response latencies was then log transformed to further address the non-normality inherent in reaction time measures (see Ratcliff, 1993).

Race concept certainty. Based on Studies 1a and 1b, participants answered the same 8 items intended to capture how personally certain they were in their beliefs about

race (personal certainty) and how much they believed that a definitive view of race exists (epistemic certainty; see Appendix A). Reliability was good for both the personal certainty ($\alpha_{session1}$ = .86, $\alpha_{session2}$ = .92) and epistemic certainty subscales ($\alpha_{session1}$ = .83, $\alpha_{session2}$ = .92).

Balanced Inventory of Desirable Responding (BIDR). Participants answered the 40 item balanced inventory of desirable responding scale (Paulhus, 1991), which consists of two 20 item subscales measuring self-deceptive enhancement—the degree to which individuals deceive themselves into believing they are superior—and impression management—the extent to which individuals aim to be seen as good by others (see Appendix D). Participants indicated their level of agreement from 1 (Strongly Disagree) to 7 (Agree Strongly) to items like "My first impressions of people usually turn out to be right" and "I never swear." The self-deceptive enhancement subscale (α = .63) and the impression management subscales (α = .76) met conventional standards of reliability.

Results

Tests for normality. I first assessed univariate normality as an indicator of multivariate normality (Johnson & Wichern, 1992; Looney, 1995), testing whether skew, kurtosis, and omnibus normality of each item significantly differed from zero (for SPSS macro used, see DeCarlo, 2012). In session 1, the 4 items of the personal certainty subscale were significantly more skewed than normal ($p < .05$) and 2 items from the personal certainty and 4 items of the epistemic certainty scale were significantly more kurtotic than normal ($p < .05$). All items evidenced significant K^2 (D'Agostino & Pearson, 1973), Kolmogorov-Smirnov, and Shapiro-Wilk values ($p < .05$ for all), and all but one item yielded a significant LM value (Jarque & Bera, 1987), suggesting that the

assumption of multivariate normality was not met. Additionally, Mardia's tests for multivariate skew (b_{1p} = 15.79) and kurtosis (b_{2p} = 107.72) indicated a significant multivariate departure from normality ($p < .001$).

Confirmatory factor analysis. I submitted the session 1 responses to the 8 items of the RCC scale to confirmatory factor analysis (CFA) in Mplus 6.12 (Muthén & Muthén, 2011) using the maximum likelihood estimation method (see Table 6 for variance-covariance matrix). As the data depart from the assumption of multivariate normality, I used the Satorra-Bentler chi-square—a chi-square corrected for non-normality—to test for a significant difference from the baseline model (Satorra & Bentler, 2001). The chi-square model fit tests whether data that is hypothetically produced according to a tested model (i.e. the expected data) is *significantly different* from the actual data (the observed data). Therefore, a significant test statistic would indicate that the hypothesized model *does not* match the actual data (i.e. is not a *good fit* to the actual data). For instance, if the one-factor model produced a significant chi-square, this would suggest that the one-factor model of race concept certainty is not a good (fitting) model. Three models were tested: the hypothesized (based on the results of Studies 1a and 1b) two-factor model, a one-factor model, and a four-factor model.

In accordance with recommendations for reporting practices in CFA (Jackson, Gillaspy, & Purc-Stephenson, 2009), I present several fit indices for each model (see Table 7). In the subsequent analyses, the following cutoffs represent models with adequate fit (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996): a root mean square error of approximation (*RMSEA*) below .06, a comparative fit index (*CFI*) and Tucker-Lewis index (*TLI*) above .95, and a standardized root mean residual (*SRMR*)

below .08. The latent variable to item paths, item residual variances, latent variable variances, and latent variable covariances (in models with multiple latent variables) are reported for the hypothesized two-factor model (Figure 5) as well as the alternative one-factor (Figure 6) and four-factor (Figure 7) model.

I tested the hypothesized two-factor measurement model against one- and four-factor models (see Table 7) using the chi-square difference test for nested models corrected for non-normality (see Bryant & Satorra, 2012). In chi-squared difference tests, a model with some restrictions (e.g. with paths that are not estimated or are set to zero) is compared to a model without such restrictions (e.g. where a path is estimated). A non-significant chi-square difference test supports rejecting the more complex/less restrictive model in favor of the simpler model, while a significant test suggests that a model without restrictions is comparatively better fitting (Jöreskorg, 1978). Therefore, a significant chi-square between the two- and one-factor models would indicate that the hypothesized two-factor model offers significantly better fit than the one-factor model. A significant chi-square between the two-and four-factor model indicates that the alternative four-factor model is a significantly better fit to the data than the two-factor model.

Hypothesized two-factor model. The latent variable of personal certainty was scaled on item 1 ("How clear to you is your view of what race is?"), the highest loading item for the first factor in Study 1a[7]. The latent variable of epistemic certainty was scaled on item 5 ("Do you believe there is a definite right and wrong answer to what race is?"),

[7] I chose to scale factors on the highest loading item from the scale development phase in order to assess latent variable variance. While doing this precludes the ability to assess the path from factor to item for the item used in this scaling method, assessing item loadings/paths is largely considered important in the exploratory phase of scale development, rather than in the confirmatory phase (see Russell, 2002).

the item with the highest loading on the second factor in Study 1a. A two-factor solution for the 8 item RCC did not differ significantly from the data, χ^2 (19, N = 177) = 26.01, p = .13. This suggested that the two-factor model was a good fit to the data. The two-factor model also yielded adequate *RMSEA* (.05, 90% *CI* [.00, .09]), *CFI* (.99), *TLI* (.98) and *SRMR* (.04), also suggesting a good fit to the data. For personal certainty, factor to item paths (unstandardized) varied from .69 to .93 and were all significant at $p < .001$. This indicates that the personal certainty predicted a significant proportion of the variance in each of the items loading on the factor. The residual variance of items on this factor ranged from .16 to .26, and all were significant at $p < .01$. While this indicates that a significant proportion of the variance was still unexplained, these variances are generally lower than the item loadings. The variance of the latent personal certainty factor was .55, and was significant at $p < .001$, suggesting that some proportion of the variance in the latent variable was unexplained. For epistemic certainty, unstandardized item paths ranged from .68 to 1.22, and epistemic certainty explained a significant proportion of the variance in each of the items, $p < .001$ for all. The residual variance of items ranged from .39 to .77, and this was a significant amount of variance left unexplained by epistemic certainty, $p < .001$. The variance of epistemic certainty was .95, and was also significant, $p < .001$ (see Figure 5).

One-factor model. The single latent variable of concept certainty was scaled on item 1. The one-factor solution for the RCC scale differed significantly from the data, χ^2 (20, N = 177) = 136.77, $p < .001$. This suggested that the one-factor solution was not a good fit to the data. Concurrently, all other indices of fit did not meet the cutoff criteria (*RMSEA* = .18, 90% *CI* [.15, .21]; *CFI* = .78; *TLI* = .69; *SRMR* = .11). Concept certainty

to item paths varied from .72 to 1.19, and concept certainty explained a significant proportion of the variance in each of the items, $p < .001$. However, item residual variances ranged from .23 to 1.08 and were all significant, $p < .01$. The variance of the concept certainty latent construct was .47 and was significant ($p < .001$), suggesting that some proportion of the variance in the latent construct of concept certainty was unexplained (see Figure 6). Comparing the two chi-squares for the one factor and two factor models, the two factor model proved to be a significantly better fit to the data χ^2 (1, $N = 177$) = 82.50, $p < .001$.

Four-factor model. The four factors of the four-factor model were concept clarity, concept accuracy, concept objectiveness, and concept concreteness. While this was the original hypothesized prediction based on prior research on attitude certainty (Krosnick & Petty, 1995; Petrocelli, Tormala, & Rucker, 2007), results from Studies 1a and 1b suggested that the two factor model was a better fit to the data. The latent concept clarity variable was scaled on item 1 ("How clear to you is your view of race?"). Concept accuracy was scaled on item 2 ("How sure are you that you know what race is?"). Concept objectiveness was scaled on item 5 ("Do you believe there is a definite right and wrong answer to what race is?"), and concept concreteness was scaled on item 7 ("Is a concrete view of race possible?"). The four-factor model did not differ significantly from the data, χ^2 (14, $N = 177$) = 9.69, $p = .78$. This suggested a good fitting model. The four-factor model yielded adequate *RMSEA* (.00, 95% *CI* [.00, .05]), *CFI* (1.00), *TLI* (1.00), and *SRMR* (.02), further supporting the validity of a four-factor solution. The factor to item paths for the variables varied from .68 to 1.15 ($p < .001$ for all) and item residual variances varied from .11 to .61 ($p < .001$ for all). This suggested

that each of the latent variables explained a significant proportion of the variance in the items, though some unexplained variance in the items was still evident. Latent variable variances ranged from .48 to .97 ($p < .001$ for all), suggesting that there was a significant proportion of the variance in each of the latent variance that still remained unexplained (see Figure 7). Unexpectedly, the chi-square difference test revealed that the alternative 4 factor model was a superior fit to the data than the hypothesized two-factor model, χ^2 (5, $N = 177$) = 15.73, $p = .006$.

Correlations and test-retest reliability. Since the principle purpose of session 2 was to assess test-retest reliability, I report the session 1 correlations here (for a full list of correlations in both sessions, see Table 8). Personal certainty was significantly positively correlated with biological race concepts ($r = .21$, $p = .006$) but negatively correlated with social-constructivist race concepts ($r = -.26$, $p < .001$)[8]. When partialling out the association of epistemic certainty with the focal variables, personal certainty was no longer correlated with biological race concepts ($r_{\text{brc pc-ec}} = -.02$, $p = .77$). Similarly, personal certainty was no longer associated with social-constructivist race concepts in session 1 ($r_{\text{src pc-ec}} = -.11$, $p = .16$)

Epistemic certainty was significantly and positively correlated with biological race concepts (BRC) ($r = .44$, $p < .001$), but negatively correlated with social-constructivist race concepts (SRC, $r = -.35$, $p < .001$)[9]. After partialling out the effect of personal certainty, epistemic certainty remained significantly positively correlated with

[8] For racial minorities, personal certainty was not significantly correlated with BRC ($B = .13$, $p = .25$) but was significantly correlated with SRC ($B = -.35$, $p < .01$). For Whites, personal certainty was significantly correlated with BRC ($B = .27$, $p = .01$) but not with SRC ($B = -.19$, $p = .07$).

[9] For racial minorities, epistemic certainty was significantly associated with both BRC ($B = .49$, $p < .001$) and SRC ($B = -.35$, $p < .01$). For Whites, epistemic certainty was significantly correlated with both BRC ($B = .41$, $p < .01$) and SRC ($B = -.29$, $p < .01$).

biological race concepts ($r_{brc\ ec\text{-}pc}$ = .40, p < .001). Epistemic certainty also retained its significant negative correlation with social constructivist race concepts ($r_{src\ ec\text{-}pc}$ = -.26, p < .001).

Response latencies for the BRC scale were not correlated with either race concepts or certainty, though response latencies for the SRC scale were significantly correlated with these variables. Specifically, longer latencies on the SRC scale were associated with stronger biological race concepts (r = .16, p = .04) and more personal certainty (r = .20, p = .007).

In session 1, scores on the BIDR self-deceptive enhancement subscale were not correlated with either personal certainty (r = .14, p = .06) or epistemic certainty (r = .14, p = .07). Similarly, the impression management subscale was not correlated with either personal (r = -.05, p = .50) or epistemic certainty (r = .12, p = .12). This suggested that race concept certainty was not conflated with measures of social desirability.

The primary purpose of Study 2 was to ascertain test-retest reliability for the RCC scale. Unfortunately, the test-retest reliability of the personal certainty scale was very low (r = .33, p < .01). The test-retest reliability of the epistemic certainty scale was stronger (r = .57, p < .001), but still fell below the recommended test-retest correlation of .80 (Nunnally & Bernstein, 1994). Given the large variability in test-retest interval across individuals (i.e., how many days passed between session 1 and 2), I conducted analyses to examine whether the test-retest reliability of the certainty subscales varied as a function of test-retest interval. Specifically, I ran multiple regression analysis including the session 1 assessment of each subscale, the test-retest interval, and their interaction as predictors of session 2 certainty scales. In these regressions, all variables were mean

centered prior to analysis. The model predicting session 2 personal certainty scores was significant, F (3, 68) = 3.04, p = .04. Study interval was not a significant predictor of session 2 personal certainty, β < .01, p = .472. Session 1 personal certainty scores were a significant predictor, β = .44, p = .004. However, the interaction between study interval and session 1 personal certainty was not significant (β < .01, p = .599), suggesting that the effect of session 1 personal certainty on session 2 scores did *not* depend on the length of time between sessions. For a list of bivariate and test-retest correlations, see Table 8.

I next ran a multiple regression model regressing session 2 epistemic certainty scores on session 1 epistemic certainty scores, study interval, and their interaction. This model explained a significant proportion of the variance in session 2 epistemic certainty scores, F (3, 68) = 12.25, p < .001. The effect of study interval on session 2 epistemic certainty was not significant, β < .01, p = .36. Session 1 epistemic certainty was a significant predictor of session 2 scores, β = .60, p < .001. The interaction term was not significant, β = -.01, p = .25. This suggested that the predictive validity of session 1 epistemic certainty scores for session 2 epistemic certainty scores did *not* depend on the time between sessions.

Discussion

The main hypothesis of Study 2, that a two-factor model of race concept certainty would adequately account for the variance in the 8-item RCC scale, was generally supported. Multiple fit indices signified that the hypothesized two-factor model sufficiently accounted for item variance. Furthermore, the hypothesized model accounted for significantly more variance than an alternative one-factor model. However, the alternative four-factor model accounted for more variance than my hypothesized model.

The four-factor model also yielded more convincing indices of fit than the two-factor model though both models fit the data well. Moreover, the significant chi-squared difference test between the two- and four-factor models suggests that the four factor model was a significantly better fit to the data than the two-factor model.

Despite these latter findings, four factors are likely more factors than necessary for the RCC scale in its current form. That is, with four factors and 8 items, each factor has only 2 items associated with it. Indeed, when conducting confirmatory factor analysis, scholars generally suggest that each factor contains *at least 3 items* (Russell, 2002), and preferably four or more (Comrey & Lee, 1992; Fabrigar et al., 1999). Hence in its current form, the RCC scale is likely best explained by the two factors personal certainty and epistemic certainty.

An additional aim of Study 2 was to assess the test-retest reliability of the RCC scale. Both the personal and epistemic certainty subscales were found to correlate with themselves when taken at least 2 weeks, and no more than 11 weeks, apart. Unfortunately, this correlation was not high. Nunnally and Bernstein (1994) suggest that test-retest correlations be approximately .80, and correlations for both the personal and epistemic certainty subscale did not meet this standard. Moreover, these low correlations were not found to be a function of high variability in the time between which participants completed session 1 and session 2. Thus, further test-retest analyses are necessary to validate the stability of the scale over time.

Another goal of Study 2 was to assess whether the RCC scale is conflated with measures of social desirability. I found that both personal and epistemic certainty were not correlated with the Balanced Inventory of Desirable Responding (Paulhus, 1991) a

commonly used measure of social desirable responding. In concert with recent research, the current study finds motives to appear socially desirable do not affect beliefs about the nature of race (Williams & Eberhardt, 2008), unlike attitudes towards specific racial groups (Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002; Plant & Devine, 1998). This indicates that the use of the RCC scale is appropriate in research designs that do not include controls for social desirable responding.

As in the initial scale development studies, in Study 2 the personal and epistemic certainty were positively correlated with biological race concepts and negatively correlated with social-constructivist race concepts. Along with the scale development studies, the current results provide moderately strong support for the reliable association of biological beliefs with certainty and social-constructivist beliefs with uncertainty. The goal of the current studies is the psychometric validation of the RCC scale, but the reliability of its correlations with particular race concepts strongly suggests that future research address the directionality of this relationship. Namely, researchers may wish to address whether belief in the biological nature of race *causes one* to feel more certain, and the processes dictating this relationship. Doing so may allow scholars to, perhaps, more precisely understand one draw of biological construals of race: The feeling of certainty that it affords a person.

Among the more unexpected effects in Study 2 were the relationships between social-constructivist response latencies, biological race concepts and personal certainty. Just why participants who spent longer answering questions about their social-constructivist beliefs tended to have stronger beliefs in race as biologically rooted is unclear. Perhaps even more surprising is the finding that time spent on the social-

constructivist questionnaire was associated with *increased* personal certainty, particularly in light of the reliable correlation between social-constructivist beliefs and *decreased* certainty. Unfortunately, the current study is not equipped to tease apart the unexpected relationship between questionnaire response time and certainty. And while measures of concept strength can be measured via reaction times, the semantic import of these operative, rather than meta-cognitive self-report, measures is not always clear (for a discussion, see Bassili, 1996). Therefore, at this time, the unexpected relationship that response latencies had with the variables is not explicable. Future research should assess whether these relationships are reliable and, if so, whether response latencies are either a function, or product, of specific beliefs about race.

In this study, and in prior studies, I largely address the reliability and psychometric validation of the RCC scale, but do not assess whether this scale moderates the relationship between biological and social-constructivist concepts on the one hand, and race-relevant attitudes on the other. The moderated race concepts model asserts that as one becomes both more personally and epistemically certain in their beliefs, the predictive validity of those beliefs for domain-relevant attitudes becomes stronger. This facet of the hypothesized model is rooted in meta-attitudinal models of attitude strength (Krosnick & Petty, 1995). The next study was designed to assess whether the RCC scale functions in the same manner for lay views and concepts as measures of certainty do for attitudes (e.g. Petrocelli, Tormala, & Rucker, 2007).

Study 3

Having shown some support for the RCC scale in studies 1a, 1b, and 2 as psychometrically valid, in Study 3, I aimed to use the measure to assess the assumptions of the moderated race concepts (MRC) model. One of the key assumptions of the MRC model is that the effect of race concepts (biological and social-constructivist) on race-relevant attitudinal variables *depends on* (i.e. is moderated by) the degree of certainty that individuals have in their views of race. Study 3 therefore includes several race-relevant measures that follow the race concept and RCC scales.

To test the hypotheses of the model, I employ multiple regression analyses in order to (1) assess whether race concepts predict race-relevant attitudinal variables, (2) assess whether this effect (if it exists) depends on individuals' degree of personal and epistemic certainty, and (3) probe at what levels of certainty the effect of race concepts differ. I probe the effect of race concepts on outcome variables at -1, 0, and +1 standard deviations above the mean personal and epistemic certainty score (see Aiken & West, 1991, p. 18-19; see also Baron & Kenny, 1986; Hayes & Matthes, 2009).

Methods

Participants. Rutgers University students from the general psychology subject pool participated in an online study for course credit. Participants were not qualified for the study if they did not speak English fluently or if they were Black/African-American. The latter criteria was set because a number of the measures assessed attitudes towards African-Americans as an *outgroup*. A total of 194 qualified individuals completed the study and of those individuals, 175 (90%) correctly completed the instructional

manipulation check placed within the study (see Study 2 Methods for description of IMC procedure).

Of the 175 participants included in analyses, most were female (n = 95, 54%). The racial/ethnic background of participants included White/Caucasian (n = 78), Hispanic/Latino (n = 14), Native American (n = 1), Middle Eastern/North African (n = 3), South Asian (n = 29), East Asian (n = 34), Southeast Asian (n = 3), Multiracial (n = 8), and other races (n = 5). Participants ranged from 18 to 29 years of age (M = 18.62 years, SD = 1.39 years).

Materials and procedures. Participants were told that the study would ask them to provide some of their views about the world. Participants completed the survey online, outside of a lab, using Qualtrics online survey software. After they answered a series of measures (in the order presented below), participants provided their demographic information and were presented with a debriefing screen. For a complete list of measures used in Study 3, see Appendix E.

Biological race concepts (BRC). The same four items were used to assess participants' beliefs in the biological nature of race as in studies 1a, 1b, and 2 (see Appendix B). The four items had very good reliability (α = .84).

Social-constructivist race concepts (SRC). Participants responded to the same five items as those used in the earlier studies to assess social-constructivist views of race (see Appendix B). The five items were mean scaled and the scale had good reliability (α = .82).

BRC and SRC response latency. Response latencies were calculated as in Study 2 (see Study 2 Methods). The mean response latency for BRC was 39.96 seconds (*SD* = 27.03). The mean SRC response latency was 65.51 seconds (*SD* = 218.19).

Attitudes towards affirmative action (ATAA). Participants' attitudes towards affirmative action were measured with six items (Kravitz & Platania, 1993) prompting participants to indicate their level of agreement from 1 (Strongly disagree) to 7 (Strongly agree). Items included, "Affirmative action is a good policy" (see Appendix E). The scale had high reliability (α = .94).

Amount of intergroup contact. The amount of intergroup contact was assessed by prompting participants to answer "How many individuals do you know who identify as Black/African-American?" and "How often do you interact with the Black/African-American individual that you know best?" from 0 (None/Never) to 7 (Seven or more/Daily). In concert with prior literature on intergroup contact (for measure use and scaling procedures, see Brown, Vivian, & Hewstone, 1999), the two items were multiplied to compute an index of overall amount of intergroup contact.

Intimacy of intergroup contact. The intimacy of participants' contact with Blacks/African-Americans was assessed by asking participants to categorize their relationship with the Black/African-American that they knew best on three scale items that each had eight anchors (from Brown, Vivian, & Hewstone, 1999; see Appendix E). The items were mean scaled and the resulting scale had adequate reliability (α = .64).

Desired intergroup closeness. The extent to which participants wished to be close to racial outgroup members was assessed with three items (adapted from Johnson & Marini, 1998; see Appendix E). Participants indicated the desirability of three scenarios

from 1 (Not at all desirable) to 8 (Desirable). The scenarios were "Living in an area where most of the neighbors are Black/African-American," "Attending a university where most of the student body was Black/African-American," and "Having a job where most of the employees are Black/African-American." Items were mean scaled and reliability was good (α = .94).

Allophilia. The extent to which participants felt positively towards outgroup members was measured with fourteen items from the Allophilia scale (Pittinsky, Rosenthal, & Montoya, 2011) to which participants responded from 1 (Strongly Disagree) to 6 (Strongly Agree). The Allophilia scale consists of four subscales. The *affection* subscale assesses the extent to which participants find outgroup members likeable (4 items; α = .93). The *comfort* subscale measures the degree to which participants are comfortable being around outgroup members with three items (α = .86). The *kinship* subscale measures how emotionally close participants are with outgroup members with three items (α = .83). The *engagement* subscale measures how motivated participants are to understand outgroup members with four items (α = .91). For a full list of items see Appendix E.

Modern racism. The extent to which participants espoused modern racism beliefs about Blacks/African-Americans was measured with the six items of the Modern Racism scale (McConahay, 1983, see Appendix E). In reliability analyses, one item did not correlate highly with any of the other items ("It is easy to understand the anger of African American people in America" all inter-item r < .15), and this item was not included. The five mean scaled items included items such as "Over the past few years, the government and news have shown more respect for African Americans than they deserve" to which

participants indicated their level of agreement from 1 (Strongly disagree) to 7 (Strongly agree). The scale was reliable (α = .78).

System justification. The degree to which participants justified the status quo of the American governmental and legal system was assessed by asking participants to indicate their level of agreement from 1 (Strongly disagree) to 7 (Strongly agree) with eight items from the System Justification scale (Kay & Jost, 2003). The scale consisted of items like "In general you find society to be fair" (for full list of items, see Appendix E). These items were mean scaled. The resulting scale had good reliability (α = .80).

Attitude certainty. The certainty of attitudes that participants held towards outgroup members was assessed by prompting participants to indicate their level of agreement from 1 (Not at all) to 7 (Extremely) with three items (adapted from Newheiser, Tausch, Dovidio, & Hewstone, 2009). An example item was "How certain are you in your attitudes towards African American individuals?"(for full list of items, see Appendix E). These items were mean scaled and the resulting scale had good reliability (α = .90).

Results

Zero-order and partial correlations. I conducted correlational analyses among the variables in the study to assess whether race concepts were associated with the race-relevant outcome variables in the study, as well as to assess the relationship between race concepts and the RCC scale (see Table 10). Social-constructivist race concepts were not significantly correlated with any of the race-relevant outcome variables. BRC was, however, significantly negatively correlated with desired closeness to outgroup members (r = -.17, p = .03). Biological race concepts were also associated with the allophilia

measure assessing positive attitudes towards African-Americans. Namely, BRC was negatively correlated with the affection (r = -.15, p = .05), comfort (r = -.22, p < .01), and kinship (r = -.27, p < .001) subscales of the allophilia measure.

Biological race concepts were not significantly correlated with personal certainty, though they were positively associated with epistemic certainty (r = .19, p = .01). Social constructivist race concepts were not associated with either personal or epistemic certainty[10]. After partialling out the effect of epistemic certainty, personal certainty was no longer significantly correlated with biological race concepts ($r_{\text{brc pc-ec}}$ = .06, p = .42) and remained uncorrelated with social-constructivist race concepts ($r_{\text{src pc-ec}}$ = .12, p = .13). Partialling out the effect of personal certainty did not affect the lack of significance between epistemic certainty and biological race concepts ($r_{\text{brc ec-pc}}$ = .15, p = .056), but revealed a significant negative correlation between epistemic certainty and social-constructivist race concepts ($r_{\text{src ec-pc}}$ = -.17, p = .02).

Moderation analyses. I tested whether the effect of biological and social-constructivist race concepts on each of the other race-relevant variables was moderated by personal and epistemic certainty. Prior to these analyses, I mean centered each of the variables used in the analysis by subtracting the mean of each scale from each participants' score, such that a participant whose mean biological race concept score was exactly at the mean for all participants was recomputed to be zero. Centering variables prior to moderation analyses in regression addresses the fact that first-order terms tend to be highly correlated with (are multicollinear with) their interaction terms (Morris,

[10] For racial minorities, personal certainty was not significantly correlated with either BRC (B = .16, p = .11) or SRC (B = -.05, p = .66). Additionally, epistemic certainty was not significantly correlated with BRC (B = .18, p = .08) or SRC (B < .01, p = .99). For White participants, personal certainty was not significantly correlated with BRC (B = .13, p = .27) or SRC (B = .13, p = .27). Epistemic certainty, in White participants, was not significantly correlated with BRC (B = .20, p = .08) or SRC (B = -.27, p = .02).

Sherman, & Mansfield, 1986). Mean centering variables reduces their correlation with the interaction term (Aiken & West, 1991; Cronbach, 1987; Jaccard, Wan, & Turrisi, 1990) and hence addresses some issues with multicollinearity (but for discussion of unaddressed multicollinearity problems see Edwards, 2008).

The first-order predictors in the regression equation were then multiplied to create an interaction term used to test moderation. For instance, when testing whether the effect of BRC on closeness was moderated by personal and epistemic certainty, the mean centered first-order predictors (BRC, personal certainty, and epistemic certainty) were multiplied to create an interaction term (BRC*personal certainty and BRC*epistemic certainty). Then, closeness was regressed on both the first-order terms and the interaction variables (BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty). A significant effect of an interaction term suggests that the effect of BRC depends on participants' level of (i.e. is moderated by) either personal or epistemic certainty.

If an interaction term was a significant predictor of the outcome variable, then I used the pick-a-point approach to probe the interaction effect (see Hayes & Matthes, 2009). In the pick-a-point approach, the effect of the predictor variable on the criterion variable is observed at some predetermined level of the moderator variable. As stated earlier, I chose to observe the effect of the predictor variable at -1, 0, and +1 standard deviations above the mean of the moderator variable. Since a significant interaction term suggests that effect of the predictor varies by levels of the moderator, the pick-a-point approach should theoretically show at what level of the moderator variable the effect of the predictor variable is significant, non-significant, and/or varies in direction.

It was possible that the expected moderation patterns differed between racial/ethnic minority and majority participants. To rule out this possibility, I separately conducted each multiple regression on racial minority (n = 97) and majority (n = 78) participants. If the significance of relationships differed between each type of participant, the statistics are reported below.

Moderation of BRC→ATAA. To test the moderation of the relationship between BRC and ATAA by personal and epistemic certainty, I regressed ATAA on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. The regression model was not significant, F (5, 169) = 1.13, p = .35, suggesting that the predictors did not explain a significant amount of the variance in ATAA scores. Neither BRC (B = -.08, p = .31), personal certainty (B = .22, p = .29), epistemic certainty (B = .09, p = .52), BRC*personal certainty (B = -.25, p = .11), nor BRC*epistemic certainty (B = .13, p = .26) were significant predictors of ATAA. Therefore, I did not further probe any of the interactions. This pattern of effects was consistent across racial minority and majority participants.

Moderation of SRC→ATAA. To assess whether personal and epistemic certainty moderated the effect of social-constructivist race concepts on ATAA, I regressed ATAA on personal certainty, epistemic certainty, SRC, and the interactions of each of the certainty subscales with SRC. This regression model was not significant, F (5. 169) = 1.38, p = .23, suggesting that the full model did not predict a significant amount of the variance in ATAA. SRC (B = .13, p = .17), personal certainty (B = .07, p = .74), epistemic certainty (B = .15, p = .05), SRC*personal certainty (B = .16, p = .34), and SRC*epistemic certainty (B = .05, p = .64) were all not significant predictors of ATAA.

I therefore did not further probe the moderation. No differences between racial minority and majority participants were evident.

Moderation of BRC→Amount of contact. To test the moderation of the relationship between BRC and amount of interracial contact by personal and epistemic certainty, I regressed amount of interracial contact on biological race concepts, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. The model was not a significant predictor of the variance in the criterion variable, F (5, 169) = .67, p = .64. Neither BRC (B = -1.45, p = .20), personal certainty (B = -2.63, p = .39), epistemic certainty (B = -.08, p = .97), BRC*personal certainty (B = -.04, p = .99), nor BRC*epistemic certainty (B = .53, p = .74) were significant predictors of the amount of interracial contact participants had experienced. I therefore did not further probe the effect. This pattern of non-significance was consistent across racial minority and majority participants.

Moderation of SRC→Amount of contact. I tested the moderation of the effect of SRC on amount of interracial contact by personal and epistemic certainty by regressing amount of interracial contact on SRC, personal certainty, epistemic certainty, and the interaction of the certainty variables with SRC. This regression model was not significant, F (5, 169) = .56, p = .73. SRC (B = .23, p = .87), personal certainty (B = -3.59, p = .24), epistemic certainty (B = -.29, p = .89), SRC*personal certainty (B = 2.77, p = .27), and SRC*epistemic certainty (B = -.85, p = .60) were all not significant predictors of contact. This effect was not further probed. These relationships were consistent across racial minority and majority participants.

Moderation of BRC→Intimacy of contact. To test whether the relationship between BRC and interracial intimacy was moderated by personal and epistemic certainty, I regressed intimacy on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. This model did not explain a significant proportion of the variance in intimacy scores, F (5, 169) = .65, p = .66. BRC (B = -.06, p = .46), personal certainty (B = .02, p = .93), epistemic certainty (B = -.03, p = .85), BRC*personal certainty (B = .16, p = .33), and BRC*epistemic certainty (B = .04, p = .74) were all not significantly associated with intimacy scores, and the moderation was not further probed. These relationships were similar across racial minority and majority participants.

Moderation of SRC→Intimacy of contact. To test for the moderation of the SRC-Intimacy relationship by personal and epistemic certainty, I regressed intimacy scores on SRC, personal certainty, epistemic certainty, and the interaction of the certainty scales with SRC. This model was not significant, F (5, 169) = .24, p = .94, suggesting that the predictors did not explain a significant proportion of the variance in interracial intimacy. Indeed, SRC (B = .06, p = .53), personal certainty (B < .01, p = .99), epistemic certainty (B = -.04, p = .78), SRC*personal certainty (B = .08, p = .64), and SRC*epistemic certainty (B = -.10, p = .38) were not significant predictors of intimacy, precluding the need for further moderation analyses. This pattern of relationships was similar across racial minority and majority participants.

Moderation of BRC→Desired closeness. I regressed desired closeness with African-Americans on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. This yielded a non-significant multiple

regression model, F (5, 169) = 1.53, p = .18. In this model, neither BRC (B = -.17, p = .06), personal certainty (B = -.08, p = .73), epistemic certainty (B = -.19, p = .24), BRC*personal certainty (B = -.12, p = .51), nor BRC*epistemic certainty (B = .08, p = .53) were significantly predictive of closeness, and hence the effects were not probed any further.

For White participants, BRC was a significant and negative predictor of desired closeness (B = -.31, p = .02), but was not a significant predictor for racial minority participants (B = -.02, p = .86). This was the only effect that differed between races.

Moderation of SRC→Desired closeness. I regressed desired closeness on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty to assess the moderation of the relationship between SRC and desired closeness by the certainty subscales. This model did not explain a significant portion of the variance in desired closeness, F (5, 169) = 1.42, p = .22. Concurrently, SRC (B = .06, p = .57), personal certainty (B = -.22, p = .35), epistemic certainty (B = -.19, p = .23), SRC*personal certainty (B = .32, p = .09), and SRC*epistemic certainty (B = -.07, p = .57) were all not significant predictors of closeness. The regression was not further probed.

I separately tested this regression model for racial minority participants, and found that personal certainty (B = -.62, p < .05) and the interaction of personal certainty with SRC (B = .61, p = .01) were significant predictors of desired closeness. Further probing this interaction effect indicated that SRC was significantly and negatively associated with desired closeness at 1 *SD below* the mean level of personal certainty (B = -.36, p = .05), but not at the mean (B = -.02, p = .90) or 1 *SD above* the mean (B = .33, p

= .11). This suggests that if racial minorities were not certain in their views of race, the more strongly they endorsed views of race as social-constructivist, the less interested they were in interacting with African-Americans. For White participants, however, there were no significant effects for any of the predictors.

Moderation of BRC → Affection. To test for the moderation of BRC on affection for African-Americans by the certainty variables, I regressed affection on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. The regression model was not significant, F (5, 169) = 1.07, p = .38. BRC (B = -.09, p = .06), personal certainty (B = .03, p = .80), epistemic certainty (B = -.06, p = .52), BRC*personal certainty (B = -.11, p = .26), and BRC*epistemic certainty (B = .06, p = .40) were not significant predictors of affection.

For racial minority participants there was a significant effect of BRC on affection towards African-Americans (B = -.14, p = .04). This indicates that when racial minorities espoused stronger beliefs in the biological nature of race, they tended to show less affection for African-Americans. No significant effects emerged for White participants.

Moderation of SRC→Affection. To assess whether the effect of SRC on affection was moderated by the certainty variables, I regressed affection on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty. This model was not significant, F (5, 169) = .81, p = .55. Similarly, SRC (B = .03, p = .63), personal certainty (B = -.05, p = .68), epistemic certainty (B = -.05, p = .54), SRC*personal certainty (B = .19, p = .08), and SRC*epistemic certainty (B = -.06, p = .38) were all not significant predictors of affection. There were no differences in these effects for racial minority and majority participants.

Moderation of BRC→Comfort. To assess whether the effect of BRC on comfort around African-Americans was moderated by either personal or epistemic certainty, I regressed comfort on BRC, personal certainty, epistemic certainty, and the interaction of each certainty scale with BRC. This regression model did not explain a significant portion of the variance in comfort scores, F (5, 169) = 1.90, p = .10. While BRC was a significant predictor of comfort (B = -.17, p < .01), personal certainty (B = .09, p = .55), epistemic certainty (B < .01, p = .92), BRC*personal certainty (B = -.02, p = .89), and BRC*epistemic certainty (B = .02, p = .81) were not significant predictors of the dependent variable. Therefore, not moderation effects were probed. This pattern of effects was similar for both racial minority and majority participants.

Moderation of SRC→Comfort. To test for the moderation of the SRC-comfort relationship by the certainty subscales, I regressed comfort on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty. This yielded a non-significant model, F (5, 169) = .36, p = .88. Neither SRC (B < .01, p > .99), personal certainty (B = .02, p = .88), epistemic certainty (B = -.03, p = .78), SRC*personal certainty (B = .16, p = 21), nor SRC*epistemic certainty (B = -.05, p = .51) were significant predictors of comfort, and hence I did not probe any moderation effects. Similar results were found in both racial minority and majority participants.

Moderation of BRC→Kinship. To test for the moderation of the relationship between biological race concepts and felt kinship with African-Americans, I regressed kinship on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. This regression model explained a significant portion of the variance in kinship scores, F (5, 169) = 4.03, p < .01. However, only BRC was a

significant predictor of kinship scores, $B = -.21$, $p < .01$. Personal certainty ($B = -.20$, $p = .20$), epistemic certainty ($B = -.04$, $p = .69$), BRC*personal certainty ($B = -.19$, $p = .11$), and BRC*epistemic certainty ($B = .10$, $p = .23$) were all not significant predictors of kinship.

For racial minorities, there was no significant effect of BRC on kinship ($B = -.15$, $p = .08$). However, BRC was significantly and negatively correlated with kinship in White participants ($B = -.27$, $p < .01$). This suggests that while there is a general relationship between biological racial beliefs and low kinship with African-Americans *across* races, this relationship is driven largely by White participants.

Moderation of SRC→Kinship. I tested whether the relationship between SRC and kinship was moderated by certainty by regressing kinship on SRC, personal certainty, epistemic certainty, and the interaction between each of the certainty scales and SRC. This model did not explain a significant portion of the variance in kinship scores, F (5, 169) = 1.69, $p = .14$. SRC ($B = .11$, $p = .12$), personal certainty ($B = -.30$, $p = .07$), epistemic certainty ($B = -.03$, $p = .75$), SRC*personal certainty ($B = -.06$, $p = .63$), and SRC*epistemic certainty ($B = .03$, $p = .72$) were not significant predictors of the dependent variable. No differences in these relationships were found between racial minority and majority participants.

Moderation of BRC→Engagement. To assess whether there was a moderation effect for the BRC-engagement relationship by any of the certainty scales, I regressed engagement with African-Americans on biological race concepts, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. This model did not explain a significant portion of the variance in engagement scores, F (5, 169) =

1.47, $p = .20$. BRC ($B = -.08$, $p = .23$), personal certainty ($B < .01$, $p = .99$), epistemic certainty ($B = -.11$, $p = .35$), and BRC*epistemic certainty ($B = .14$, $p = .12$) did not have a significant relationship with engagement. However the interaction of BRC and personal certainty was significant, $B = -.28$, $p = .03$. I further probed the effect of BRC on engagement at -1, 0, and +1 *SD* above the mean level of personal certainty (when controlling for epistemic certainty). The effect of BRC was not significant at either -1 SD ($B = .09$, $p = .35$) or 0 SD ($B = -.08$, $p = .23$), but was significantly negative at +1 SD above the mean level of personal certainty ($B = -.24$, $p = .02$). This suggested that when participants were highly certain that their strong biological beliefs about race were true, they were less interested in learning about African-Americans.

Further analysis indicated that this pattern of effects was replicated in racial minority participants. Namely, the interaction of BRC and personal certainty was significant, $B = -.44$, $p = .02$. While the effect of BRC was not significant at -1 SD ($B = .20$, $p = .14$) or 0 SD ($B = -.05$, $p = .56$), the effect of BRC was negative and significant at +1 SD above the mean level of personal certainty, $B = -.30$, $p < .05$. In White participants, the interaction of BRC and personal certainty was *not* significant, $B = -.18$, $p = .33$. This indicates that the effect of biological race concepts on desired engagement with African-Americans only depended on one's level of personal certainty if they were a racial minority.

Moderation of SRC→Engagement. To test whether the effect of SRC on engagement was moderated by certainty, I regressed engagement on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty. The model did not explain a significant portion of the variance in the dependent variable,

F (5, 169) = .68, *p* = .64. SRC (*B* = .10, *p* = .21), personal certainty (*B* = -.13, *p* = .47), epistemic certainty (*B* = -.05, *p* = .64), SRC*personal certainty (*B* = .09, *p* = .54), and SRC*epistemic certainty (*B* = -.01, *p* = .90) were not significant predictors of engagement and hence I did not probe any interactions for this model.

Analyzing racial minorities and Whites separately, there were several differences. For racial minorities, the interactions of SRC with personal certainty (*B* = .10) and epistemic certainty (*B* = .18) were both not significant predictors of engagement (*p* > .05 for both). However, for Whites, there were significant effects of both SRC and personal certainty (*B* = .57, *p* = .01) and SRC and epistemic certainty (*B* = -.27, *p* < .05). I probed the effect of SRC at different levels of personal certainty in Whites. The effect of SRC was not significant at -1 *SD* (*B* = -.29, *p* = .14) and 0 *SD* (*B* = .05, *p* = .69), but was significant and positively predictive of engagement at +1 *SD* above the mean level of personal certainty (*B* = .39, *p* = .03). However, probing the interaction between SRC and epistemic certainty indicated that SRC was not a significant predictor of engagement at -1 *SD* (*B* = .30), 0 *SD* (*B* = .05), and +1 *SD* (*B* = -.20) above the mean level of epistemic certainty (*p* > .05 for all). The above results suggest that for White individuals, strong personal conviction in the truth of social-constructivist construals of race are associated with a wish to engage in African-American interests.

Moderation of BRC→Modern racism. To assess the moderation of the BRC-modern racism relationship by the certainty scales, I regressed modern racism scores on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. This model was not significant, *F* (5, 169) = .38, *p* = .86. BRC (*B* = -.05, *p* = .40), personal certainty (*B* = .14, *p* = .38), epistemic certainty (*B* <

.01), BRC*personal certainty (*B* = .06, *p* = .65), and BRC*epistemic certainty (*B* = -.02, *p* = .79) were also not significant predictors of modern racism scores. No moderation effects were probed. These results were similar for both racial minority and majority participants.

Moderation of SRC→Modern racism. I assessed the moderation of the effect of SRC on modern racism through certainty, by regressing modern racism scores on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty. This model did not predict a significant portion of the variance in modern racism scores, *F* (5, 169) = .83, *p* = .53. Similarly, SRC (*B* = -.09, *p* = .22), personal certainty (*B* = .20, *p* = .23), epistemic certainty (*B* = -.04, *p* = .67), SRC*personal certainty (*B* = -.08, *p* = .54) and SRC*epistemic certainty (*B* = -.04, *p* = .63) were not significant predictors of modern racism, and therefore no moderation effects were probed. Similar results were found in both racial minorities and Whites.

Moderation of BRC→System justification. I tested whether the relationship between biological race concepts and motives to justify the legitimacy of the status quo was moderated by certainty. I regressed system justification on BRC, personal certainty, epistemic certainty, BRC*personal certainty, and BRC*epistemic certainty. This model did not explain a significant portion of the variance in system justification scores, *F* (5, 169) = 1.21, *p* = .31. Additionally, BRC (*B* = .07, *p* = .23), personal certainty (*B* = .25, *p* = .09), epistemic certainty (*B* = -.12, *p* = .25), BRC*personal certainty (*B* = .10, *p* = .40), and BRC*epistemic certainty (*B* < .01, *p* = .98) were not significant predictors of system justification. Therefore, no moderation effects were probed.

In racial minority participants, this regression model yielded a significant positive effect of personal certainty on system justification motives, $B = .41$, $p = .03$. This effect was not present in White participants, $B = .08$, $p = .73$. This suggests that as racial minorities became more certain in their views of race, the more they felt the need to justify the legitimacy of the status quo.

Moderation of SRC→System justification. To assess the moderation of the SRC-system justification relationship by the certainty facets, I regressed system justification on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty. This model did not explain a significant portion of the variance in system justification scores, F (5, 169) = .78, $p = .57$. Similarly, SRC ($B = -.03$, $p = .66$), personal certainty ($B = .29$, $p = .06$), epistemic certainty ($B = -.11$, $p = .25$), SRC*personal certainty ($B = -.04$, $p = .75$), and SRC*epistemic certainty ($B = .03$, $p = .75$) were not significantly associated with system justification scores.

For racial minorities, this model yielded a significant effect of personal certainty on system justification scores, $B = .45$, $p = .02$. However, personal certainty was not significantly associated with system justification in White participants, $B = .14$, $p = .59$. As in the prior analysis, this indicates that system justification motives and personal certainty are positively associated in racial minorities.

Moderation of BRC→Attitude certainty. To test whether the relationship between biological race concepts and attitude certainty was moderated by race concept certainty, I regressed attitude certainty on BRC, personal certainty, epistemic certainty, and the interaction of each of the certainty subscales with BRC. This model did not explain a significant portion of the variance in attitude certainty, F (5, 169) = 1.77, $p =$

.12. In this model, personal certainty was a significant predictor of higher attitude certainty, $B = .42$, $p = .03$. However, BRC ($B = -.09$, $p = .21$), epistemic certainty ($B = .06$, $p = .65$), BRC*personal certainty ($B = -.10$, $p = .49$), and BRC*epistemic certainty ($B = .10$, $p = .34$) were not significantly associated with attitude certainty scores. As none of the interaction terms were significant, I did not probe any moderation effects.

When assessing this regression model in racial minorities, personal certainty was again a significant and positive predictor of attitude certainty, $B = .59$, $p < .01$. However, this relationship was not significant in White participants, $B = .22$, $p = .50$. This would suggest that the association of personal certainty with attitude certainty when collapsing *across* races is largely driven by racial minorities.

Moderation of SRC→Attitude certainty. To test whether the relationship between social-constructivist race concepts and attitude certainty was moderated by concept certainty, I regressed attitude certainty on SRC, personal certainty, epistemic certainty, SRC*personal certainty, and SRC*epistemic certainty. This model did not explain a significant portion of the variance in attitude certainty, $F(5, 169) = 1.62$, $p = .16$. Furthermore, neither SRC ($B = -.06$, $p = .49$), personal certainty ($B = .36$, $p = .06$), epistemic certainty ($B = .04$, $p = .74$), SRC*personal certainty ($B = .15$, $p = .33$), nor SRC*epistemic certainty ($B = -.08$, $p = .45$) were significant predictors of attitude certainty. There were no significant relationships when analyzing racial minority and majority participants separately.

Discussion

Unlike Studies 1a, 1b, and 2, in Study 3, the relationship between race concepts and certainty was less clear. In this study, personal certainty was *not* associated with

either biological or social-constructivist views, and epistemic certainty was only associated with higher biological race concepts. One clear difference in this study was the exclusion of Black participants. This was done since a number of the race-relevant measures identified Blacks/African-Americans as the outgroup of focus. Theoretically, doing so may have excluded a subset of individuals who partly drove the association between specific race concepts and feelings of certainty. This, however, is not the case: When excluding Black/African Americans Studies 1a, 1b, and 2, positive correlations between biological race concepts and certainty, and negative correlations between social-constructivist race concepts and certainty, remain significant. Only further data collection will help to uncover whether the more reliable finding is the existence, or absence, of a link between race concepts and certainty.

Contrary to hypotheses, few of the race-relevant variables in Study 3 were related to the race concepts of individuals, and only the association between biological race concepts and desired engagement with Black/African-Americans was moderated by personal certainty. One reason that may explain why so few moderation effects were uncovered may be the inherent difficulty of correlational studies to unravel moderated effects. When assessing moderator effects, correlational designs are notoriously underpowered without large sample sizes of over 300 (Aiken & West, 1991; Judd & Kenny, 2010). Yet another reason may be the manner in which participants completed the survey. Participants completed the study outside of the lab, and the possibility exists that participants may simply not have attended to the survey. Indeed, while the prior studies were also completed by participants in their chosen environment, Study 3 was a much longer study, with 8 different scales presented to participants after the race concept

and RCC scales. The length may have encouraged participants to "take a break" from the survey that they might not have otherwise been able to take in an in-lab survey. Attentiveness issues may potentially explain the low correlation between race concepts and certainty as well.

General Discussion

In general, the present set of studies does not provide convincing support for a moderated model of race concepts. One of the key hypotheses of the moderated race concepts (MRC) model was that both biological and social-constructivist race concepts would be related to race-relevant attitudes (e.g. attitudes towards affirmative action, interracial contact, and prejudice) and that this relationship would vary as a function of how certain individuals were in their race-relevant beliefs. However, race concepts were only correlated with a modest number of the outcome variables in Study 3, and only the relationship between biological race concepts and engagement with African-American interests was moderated by personal certainty. Additionally, further tests suggested that this latter effect may be unique to racial minority participants, as the moderation effect was not significant in White participants.

Considering that moderation was one of the key hypotheses of the MRC model at this time questions still remain as to the construct validity of the proposed certainty measure. Construct validity refers to the extent to which a measure actually assesses the theoretical construct it purports to measure (Nunnally & Bernstein, 1994), and here, the theoretical construct was hypothesized as a parallel of attitude certainty—a reliable moderator of the attitude-behavior correlation (Gross, Holtz, & Miller, 1995; Krosnick & Petty, 1995; see also Visser, Krosnick, & Simmons, 2003). Little evidence in these studies supports the hypotheses that concept certainty is a parallel of attitude certainty.

In a series of studies using a diverse set of samples, however, the current paper demonstrates that the RCC is a promising scale psychometrically. The eight items retained after initial scale development all cohere around multiple factors, supporting the

view that concept certainty is a multidimensional construct. There is some ambiguity in study 2 as to whether two or four factors best explain the construct of concept certainty. Given the current form of the scale as an 8-item measure, the two-factor model is most plausible, as the number of items places constraints on the number of latent variables that any model may reliably estimate (Comrey & Lee, 1992; Russell, 2002). Further psychometric validation should aim to generate more items (approximately 16) to more accurately test for whether a four-, compared to two-, factor model of race concept certainty is most valid.

Biological Certainty and Social-Constructivist Uncertainty

One of the most reliable relationships throughout the current set of studies was the positive correlation between biological race concepts and certainty, and the negative correlation between social-constructivist race concepts and certainty (see Table 3). In four of the five samples tested, participants who believed that their view of race was correct (had high personal certainty) tended to also have strong beliefs that race *was* biological, and *not* social-constructivist, in nature. In all studies, believing there was a *correct* answer the question "What is race" (having high epistemic certainty) was associated with stronger beliefs in a biological interpretation of race, while in four of these studies, believing that there was *no correct* answer was associated with believing in the socio-historical fluidity of the meaning of race. Moreover, epistemic certainty largely retained its association with each race concept when statistically controlling for its overlap with personal certainty.

The aim of the current set of studies was not to investigate *why* particular views of race are associated with concept certainty, but I did seek to observe *whether* these views

were associated with certainty. All studies were conducted using non-experimental survey methodology, precluding the ability to test either the directionality or the determinants of the race concept-concept certainty relationship. In other words, we do not know whether believing that race is "in the genes" engenders concept certainty, or whether believing that there is a *true* view on race leads people to side with more genetic interpretations of the construct. Even if we were to assume that the former (concept→certainty) relationship is the case, just what aspect of biological race concepts causes higher personal certainty is unknown.

The reason that biological views of race are associated with greater certainty may lie in the perceived informativeness of biological concepts. Genetic explanations for the presence of human qualities tend to exacerbate the perceived homogeneity of persons with those qualities (Dar-Nimrod & Heine, 2011), partly because genetically defined qualities are seen as more *essential* to the nature of a person (Haslam & Whelan, 2008). In the context of race, perceived group similarity has direct bearing on how applicable a stereotypic trait is to a group (see Park & Judd, 1990), and when a racial outgroup is seen as highly variable in personality, individuals tend to be more *uncertain* about the nature of that group (Ryan, Bogart, & Vender, 2000; see also Lambert, Payne, Ramsey, & Shaffer, 2005). One might envision that thinking race is "in the genes" allows a person to believe that they can predict something about another based merely on their race and justify "judging a book by its cover."

On the other hand, social-constructivist beliefs are, by their very nature, beliefs about the fluidity of racial meaning. According to this view, not only do recognized racial categories change depending on the socio-political atmosphere (Smedley &

Smedley, 2005), but the racial identification of individuals may itself change (Gaither, Sommers, & Ambady, 2013; Hitlin, Brown, & Elder, 2006; see also Sanchez, Shih, & Garcia, 2009). Furthermore, social-constructivist beliefs are also associated with perceived group overlap in qualities (No, Hong, Liao, Lee, Wood, & Chao, 2008), whereas biological beliefs are associated with greater perceived group distinctiveness (Martin & Parker, 1995), suggesting that believing in race as a social construct dilutes the predictive power of race for person-based judgments (but for a different view see Rangel & Keller, 2005). If the meaning of race is seemingly in constant flux, then knowing that is the case may lead one to believe that no "objective" and stable meaning actually exists. It would therefore make sense that social-constructivist race concepts are associated with lower concept certainty.

Individuals may also be more certain in their race-relevant beliefs if they happen to support a biological view of race because such views may be more easily accessible than social-constructivist views. A number of scholars have posited that certainty is inherently associated with the accessibility of cognitions (Holland, Verplanken, & van Knippenberg, 2003; Powell & Fazio, 1984; for recent review see Visser & Holbrook, 2012). Cognitions become more accessible through either repeated expression or exposure (Petrocelli, Tormala, & Rucker, 2007). Biological views of race tend to be more prevalent than social-constructivist views (Morning, 2011; Smedley & Smedley, 2005), and therefore individuals may simply be able to retrieve genetic explanations for race with greater ease. Genetic explanations may not simply offer more perceived information about the future (i.e. predictive validity), but also more closely match past representations of race (i.e. be more accessible).

Future Directions

The initial focus of future research on concept certainty should be to address some of the lingering psychometric concerns with the measure of race concept certainty. This set of studies indeed provides some evidence for a two-factor model, but as stated earlier, this may be a product of the number of items chosen to represent race concept certainty. Perhaps just as pressing, Study 2 provided little support for the stability of the personal and epistemic certainty subscales over time. The low test-retest correlations may be a function of both the high attrition rate between session 1 and session 2, and the high variability in the session-to-session interval. The next phase of scale validation should be dedicated to adding more items to the current race concept certainty scale before re-assessing the fit of the four-factor model, while using more stringent test-retest procedures (e.g. *requiring* participants to complete both sessions *in-lab*).

Experimentally manipulating both certainty and specific race concepts may help to unpack the relationship between the variables in the study. Considering that prior research has manipulated certainty by repeated expression (Petrocelli, Tormala, & Rucker, 2007), future research may consider asking participants to elaborate on how strongly they believe that race is a social-construction as a manipulation of personal certainty. Given that previous research has manipulated race concepts by having participants read a hypothetical scholarly article (Williams & Eberhardt, 2008), additional research may consider having participants read an article in support of either a genetic or social-constructivist explanation of race. These manipulations may help elucidate the causal directionality between the race concept-concept certainty relationships.

The study of conceptual certainty and its relationship to lay views about the nature of social categories is likely to become increasingly important as scholars begin to explore how particular cognitions fulfill needs for structure and certainty. Recent research has found that exposure to diverse others can change both needs for structure and race concepts (Tadmor et al., 2012). As psychologists continue to examine the bases for people's lay beliefs, metacognitive constructs like conceptual certainty offer researchers one novel, but intuitive, reason why people endorse beliefs that engender prejudice: Such beliefs may simply feel more "accurate" to individuals.

Table 1

Study 1a Race Concept Factor Loadings

	Factor 1 (BRC)	Factor 2 (SRC)
To a large extent, a person's race biologically determines his or her abilities and traits.[a, †]	-	-
A person's race is fixed at birth.[b]	**.91 (.90)**	.02 (-.47)
Race has a strong biological basis, and thus cannot be changed.[a]	**.87 (.90)**	-.05 (-.52)
A person's race is determined by their DNA.	**.85 (.78)**	.13 (-.32)
Racial groups are primarily determined by biology.[b]	**.75 (.83)**	-.15 (-.55)
Racial categories are constructed for economic, political, and social reasons. If the socio-political situation changes, the racial categories will change as well. [a]	.03 (-.44)	**.89 (.87)**
Racial categories are fluid, malleable ideas that come from society.[a]	< .01 (-.43)	**.80 (.80)**
How a person is racially defined depends on cultural norms, which can change.[b]	-.09 (-.45)	**.67 (.72)**
The political climate can dictate how one is racially categorized.[b]	.06 (-.27)	**.62 (.58)**
The racial categories that we now recognize can change in the future.	-.01 (-.29)	**.51 (.52)**

Note. [a]adapted from No, Hong, Liao, Lee, Wood, & Chao, 2008. [b]adapted from Williams & Eberhardt, 2008. [†]Item dropped from scale. BRC = Biological race concepts. SRC = Social-constructivist race concepts. Principal axis factoring on 9 items with Promax rotation extracting 2 factors. Pattern loadings outside of parentheses, structure loadings within. Bolded coefficients indicate the factor that retained items primarily loaded on.

Table 2

Study 1a Preliminary Race Concept Certainty Loadings

	Factor 1 (Personal)	Factor 2 (Epistemic)
Items retained		
1 How clear to you is your view of what race is?	**.89 (.88)**	-.06 (.43)
2 How sure are you that you know what race is?	**.88 (.91)**	-.05 (.46)
3 Do you understand what your concept of race is?	**.82 (.80)**	-.16 (.33)
4 How correct would you say your view of race is?	**.83 (.83)**	-.03 (.42)
5 Do you believe there is a definite right and wrong answer to what race is?	.01 (.48)	**.86 (.88)**
6 Is there a correct and incorrect answer to the question "What is race?"	-.02 (.46)	**.79 (.84)**
7 Is a concrete view of race possible?	-.10 (.45)	**.71 (.81)**
8 Is there anyone that has a solid understanding/view of race, or are all views at least somewhat vague?	-.01 (.49)	**.52 (.71)**
Items discarded		
9 To what extent are you certain that you understand the concept of race?	**.95 (.92)**	-.11 (.42)
10 How certain are you that you know what race is?	**.88 (.91)**	-.01 (.48)
11 How clear or unclear is your idea of race to you?	**.87 (.89)**	-.14 (.40)
12 To what extent is your understanding of race true?	**.85 (.83)**	.19 (.53)
13 To what degree is your concept of race clear or unclear?	**.84 (.91)**	-.02 (.50)
14 What level of certainty best describes how true you believe your view of race to be?	**.83 (.86)**	.16 (.55)
15 Do you understand what your concept of race is?	**.82 (.80)**	-.16 (.33)
16 Are you confident in your views of the concept of race?	**.81 (.88)**	.05 (.52)
17 How much are you able to bring to mind your concept of race?	**.71 (.67)**	-.30 (.18)
18 How certain are you that you have the most correct view of race?	**.69 (.76)**	.30 (.59)
19 How would you describe the accuracy of your concept of race?	**.63 (.75)**	.21 (.55)

20 Which choice best describes how you think of individuals' answers to the question, "What is race?"	-.03 (.42)	**.87 (.85)**
21 Do you believe a true and false answer exists to the question of what race is?	.07 (.50)	**.76 (.82)**
22 Does a right and wrong answer exist when considering what race is?	-.09 (.39)	**.68 (.74)**
23 Do you believe that anyone has a clear view of what race is?	.05 (.48)	**.38 (.60)**
24 Do you believe anyone has a concrete understanding of what race is?	.15 (.50)	**.28 (.54)**
25 Does a completely concrete view of race exist for anyone, or are all views fuzzy and abstract?	.09 (.47)	**.21 (.49)**

Note. $N = 72$; Principal components analysis on 25 items with Promax rotation extracting 2 factors. Pattern loadings outside of parentheses, structure loadings within. Repetitive items and items that had insufficient (< .5) pattern or structure loadings were discarded. Bolded coefficients indicate the factor that retained items primarily loaded on.

Table 3

Bivariate (And Partial) Correlations Between Race Concept and Race Concept Certainty Scales Across Studies

		Study				
		1a	1b	2 Session 1	2 Session 2	3
Variables		*N* = 72	*N* = 214	*N* = 177	*N* = 79	*N* = 175
BRC						
	Personal certainty	.41*** (.27*)	.32*** (.14*)	.21** (-.02)	.32** (.04)	.14 (.06)
	Epistemic certainty	.37** (.20)	.35*** (.22**)	.44*** (.40***)	.42*** (.29**)	.19** (.15)
SRC						
	Personal certainty	-.25* (-.09)	-.18** (< .01)	-.26*** (-.11)	-.31** (< .01)	.04 (.12)
	Epistemic certainty	-.35** (-.27*)	-.30*** (-.25***)	-.35*** (-.26***)	-.44*** (-.33**)	-.14 (-.17**)

Note. *p < .05, **p < .01, ***p < .001. BRC = Biological race concepts; SRC = Social-constructivist race concepts. Bivariate correlations outside of parenthesis. Partial correlations (partialling out other component of certainty) in parenthesis.

Table 4

Study 1b Item variance-covariance matrix

	1	2	3	4	5	6	7	8
1	**0.67**							
2	**0.52**	**0.71**						
3	**0.38**	**0.40**	**0.52**					
4	**0.46**	**0.47**	**0.34**	**0.61**				
5	0.39	0.46	0.34	0.38	**1.43**			
6	0.36	0.39	0.27	0.31	**0.96**	**1.38**		
7	0.42	0.50	0.34	0.37	**0.72**	**0.69**	**1.30**	
8	0.47	0.49	0.38	0.39	**0.73**	**0.77**	**0.69**	**1.19**
SD	0.82	0.84	0.72	0.78	1.20	1.18	1.14	1.09
M	3.81	3.77	3.68	3.92	3.29	3.41	3.43	3.35

Note. Item numbers refer to numbered items in Table 2.

Bolded covariances indicate that items primarily loaded on the same factor.

Table 5

Study 1b Item loadings and factor correlations

	Item loadings	
Item	Factor 1	Factor 2
1	**.88 (.87)**	-.02 (.52)
2	**.85 (.87)**	.04 (.57)
3	**.73 (.75)**	.04 (.48)
4	**.83 (.81)**	-.03 (.48)
5	.00 (.49)	**.79 (.80)**
6	-.15 (.43)	**.94 (.84)**
7	.22 (.55)	**.53 (.74)**
8	.24 (.61)	**.59 (.74)**

	Factor correlations	
	Factor 1	Factor 2
Factor 1	1.00	
Factor 2	.61	1.00

Note. $N = 214$. Item loadings for 8 items submitted to principal axis factoring with Promax rotation for a two-factor solution. Pattern loadings outside of parentheses, structure loadings within. Bolded loadings indicate the primary factor that items loaded on. Item numbers refer to numbering in Table 2.

Table 6

Study 2 Item variance-covariance matrix

	1	2	3	4	5	6	7	8
1	**0.71**							
2	**0.51**	**0.71**						
3	**0.41**	**0.36**	**0.54**					
4	**0.38**	**0.36**	**0.24**	**0.51**				
5	0.32	0.46	0.24	0.25	**1.56**			
6	0.45	0.49	0.31	0.38	**1.12**	**1.60**		
7	0.34	0.35	0.24	0.27	**0.72**	**0.81**	**1.28**	
8	0.29	0.32	0.19	0.26	**0.61**	**0.68**	**0.67**	**1.22**
SD	0.85	0.84	0.73	0.71	1.25	1.27	1.13	1.11
M	3.69	3.62	3.86	3.56	2.76	2.95	2.89	3.03

Note. Item numbers refer to numbered items in Table 2.

Bolded covariances indicate that items primarily loaded on the same factor.

Table 7

Study 2 Fit indices for measurement models

	Measurement Models			
	Baseline Full Model	Hypothesized Two-Factor	Alternative One-Factor	Alternative Four-Factor
Satorra-Bentler χ^2 (df)	558.77 (28)	26.01 (19)	136.77*** (20)	9.69 (14)
Difference χ^2 (df)			82.50*** (1)	15.73** (5)
RMSEA		.05, 95% CI [.00, .09]	.18, 95% CI [.15, .21]	.00, 95% CI [.00, .05]
CFI		.99	.78	1.00
TLI		.98	.69	1.00
SRMR		.04	.11	.02

Note. *** $p < .001$, ** $p < .01$. Difference χ^2 is computed using the Satorra-Bentler χ^2 and each statistic's correction factor for non-normality (see Bryant & Satorra, 2012). RMSEA = root mean square error of approximation. CFI = comparative fit index. TLI = Tucker-Lewis index. SRMR = standardized root mean square residual.

Table 8

Study 2 Bivariate and Test-Retest Correlations Among Session 1 and Session 2 Variables

	PC	EC	BRC	SRC	B-RT	S-RT	BIDR – SDE	BIDR - IM
PC	**.33*****	.66***	.33**	-.36**	.15	.15	-	-
EC	.51***	**.57*****	.44***	-.47***	.08	.07	-	-
BRC	.21**	.44***	**.71*****	-.38**	-.09	.03	-	-
SRC	-.26***	-.35***	-.28***	**.33****	.23	.06	-	-
B-RT	.08	.06	.12	-.02	**.45*****	.40**	-	-
S-RT	.20**	.06	.16*	-.07	.66***	**.28***	-	-
BIDR – SDE	.14	.14	-.06	-.14	.04	.08	-	
BIDR – IM	-.05	.12	.03	-.05	.02	.07	.31***	-

Note. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$. Session 1 ($N = 177$) correlations in lower diagonal, session 2 ($N = 72$) correlations in upper diagonal. Test-retest ($N = 72$) correlations in **bold** along the diagonal. PC = Personal certainty; EC = Epistemic certainty; BRC = Biological race concepts; SRC = Social-constructivist race concepts; B-RT = Biological race concepts response time; S-RT = Social-constructivist race concepts response time; BIDR – SDE = Balanced inventory of desirable responding – Self-deceptive enhancement; BIDR – IM = Balanced inventory of desirable responding – Impression management.

Table 9

Study 3 Item variance-covariance matrix

	1	2	3	4	5	6	7	8
1	**0.58**							
2	**0.31**	**0.55**						
3	**0.27**	**0.23**	**0.45**					
4	**0.35**	**0.25**	**0.22**	**0.53**				
5	0.20	0.29	0.27	0.19	**1.25**			
6	0.23	0.25	0.24	0.17	**0.81**	**1.32**		
7	0.25	0.21	0.24	0.21	**0.63**	**0.53**	**1.19**	
8	0.28	0.28	0.29	0.16	**0.55**	**0.55**	**0.60**	**1.16**
SD	0.76	0.74	0.67	0.73	1.12	1.15	1.09	1.08
M	3.73	3.68	3.58	3.79	2.89	2.97	3.03	3.14

Note. Item numbers refer to numbered items in Table 2.

Bolded covariances indicate that items primarily loaded on the same factor.

Table 10

Study 3 Correlations between variables

	PC	EC	BRC	SRC	B-RT	S-RT	ATAA	Contact	Intimacy	Closeness	Affection	Comfort	Kinship	Engage	MR	SJ	AC
PC	-																
EC	.46***	-															
BRC	.14	.19**	-														
SRC	.04	-.14	-.26**	-													
B-RT	.10	-.15*	-.10	.05	-												
S-RT	.06	.01	.12	-.01	.51***	-											
ATAA	.10	.10	-.04	.10	.07	.07	-										
Contact	-.10	-.06	-.11	.01	.05	.04	.18*	-									
Intimacy	-.01	-.03	-.07	.05	.10	.08	.14	.53***	-								
Closeness	-.10	-.14	-.17*	.06	.08	.09	.09	.32***	.24**	-							
Affection	-.04	-.07	-.15*	.04	.16*	.12	.34***	.34***	.34***	.29***	-						
Comfort	.02	-.01	-.22**	.01	.16*	.07	.13	.46***	.35***	.49***	.77***	-					
Kinship	-.17*	-.12	-.27***	.12	.11	-.01	.10	.37***	.26***	.52***	.51***	.60***	-				
Engage	-.07	-.08	-.09	.10	.12	.15	.31***	.22**	.22**	.46***	.57***	.49***	.61***	-			
MR	.07	.02	-.06	-.10	-.08	-.13	-.17*	-.10	-.11	-.18*	-.26***	-.25***	-.05	-.32***	-		
SJ	.12	-.02	.09	-.01	-.09	-.08	-.20**	.08	.11	-.07	-.02	.11	.08	-.11	.22**	-	
AC	.19*	.12	-.06	-.06	.10	.11	.09	.33***	.33***	.34***	.42***	.46***	.32***	.26***	-.06	.09	-

Note. $N = 175$. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$; PC = personal certainty, EC = epistemic certainty, BRC = biological race concepts, SRC = social-constructivist race concepts, B-RT = biological race concepts response time, S-RT = social-constructivist race concepts response time, ATAA = attitudes towards affirmative action, Contact = intergroup contact, Intimacy = intergroup intimacy, Closeness = intergroup closeness, Affection = allophilia (affection), Comfort = allophilia (comfort), Kinship = allophilia (kinship), Engagement = allophilia (engagement), MR = modern racism, SJ = system justification, AC = attitude certainty.

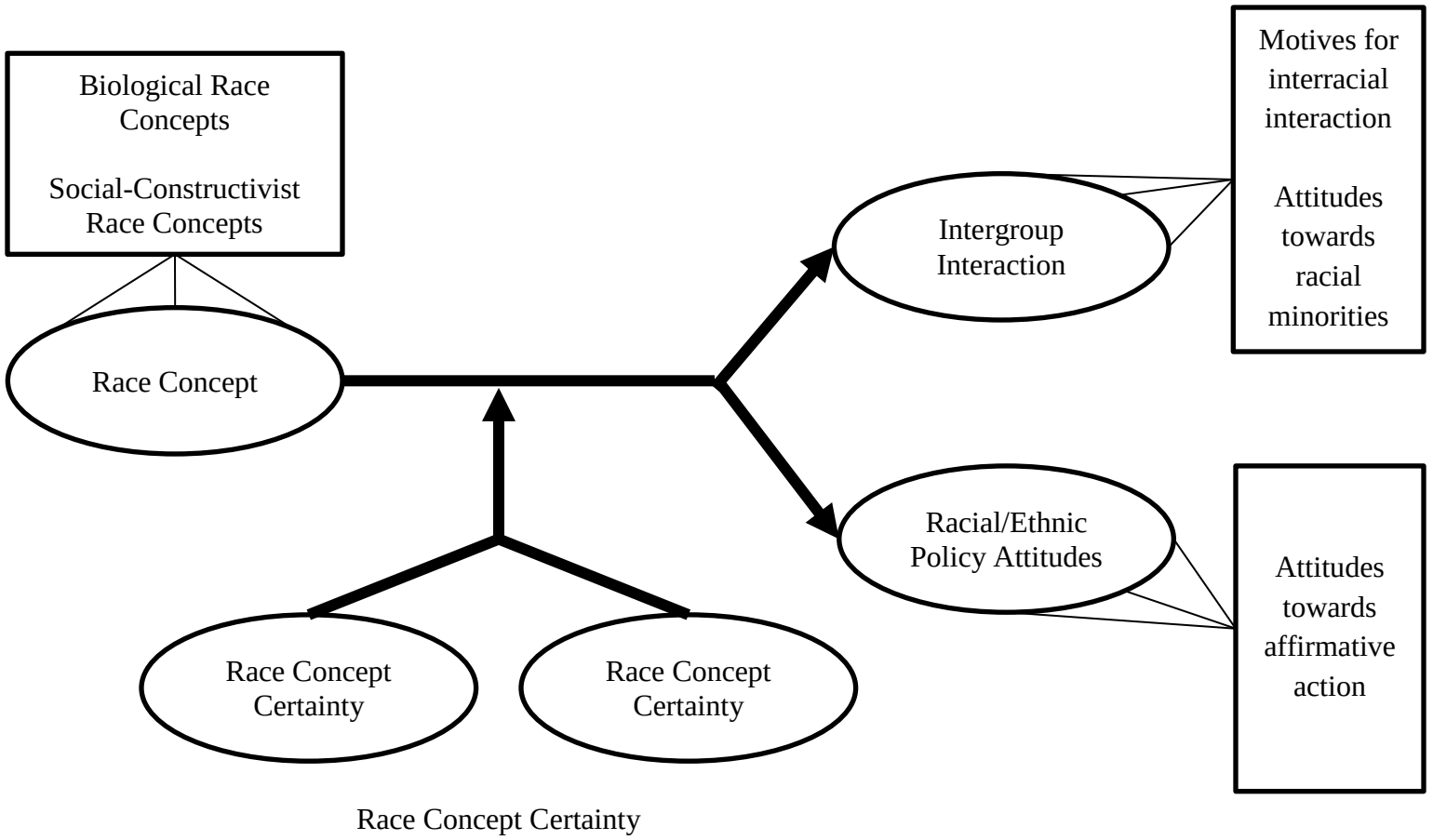

Figure 1. Moderated race concepts (MRC) model. Race concept certainty moderates the effect of race concepts on two classes of outcomes.

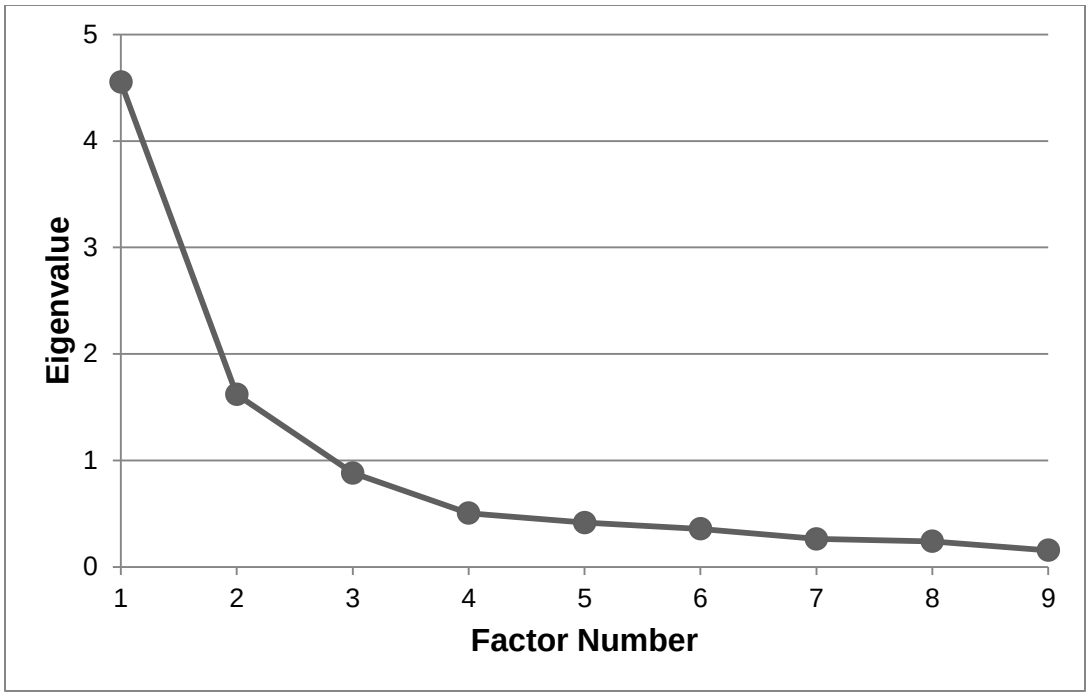

Figure 2. Study 1a scree plot of race concept scales. Eigenvalues are graphed for all factors in a principal axis factoring of 9 items assessing biological and social-constructivist race concepts.

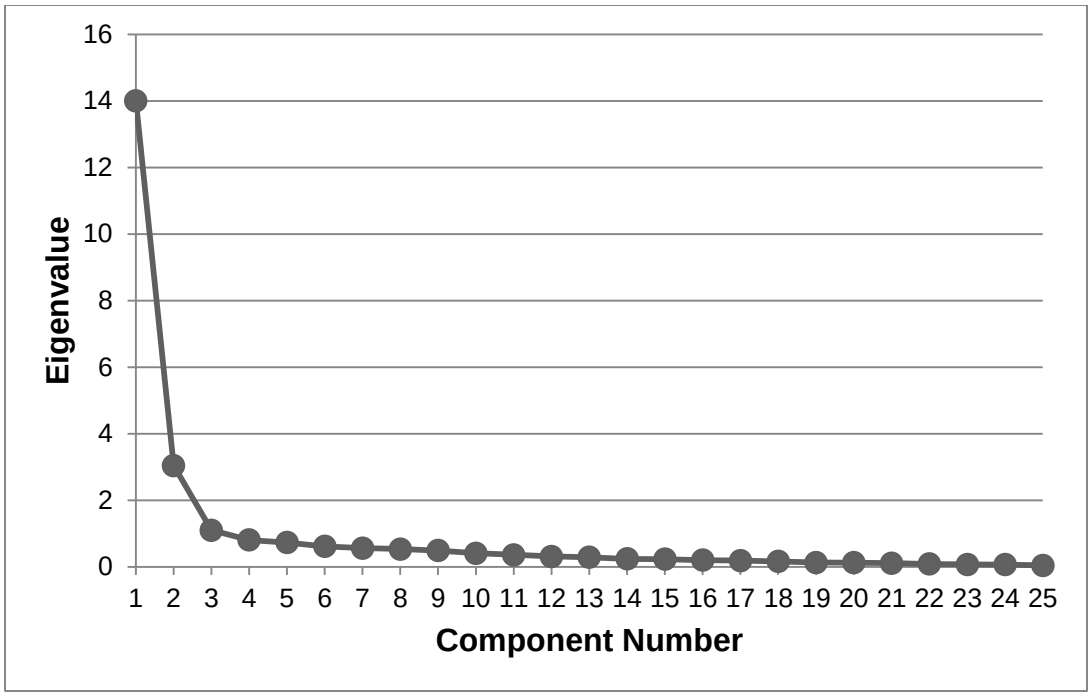

Figure 3. Study 1a scree plot of preliminary race concept certainty scale. Eigenvalues are graphed for all components in a principal components analysis of the 25 item preliminary race concept certainty scale.

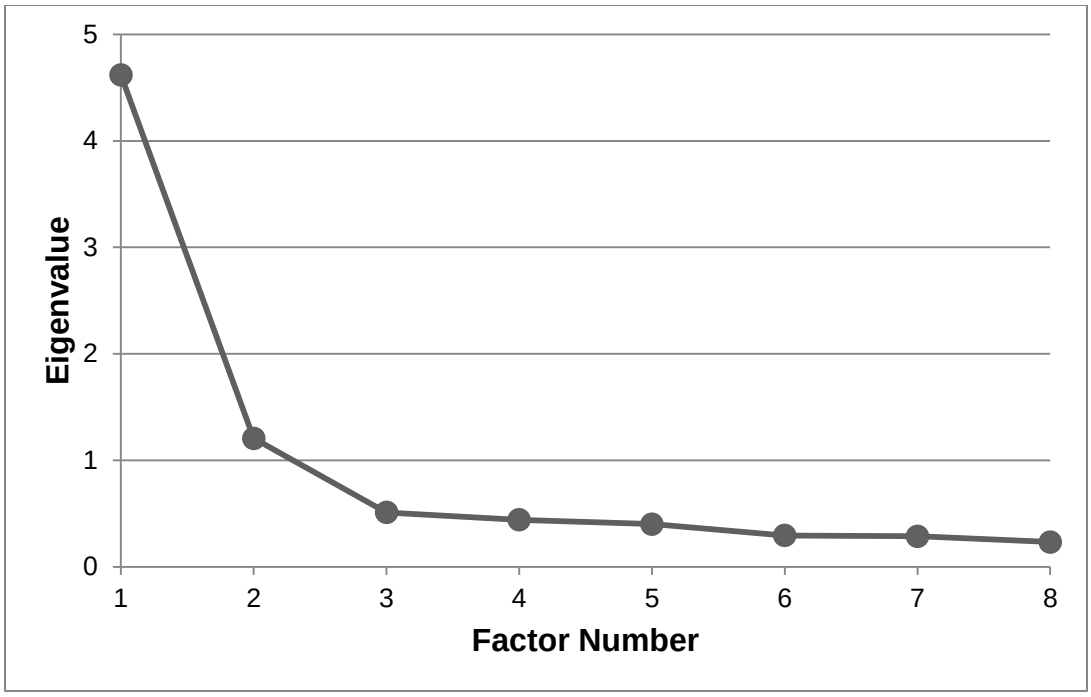

Figure 4. Study 1b scree plot of race concept certainty scale. Eigenvalues are graphed for all factors in a principal axis factoring of the 8 item race concept certainty scale.

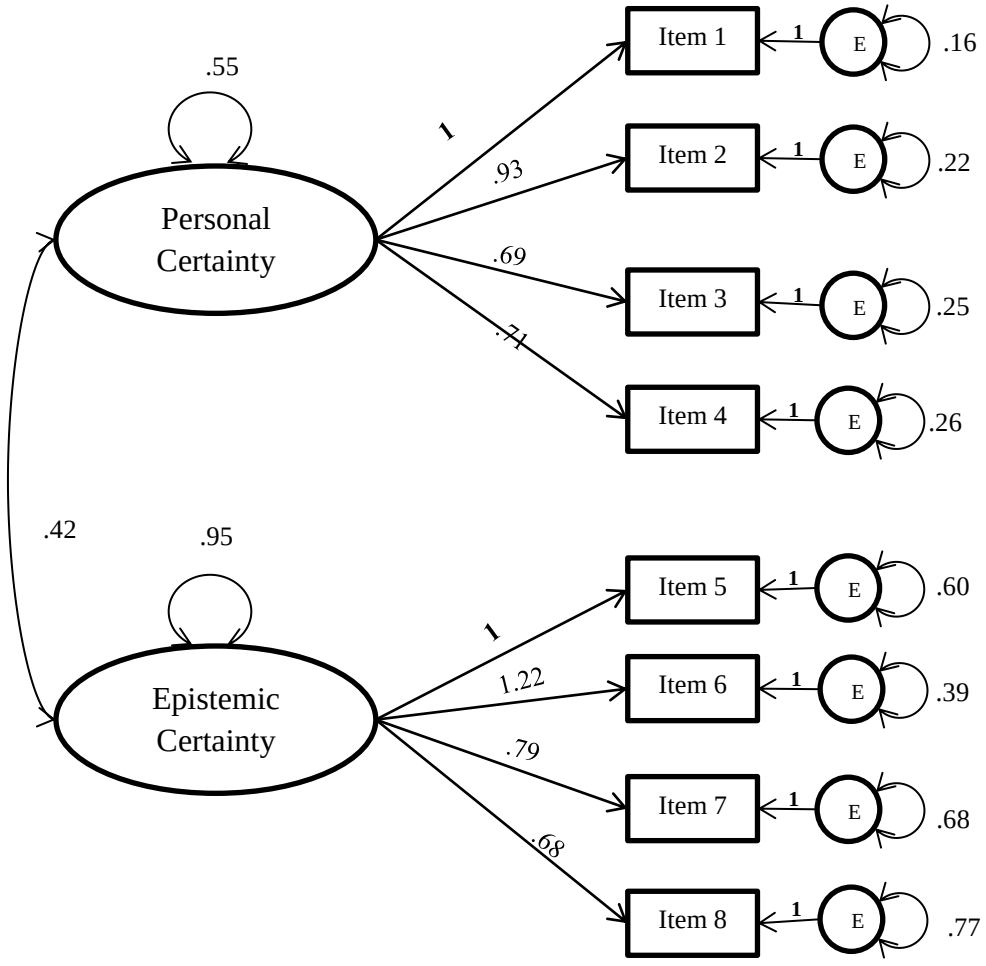

Figure 5. Hypothesized two-factor measurement model of race concept certainty. Factor loadings (from personal/epistemic certainty to items), latent variable variances (double headed arrows pointing to one variable), latent variable covariances (double headed arrows pointing to two variables), and error variances (double headed arrows pointing to "E"s) indicate unstandardized coefficients obtained in Study 2 (session 1; $N = 177$) when conducting confirmatory factor analysis using the maximum likelihood estimation method on the eight items of the RCC. A bolded "**1**" indicates a path used to scale the latent variable. Item numbers refer to numbering in Table 2.

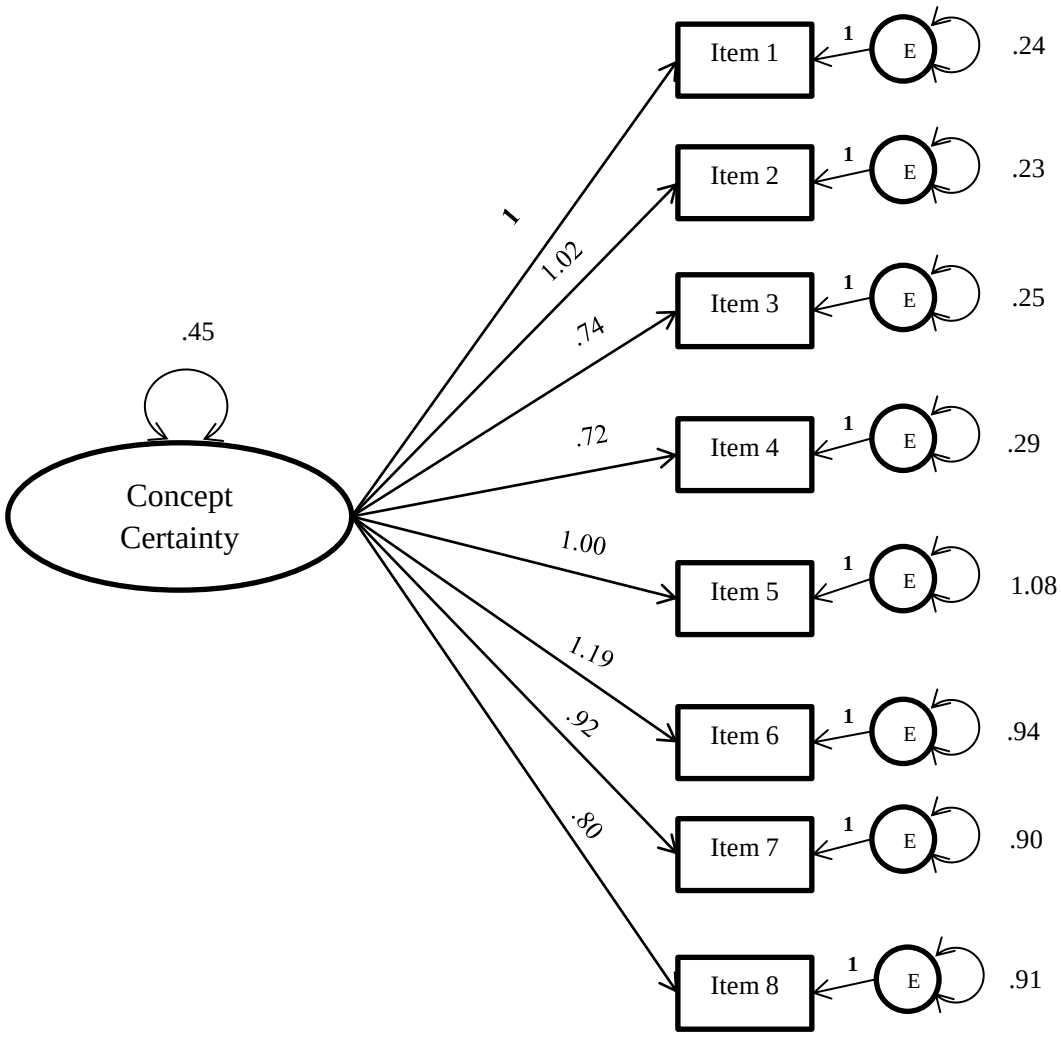

Figure 6. Alternative one-factor measurement model of race concept certainty. Factor loadings (from personal/epistemic certainty to items), latent variable variances (double headed arrows pointing to one variable), latent variable covariances (double headed arrows pointing to two variables), and error variances (double headed arrows pointing to "E"s) indicate unstandardized coefficients obtained in Study 2 (session 1; $N = 177$) when conducting confirmatory factor analysis using the maximum likelihood estimation method on the eight items of the RCC. A bolded "**1**" indicates a path used to scale the latent variable. Item numbers refer to numbering in Table 2.

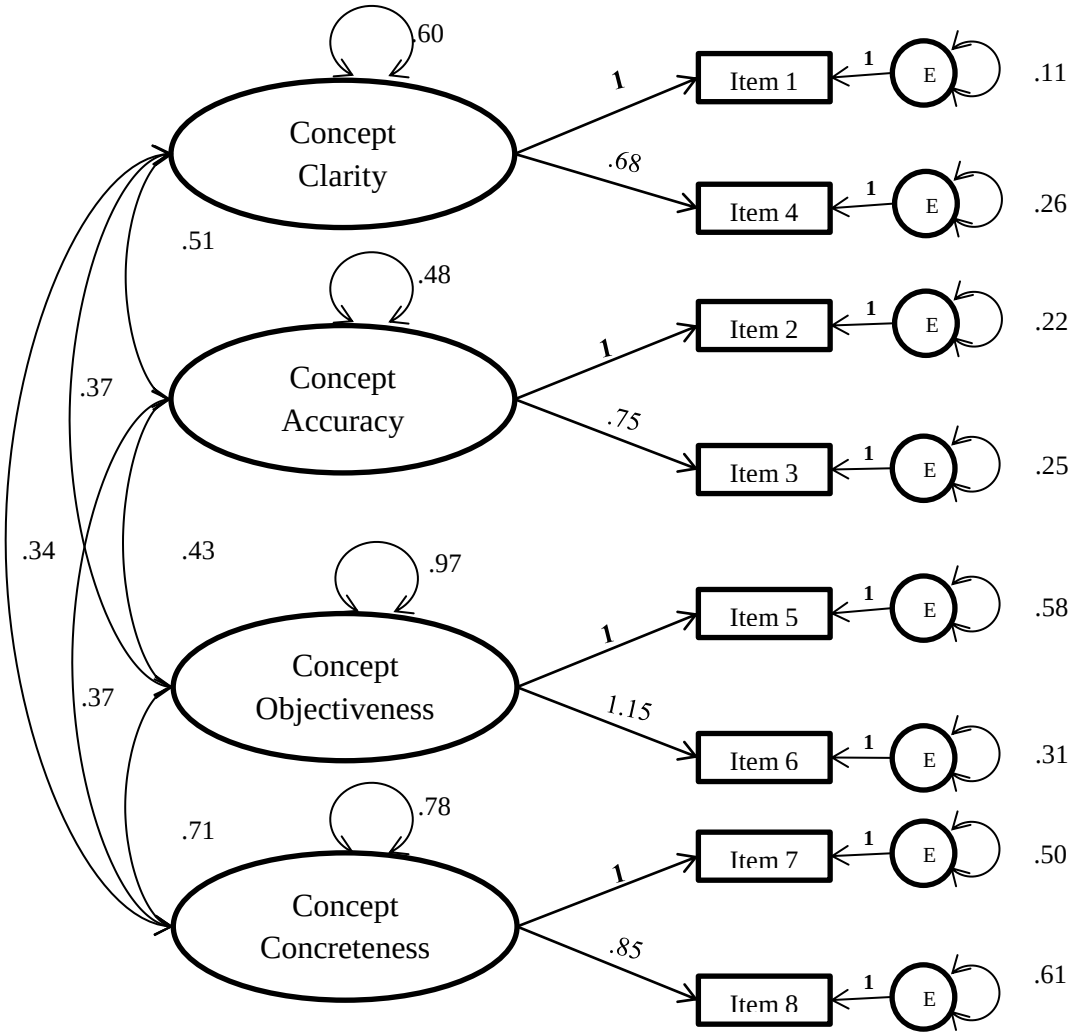

Figure 7. Alternative four-factor measurement model of race concept certainty. Factor loadings (from personal/epistemic certainty to items), latent variable variances (double headed arrows pointing to one variable), latent variable covariances (double headed arrows pointing to two variables), and error variances indicate unstandardized coefficients obtained in Study 2 (session 1; $N = 177$) when conducting confirmatory factor analysis using the maximum likelihood estimation method on the eight items of the RCC. Latent factor covariances are at the center of each bow. A bolded "**1**" indicates a path used to scale the latent variable. Item numbers refer to numbering in Table 2.

Appendix A

Preliminary Race Concept Certainty Scale

(Items 1-8 used throughout all studies. Items 9-25 used in Study 1a)

	Response Options				
	1	**2**	**3**	**4**	**5**
1 How clear to you is your view of what race is?[a,c]	Completely unclear	Mostly unclear	Partly clear, partly unclear	Mostly clear	Completely clear
2 How sure are you that you know what race is? [a,d]	Completely unsure	Mostly unsure	Partly sure, partly unsure	Mostly sure	Completely sure
3 Do you understand what your concept of race is? [a,d]	Do not understand at all	Mostly do not understand	Partly understand, partly do not understand	Mostly understand	Completely understand
4 How correct would you say your view of race is? [a,c]	Completely incorrect	Mostly incorrect	Partly correct, partly incorrect	Mostly correct	Completely correct
5 Do you believe there is a definite right and wrong answer to what race is? [b,e]	There is definitely no right or wrong answer	There is probably no right or wrong answer	There may or may not be a right or wrong answer	There is probably a right and wrong answer	There is definitely a right and wrong answer
6 Is there a correct and incorrect answer to the question "What is race?" [b,e]	Definitely no correct or incorrect answer	Probably no correct or incorrect answer	May or may not be a correct or incorrect answer	Probably a correct and incorrect answer	Definitely a correct and incorrect answer

7 Is a concrete view of race possible? [b,f]	Definitely no concrete view	Probably no concrete view	May or may not be a concrete view	Probably a concrete view	Definitely a concrete view
8 Is there anyone that has a solid understanding/view of race, or are all views at least somewhat vague? [b,f]	There are certainly no solid views of race	There are probably no solid views of race	May or may not be a solid view of race	There is probably a solid view of race	There is certainly a solid view of race
9 To what extent are you certain that you understand the concept of race? [a,c]	Completely uncertain	Mostly uncertain	Partly certain, partly uncertain	Mostly certain	Completely certain
10 How certain are you that you know what race is? [a,d]	Completely uncertain	Mostly uncertain	Partly certain, partly uncertain	Mostly certain	Completely certain
11 How clear or unclear is your idea of race to you? [a,c]	Completely unclear	Mostly unclear	Partly clear, partly unclear	Mostly clear	Completely clear
12 To what extent is your understanding of race true? [a,d]	Completely untrue	Mostly untrue	Partly true, partly untrue	Mostly true	Completely true
13 To what degree is your concept of race clear or unclear? [a,c]	Completely unclear	Mostly unclear	Partly clear, partly unclear	Mostly clear	Completely clear
14 What level of certainty best describes how true you believe your view of race to be? [a,d]	Completely uncertain	Mostly uncertain	Partly certain, partly uncertain	Mostly certain	Completely certain

15 Do you understand what your concept of race is? [a,c]	Do not understand at all	Mostly do not understand	Partly understand, partly do not understand	Mostly understand	Completely understand
16 Are you confident in your views of the concept of race? [a,d]	Not at all confident	Mostly not confident	Partly confident, partly not confident	Mostly confident	Completely confident
17 How much are you able to bring to mind your concept of race? [a,c]	Completely unable	Mostly unable	Partly able, partly unable	Mostly able	Completely able
18 How certain are you that you have the most correct view of race? [a,d]	Completely uncertain	Mostly uncertain	Partly certain, partly uncertain	Mostly certain	Completely certain
19 How would you describe the accuracy of your concept of race? [a,d]	Completely inaccurate	Mostly inaccurate	Partly accurate, partly inaccurate	Mostly accurate	Completely accurate
20 Which choice best describes how you think of individuals' answers to the question, "What is race?" [b,e]	There is definitely no right or wrong answer	There is probably no right or wrong answer	There may or may not be a right or wrong answer	There is probably a right and wrong answer	There is definitely a right and wrong answer
21 Do you believe a true and false answer exists to the question of what race is? [b,e]	Definitely no true or false answer	Probably no true or false	May or may not be a true or false answer	Probably a true and a false	Definitely a true and a false

		answer		answer	answer
22 Does a right and wrong answer exist when considering what race is? [b,e]	There is definitely no right or wrong answer	There is probably no right or wrong answer	There may or may not be a right or wrong answer	There is probably a right and wrong answer	There is definitely a right and wrong answer
23 Do you believe that anyone has a clear view of what race is? [b,f]	No one has a clear view	Probably no one has a clear view	May or may not be a person with a clear view	Probably, a clear view exists	Definitely, a clear view exists
24 Do you believe anyone has a concrete understanding of what race is? [b,f]	Definitely no concrete view	Probably no concrete view	May or may not be a concrete view	Probably a concrete view	Definitely a concrete view
25 Does a completely concrete view of race exist for anyone, or are all views fuzzy and abstract? [b,f]	Definitely no concrete view	Probably no concrete view	May or may not be a concrete view	Probably a concrete view	Definitely a concrete view

Note. Superscripts denote the factors that the item was intended to load on in the two-factor (a = personal; b = epistemic) and four factor (c = clarity, d = accuracy, e = objectiveness, f = concreteness) solutions. Items 9- 25 dropped from race concept certainty scale after Study 1a.

Appendix B

Instructional Manipulation Checks (IMCs) Used Throughout Studies

Correct answers are bolded.

1) While watching television, have you ever had a fatal heart attack?

1	2	3	4	5
Never	Rarely	Sometimes	Often	All of the time

2) Would you say that the following survey is an online survey taken with Mechanical Turk?

1	**2**
No	**Yes**

3) Please respond to this question by answering Disagree Strongly.

1	2	3	4	5	6	7
Disagree Strongly	Disagree	Disagree Somewhat	Neither Agree nor Disagree	Agree Somewhat	Agree	Agree Strongly

4) In the directions given at the top of the screen, does the word “bench” appear at all?

1	2	3	4	5	6	7
Not at all						Completely

Explicit validation question notice (Presented after IMCs 1 and 2 in Studies 2 and 3)

The following survey requires you to read each question carefully and to respond openly and honestly.

Validation questions (like the ones on the previous page) have been placed within the questionnaire to monitor whether you are fully attending to the survey questions.

Validation questions require you to provide a specific correct (valid) answer, and if that answer is not chosen, then we will not be able to use your responses for this study.

Please attend to all questions and answer each one as honestly as possible.

Thank you.

Appendix C

Biological and Social Constructivist Race Concept Items (Used in all studies)

Instructions: Please respond to each of the following statements from 1 (Strongly Disagree) to 7 Strongly Agree):

1	2	3	4	5	6	7
Strongly disagree	Disagree	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree	Strongly agree

To a large extent, a person's race biologically determines his or her abilities and traits.[a, †]

A person's race is fixed at birth.[b]

Race has a strong biological basis, and thus cannot be changed.[a]

A person's race is determined by their DNA.

Racial groups are primarily determined by biology.[b]

Racial categories are constructed for economic, political, and social reasons. If the socio-political situation changes, the racial categories will change as well. [a]

Racial categories are fluid, malleable ideas that come from society.[a]

How a person is racially defined depends on cultural norms, which can change.[b]

The political climate can dictate how one is racially categorized.[b]

The racial categories that we now recognize can change in the future.

Note. [a]adapted from No, Hong, Liao, Lee, Wood, & Chao, 2008. [b]adapted from Williams & Eberhardt, 2008. [†]Item dropped from scale. BRC = Biological race concepts. SRC = Social-constructivist race concepts.

Appendix D

Balanced Inventory of Desirable Responding (Used in Study 2)

Directions: Using the scale below as a guide write a number beside each statement to indicate how much you agree with it.

1	2	3	4	5	6	7
Not true			Somewhat true			Very true

My first impressions of people usually turn out to be right.

It would be hard for me to break any of my habits

I don't care to know what other people think of me.

I have not always been honest with myself.

I always know why I like things.

When my emotions are aroused, it biases my thinking.

Once I've made up my mind, other people can seldom change my opinion.

I am not a safe driver when I exceed the speed limit.

I am in full control of my fate.

It's hard for me to shut off a disturbing thought.

I never regret my decisions

I sometimes lose out on things because I can't make up my mind soon enough.

The reason I vote is because my vote can make a difference.

My parents were not always fair when they punished me.

I am a completely rational person.

I rarely appreciate criticism.

I am very confident of my judgments.

I have sometimes doubted my ability as a lover.

It's all right with me if some people happen to dislike me.

I don't always know the reasons why I do the things I do.

I sometimes tell lies if I have to.

I never cover up my mistakes.

There have been occasions when I have taken advantage of someone.

I never swear.

I sometimes try to get even rather than forgive and forget.

I always obey laws, even if I'm unlikely to get caught.

I have said something bad about a friend behind his or her back.

When I hear people talking privately, I avoid listening.

I have received too much change from a salesperson without telling him or her.

I always declare everything at customs.

When I was young I sometimes stole things

I have never dropped litter on the street.

I sometimes drive faster than the speed limit.

I never read sexy books or magazines.

I have done things that I don't tell other people about.

I never take things that don't belong to me.

I have taken sick-leave from work or school even though I wasn't really sick.

I have never damaged a library book or store merchandise without reporting it.

I have some pretty awful habits.

I don't gossip about other people's business.

Appendix E

Scales Used in Study 3

Attitudes towards affirmative action scale (Kravitz & Platania, 1991)

Directions: The next questions refer to affirmative action. "Affirmative action" refers to policies that take factors including "race, color, religion, sex or national origin" into consideration in order to benefit an underrepresented group, usually as a means to counter the effects of a history of discrimination. "Affirmative action" is action taken to increase the representation of women and minorities in areas of employment, education, and business from which they have been historically excluded.

1	2	3	4	5	6	7
Strongly disagree	Disagree	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree	Strongly agree

1. Affirmative action is a good policy.

2. I would *not* like to work at an organization with an affirmative action program.

3. The goals of affirmative action are good.

4. Employees should be actively involved in attempts to improve the affirmative action conditions at their place of employment.

5. I *would* be willing to work at an organization with an affirmative action plan.

6. All in all, I oppose affirmative action plans in industry for racial/ethnic minorities.

Amount of intergroup contact (Brown, Vivian, & Hewstone, 1999)

Directions: Please answer each of the following questions with the choices provided

0	1	2	3	4	5	6	7
None/Never							Seven or more
How many individuals do you know who identify as Black/African-American?							
How often do you interact with the Black/African-American individual that you know best?							

Note. Responses were multiplied to compute an index of overall amount of intergroup contact.

Intimacy of intergroup contact (Brown, Vivian, & Hewstone, 1999)

Directions: Please indicate how you would categorize your relationships *with the Black/African-American individual that you know best*.

Casual Acquaintance	1	2	3	4	5	6	7	8	Close Friendship
Unfriendly	1	2	3	4	5	6	7	8	Friendly
Formal	1	2	3	4	5	6	7	8	Informal

Desired intergroup closeness (adapted from Johnson & Marini, 1998)

Directions: Please answer each of the questions below by indicating the desirability of each of the following scenarios.

1	2	3	4	5	6	7	8
Not at all desirable							Desirable
Living in an area where most of the neighbors are Black/African-American.							
Attending a university where most of the student body was Black/African-American.							
Having a job where most of the employees are Black/African-American.							

Allophilia scale (Pittinsky, Rosenthal, & Montoya, 2011)

Directions: Read each of the following statements and indicate your level of agreement.

1	2	3	4	5	6	7
Strongly disagree	Disagree	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree	Strongly agree
In general, I have positive attitudes about Black/African Americans. [a]						
I respect Black/African Americans. [a]						
I like Black/African Americans. [a]						
I feel positively towards Black/African Americans.[a]						
I am at ease around Blacks/African Americans. [b]						
I am comfortable when I hang out with Blacks/African Americans. [b]						
I feel like I can be myself around Blacks/African Americans. [b]						
I feel a sense of belonging with Blacks/African Americans. [c]						
I feel a kinship with Blacks/African Americans. [c]						
I would like to be more like Blacks/African Americans. [c]						
I am truly interested in understanding the points of view of Blacks/African Americans. [d]						
I am motivated to get to know Black/African Americans. [d]						

To enrich my life, I would try and make more friends who are Blacks/African Americans. [d]

I am interested in hearing about the experiences of Blacks/African Americans. [d]

Note. Superscripts indicate the subscale associated with each item (a = affection, b = comfort, c = kinship, d = engagement).

Modern racism scale (adapted from McConahay, 1986)

Directions: Please indicate your level of agreement with each of the following statements below.

1	2	3	4	5	6	7
Not at all						Extremely

Over the past few years, African Americans have gotten more economically than they deserve.

Over the past few years, the government and news media have shown more respect for African Americans than they deserve.

It is easy to understand the anger of African Americans people in America. (R) [†]

Discrimination against African Americans is no longer a problem in the United States.

African Americans are getting too demanding in their push for equal rights.

African Americans should not push themselves where they are not wanted.

Note. [†]Item dropped from scale due to low inter-item reliabilities (all $r < .15$).

System justification scale (Kay & Jost, 2003)

Directions: Please read each statement carefully and indicate your level of agreement

1	2	3	4	5	6	7
Strongly disagree	Disagree	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree	Strongly agree

In general, you find society to be fair.

In general, the American political system operates as it should.

American society needs to be radically restructured. (R)

The United States is the best country in the world to live in.

Most policies serve the greater good.

Everyone has a fair shot at wealth and happiness.

Our society is getting worse every year. (R)

Society is set up so that people usually get what they deserve.

Note. (R) denotes a reverse-scored item.

Attitude certainty scale (Newheiser, Tausch, Dovidio, & Hewstone, 2003)

Directions: Please read each statement carefully and indicate your level of agreement

1	2	3	4	5	6	7
Not at all						Extremely

How certain are you in your attitudes towards African American individuals?

How sure are you that your opinion about African American people is correct?

How accurate do you think your opinion about African American individuals is?

References

Abelson, R. P. (1988). Conviction. *American Psychologist, 43,* 267-275.

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* London: Sage.

Barnett, V., & Lewis, T. (1978). *Outliers in statistical data*. New York: Wiley.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173-1182.

Bassili, J. N. (1993). Response latency versus certainty as indexes of the strength of voting intentions in a CATI survey. *Public Opinion Quarterly, 57,* 54-61.

Bassili, J. N. (1996). Meta-judgmental versus operative indexes of psychological attributes: The case of measures of attitude strength. *Journal of Personality and Social Psychology, 71,* 637-653.

Bassili, J. N. (2008). Attitude strength. In W. D. Crano & R. Prislin (Eds.), *Attitudes and attitude change* (pp. 237-260). New York, NY: Taylor & Francis Group.

Bassili, J. N., & Krosnick, J. A. (2000). Do strength-related attitude properties determine susceptibility to response effects? New evidence from response latency, attitude extremity, and aggregate indices. *Political Psychology, 21,* 107-132.

Bastian, B., Loughnan, S., & Koval, P. (2011). Essentialist beliefs predict automatic motor-responses to social categories. *Group Processes and Intergroup Relations, 14,* 559-567.

Bentler, P. M., & Kano, Y. (1990). On the equivalence of factors and components. *Multivariate Behavioral Research, 25,* 67-74.

Bernstein, M. J., Sacco, D. F., Young, S. G., Hugenberg, K., & Cook, E. (2010). Being "in" with the in-crowd: The effects of social exclusion and inclusion are enhanced by the perceived essentialism of ingroups and outgroups. *Personality and Social Psychology Bulletin, 36,* 999-1009.

Bollen, K. A. (1989). *Structural models with latent variables*. New York: Wiley.

Boysen, G. A., & Vogel, D. L. (2007).Biased assimilation and attitude polarization in response to learning about biological explanations of homosexuality. *Sex Roles, 57,* 755-762.

Brown, R., Vivian, J., & Hewstone, M. (1999). Changing attitudes through intergroup contact: The effects of group membership salience. *European Journal of Social Psychology, 29,* 741-764.

Bryant, F. B., & Satorra, A. (2012). Principles and practice of scaled difference chi-square testing. *Structural Equation Modeling, 19,* 372-398.

Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science, 6,* 3-5.

Campbell, D. T. (1960). Recommendation for APA test standards regarding construct, trait, or discriminant validity. *The American Psychologist, 15,* 546-553.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56,* 81-105.

Caspi, A., & Roberts, B. W. (2001). Personality development across the life course: The argument for change and continuity. *Psychological Inquiry, 12*, 49-66.

Cohen, J. (1990). A power primer. *Psychological Bulletin, 112*, 155-159.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Condit, C. M, Parrott, R. L, Bates, B. R., Bevan, J. L., &Achter, P. J. (2004). Exploration of the impact of messages about genes and race on lay attitudes. *Clinical Genetics, 66*, 402-408.

Costello, A., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*, 1-9.

Courville, T., & Thompson, B. (2001). Use of structure coefficients in published multiple regression articles: β is not enough. *Educational and Psychological Measurement, 61*, 229-248.

Cronbach, L. J. (1987). Statistical tests for moderator variables: Flaws in analyses recently proposed. *Psychological Bulletin, 102*, 414-417.

D'Agostino, R. B., & Pearson, E. S. (1973).Testing for departures from normality: Fuller empirical results for the distribution of b_2 and $\sqrt{b_1}$.*Biometrika, 60*, 613-622.

Dar-Nimrod, I., & Heine, S. J. (2011). Genetic essentialism: On the deceptive determinism of DNA. *Psychological Bulletin, 137*, 800-818.

DeCarlo, L. T. (2012, April). DeCarlo homepage. Retrieved February 3, 2013 from http://www.columbia.edu/~ld208/

Devine, P. G., Plant, E. A., Amodio, D. M., Harmon-Jones, E., & Vance, S. L. (2002). The regulation of explicit and implicit race bias: The role of motivations to respond without prejudice. *Journal of Personality and Social Psychology, 82*, 835-848.

DiStephano, C. & Hess, B. (2005). Using confirmatory factor analysis for construct validation: An empirical review. *Journal of Psychoeducational Assessment, 23*, 225-241.

Dubriwny, T. N., Bates, B. R., & Bevan, J. L. (2004). Lay understandings of race: Cultural and genetic definitions. *Community Genetics, 7*, 185-195.

Dunton, B. C., & Fazio, R. H. (1997).An individual difference measure of motivation to control prejudiced reactions. *Personality and Social Psychology Bulletin, 23,* 316-326.

Edwards, J. (2008). Seven deadly myths of testing moderation in organizational research. In C. E. Lance & R. J. Vandenberg (Eds.), *Statistical and methodological myths and urban legends: Received doctrine, veracity, and fable in the organizational and social sciences*. (pp. 145-166). New York: Routledge.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999).Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*, 272-299.

Gaither, S. E., Sommers, S. R., & Ambady, N. (2013). When the half affects the whole: Priming identity for biracial individuals. *Journal of Experimental Psychology, 49*, 368-371.

Glasgow, J., Shulman, J. L., & Covarrubias, E. G. (2009). The ordinary conception of race in the United States and its relation to racial attitudes: A new approach. *Journal of Cognition and Culture, 9,* 15-38.

Gross, S. R., Holtz, R., & Miller, N. (1995). Attitude certainty. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 215-246). Mahwah, NJ: Lawrence Erlbaum Associates.

Haslam, N., Rothschild, L., & Ernst, D. (2000). Essentialist beliefs about social categories. *British Journal of Social Psychology, 39,* 113-127.

Haslam, N., Rothschild, L., & Ernst, D. (2002). Are essentialist beliefs associated with prejudice? *British Journal of Social Psychology, 41,* 87-100.

Haslam, N., & Whelan, J. (2008). Human natures: Psychological essentialism in thinking about differences between people. *Social and Personality Psychology Compass, 2*, 1297-1312.

Hayes, A. F., & Matthes, J. (2009). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. *Behavior Research Methods, 41,* 924-936.

Heise, D. R. (1969). Separating reliability and stability in test-retest correlation. *American Sociological Review, 34*, 93-101.

Hendrickson, A. E., & White, P. O. (1964). Promax: A quick method for rotation to oblique simple structure. *British Journal of Statistical Psychology, 17,* 65-70.

Henry, P. J., & Sears, D. O. (2002). The Symbolic Racism 2000 Scale. *Political Psychology, 23*, 253-283.

Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published research: Common errors and some comment on improved practice. *Educational and Psychological Measurement, 66*, 393-416.

Hilton, J. L., & von Hippel, W. (1996). Stereotypes. *Annual Review of Psychology, 41*, 237-271.

Hitlin, S., Brown, J. S., & Elder, G. H. Jr. (2006). Racial self-categorization in adolescence: multiracial development and social pathways. *Child Development, 77*, 1298-1308.

Holland, R. W., Verplanken, B., & van Knippenberg, A. (2003). From repetition to conviction: Attitude accessibility as a determinant of attitude certainty. *Journal of Experimental Social Psychology, 39,* 594-601.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.

Humphreys, L. G. (1964). Number of cases and number of factors: An example where N is very large. *Educational and Psychological Measurement, 24*, 457.

Jaccard, J., Wan, C. K., & Turrisi, R. (1990). The detection and interpretation of interaction effects between continuous variables in multiple regression. *Multivariate Behavioral Research, 25*, 467-478.

Jackson, D. L., Gillaspy, J. A. Jr., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14*, 6-23.

Jackson, L. A., Sullivan, L. A., & Hodge, C. N. (1993). Stereotype effects on attributions, predictions, and evaluations: No two social judgments are quite alike. *Journal of Personality and Social Psychology, 65*, 69-84.

Jarque, C. M., & Bera, A. K. (1987).A test for normality of observations and regression residuals. *International Statistical Review, 55*, 163-172.

Jayaratne, T. E., Ybarra, O., Sheldon, J. P., Brown, T. N., Feldbaum, M., Pfeffer, C. A., & Petty, E. A. (2006). White Americans' genetic lay theories of race differences and sexual orientation: Their relationship with prejudice towards Blacks and gay men and lesbians. *Group Processes and Intergroup Relations, 9*, 77-94.

Johnson, M. K., & Marini, M. M. (1998). Bridging the racial divide in the United States: The effect of gender. *Social Psychology Quarterly, 61*, 247-258.

Johnson, R. A. & Wichern, D. W. (1992). *Applied multivariate statistical analysis* (3rd ed). Englewood Cliffs, NJ: Prentice-Hall.

Jöreskog, K. G. (1978). Structural analysis of covariance and correlation matrices. *Psychometrika, 43*, 443-477.

Judd, C. M., & Kenny, D. A. (2010). Data analysis in social psychology: Recent and recurring issues. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 115-139). New York, NY: Wiley.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20,* 141-151.

Kaiser, H. F. (1970). A second generation Little-Jiffy. *Psychometrika, 35,* 401-415.

Kay, A. C., Day, M. V., Zanna, M. P., & Nussbaum, A. D. (2013). The insidious (and ironic) effects of positive stereotypes. *Journal of Experimental Social Psychology, 49,* 287-291.

Kay, A. C., & Jost, J. T. (2003). Complementary justice: Effects of "poor but happy" and "poor but honest" stereotype exemplars on system justification and implicit activation of the justice motive. *Journal of Personality and Social Psychology, 85,* 823-837.

Kitchener, K. S. (1983). Cognition, metacognition, and epistemic cognition: A three-level model of cognitive processing. *Human Development, 26*, 222-232.

Koriat, A. (2011). Subjective confidence in perceptual judgments: A test of the self-consistency model. *Journal of Experimental Psychology, 140,* 117-139.

Kravitz, D. A., & Platania, J. (1993). Attitudes and beliefs about affirmative action: Effects of target and of respondent sex and ethnicity. *Journal of Applied Psychology, 78*, 928-938.

Krieger, N. (2005). Stormy weather: Race, gene expression, and the science of health disparities. *American Journal of Public Health, 95,* 2155-2160.

Krosnick, J. A., Boninger, D. S., Chuang, Y. C., Berent, M. K., & Carnot, C. G. (1993). Attitude strength: One construct or many related constructs? *Journal of Personality and Social Psychology 65,* 1132-1151.

Krosnick, J. A., & Petty, R. E. (1995). Attitude strength: An overview. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude Strength: Antecedents and Consequences* (pp. 1-24). Mahwah, NJ: Lawrence Erlbaum Associates.

Lambert, A. J., Payne, B. K., Ramsey, S., & Shaffer, L. M. (2005). On the predictive validity of implicit attitude measures: The moderating effect of perceived group variability. *Journal of Experimental Social Psychology, 41,* 114-128.

Lance, C. E., Butts, M. M., & Michels, L. C. (2006). The sources of four commonly reported cutoff criteria: What did they really say? *Organizational Research Methods, 9,* 202-220.

Lee, C. (2009). "Race" and "ethnicity" in biomedical research: How do scientists construct and explain differences in health. *Social Science and Medicine, 68,* 1183-1190.

Looney, S. W. (1995). How to use tests for univariate normality to assess multivariate normality. *The American Statistician, 49,* 64-701.

Lories, G., & Schelstraete, M. A. (1998). The feeling-of-knowing as a judgment. In V. Y. Yzerbyt, G. Lories, & B. Dardenne (Eds.), *Cognitive and social dimensions, metacognition* (pp. 53-68). London, Sage.

Lun, J., Sinclair, S., Whitchurch, E. R., & Glenn, C. (2007). (Why) do I think what you think? Epistemic social tuning and implicit prejudice. *Journal of Personality and Social Psychology, 93,* 957-972.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1,* 130-149.

Martin, C. L., & Parker, S. (1995). Folk theories about sex and race differences. *Personality and Social Psychology Bulletin, 21,* 45-57.

McConahay, J. B. (1983). Modern racism and modern discrimination: The effects of race, racial attitudes, and the context on simulated hiring decisions. *Personality and Social Psychology Bulletin, 9,* 551-558.

McCrae, R. R., & Costa, P. T. Jr. (1994). The stability of personality: Observations and evaluations. *Current Directions in Psychological Science, 3,* 173-175.

McDonald, R. P. (1999). *Test theory: A unified treatment.* Mahwah, NJ: Lawrence Erlbaum.

Morning, A. (2009). Toward a sociology of racial conceptualization for the 21st century. *Social Forces, 87,* 1167-1192.

Morning, A. (2011). *The Nature of Race: How Scientists Think and Teach About Human Difference.* CA: University of California Press.

Morris, J. H., Sherman, J. D., & Mansfield, E. R. (1986). Failures to detect moderating effects with ordinary least squares-moderated multiple regression: Some reasons and a remedy. *Psychological Bulletin, 99,* 282-288.

Mote, T. A. (1970). An artifact of the rotation of too few factors: Study orientation vs. trait anxiety. *Revista Interamericana de Psicologia, 37,* 61-91.

Muthén, L. K., & Muthén, B. O. (2011). *Mplus user's guide,* (6th ed.). Los Angeles, CA: Muthén & Muthén.

Neel, R., & Shapiro, J. R. (2012). Is racial bias malleable? Whites' lay theories of racial bias predict divergent strategies for interracial interractions. *Journal of Personality and Social Psychology, 103,* 101-120.

Newheiser, A. K., Tausch, N., Dovidio, J. F., & Hewstone, M. (2009). Entitativity and prejudice: Examining their relationships and the moderating effect of attitude certainty. *Journal of Experimental Social Psychology, 45,* 920-926.

No, S., Hong, Y., Liao, H., Lee, K., Wood., D., & Chao, M. M. (2008). Lay theory of race affects and moderates Asian American's responses towards American culture. *Journal of Personality and Social Psychology, 95,* 991-1004.

Nunnally, J. (1978). *Psychometric Theory*. New York, NY: McGraw-Hill.

Nunnally, J., & Bernstein, I. (1994). *Psychometric Theory.* US: McGraw-Hill Humanities.

Oppenheimer, D. M., Meyvis, T., & Davidenko, N. (2009). Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology, 45,* 867-872.

Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on Amazon mechanical turk. *Judgment and Decision Making, 5,* 411-419.

Park, B., & Judd, C. M. (1990). Measures and models of perceived group variability. *Journal of Personality and Social Psychology, 59*, 173-191.

Pauker, K., Ambady, N., & Apfelbaum, E. P. (2010). Race salience and essentialist thinking in racial stereotype development. *Child Development, 81*, 1799-1813.

Paulus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of Personality and Social Psychological Attitudes* (pp. 17-59). San Diego, CA: Academic Press.

Petrocelli, J. V., Tormala, Z. L., & Rucker, D. D. (2007). Unpacking attitude certainty: Attitude clarity and attitude correctness. *Journal of Personality and Social Psychology, 92*, 30-41.

Petty, R. E., Briñol, P, & DeMarree, K. G. (2007). The meta-cognitive model (MCM) of attitudes: Implications for attitude measurement, change, and strength. *Social Cognition, 25*, 657-686.

Pittinsky, T. L., Rosenthal., S. A., & Montoya, R. M. (2011). Measuring positive attitudes toward outgroups: Development and validation of the Allophilia scale. In L. R. Tropp & R. K. Mallett (Eds.), *Beyond prejudice reduction: Pathways to positive intergroup relations* (pp.41-60). Washington, DC: American Psychological Association.

Plant, E. A., & Devine, P. G. (1998). Internal and external motivation to respond without prejudice. *Journal of Personality and Social Psychology, 75*, 811-832.

Powell, M. C., & Fazio, R. H. (1984). Attitude accessibility as a function of repeated attitude expression. *Personality and Social Psychology Bulletin, 10*, 139-148.

Prentice, D. A., & Miller, D. T. (2007). Psychological essentialism in human categories. *Current Directions in Psychological Science, 16*, 202-206.

Rangel, U., & Keller, J. (2011). Essentialism goes social: Belief in social determinism as a component of psychological essentialism. *Journal of Personality and Social Psychology, 100*, 1056-1078.

Ratcliff, R. (1993). Methods for dealing with reaction time outliers. *Psychological Bulletin, 114*, 510-532.

Roberts, B. W., Caspi, A., & Moffitt, T. E. (2001). The kids are alright: Growth and stability in personality development from adolescence to adulthood. *Journal of Personality and Social Psychology, 81*, 670-683.

Rosner, J. L., & Hong, Y.-Y. (2010). Lay theories of racial differences make a difference. *Psychological Inquiry, 21*, 160-163.

Rucker, D. D., & Petty, R. E. (2004).When resistance is futile: Consequences of failed counterarguing for attitude certainty. *Journal of Personality and Social Psychology, 86*, 219-235.

Russell, D. W. (2002). In search of underlying dimensions: The use (and abuse) of factor analysis in Personality and Social Psychology Bulletin. *Personality and Social Psychology Bulletin, 28*, 1629-1646.

Ryan, C. S., Bogart, L. M., & Vender, J. P (2000). Effects of perceived group variability on the gathering of information about individual group members. *Journal of Experimental Social Psychology, 36*, 90-101.

Sanchez, D. T.., Shih, M., & Garcia, J. A. (2009). Juggling multiple racial identities: Malleable racial identification and psychological well-being. *Cultural Diversity and Ethnic Minority Psychology, 15*, 243-254.

Satorra, A. & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika, 66*, 507-514.

Shulman, J. L., & Glasgow, J. (2010). Is race-thinking biological or social, and does it matter for racism? An exploratory study. *Journal of Social Philosophy, 41*, 244-259.

Sinclair, S., Lowery, B. S., Hardin, C. D., & Colangelo, A. (2005). Social tuning of automatic racial attitudes: The role of affiliative motivation. *Journal of Personality and Social Psychology, 89*, 583-592.

Smedley, A., & Smedley, B. D. (2005). Race as biology is fiction, racism as a social problem is real: Anthropological and historical perspectives on the social construction of race. *American Psychologist, 60*, 16-26.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52*, 613-629.

Tadmor, C. T., Hong, Y. –Y., Chao, M. M., Wiruchnipawan, F., & Wang, W. (2012). Multicultural experiences reduce intergroup bias through epistemic unfreezing. *Journal of Personality and Social Psychology, 103*, 750-772.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis*. Washington, DC: American Psychological Association.

Tormala, Z. L., & Petty, R. E. (2002). What doesn't kill me makes me stronger: The effects of resisting persuasion on attitude certainty. *Journal of Personality and Social Psychology, 83,* 1298-1313.

Tormala, Z. L., & Rucker, D. D. (2007). Attitude certainty: A review of past findings and emerging perspectives. *Social and Personality Psychology Compass, 1,* 469-492.

Velicer, W. F., & Jackson, D. N. (1990). Component analysis versus common factor-analysis: Some further observations. *Multivariate Behavioral Research, 25*, 97-114.

Verkuyten, M., & Brug, P. (2004). Multiculturalism and group status: The role of ethnic identification, group essentialism and protestant ethic. *European Journal of Social Psychology, 34,* 647-661.

Visser, P. S., & Holbrook, A. L. (2012). Metacognitive determinants of attitude strength. In P. Briñol, & K. G. DeMarree (Eds.), *Social metacognition* (pp. 21-41). New York, NY: Taylor & Francis Group.

Visser, P. S., Krosnick, J. A., & Simmons, J. P. (2003). Distinguishing the cognitive and behavioral consequences of attitude importance and certainty: A new approach to testing the common-factor hypothesis. *Journal of Experimental Social Psychology, 39,* 118-141.

Williams, J. E. (2011). They say it's in the genes: Decoding racial ideologies in genomics. *Journal of Contemporary Ethnography, 40,* 550-581.

Williams, M. J., Eberhardt, J. L. (2008). Biological conceptions of race and the motivation to cross racial boundaries. *Journal of Personality and Social Psychology, 94*, 1033-1047.

Young, A. I., & Fazio, R. H. (2013). Attitude accessibility as a determinant of object construal and evaluation. *Journal of Experimental Social Psychology, 49,* 404-418.

Zwick, W. R., & Velicer, W. F. (1986). Factors influencing five rules for determining the number of components to retain. *Psychological Bulletin, 99*, 432-442.