

Implicit Self-Criminal Cognition and Its Relation to Criminal Behavior

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Three studies adopted implicit social cognition theory and methodology to understand criminal cognition outside of conscious awareness or control, specifically by testing whether individual differences in implicit associations between the self and the group criminals are related to criminal behavior. A Single Category Implicit Association Test measured self-criminal associations across 3 adult samples—2 from Newark, New Jersey, a high-crime United States city, and an adult national sample from the United States. Then, all participants reported their criminal behavior in 2 cross-sectional design studies and 1 longitudinal design study. Consistent with an additive model of implicit and explicit cognition, studies generally demonstrated that strong implicit self-criminal associations increased the odds of committing a criminal act, even after accounting for explicit self-criminal cognition, past criminal behavior, and/or criminal-related demographics. This research suggests that implicit self-criminal associations serve as a cognitive marker for criminal behavior. Furthermore, the present research calls into question criminal justice policies and practices that assume that criminal behavior is exclusively driven by criminal intent.

Public Significance Statement

Three studies demonstrate that strong implicit self-criminal cognitive associations are linked to criminal behavior, even after controlling for the roles of explicit self-criminal cognition and criminal-related demographics. This research suggests that criminal cognition outside of conscious awareness or conscious control may be a cognitive marker for criminal behavior. Furthermore, it challenges the law and criminal justice policy and practice assumption that offenders know and control the causes of their behavior, thus suggesting that implicit social cognition should be considered in public discussions about criminal justice reform.

Keywords: criminal identity, implicit social cognition, criminal justice system

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The size of the correctional population in the United States is staggering. In 2013, nearly 6.9 million or approximately 1 in 35 adults were under correctional supervision, including 4.75 million on pro-

bation or parole and 2.22 million in prison or local jail on any given day (Glaze & Kaeble, 2014). These millions and all others formerly under supervision represent individuals in the criminal justice system. Factors ranging from social structural at the macro level to genetic at the micro level have been proposed to understand criminal acts (Elliot, 2000; Garnefski & Okma, 1996). Within the range of explanatory factors, the psychological construct of criminal identity is thought to be one of the drivers of criminal behavior, and the shedding or replacement of a criminal identity is believed to be necessary for long-term desistance (Hochstetler, Copes, & Williams, 2010). Although qualitative studies in the criminology literature describe how criminals think about their identity with other criminals and criminal-related characteristics (Brezina & Topalli, 2012; Little, 1990; Shover, 1996), these investigations are limited to criminals' ability to introspect about and willingness to self-report their criminal cognition.¹

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The data are available at <http://re3data.org/>

The experiment materials are available at <http://re3data.org/>

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¹ The term “criminal” broadly refers to individuals who may have committed a crime and who may have or have not interacted with the criminal justice system, as well as those who have not a committed crime but have interacted with the criminal justice system.

Relying on introspection is limiting because individuals may not be fully aware of the potential impact of committing a criminal act on their self-concept (see Schnabel & Asendorf, 2010). Equally important, relying on the willingness to self-report may be problematic because being a criminal is generally stigmatized in the United States and thus individuals who commit a criminal act may be motivated to minimize or distance themselves from a stigmatized group like criminals (Goffman, 1963; also see Quinn, 2006).

Given the previous limitations, the present research adopts implicit social cognition theory and methodology (Gawronski & Payne, 2010) to better understand criminal cognition and its link to criminal behavior. Applying the research on implicit self and identity cognitive processes to the present research (Devos & Banaji, 2003; Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002), an implicit criminal identity is the association between the mental representations of the self-concept and of criminality that exists outside of conscious awareness or control. Because criminal as an identity is stigmatized, self-criminal cognitive associations linked to criminal behavior may be more difficult to capture if researchers rely only on introspection and willingness to self-report; thus, self-criminal associations that operate implicitly may be a more valid and stronger cognitive marker of criminal behavior than explicit self-criminal associations. The present research is the first test, to our knowledge, of the relation between implicit self-criminal associations and criminal behavior above and beyond any role of explicit self-criminal associations (and after accounting for criminality-related demographics).

Implicit Self-Criminal Associations and Their Relation to Criminal Behavior

A fundamental hypothesis stemming from the self and identity literature is that individuals' behavioral actions can be mentally represented in the memories they hold about their self-concept (Oyserman, Elmore, & Smith, 2012; Swann & Bosson, 2010). This hypothesis suggests that individuals who commit a criminal act should develop a mental association between their self-concept and criminality (Veysey & Rivera, 2017). Moreover, self-criminal associations might serve to promote and maintain future criminal acts (see Major & O'Brien, 2005). The hypothesized link between the criminal self and identity and criminal acts is theoretically consistent with the criminology literature (Brezina & Topalli, 2012; Little, 1990; Shover, 1996), but it is not reliably supported by empirical investigations (Veysey & Rivera, 2017).

A challenge to empirically demonstrating the relation between self-criminal cognition and criminal behavior is that criminality is stigmatized (Moore, Stuewig, & Tangney, 2016). Although individuals are capable of acknowledging engaging in a behavior defined as an illegal act (e.g., driving under the influence, stealing from work; Saad, Veysey, & Rivera, 2018), they may distance their self-concept from such behaviors because they wish to influence others' impressions of them (see Mills & Kroner, 2006) and/or protect their self-image from internalizing stigmatized attitudes (Lemert, 1974).

To understand the criminal cognition and behavior relation, we adopt implicit social cognition theories (for reviews, see Gawronski & Payne, 2010). Implicit social cognition theories generally hypothesize that mental representations about the self are shaped by (a) implicit processes that operate outside of individuals' con-

scious awareness and (b) explicit processes that are rooted in introspection and motivational control (Devos & Banaji, 2003; Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002). Furthermore, implicit social cognition theories and evidence suggest that implicit social cognition might have greater explanatory utility than explicit social cognition in stigmatized and socially sensitive domains (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). This may be the case because measures of implicit social cognition appear to be better at capturing cognition about stigma existing outside of conscious awareness or that individuals are unable to introspect on or unwilling to self-report.

The current research adopts an implicit social cognition additive model in which implicit versus explicit social cognition distinctly explains variance in behavioral outcomes (Perugini & Banse, 2007; Perugini, Richetin, & Zogmaister, 2010). Specifically, an additive model would examine the specific contribution of a measure of implicit self-criminal associations in terms of its incremental validity over a measure of explicit self-criminal associations in explaining variation in criminal behavior. This work would be consistent with emerging evidence on implicit identity research as well as past additive model studies on the self-concept (e.g., Asendorpf, Banse, & Mücke, 2002; Schnabel, Banse, & Asendorpf, 2006; for a review, see Perugini et al., 2010).

We use a single-category version of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998; Karpinski & Steinman, 2006), a well-known measure of implicit social cognition, to assess individual differences in the strength of associations between the self-concept and the group criminals outside of conscious awareness and control. The IAT was initially established to measure automatic associations underlying stereotyped attitudes, specifically group and individual differences in racism (e.g., Greenwald et al., 1998), homophobia (e.g., Dasgupta & Rivera, 2006, 2008; Rivera & Dasgupta, 2018), and sexism (e.g., Rudman & Kilianski, 2000). Meta-analyses and large national sample IAT studies (e.g., Greenwald et al., 2009; Nosek, Banaji, & Greenwald, 2002) demonstrate that, on average, IAT-measured stereotyped attitudes show stronger effects (e.g., higher levels of stereotyping and prejudice) than do self-reported stereotyped attitudes, and perhaps more importantly, that individual differences in stereotyped attitudes measured with an IAT have *stronger* utility in predicting behavioral outcomes (e.g., discrimination) than do individual differences in self-reported stereotyped attitudes. These results suggest that to the extent that individuals are not consciously aware of their biases in memory and/or that they wish to consciously control their self-reported biases, an "implicit measure" of stereotyped attitudes such as the IAT should be better at revealing biases than a traditional self-report measure of stereotyped attitudes.

Past research has used the IAT to measure the automatic associations underlying the self-concept and groups—that is, an implicit identification with a group and its attributes (Rivera & Veysey, 2015; Sachs, Veysey, & Rivera, 2018; Veysey & Rivera, 2017; also see Devos & Banaji, 2003). Emerging evidence appears to parallel the previous IAT research on stereotyped attitudes—studies measuring automatic associations between the self-concept and a group category demonstrate that IAT-measured individual differences in implicit self-group associations have unique utility in explaining behavioral outcomes above and beyond those of

self-reported individual differences in explicit self-group associations.

The present research examines the relation between individual differences in implicit self-criminal cognition and criminal behavior, which we define as committing an act prohibited by law and punishable by the state. Although criminal behavior varies considerably from minor to major offenses, we anticipated participants would be able to recall such offenses and, under research conditions of confidentiality and anonymity, be willing to share their experiences. The previously mentioned review suggests that individuals who have committed a criminal behavior may not be able (or less able) to introspect or motivated to report the relation between criminal behavior and its centrality to their criminal-related self and identity beliefs. Thus, our main hypothesis is that implicit self-criminal cognition is likely to be a stronger cognitive marker of criminal behavior than explicit self-criminal cognition.

Study 1

Study 1 developed an IAT to measure individual differences in implicit self-criminal associations. Our primary goal was to test whether strong implicit self-criminal associations are related to criminal behavior using an adult community sample from Newark, New Jersey. Newark has one of the highest crime rates in the United States and is often ranked as one of the country's most dangerous cities (Federal Bureau of Investigation, 2016). According to the Federal Bureau of Investigation (2016), Newark's 2014 rates of both violent and nonviolent crimes outpaced every other major city in the state of New Jersey. Given its high-crime profile, Newark is an ideal geographical area to provide an initial test of our hypothesis because a relatively high proportion of its citizens should have past experiences with criminal behavior, which is central to testing our main hypothesis between such behavior and implicit self-criminal cognition. We expected to find support for this relation above and beyond the role of explicit self-criminal cognition and after controlling for criminal-related demographics such as socioeconomic status.

Method

Participants. A community sample of 106 adults from Newark, New Jersey was recruited through flyers posted at local businesses and community colleges to participate in a study on "identity and experiences" in exchange for \$20. Table 1 reports participants' demographics. In summary, participants' average age was 33.46 years ($SD = 13.75$), most identified as male (51.9%), half as African American/Black (50%) and unemployed (50%), and most frequently (18.9%) came from households with a family income in the \$0–\$10,000 range. All research reported across the three studies in this article was approved by the Rutgers University Institutional Review Board, and all data sets are available at the Open Science Framework (<https://osf.io/856cs/>).

Measurements.

Implicit self-criminal associations. A Single Category Implicit Association Test (SC-IAT; Karpinski & Steinman, 2006) was administered to measure individual differences in response time to pairing the self (vs. others) with the group criminals. The SC-IAT, modified from the original IAT (Greenwald et al., 1998), is particularly useful when a single mental concept has no clear

Table 1
Study 1: Sample Demographics ($N = 106$)

Variable	
Age (mean years)	33.46 (13.75)
Gender	
Male	51.9
Female	47.2
Other	.9
Ethnicity/race	
African American/Black	50.0
Hispanic/Latino	17.9
Asian or Pacific Islander	7.5
Multiracial	5.7
Native American	1.9
White	15.1
Other	1.9
Employment status	
Unemployed	50.0
20 hr or less	24.5
21–30 hr	12.3
31–40 hr	9.4
41 hr or more	3.8
Household/family income	
\$0–\$10,000	18.9
\$10,001–\$20,000	10.4
\$20,001–\$30,000	17.9
\$30,001–\$40,000	12.3
\$40,001–\$50,000	7.5
\$50,001–\$60,000	4.7
\$60,001–\$70,000	4.7
\$70,001–\$80,000	5.7
\$80,001–\$90,000	1.9
\$90,001–\$100,000	2.8
\$100,001 or more	13.2

Note. Values represent percentages, unless otherwise noted in parentheses after variable. For means, SD s are in parentheses.

comparison, such as is the case with the group criminals. Procedurally, semantic stimuli representing the self (*I, me, my, mine, self*), others (*they, them, their, theirs, others*), and criminal (*criminal, felon, lawbreaker, offender, convict, delinquent, prisoner*) randomly appeared one after the other centered on the computer screen. The seven criminality words, along with a set of words unrelated to criminal (*hypocrite, snob, coward, jerk, idiot, fool, loser*), were pretested with a separate adult sample ($N = 48$) that rated the words on a 7-point scale from "not at all related to criminality" to "completely related to criminality." We first averaged the ratings across all participants for each word related and unrelated to criminality and then submitted the ratings to a paired-samples t test. On average, the ratings of the seven criminal-related stimuli ($M = 6.17$, $SD = .45$) were significantly higher than those of the criminal-unrelated stimuli ($M = 3.16$, $SD = .20$), $t(6) = 17.70$, $p < .001$, $d = 8.64$.

On the computer screen, category labels were appropriately and randomly positioned on the top left and top right sides of the screen. For one block of trials, participants were instructed to use the "A" key to classify "self" and "criminal" words and the "K" key to classify "other" words (i.e., "self + criminal" trials). In the other block of trials, the key assignment was reversed—participants used the "A" key to classify "self" and the "K" key to classify "other" and "criminal" words ("other + criminal" trials). The order of the two tasks was counterbalanced between-

participants. For each block, participants first read a set of instructions and then completed 17 practice trials followed by 68 critical trials. For each trial, the target word remained on the screen until participants responded but not longer than 1,500 ms. If participants failed to respond within 1,500 ms, a reminder to "Please respond more quickly!" appeared for 500 ms. Following each response, participants were given feedback regarding the accuracy of their response. A green O in the center of the screen for 150 ms followed correct responses (e.g., classified "I" as a "self" word); a red X in the center of the screen for 150 ms followed incorrect responses (e.g., classified "them" as a "self" word).

The SC-IAT was scored in accordance with past procedures (Greenwald, Nosek, & Banaji, 2003; Karpinski & Steinman, 2006). The IAT in general is a measure of relative associations (presently, self-criminal associations relative to other-criminal associations), so its scoring is a function of the difference between reaction times (RTs) to categories simultaneously paired on the computer screen. Although some have raised concerns about difference scores, the approach continues to be well accepted (Richtin, Costantini, Perugini, & Schönbrodt, 2015). The SC-IAT score in the present research is the difference in standardized RTs between the self + criminal and other + criminal trials. Therefore, relatively high SC-IAT score indicates faster RTs when self stimuli were paired with criminal stimuli than when other stimuli were paired with criminal stimuli. In other words, higher SC-IAT scores mean relatively strong self-criminal mental associations.

Explicit self-criminal associations. Participants reported the extent to which they associated themselves with the seven criminal words in the SC-IAT on a 7-point scale ranging from "not all characteristic of me" to "extremely characteristic of me." Higher scores indicate relatively strong explicit self-criminal associations. As part of this measure, participants also rated themselves on the seven words unrelated to criminal described in the Implicit Self-Criminal Associations section. An Analysis of Variance (ANOVA) showed that noncriminal ratings did not vary as a function of criminal behavior, $F(1, 104) = .10, p = .78$, so they are no longer discussed.

Criminal behavior. Criminal behavior is defined as an act prohibited by law and can be punished by the state (Andrews & Bonta, 2015). Consistent with this definition and our past research (Rivera & Veysey, 2015; Veysey & Rivera, 2017), we measured criminal behavior as committing an act at any time for which an individual was arrested, convicted, and/or incarcerated. Participants who responded affirmatively to any of these three categories proceeded to describe their experience. Participants identified as

having no criminal behavior participation were those who reported never having been arrested, convicted, or incarcerated.

Demographics. Participants completed a demographics and background questionnaire that included age, gender, ethnicity/race, employment status, and household/family income. Age (continuous) was an open-ended question and was measured in years. The remaining variables were categorical, and each of their response options and values are described in Table 1 (e.g., participants' options to indicate their "gender" were *male, female, other*).

Procedure. A female research assistant informed participants that the study was examining "people's identity and experiences." In a private room, participants completed the measures of implicit and explicit self-criminal associations, a demographics questionnaire, and the measure of criminal behavior (in this order). Finally, they were fully debriefed and remunerated.

Results

General plan of analyses. Across all studies, we used hierarchical logistic regression analysis to test the hypothesized relation between implicit self-criminal associations and criminal behavior above and beyond explicit criminal cognition factors and controlling for criminality-related demographics. Because individuals who are young, identify as African American/Black and Hispanic, from low socioeconomic status, and are men have a higher likelihood of engaging in criminal behavior and/or involved in the criminal justice system (for a review, see South & Messner, 2000), we statistically controlled for age, ethnicity/race (1 = *African American/Black and Hispanics*; 0 = *all others*), employment status, income, and gender. For gender, participants who identified as "other gender" were nominal ($n = 1$ in Studies 1 and 3), so gender was coded (1 = *male*; 0 = *female, other*) to facilitate the interpretation of the logistic regression. All demographic control variables were entered in the first step of the regression, explicit self-criminal association scores were entered in the second step, and finally implicit self-criminal associations scores as measured with the SC-IAT were entered in the third step. The criterion measure was always criminal behavior (1 = *engaged in criminal behavior*; 0 = *did not engage in criminal behavior*).

Are implicit self-criminal associations related to criminal behavior? Table 2 reports the zero-order correlations among all control and predictor variables and Table 3 provides a summary of the hierarchical logistic regression analysis. Forty-one participants (38.7%) reported engaging in a criminal behavior. When the demographic covariates were simultaneously entered into the re-

Table 2
Study 1: Zero-Order Correlations Among Variables ($N = 106$)

Variable	1	2	3	4	5	6	7
1. Age	—						
2. Gender	-.09	—					
3. Ethnicity/race	.36***	.14	—				
4. Employment status	-.16	.08	.06	—			
5. Household/family income	-.44	.04	-.26**	.26**	—		
6. Explicit self-criminal associations	.02	-.10	-.08	-.08	-.15	—	
7. Implicit self-criminal associations	.18*	.06	.08	.02	-.12	.07	—

* $p < .07$. ** $p < .01$. *** $p < .001$.

Table 3
 Study 1: Hierarchical Logistic Regression Analysis Predicting Criminal Behavior ($N = 106$)

Step and variable	<i>B</i>	<i>SE</i>	Wald statistic	Odds ratio	χ^2
Step 1					22.52***
Age	.04	.02	3.25	1.04*	
Gender	.99	.46	4.72	2.69**	
Employment status	-.17	.21	.68	.84	
Ethnicity/race	-.74	.56	1.75	.48	
Household/family income	-.16	.08	4.01	.85**	
Step 2					27.69***
Age	.05	.02	4.45	1.05**	
Gender	1.00	.55	3.31	2.71*	
Employment status	-.22	.25	.79	.81	
Ethnicity/race	-.54	.68	.64	.58	
Household/family income	-.15	.09	2.56	.86	
Explicit self-criminal associations	1.23	.33	13.91	3.41***	
Step 3					6.42**
Age	.04	.02	2.98	1.04*	
Gender	1.09	.58	3.52	2.98*	
Employment status	-.25	.26	.95	.78	
Ethnicity/race	-.57	.70	.67	.57	
Household/family income	-.15	.10	2.39	.86	
Explicit self-criminal associations	1.28	.34	13.95	3.59***	
Implicit self-criminal associations	2.25	1.14	3.85	9.50**	

* $p \leq .08$. ** $p < .05$. *** $p < .01$.

gression, older, male, and lower income participants were more likely than younger, female, and higher income participants, respectively, to have engaged in criminal behavior. Furthermore, after controlling for demographic variables, participants with stronger explicit self-criminal associations were more likely to have engaged in criminal behavior than participants with weaker (or no) explicit self-criminal associations. Finally, after controlling for demographic and explicit criminal cognition factors, individual differences in SC-IAT-measured implicit self-criminal associations were related to criminal behavior, $\chi^2(1, N = 106) = 6.38$, $p < .05$. Logistic regression analyses showed that participants with strong implicit self-criminal associations (or a 1 *SD* increase in SC-IAT scores) were associated with an approximately 8.96-fold, 95% confidence interval (CI) [1.02, 78.63], increase in the odds of being arrested, incarcerated, and/or imprisoned, and this is above and beyond the criminal behavioral odds associated with explicit self-criminal associations (3.46, 95% CI [1.82, 6.57]).

Study 2: Cross-Sectional

Study 1 provided the first evidence of an implicit cognition marker for criminal behavior and demonstrated the SC-IAT's utility as a measure of implicit self-criminal cognition to predict criminal behaviors above and beyond explicit criminal cognition and after controlling for criminal-related demographics. This evidence emerged within an adult community sample from Newark, New Jersey, a city with one of the highest crime rates nationally. One might argue that Newark residents are expected to show a relatively strong relation between implicit self-criminal cognition and criminal behavior because they are in fact frequently exposed to crime in their neighborhoods. Perhaps a more rigorous test of our hypothesis would be with a sample of individuals who, unlike Newark residents, vary considerably in their exposure to crime. Thus, the main goal of Study 2 was to recruit a national sample to

replicate the finding that strong implicit self-criminal associations are related to a higher likelihood of participating in criminal behavior above and beyond explicit self-criminal associations, and after controlling for exposure to neighborhood crime and other criminal-related demographics.

Method

Participants. For Study 2, we followed Faul, Erdfelder, Buchner, and Lang (2009) and Faul, Erdfelder, Lang, and Buchner (2007) G*Power guidelines to calculate an a priori power analysis. Analysis set at a medium effect size (based on Study 1), alpha of 0.05, power of 0.80, and two main predictors (implicit and explicit criminal identities) yielded a sample size of 68. We recruited 109 adults from across the United States through Amazon Mechanical Turk, an online workforce of over 100,000 people who receive nominal monetary remuneration for completing tasks posted online such as research studies (Pontin, 2007). Mechanical Turk participants are more representative of a national sample than convenience samples, reliable in their responses to measurements, and behave similarly to in-person experimental participants in laboratory settings (Berinsky, Huber, & Lenz, 2012; Buhrmester, Kwang, & Gosling, 2011). We required that Mechanical Turk participants live in the United States and that their approval rating (ratio of accepted hits to completed and approved hits) be greater than or equal to 85. Table 4 reports participants' demographics. In summary, participants' average age was 38.2 years ($SD = 12.1$), most identified as female (52.5%) and White (88.6%), 31.4% reported an employment status of 31–40 hr/week, and most frequently (22%) came from households with a family income in the \$50,001–\$60,000 range.

Measurements and procedure. The measurements and procedure were identical to those reported in Study 1 with two exceptions. First, the main criminal behavior criterion was a mod-

Table 4
Study 2: Sample Demographics (N = 118)

Variable	
Age (mean years)	38.2 (12.1)
Gender	
Male	47.5
Female	52.5
Ethnicity/race	
African American/Black	8.1
Hispanic/Latino	4.0
Asian or Pacific Islander	5.6
Multiracial	.8
Native American	.8
White	80.6
Employment status	
Unemployed	23.7
20 hr or less	11.0
21–30 hr	5.1
31–40 hr	31.4
41 hr or more	28.8
Household/family income	
\$0–\$10,000	6.8
\$10,001–\$20,000	13.6
\$20,001–\$30,000	11.0
\$30,001–\$40,000	11.9
\$40,001–\$50,000	11.9
\$50,001–\$60,000	22.0
\$60,001–\$70,000	.0
\$70,001–\$80,000	9.3
\$80,001–\$90,000	2.5
\$90,001–\$100,000	4.2
\$100,001 or more	6.8
Neighborhood safety	
Crime rate (per 1000 residents)	34.9 (17.5)
Subjective fear	
Not at all afraid	60.2
Somewhat afraid	33.9
Afraid	4.2
Very afraid	1.7

Note. Values represent percentages, unless otherwise noted in parentheses after variable. For means, SDs are in parentheses.

ified version of our criminal behavior measure from Study 1. Second, we included two measures (subjective and objective) of neighborhood safety/crime. Both changes are discussed next.

Criminal behavior. Mechanical Turk participants are more representative of a national sample and thus less likely to have been arrested, convicted of a crime, and/or incarcerated relative

to Study 1’s participants from Newark (a high-crime city). Therefore, we broadened our measure of criminal behavior to include any act committed for which participants could have been arrested, which meets our definition of criminal behavior as an act prohibited by law and can be punished by the state (Andrews & Bonta, 2015).

Neighborhood crime and safety. We obtained objective and subjective measures of neighborhood crime and safety. The objective measure was crime rates, which was the mean or estimated mean of violence and property crime rates per 100,000 persons in a zip code in 2012 (from the Federal Bureau of Investigation’s Uniform Crime Reporting Statistics). The subjective measure was a single item from the General Social Survey (Davis & Smith, 1998) that asked participants to indicate the extent to which they were afraid to walk at night in their neighborhood on a 4-point scale (“very afraid,” “afraid,” “somewhat afraid,” “not at all afraid”).

Results

Are implicit self-criminal associations related to criminal behavior? We followed the same general plan of analyses described under Study 1. Table 5 reports the zero-order correlations among all control and predictor variables and Table 6 provides a summary of the hierarchical logistic regression analysis. Fifty-one participants (46.8%) reported engaging in a criminal behavior. When the covariates were simultaneously entered into the regression, none of the demographics or neighborhood safety and crime factors were significantly related to criminal behavior. After controlling for demographic and neighborhood variables, participants with stronger explicit self-criminal associations tended to be less likely to engage in criminal behavior than participants with weaker (or no) explicit self-criminal associations, but this relation was not statistically significant. Finally, after controlling for demographic, neighborhood, and explicit criminal cognition factors, individual differences in implicit criminal identities were related to criminal behavior, $\chi^2(1, N = 109) = 4.87, p < .05$. Logistic regression analyses showed that participants with strong implicit criminal identities were associated with an approximately 3.26-fold, 95% CI [1.10, 9.36], increase in the odds of engaging in criminal behavior. Thus, in Study 2, the only variable that significantly explained who did versus did not engage in criminal behavior was implicit self-criminal cognition.

Table 5
Study 2: Zero-Order Correlations Among Variables (N = 118)

Variable	1	2	3	4	5	6	7	8	9
1. Age	—								
2. Gender	-.11	—							
3. Ethnicity/race	-.17*	-.03	—						
4. Employment status	-.17*	.20**	.16*	—					
5. Household/family income	-.05	.03	.08	.37***	—				
6. Neighborhood crime rate	-.18**	.00	.08	.09	.01	—			
7. Neighborhood subjective fear	-.14	-.17*	.13	-.04	-.20**	.05	—		
8. Explicit self-criminal associations	-.07	.14	-.10	-.06	-.12	.18**	.10	—	
9. Implicit self-criminal associations	.20**	-.01	.05	.09	.08	-.10	-.08	.03	—

* $p < .10$. ** $p < .05$. *** $p < .001$.

Table 6
 Study 2: Hierarchical Logistic Regression Analysis Predicting Criminal Behavior ($N = 118$)

Step and variable	<i>b</i>	<i>SE</i>	Wald statistic	Odds ratio	χ^2
Step 1					9.42
Age	.01	.02	.27	1.01	
Gender	.42	.40	1.10	1.52	
Employment status	.15	.14	1.16	1.16	
Ethnicity/race	.43	.62	.48	1.53	
Household/family income	-.12	.08	2.48	1.16	
Neighborhood crime rate	.01	.01	1.18	.89	
Neighborhood subjective fear	.49	.32	2.36	1.63	
Step 2					14.11*
Age	.01	.02	.12	1.01	
Gender	.59	.42	1.97	1.80	
Employment status	.15	.14	1.14	1.16	
Ethnicity/race	.31	.62	.24	1.36	
Household/family income	-.14	.08	3.13	.87*	
Neighborhood crime rate	.01	.01	.47	1.01	
Neighborhood subjective fear	.58	.33	3.05	1.78	
Explicit self-criminal associations	-.64	.35	3.34	.53*	
Step 3					4.87**
Age	.00	.02	.10	1.00	
Gender	.65	.43	2.30	1.92	
Employment status	.12	.14	.74	1.13	
Ethnicity/race	.23	.64	.13	1.26	
Household/family income	-.16	.08	3.54	.86*	
Neighborhood crime rate	.01	.01	.76	1.01	
Neighborhood subjective fear	.64	.34	3.47	1.89*	
Explicit self-criminal associations	-.76	.39	3.75	.47*	
Implicit self-criminal associations	1.17	.55	4.54	3.21**	

* $p < .10$. ** $p < .05$.

Study 3: Longitudinal

Studies 1 and 2 consistently showed support for the relation between implicit self-criminal cognition and criminal behavior. One limitation of the first two studies is that criminal behavior was measured in a cross-sectional design. Study 3 provided us with an opportunity to test our hypothesized relation in a longitudinal design—to examine whether individual differences in implicit self-criminal associations measured in the laboratory predicts criminal behavior at a later time after participants' laboratory visit.

Method

Participants. We had telephone contact information for 53 Newark, New Jersey, community residents who participated in a different laboratory study on implicit criminal cognition and African American stereotypes (Saad et al., 2018). These participants were recruited through flyers posted at local businesses and community colleges. At least 7 months after their laboratory visit, we made three attempts to reach them for a brief follow-up telephone interview. We were able to collect data from 28 (53%) participants. Participants received \$20 for the initial laboratory visit, but they did not receive any remuneration for the follow-up telephone interview. Table 7 reports participants' demographics. In summary, participants' average age was 40.3 years ($SD = 14.7$), most identified as male (60.7%), African American/Black (71.4%), unemployed (57.1%) and most frequently (50.0%) came from households with a family income in the \$0–\$10,000 range.

Measurements and procedure. First, participants completed the measures in the laboratory. The measurements were identical

to those reported in Study 1 with one exception—a measure of past criminal experience (prior to the laboratory study) that was identical to that of our criminal behavior measure was used as an additional control variable of criminal history in the regression. Then, participants were contacted via the telephone to complete the main criterion, which was the criminal behavior measure from Study 2.

Criminal behavior (follow-up telephone interview). A female research assistant conducted a brief (approximately 5 min) telephone interview with the 28 participants 7–20 months following their laboratory visit. The 7–20-month range is partly explained by the fact that the laboratory study in which participants completed the SC-IAT took 15 months to complete and because attempts to contact participants for the follow-up telephone interview stretched over a 3-month period. After confirming their laboratory participation, and consistent with the criminal behavior measure from Study 2, the assistant asked all participants whether they had been arrested, convicted of a crime, incarcerated, and/or whether they had committed any act for which they could have been arrested since their participation in the laboratory study (here, the assistant reminded participants of the specific date of their laboratory visit).

Results

Do implicit self-criminal associations predict criminal behavior over time? The main test was whether SC-IAT-measured implicit criminal identities predicted criminal behavior over a 7–20-month follow-up period, above and beyond criminality-related demographics, explicit self-criminal cognition,

Table 7
Study 3 Longitudinal: Sample Demographics (N = 28)

Variable	
Age (mean years)	40.4 (14.8)
Gender	
Male	60.7
Female	35.7
Other	3.6
Ethnicity/race	
African American/Black	71.4
Hispanic/Latino	10.7
Asian or Pacific Islander	10.7
Multiracial	.0
Native American	3.6
White	.0
Other	3.6
Employment status	
Unemployed	57.1
20 hr or less	28.6
21–30 hr	.0
31–40 hr	7.1
41 hr or more	3.6
Household/family income	
\$0–\$10,000	50.0
\$10,001–\$20,000	21.4
\$20,001–\$30,000	14.3
\$30,001–\$40,000	3.6
\$40,001–\$50,000	.0
\$50,001–\$60,000	.0
\$60,001–\$70,000	.0
\$70,001–\$80,000	7.1
\$80,001–\$90,000	.0
\$90,001–\$100,000	3.6
\$100,001 or more	.0

Note. Values represent percentages, unless otherwise noted in parentheses after variable. For means, *SDs* are in parentheses.

and criminal history. We followed the same general plan of analyses described under Study 1. Table 8 reports the zero-order correlations among all control and predictor variables and Table 9 provides a summary of the hierarchical logistic regression analysis. Nine participants (29.0%) reported engaging in a criminal behavior. When the demographic covariates were simultaneously entered in the first step, and the explicit self-criminal cognition and past behavior variables in the second step, neither of these variables predicted criminal behavior. However, the implicit criminal identities measured with the SC-IAT during their initial laboratory

visit predicted future participation in criminal behavior, $\chi^2(1, N = 28) = 3.61, p < .05$. Logistic regression analyses showed that strong implicit criminal identities were associated with an approximately 19.99-fold, 95% CI [1.57, 694.42], increase in the odds of participation in criminal behavior during a subsequent 7–20-month period.

General Discussion

We adopted implicit social cognition theory and methodology to examine criminal cognition and to test whether an implicit self-criminal association is a cognitive marker for criminal behavior. A single-category IAT measured speeded associations between the self and criminality across two samples of adults from Newark, New Jersey, a high-crime U.S. city (Studies 1 and 3), and one sample of adults from across the U.S. (Study 2). In Study 1, individuals with strong implicit self-criminal associations were more likely to engage in criminal behavior than those with weak (or no) implicit self-criminal associations. Study 2 replicated these results with a national and more diverse sample in terms of demographics and exposure to criminality in their neighborhoods. Finally, Study 3 extended these studies by employing a longitudinal design and demonstrating that implicit self-criminal associations predicted criminal behavior over a 7–20-month follow-up period. Moreover, and consistent with a prediction of a behavior additive model, across the three studies the relation between implicit self-criminal associations and criminal behavior held after controlling for demographic variables of age, gender, ethnic-racial identification, and socioeconomic status, as well as explicit criminal cognition variables. Most impressive was that across all studies SC-IAT-measured implicit self-criminal associations were the strongest and most consistent predictor of criminal behavior relative to the measures of explicit self-criminal cognition and criminal-related demographic variables.

The present data have implications for criminology's approach to understanding the relation between criminal identity and criminal behavior. Criminology research relies on individuals' ability to introspect about and their willingness to self-report their criminal cognition. Introspection is limited to the extent to which individuals are aware of the potential impact of criminality on their self-concept. Moreover, relying on the motivation to self-report is problematic because criminality is stigmatized in most societies and, therefore, individuals may be motivated to minimize or even deny any criminality thoughts. In our studies, we went to great

Table 8
Study 3: Zero-Order Correlations Among Variables (N = 28)

Variable	1	2	3	4	5	6	7	8
1. Age	—							
2. Gender	.33*	—						
3. Ethnicity/race	.28	.20	—					
4. Employment status	-.13	-.02	.15	—				
5. Household/family income	-.38**	-.45**	-.43**	.38**	—			
6. Past criminal behavior	.42**	.20	.51**	.15	-.23	—		
7. Explicit self-criminal association	.04	-.13	.35*	.15	-.23	.11	—	
8. Implicit self-criminal associations	.04	.05	-.04	-.11	-.21	-.09	-.12	—

* $p < .09$. ** $p < .05$.

Table 9
 Study 3: Hierarchical Logistic Regression Analysis Predicting Criminal Behavior ($N = 28$)

Step and variable	<i>b</i>	<i>SE</i>	Wald statistic	Odds ratio	χ^2
Step 1					12.76**
Age	-.09	.05	3.73	.91*	
Gender	-1.74	1.25	1.92	.18	
Employment status	.01	.64	.00	1.01	
Ethnicity/race	-3.71	3.45	1.16	.02	
Household/family income	-1.48	.83	3.18	.23*	
Step 2					.20
Age	-.10	.06	3.39	.90*	
Gender	-1.94	1.40	1.91	.14	
Employment status	.04	.69	.00	1.04	
Ethnicity/race	-3.75	3.62	1.07	.02	
Household/family income	-1.43	.79	3.24	.24*	
Past criminal behavior	.92	2.08	.20	2.51	
Explicit self-criminal associations	.03	.39	.00	1.03	
Step 3					3.61**
Age	-.13	.07	3.61	.89*	
Gender	-2.28	1.70	1.79	.10	
Employment status	-.15	.71	.05	.86	
Ethnicity/race	-3.16	3.42	.85	.04	
Household/family income	-1.44	.79	3.30	.24*	
Past criminal behavior	1.20	2.48	.23	3.31	
Explicit self-criminal associations	.00	.51	.00	1.00	
Implicit self-criminal associations	3.00	1.81	2.74	19.99*	

* $p \leq .09$. ** $p < .05$.

lengths to promote sincere responses on self-report measures by insuring the protection and confidentiality of our participants' identity, collecting data directly using a computer-based platform, and by providing participants with privacy during data collection (in Studies 1 and 3; the extent of privacy for Study 2 participants is unknown). Under these conditions, individual differences in participants' explicit self-criminal associations only covaried with criminal behavior in one of three of our studies. However, SC-IAT-measured implicit self-criminal cognition outperformed self-reported explicit criminal cognition when predicting criminal behavior in Study 1 and was the only criminal cognition predictor in Studies 2 and 3. This may be the case because the SC-IAT is an indirect measure of social cognition and therefore relatively effective in bypassing both introspection and willingness when assessing the mental representation of the self as criminal. The extent to which the SC-IAT captures the basic cognitive association between the self and the group criminals outside of conscious awareness or control, we would expect it to exhibit superior predictive validity. Our findings are consistent with this rationale.

As noted previously, individual differences in explicit self-criminal cognition was associated with criminal behavior in only one of three present studies. In addition to the limitations of self-reported criminal cognition measures, another plausible reason for this inconsistent finding is the nature of the samples across the different studies. The relation was evident in Study 1, which recruited participants from Newark, New Jersey, a city with one of the highest crime rates in the United States and is often ranked as one of the country's most dangerous cities (Federal Bureau of Investigation, 2016). Given its high-crime profile, its citizens are frequently exposed to crime directly in their immediate neighborhoods and indirectly via local media coverage, which in turn can have a potent role in shaping criminal-related cognition and be-

havior. This would be consistent with the criminology basic hypothesis that community-level factors are a source of offending (Sampson, Raudenbush, & Earls, 1997; Sampson & Wilson, 1995). By comparison, the relation was not evident in Study 2, which recruited participants from communities that varied considerably in crime rates, suggesting that many participants had low direct and indirect exposure to crime in their neighborhoods. (We caution to speculate on Study 3 because, as noted below, the sample size was relatively small.) However, this explanation is speculative and the present research design and data are unable to test a cause-and-effect hypothesis. Regardless, from our perspective, the inconsistent relation between explicit self-criminal cognition and criminal behavior across three studies speaks to the importance of considering the role of implicit self-criminal cognition. Indeed, all studies in the present research consistently show that individual differences in implicit self-criminal associations explain which participants committed a criminal behavior.

An Implicit Self-Criminal Association as a Criminal Identity and its Relation to Criminal Behavior: Which is the Chicken and Which is the Egg?

The present research was partly based on the fundamental hypothesis in psychology and criminology that individuals who commit a criminal act should yield a mental association between their self-concept and criminality, and that self-criminal associations should serve to promote and maintain future criminal acts (Brezina & Topalli, 2012; Little, 1990; Shover, 1996; Veysey & Rivera, 2017; also see Oyserman et al., 2012; Swann & Bosson, 2010). This hypothesized bidirectional relation, however, still raises the question whether self-criminal cognition is the antecedent to or consequence of criminal behavior. To the extent that

self-criminal associations underlie a criminal identity, which in theory should drive criminal identity-based behaviors, they may be a precursor to engaging in criminal acts. The data in Study 3 were longitudinal and provide some preliminary evidence for this hypothesis, but they should be interpreted with caution because the data are correlational and the sample size was relatively small. Future research using longitudinal studies with larger samples and that follow individuals over time are necessary to unequivocally support the assumptions underlying past and present identity and behavior research.

As an alternative, engaging in criminal behavior can lead to self-criminal cognition, which is consistent with the social psychological research on the role of behavior shaping beliefs (Myers & Twenge, 2016). Some individuals engage in criminal behaviors because of situational factors (e.g., response to physical threats from an offender, thrill seeking) or simply because of “bad luck” (being “in the wrong place at the wrong time”). According to implicit social cognition theory (Greenwald et al., 2002; Nosek & Hansen, 2008), one or a combination of these experiences can lead to the association between the mental representations of the self and the category criminal outside of conscious awareness and conscious control, a process underlying an implicit criminal identity. From this perspective, committing a criminal act is the antecedent to developing an implicit criminal identity.

Implications for Crime Intervention and Criminal Justice Policies and Practices

Much of the current thinking on effective interventions for desistance and crime reduction focuses on changing aspects of individuals' lives (including cognitions and identities), opportunities, and contexts, in particular the “turning points” that change the trajectory of an individual's life from a criminal pattern to a prosocial one (i.e., a desistance process; Laub & Sampson, 2003; also see Humphrey & Cordella, 2013 for a comprehensive discussion). Most relevant to the present research are intervention programs that focus on human agency because they rely on an individual's willpower to desist from criminal behavior. However, self-control efforts can fail when other factors are competing for cognitive resources (Muraven & Baumeister, 2000). Indeed, offenders who are reentering society are faced with staggering challenges such as the constant attempts to distance themselves from the stigma of criminality, obtaining employment and housing opportunities, and achieving and maintaining good physical and mental health (see Forman, 2017; Mauer & Chesney-Lind, 2002; Richards & Jones, 2004).

Our research suggests that one alternative way to reduce criminal behavior recidivism is to attenuate implicit self-criminal associations. A robust line of social psychological research demonstrates that reminding individuals of important and positive parts of their lives can set off a host of psychological and behavioral benefits (McQueen & Klein, 2006; Sherman & Cohen, 2006). Consistent with self-affirmation theory, individuals have numerous sources of self-worth such as values and traits tied to their personal and group identities (Sherman & Cohen, 2006). When self-image is threatened by behavior in one domain, an individual may draw from an alternative source of self-worth to restore the integrity of their overall self-concept and well-being. In the case of justice-involved individuals, a self-affirmation can be operational-

ized by providing them with as many opportunities to build, strengthen, and maintain values and characteristics unrelated to criminality. For example, Rivera and Veysey (2015) suggest that enhancing relationships with important others such as friends, parents, siblings, and children may be one important value for justice-involved individuals to focus on when seeking a successful transformation. If self-affirmation strategies are incorporated into community and correctional programs, they have the potential to attenuate implicit self-criminal cognition and help increase the chances of a successful transformation to a prosocial citizen.

Finally, an implication of the present research for criminal justice policies and practices is that it calls into question the extent to which criminal behavior is linked to consciously known or intended criminal cognition. An individual may actively disavow criminal cognition, but it can still be linked to criminal behavior outside of conscious awareness and control. Criminal justice policies and practices should consider the insights of implicit social cognition theory and evidence as applied to criminal identities and behavior by pondering two basic questions. First, do criminal justice policies and practices consider the constraints of intention, awareness, and control on criminal cognition and behavior? Most recently, legal scholarship and judicial opinions have deliberated over the impact of implicit social cognition research on the law, in particular, challenges to the prevailing assumptions underlying criminal intent (what implicit social cognition theory refers to as motivational control; Lane, Kang, & Banaji, 2007). This leads to the second question: how do current criminal justice policies and practices consider the possibility that offenders behave criminally without their conscious awareness or control? This issue has direct implications for the practice of exclusively relying on offenders' self-assessments. Revisiting criminal justice policy and practices with these two questions in mind may yield objectives that can potentially improve the criminal justice system in general and address one of its often-forgotten objectives, to rehabilitate offenders.

Caveats

In the present research, we assessed criminal behavior using a self-report measure, which relied on participants' recall of committing an act prohibited by law and punishable by the state. We acknowledge two potential limitations to this methodological approach. First, one may argue that an objective measure of criminal behavior, such as relying on criminal justice records, is more valid and thus may yield stronger relations between implicit self-criminal cognition and criminal behavior than the ones we observed across the present three studies. While this methodological approach may be more ideal, it comes with the practical challenge of locating and recruiting individuals with records of criminal behavior to complete the present research measures. An alternative approach and future research direction may be to recruit a convenient sample of offenders in prison and follow them over time to both replicate and extend the present cross-sectional and longitudinal studies.

A second limitation is that one may argue that the self-report measure of criminal behavior flies in the face of one of our assumptions—individuals may be unwilling to self-report criminality because it is generally stigmatized. However, and consistent

with seminal implicit social cognition theory (Greenwald & Banaji, 1995), our argument is that there is a distinction between past behavior and the effect that such an experience can have on cognition. As per Greenwald and Banaji (1995), “the identifying feature of implicit cognition is that past experience influences judgment in a fashion not introspectively known by the actor” (p. 4). We suggest that individuals are aware and (likely) willing to acknowledge a past *behavior* like a criminal act, but that they are unable (or less able) to introspect about its effect on *cognition* about the self. For example, consider the individual who is willing to admit to driving under the influence of drugs or stealing from work, but that they do not consider such behavior to be a central part of their self and identity beliefs. We see our work as complementing emerging research on the link between self-cognition and self-reported stigmatized behavior (Nock, Park, Finn, Deliberto, Dour, & Banaji, 2010; von Hippel, Brener, & Horwitz, 2018). For example, Nock et al. (2010) show that clinical patients with a self-reported suicide attempt history exhibited stronger implicit associations between words about death and suicide and their self-concept when compared with clinical patients with no self-reported suicide attempt history. Furthermore, patients’ strong implicit identification with death and suicide predicted future suicide attempts over a 6-month period at a sixfold increased rate, a prediction above and beyond any contribution of explicit suicide-related cognition, past self-reported suicide attempts, and both patients’ and clinicians’ future predictions. This work is consistent with the present three studies demonstrating that strong implicit self-criminal cognitive associations are linked to self-reported criminal behavior, even after controlling for the roles of explicit self-criminal cognition and criminal-related demographics.

Conclusion

The present research represents a significant extension to criminology’s approach to examining criminal cognition and behavior. That research is limited to respondents’ willingness and ability to introspect on the impact of criminality on the self-concept. The present studies drew from implicit social cognition theory and methodology to understand criminal cognition outside of conscious awareness or control. Across three adult samples in cross-sectional and longitudinal studies, strong implicit self-criminal cognition was associated with criminal behavior, above and beyond explicit self-criminal cognition and even after accounting for criminal-related demographics and past behavior. Altogether, this research highlights the importance of considering implicit criminal cognition when developing policies and intervention programs that wish to promote and maintain desistance from crime.

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