CRIMINOLOGY

FRIENDS WITH MY FUTURE SELF: LONGITUDINAL VIVIDNESS INTERVENTION REDUCES DELINQUENCY*

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In a field experiment, we use a novel method to test whether instilling a greater sense of vividness of the future self motivates people to act in a more future-oriented way and reduces their delinquent involvement. We manipulate vividness of the future self by having participants, a sample of high-school youth (N = 133), "befriend" an avatar representing their future self on a social network website. For 7 days, they reply to short messages from their future self designed to trigger thinking about that distant self. Using repeated-measures analysis of variance (ANOVA), we find that participants who had been linked to their future self report less delinquent involvement, whereas controls did not. Furthermore, the results of a nonparametric bootstrapping procedure show that this effect is mediated by changes in vividness of the future self, such that increases in vividness lead to lower self-reported delinquency. We conclude that vividness of the future self holds promise not only as a cognitive explanation for the failure to make informed cost–benefit trade-offs but also for interventions aiming to reduce delinquency.

Typically, crime's benefits are immediate, whereas its costs tend to be more remote (Hirschi, 2004). If these remote costs fail to motivate individuals to refrain from committing it, then crime is likely to occur (Nagin and Pogarsky, 2004). Unsurprisingly, extant research has shown that, compared with their normative peers, delinquents tend to overvalue or focus on the more direct consequences of behavior, e.g., sexual gratification, fast cash, goods, or status, while disregarding or discounting the more delayed effects, e.g., sanctions, dropping out of school, having a criminal record, (social) exclusion, and

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stigmatization (e.g., Farrington, 1995; Loughran, Paternoster, and Weiss, 2012; Nagin and Pogarsky, 2001; Steinberg et al., 2009; Tangney, Baumeister, and Boone, 2004; Topalli and Wright, 2014).

The idea that delinquents have a tendency to live in the "here and now" while disregarding the more distant consequences of their actions also underlies several established theoretical perspectives and concepts in criminology, such as self-control, impulsivity, and temporal discounting (e.g., Gottfredson and Hirschi, 1990; Moffitt, 1993; Wilson and Herrnstein, 1985). As Wilson and Herrnstein (1985: 44–45) noted: "[T]he extent to which people take into account distant possibilities … will affect whether they choose crime or noncrime." Similarly, Gottfredson and Hirschi (1990) argued that the ability to consider the longer term consequences of one's actions is the principal factor driving criminal involvement.

The (lack of) consideration of delayed consequences is not limited to research and theorizing about crime and delinquency, but also pervades much of our thinking about sanctioning and the criminal justice system. Deterrence, one of the foundational assumptions of most contemporary criminal justice systems, is premised on the notion that potential offenders would abstain from offending if they were to contemplate its cost adequately. Nor are the negative consequences of the tendency to be present-focused confined to the ambit of criminal conduct, as it has also been shown to be predictive of other self-defeating and risk behaviors such as drug use, unprotected sex, gambling, smoking, and drunk driving (Steinberg et al., 2009; Zimbardo and Boyd, 1999, 2008; Zuckerman, 1979).

In this article, we explore a potential cognitive mechanism accounting for the present-orientedness of delinquent individuals. We propose a novel perspective based on the assumption that the tendency to live in the here and now is related to the inability to project one's self into the future. Drawing from multiple-self models, we argue that people differ in the extent to which they can visualize themselves at a later point in time and that these differences in perception of the self over time impact delinquent decision making. That is, a vivid image of the future self leads one to contemplate the delayed potential consequences of behavior as a result of the realization that these ultimately accrue to oneself, even if at a delay. Conversely, a weak or vague image of the future self promotes reaping the benefits of the present moment and discourages the contemplation of long-term consequences. As delinquency, analogous to other self-defeating behaviors and self-control dilemmas, is typically characterized by immediate benefits and temporally more remote costs, a lack of vividness of the future self is likely to encourage delinquent decision making (or, at least, not to deter it). We will argue that increasing the vividness of the future self should reduce delinquency as it motivates individuals to conceptualize more clearly the interests of their self in the future.

These assumptions are tested using a novel method that taps into the potential of social media as a tool for delinquency research. In a field experiment, participants, a sample of high-school youth, "befriend" their future self on a social network website. For 7 consecutive days, participants receive a daily message from their future self that is designed to trigger thinking about the future self with the objective of instilling an increasingly vivid image of the self in the future. Participants in the control condition are linked to their present avatar and receive similar messages from this avatar, but instead these messages are situated in the present. Before and after the manipulation, participants self-report their delinquent activity and fill out a vividness of the future self measure.

MULTIPLE-SELF MODELS

To express the sensation of intraindividual conflict embedded in choices that have immediate benefits and long-term costs, various scholars have proposed "multiple-self" models (Loewenstein, 1996: 288). Rather than viewing the self as a single unitary concept, this class of models conceptualizes the individual as a collection of distinct identities that overlap with each other over time (e.g., Hershfield, 2011). Each of these overlapping selves might or might not share a strong degree of psychological connection with the next one and the degree of connectedness between successive selves varies as a function of time. The larger the temporal distance between two selves, the weaker the psychological connection between the two (Parfit, 1971, 1984). According to multiple-self models, the distinction or separation between selves resembles the distinction between individuals, and the attitudes toward a future self might resemble those toward other individuals.

In particular, Parfit (1971, 1984) went so far as to suggest that there is no underlying sense of self across time, but each self exists in time on its own and is connected to earlier and later selves by a matter of degree. To theorists like Parfit, the seeming unity of the self actually reflects no more than a succession of qualitatively similar, overlapping, and causally related psychological traits (Radden, 1996). By this logic, what matters for decisions is the extent to which one self is psychologically connected to another self. Just as people can feel differing degrees of connection to other people—and just as these different levels of connection can dictate whether we will make sacrifices for other people—so too can differing levels of connection to our future selves predict whether we will act in the interest of those future selves. The analogy between interindividual and intraindividual differences is relevant because if weak, then the attitude of an individual toward the future self can resemble that toward another person. As Butler (1736: 102) first pointed out: "[I]f the self or person of today, and that of tomorrow, are not the same, but only [similar] persons, the person of today is really no more interested in what will befall the person of tomorrow, than in what will befall any other person." Discounting one's "own" future utility, then, may be no more irrational than discounting the utility of someone else (Frederick, Loewenstein, and O'Donoghue, 2003: 90).

The existence of multiple selves and the lack of connection between them can set up a situation in which an individual experiences a degree of intrapersonal tension (Bazerman, Tenbrunsel, and Wade-Benzoni, 1998; Parfit, 2011; Schelling, 1984), where a conflict exists between what the self of today wants and what will benefit (or harm) the future self. Problems with intertemporal choice, in short, might be the result of a conflict between temporally distinct selves (Frederick, Loewenstein, and O'Donoghue, 2003). If the sense of connection to the future self is no greater than, for example, the sense of connection that the current self feels toward a stranger, then one is essentially justified in acting in a way that benefits only the present self (even if such actions may cause harm to the future self). Such logic implies a prioritization of self-interest actions. However, both Whiting (1986) and Johnston (1997) argued that we do not always act in self-interested ways. People make sacrifices for their children, their aging parents, their spouses, and other close family and friends. Whiting (1986) argued that the same should be true of our future selves: If a sense of

emotional connection is felt toward them, then people will be likely to make sacrifices that benefit that future self.[1]

A small body of theory and research has explored the idea of multiple selves as it relates to delinquency and related unethical behaviors. Different from the current study, most of this literature has focused on the notion of *possible* future selves, i.e., an individual's self-relevant expectations for the future, such as the self he or she either hopes or fears to become. These hoped for or feared selves are assumed to motivate the pursuit or avoidance of specific behaviors, such as the onset of or desistance from delinquency (e.g., Markus and Nurius, 1986; Oyserman and Markus, 1990; Paternoster and Bushway, 2009; Silver and Ulmer, 2012). In contrast, our perspective focuses on the cost–benefit trade-off inherent in criminal choices and aims to shed light on the cognitive mechanism underlying this trade-off. Additionally, our perspective differs from these other approaches as it does not revolve around *possible,* and therefore hypothetical, future selves but on the *actual* self extended into the future.

VIVIDNESS OF THE FUTURE SELF

Recent psychological research based on the notion of multiple selves has generated two important insights. First, in line with the main assumption underlying multiple-self models, it has been shown that people tend to think of themselves in the future as if they are different people (e.g., Bryan and Hershfield, 2012; Pronin, Olivola, and Kennedy, 2008). Pronin and Ross (2006), for example, found that when people imagine a scene playing out in front of them in the near future, they take the first-person perspective. By contrast, when imagining the distant future, people are more likely to take an observer's perspective and view their future self in that scene. Second, this research has shown that there are important individual differences in the extent to which individuals feel connected to their future self (Bartels and Rips, 2010; Ersner-Hershfield et al., 2009), and these individual differences in connection are associated with intertemporal choice (e.g., saving behavior).

These findings are relevant for our understanding of delinquent decision making in important ways. If the mental representation of our future self is no more than a vague image, then we might not heavily weigh the consequences for that future self in our decisions made in the present. If, by contrast, our mental image of the person we will be in the future is clear and vivid, then that future self is likely to be cognitively present when we make decisions that can (also) affect us in the future. A vivid image of the future self requires the contemplation of the delayed costs and benefits of behavior as a result of the realization that these ultimately accrue to (a later version of) the self, even if they materialize only months or even years later. Conversely, a weak or vague image of the future

1. Parfit (1986) also raised another important, if not troubling, implication of the notion of multiple selves—versus the common view of the self as a unitary concept—for our conceptions of justice and culpability. This regards the relationship among personal identity, ethics, and punishment. If in fact there is no easily reducible sense of identity, then why would society be rationally required to punish an individual for a past action—that is, an action committed by a past self that holds no psychological connection to the current self? To some extent, the possibility of parole in the justice system acknowledges the idea that past selves who have committed transgressions are not necessarily connected to the present self who has been reformed. Future research might expand this philosophical discussion by examining whether attitudes about change in personal identity are linked to attitudes toward punishment.

self promotes reaping the benefits of the present moment and discourages the contemplation of the delayed consequences for a self of whom we only have a faint notion and experience only a weak connection to.

Increasing empirical evidence supports the basic assumptions underlying this idea and how it relates to crime and related behavioral domains. In the domain of unethical decision making, Hershfield, Cohen, and Thompson (2012) found that individuals who reported feeling less similar to their future selves were more likely to lie, were more comfortable with unethical decision making, and made more false promises than individuals reporting greater similarity to their future selves. Importantly, these relationships held when controlling for trait levels of self-control and were not explained by thinking about the future in general.

Van Gelder, Hershfield, and Nordgren (2013) examined the relation between vividness of the future self and delinquency in two studies. In one study, to increase vividness, participants were asked to write a letter to their 20-year-older self. Subsequently, they were presented a series of vignettes describing delinquent choice dilemmas. These participants were significantly less likely to make delinquent choices compared with participants in the control condition who had written a letter to their 3-month-older self. In other words, contemplating, and hence rendering more vivid, a later version of the self reduced the propensity to behave delinquently.

In the second study, instead of merely imaging their future self, participants were actually confronted with their future self in an immersive virtual reality environment. Using specialized software, realistic age-morphed avatars of participants were created. Participants subsequently walked around in a virtual room, in which all real-world input was removed, and were instructed to perform some brief exercises in front of a (virtual) mirror hanging on one of its walls. Participants in the experimental condition, instead of seeing their contemporary selves, faced their age-morphed selves in the mirror. After the virtual reality experience, all participants took a trivia quiz (see Nagin and Pogarsky, 2003), allegedly as an optional bonus for their participation in the experiment, for which they could win cash by achieving a high score. The quiz was rigged to make it almost impossible to get a high score and get the bonus by participating honestly. As answers were shown on the last page of the quiz booklet, participants had the opportunity to cheat. In other words, to earn the extra money in the experiment, they had to cheat. Compared with the control group who had viewed an avatar of their present self in the virtual mirror, participants who had just looked at their future self were significantly less likely to claim a high score and, hence, to cheat on the quiz. In sum, this study demonstrated that vividness of the future self predicts delinquency and that it can be experimentally manipulated.

CURRENT RESEARCH

The current research extends previous studies that examined the link between future selves and delinquency in various ways. First, we test the proposed relations in a naturalistic field setting instead of a laboratory, which speaks to the ecological validity of the study. Second, we examine an outcome that is more consequential in nature. Although cheating on a quiz is unquestionably an ethical violation, it does not necessarily carry with it obvious negative consequences to the self. In the current study, however, we examine real-world delinquent behaviors (e.g., theft, property damage, use of violence, and truancy) that could be consequential for the self. Third, we examine the effectiveness of

the experimental intervention in a longitudinal, rather than a single-shot, setting, which can speak to the longer term effects and the potential of the paradigm for future interventions involving delinquent youth. Fourth, we introduce a new research approach that we believe has much potential for criminological research.

In the current study, participants in the experimental condition befriended their future self on Facebook, and for a period of 7 days they received one daily message from that distant self to which they had to respond. Before and after the manipulation, vividness of the future self was measured and participants self-reported their delinquent and antisocial behavior. Participants in the control group were presented the same materials but befriended their present avatar instead of their future self and responded to messages that were situated in the present.

As mentioned, we theorized that individuals who have more difficulty imagining themselves in the future engage in more delinquency than individuals with a more vivid image of their future self. This reasoning resulted in the following predictions. First, we hypothesized that vividness of the future self would be correlated with self-reported delinquency. Second, we predicted that individuals in the experimental condition who befriended their future self would report higher vividness of the future self after the manipulation than those who had befriended their present avatar. Third, we predicted that our manipulation would reduce self-reported delinquency and that this reduction would be explained by increases in the vividness of the future self.

METHOD

PARTICIPANTS

A total of 133 secondary school youth (55% female, $M_{age} = 16.8$, range: 16–19 years of age), all fifth graders in pre-university education, from two public schools in two medium-sized cities, Hoorn and Haarlem, located in the province of Noord-Holland in the Netherlands, participated in the study. Pre-university education in the Netherlands has six grades and is typically attended from 12 to 18 years of age. It is the highest level of secondary education in the Dutch education system. Instead of randomly allocating participants to the conditions, to avoid spillage in terms of the manipulation, youth from the school in Haarlem were assigned to the experimental condition, whereas students from the school in Hoorn were assigned to the control condition. Both schools are highly similar in terms of size (i.e., number of students), student gender, racial/ethnic background, average grades and final year passing rates, and parental and student satisfaction with the school (see table 1 for details). However, the school populations differed in terms of socioeconomic status (SES); the student population in Hoorn has a lower SES than in Haarlem. None of the participants in either school reported having a criminal record. Furthermore, both cities are highly similar in terms of registered crime rates; Haarlem has 75 registered crimes per 1,000 inhabitants versus 77.2 in Hoorn (Statistics Netherlands, 2014ab). Of all participants, 87 (65 percent) completed all stages of the study. Participants who completed all materials received a cinema voucher of €10 in exchange for their participation. Parents were informed about the study and could refuse participation (passive consent). The research proposal was reviewed by the ethics committee of the university associated with the data collection prior to the study. No objections or ethical concerns were raised against it.

Table 1. School Characteristics ($N = 2$)

School Characteristics	School Haarlem (Experimental Condition)	School Hoorn (Control Condition)
Number of Students	1754	1634
Male Students (%)	50.00	55.00
Ethnic Background (%)		
Dutch	86.00	89.00
Western immigrant	7.00	6.00
Non-Western immigrant	4.00	3.00
Other (%)	4.00	2.00
Socio-Economic Status	26.30	15.94
Final Year Passing Rate (%)	81.36	85.50
Average Grade Final Year	6.34	6.24
Parental Satisfaction With School	7.40	7.20
Student Statisfaction With School	7.00	7.30

Sources: Performance Rating of Dutch Secondary Schools 2013 (2014); Schoolkompas (2014).

MATERIALS

Manipulation

For each participant, we created a personal page of the future self or present avatar on the social network website Facebook. A social network website is a service with which users can create and maintain an online social network through the creation of a personal profile. After registering with the service, users can "befriend" other members of the network by connecting to their profiles. Personal profiles can contain specific information about the user (such as age, residence, preferences, hobbies, etc.), photos, and other images or information. Importantly, linked users can communicate with each other through public or private (instant) messages, and they can exchange photos, videos, images, and website URLs. In 2012, 88 percent of Dutch youth 12–25 years of age were members of a social network service such as Facebook (Statistics Netherlands, 2014a).

The personal profile page that was created for each participant featured the name of the participant and a digitalized picture of his or her face, i.e., the avatar. To create persuasive visual analogs of 15-year-older versions of participants on the basis of digital pictures of their face, we followed the procedure designed by Hershfield et al. (2011; see figure 1). We opted for a 15-year interval between the age of the present self and the future self (instead of 20 years as did Van Gelder, Hershfield, and Nordgren, 2013, who examined a sample of university undergraduates) as younger people subjectively experience an extension of time into the future as more distant than older people (Steinberg et al., 2009). That is, we assume that the younger the people are, the more difficult it is for them to imagine a self that is further away in time. For example, 5 years of time represents one third of a 15-year-old's life but only one fifth of a 25-year-old's life. Thus, 5 years into the future is subjectively further away for a 15-year-old than for a 25-year-old (Barbot and Hunter, 2012). Furthermore, in the experimental condition, the background clearly displayed the year 2028, i.e., exactly, 15 years after the time of study.

For a period of 7 days, participants received one daily message via Facebook to which they had to respond. In the experimental condition, the messages were designed to trigger thinking about the future self (e.g., "Imagine and briefly describe what you do on a day like today in exactly three years from now. Think, for example, of your activities that day,

Figure 1. Two Digitalized Pictures of the Same Individual

NOTES: The left image is a nonmorphed avatar. The avatar in the right panel is made to look 15 years older.

whom you meet, your work, family, sports, hobbies, etc."). Participants in the control group responded to similar messages, but these were situated in the present (e.g., "Briefly describe what you did yesterday."). Messages regarded main life domains such as family, relationships, work, education, social life, sports, and hobbies. At the beginning of the week, the message regarded the nearer future starting with the next year. Gradually, this built up to 15 years into the future with the final message.

Vividness of the Future Self

Vividness of the future self (henceforth: "vividness") was measured by six items. Five items, e.g., "I have a clear image of myself in 15 years from now" and "I find it easy to imagine myself in 15 years from now," were measured on a 5-point Likert scale (completely disagree to completely agree). The sixth item consisted of five images of the same human face with an emotionally neutral expression that grew increasingly vague. Participants were asked to indicate which of the five pictures best reflected how clear their image of their own 15-year-older self was. The scores on this item and two other items that were negatively phrased were recoded. The responses on the six items were subsequently averaged to form a vividness scale (all items of the scale appear in the online supporting information).[2] Higher scores on this scale reflect higher vividness. Scale reliabilities at

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Table 2. Descriptives and Correlations of Gender, Age, and Vividness of the Future Self (Vividness) at T1, T2, and T3 and Self-Reported Delinquency at T1 and T3 ($N = 133$)

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Condition (control = 1)	—										
2. Male	.00	—									
3. Age	.04	.01	—								
4. Vividness T1	–.19*	.03	.03	—							
5. Vividness T2	–.02	–.02	.00	.74**	—						
6. Vividness T3	–.06	.05	.00	.78**	.87**	—					
7. $\text{Delinquency}_{\text{year}}$	–.11	–.06	–.01	–.29**	–.24*	–.29**	—				
8. $\text{Delinquency}_{\text{week}}$ T1 (9 items)	–.11	–.18*	.15	–.19*	–.10	–.15	.17	—			
9. $\text{Delinquency}_{\text{week}}$ T3 (9 items)	–.38**	–.11	.12	–.11	–.12	–.06	.25*	.61**	—		
10. $\text{Delinquency}_{\text{week}}$ T1 (10 items)	–.09	–.18*	.13	–.19*	–.06	–.13	.15	.98**	.62**	—	
11. $\text{Delinquency}_{\text{week}}$ T3 (10 items)	–.31**	–.15	.08	–.14	–.14	–.08	.23*	.60**	.98**	.61**	—
Mean	.48	.45	16.79	2.58	2.66	2.59	1.07	1.37	1.33	1.36	1.32
SD			.63	.80	.75	.73	.07	.27	.22	.26	.21

NOTES: $N_{T1} = 133$, $N_{T2} = 96$, $N_{T3} = 87$.
ABBREVIATION: SD = standard deviation.
*$p < .05$, **$p < .01$ (two-tailed tests).

different time points (see the Procedure section) ranged from Cronbach's $\alpha = .87$ to $\alpha = .89$. Scale descriptives appear in table 2.

Self-Reported Delinquency

Two measures for self-reported delinquency were used: one measuring delinquency in the past week and the other measuring delinquency for the preceding 12 months. To measure delinquency in the past week, participants were presented nine items that inquired about their delinquent behavior and analogous antisocial behaviors in the previous 7 days.[3] Each item was preceded by the same stem: How often in past week did you … 1) Skip school? 2) Steal something from a store? 3) Do something you regretted later? 4) Drink alcohol? 5) Do something that was not allowed? 6) Smoke a joint or use other drugs? 7) Kick or hit someone? 8) Steal or take something from someone (e.g., money, a phone, clothing, or something else)? 9) Damage or break something that was not yours? The possible answers were never, 1 or 2 times, 3 to 5 times, 6 to 10 times, more often. Exactly 7 days after responding to the last message from their avatar, participants were again presented these items. For both time points, the scores on all items were averaged and combined into a self-reported delinquency scale ($\text{delinquency}_{\text{week}}$). Descriptives appear in table 2. Additionally, participants were presented a standard self-report

3. Initially, we had conceived a 10-item scale to measure delinquency in the prior week. One item in this scale measured cheating on a test, exams, or with something else. With hindsight, we realized that this item was inappropriate given that we did not ascertain whether students from both schools had taken tests or exams during the period of study and, therefore, actually had had the opportunity to cheat or not, which could account for variation in item scores. To exclude this possibility, we opted for a 9-item scale that excluded this item. We note, however, that overall results for the 10-item scale overlapped with the results for the 9-item scale with the exception of the results of the repeated-measures analysis of variance (ANOVA) comparing changes in delinquency over time between groups (see the Results section). Results for the 10-item scale are reported in footnote 6.

delinquency questionnaire consisting of 20 items inquiring about delinquent involvement in the preceding 12 months ($delinquency_{year}$; Svensson et al., 2013).[4] The items in the questionnaire referred to a wide array of delinquent acts, both minor offenses and more serious ones, such as vandalism, theft, burglary, assault, drug dealing, and fraud. Items inquired about how often participants had performed the described criminal behavior in the previous year and were preceded by the same stem: How often in past 12 months did you… 1) Break into a house to steal something? 2) Rob someone? 3) Use a knife or other weapon? etc.

The possible answers were never, 1 or 2 times, 3 to 5 times, 6 to 10 times, more often. Scores were averaged and combined into a self-reported delinquency scale (see table 2 for descriptive statistics). To conceal the actual goal of the study, the delinquency questionnaires were alternated with filler questions regarding daily activities, music preferences, and hobbies of the participants. All items for both the $delinquency_{week}$ and $delinquency_{year}$ scales appear in the online supporting information.

PROCEDURE

After obtaining permission from school management, the study was introduced during school hours in classroom settings as a pilot study for a large-scale study into the daily activities of high-school youth in the Netherlands using social media. The students were told that for each participant, a Facebook page of his or her avatar would be made and that over the course of a week they would interact with their avatar who would send them one daily message in the morning to which they had to respond on that same day. Additionally, they were to complete several short questionnaires about their daily activities at different time points. Participants were told that participation was strictly voluntary and that they could stop participating at any time without providing reasons. If students agreed to participate, then a picture of his or her face was taken on site that would later appear on the Facebook page of their future self (control condition: present avatar). Because of the nature of the study, only those students who had a personal Facebook page were eligible for participation.

Measurements were taken at three different time points spaced 1 week apart. At time 1, 1 day prior to the start of the manipulation, baseline information on vividness, $delinquency_{week}$, gender, and age was collected. At time 2, which immediately followed the last Facebook assignment on day 7 of the manipulation, vividness was again measured. At time 3, exactly 7 days after the manipulation had ended, vividness, $delinquency_{year}$, and $delinquency_{week}$ were measured.

RESULTS

We first checked for differences in attrition. No significant differences were found in vividness of the future self between participants that completed all stages of the study

4. The original design also included a series of criminal choice vignettes that were novel to the present study and were taken at T1 and T2. However, the measure based on these vignettes proved to be unreliable ($\alpha < .70$) and principal component analyses yielded different (multi-)factor solutions at both time points, which points against a unitary measure of delinquency. The vignettes were therefore not taken up in the analyses.

Table 3. Means and Standard Deviations of the Self-Reported Delinquency Items and Scales at T1 and T3 ($N = 87$)

	Experimental Condition ($n = 37$)					Control Condition ($n = 50$)				
	T1		T3		Δ	T1		T3		Δ
	Mean	(SD)	Mean	(SD)	(T3 – T1)	Mean	(SD)	Mean	(SD)	(T3 – T1)
Self-Report Delinquency										
1. Skip school	1.00	(.00)	1.00	(.00)	.00	1.38	(.73)	1.68	(.80)	.30
2. Steal from store	1.03	(.16)	1.03	(.16)	.00	1.00	(.00)	1.00	(.00)	.00
3. Regret later	1.59	(.64)	1.49	(.56)	–.10	1.78	(.93)	1.82	(.83)	.04
4. Drink alcohol	1.81	(.74)	1.70	(.66)	–.11	2.00	(.67)	2.04	(.95)	.04
5. Not allowed	1.70	(.70)	1.59	(.60)	–.11	1.72	(.90)	1.74	(.75)	.02
6. Smoked joint/used drugs	1.03	(.16)	1.08	(.28)	.05	1.08	(.27)	1.04	(.19)	–.04
7. Kick or hit someone	1.11	(.32)	1.11	(.32)	.00	1.20	(.50)	1.20	(.45)	.00
8. Steal from someone	1.03	(.16)	1.03	(.16)	.00	1.02	(.14)	1.02	(.14)	.00
9. Damage/break something	1.14	(.35)	1.05	(.23)	–.09	1.08	(.27)	1.10	(.30)	.02
10. Cheat on exams or test	1.35	(.48)	1.38	(.49)	.03	1.24	(.43)	1.14	(.35)	–.10
$\text{Delinquency}_{\text{week}}$ (9-item scale)	1.27	(.21)	1.23	(.18)	–.04	1.36	(.24)	1.40	(.23)	.04
$\text{Delinquency}_{\text{week}}$ (10-item scale)	1.28	(.21)	1.25	(.17)	–.03	1.35	(.23)	1.38	(.22)	.03

NOTES: $N_{T1} = 133$, $N_{T2} = 96$, $N_{T3} = 87$.
ABBREVIATION: SD = standard deviation.

and those who dropped out [$t(131) = -.87$, p = n.s.]. Male participants were more likely to drop out than female participants [$\chi^2(1, N = 133) = 20.14$, $p < .001$], and the dropout rate was higher in the experimental condition than the control condition [$\chi^2(1, N = 133) = 8.81$, $p < .001$]. Finally, a marginally significant difference was found in terms of self-reported delinquency in the prior week [$t(131) = 1.86$, $p = .05$]. High scorers were slightly more likely to drop out. This finding implies that the final sample showed less variance in terms of delinquency, which makes our design more conservative as it is more difficult to obtain significant effects.

Subsequently, we checked for baseline differences between the experimental and control conditions. We found no significant differences for gender [$t(131) = .04$, p = n.s., age, $t(131) = .42$, p = n.s.], $\text{delinquency}_{\text{year}}$, [$t(85) = 1.06$, p = n.s.], and $\text{delinquency}_{\text{week}}$ [$t(131) = 1.29$, p = n.s.]. However, the conditions did differ in vividness at time 1; the control condition scored higher 2.73 (standard deviation [SD] = .90) than the experimental condition 2.43 (SD = .67) [$t(131) = 2.20$, $p < .05$, $d = .38$].

Next, we examined whether our manipulation of vividness was successful using a repeated-measures ANOVA with time entered as a within-subjects factor and condition as a between-subjects factor (table 3). As expected, we found a significant interaction between time and condition [$F(1,94) = 8.43$, $p < .01$, $\eta^2 = .08$]. Vividness increased from T1 to T2 for the experimental condition [$t(44) = -2.56$, $p < .05$, $d = .38$ ($\Delta = .26$, SD = .58)] but not for the control condition, which showed a small but not significant decrease in vividness [$t(50) = 1.20$, p = n.s. ($\Delta = .07$, SD = .41)].

In a subsequent step, we computed the bivariate correlations between the vividness measures over different time points (table 2). All vividness measures intercorrelated strongly ($r > .70$), indicating stability over time. Moreover, the correlation between T2 and T3 ($r = .87$) in which no manipulation of vividness occurred was higher than the correlations between T1 and T2 ($r = .74$) as well as between T1 and T3 ($r = .78$). A Fisher's

r test for differences between correlation coefficients revealed that the correlation between T2 and T3 was significantly higher than between T1 and T2 ($z = 2.54, p < .05$) and marginally significantly higher than between T1 and T3 ($z = 1.86, p = .06$). These findings indicate that vividness appears to be relatively stable over time and are also in line with our manipulation as the correlation between vividness at T1 and T2, during which our manipulation took place, is lower than between T2 and T3, in which no manipulation of the vividness occurred.

To test our main hypotheses, we first examined bivariate correlations between baseline levels of vividness and the outcome measures $\text{delinquency}_{\text{week}}$ at T1 and $\text{delinquency}_{\text{year}}$. As can be seen in table 2 and in line with our hypothesis, vividness is significantly negatively correlated with both $\text{delinquency}_{\text{week}}$ at T1 ($p < .05$) and $\text{delinquency}_{\text{year}}$, ($p < .01$).

Subsequently, we examined to what extent our manipulation of vividness influenced self-reported delinquency. Recall that our measure of $\text{delinquency}_{\text{week}}$ at T1 inquired about delinquent and antisocial behavior during the week prior to the start of the manipulation. The $\text{delinquency}_{\text{week}}$ measure at T3 inquired about delinquent behavior during the week after the manipulation had ended. We predicted that participants in the experimental condition would report less delinquent activity at T3 compared to T1.

To test this prediction, we compared the change in $\text{delinquency}_{\text{week}}$ between the conditions using a repeated-measures ANOVA with time as within-subjects factor and condition as between-subjects factor. Our choice for examining within-person change using a repeated-measures ANOVA, rather than regression analysis with prior offending added as a control variable, is guided by the fact that a repeated-measures ANOVA removes variability because of preexisting individual differences (e.g., regarding self-reported delinquency) from the error term (Stevens, 2012). As explained by Allison (1990), in the case of a nonequivalent control group design, the use of within-person change enhances the ability to make causal inferences from the data and is more accurate than regression analysis with pretest controls.

Means and standard deviations for both the individual items and for the $\text{delinquency}_{\text{week}}$ scales appear in table 3. As shown in table 3, for the experimental condition, with the exception of the drug use item, all items show either the expected decrease from T1 to T3 or no change, whereas for the control condition, items either show a slight increase or no change. For the total scale, we find a marginally significant interaction effect between time and condition [$F(1, 85) = 3.60, p = .06, \eta^2 = .04$].

As tends to be the case with self-report delinquency measures (Huizinga and Elliott, 1986), our $\text{delinquency}_{\text{week}}$ scales had a skewed distribution. To examine whether these results were robust against violations of normality, we reran the repeated-measures ANOVA after employing a Box–Cox transformation on the scales (Box and Cox, 1964). After the Box–Cox transformation, the $\text{delinquency}_{\text{week}}$ scales showed only marginal deviations from a normal distribution.[5] Reanalyzing the repeated-measures ANOVA using the transformed scales, the *p* value of the interaction effect of the nine-item scale was

5. The skewness of the transformed scales ranged from –.04 to .10 (original range .79 to 1.18) and the kurtosis from –.55 to –.02 (original range .35 to 2.41). After Box–Cox transformation, the residuals of the general linear model (GLM) were normally distributed at T1 (Shapiro–Wilk test $p > .05$) and had a marginal skewness of .17 and a kurtosis of –.26 at T3.

identical to the original analysis [$F(1, 85) = 3.77$, $p = .06$, $\eta^2 = .04$.]. We can therefore conclude that our initial results were robust against violations of normality.

Finally, as a proper test of our hypothesis that vividness of the future self predicts delinquency, we ran a mediation model in which we examined the direct and indirect effects of condition on change in self-reported delinquency, with change in vividness of the future self as a mediator of this relationship. Support for our hypothesis requires the effect of our manipulation on the change in self-reported delinquency to operate via changes in vividness of the future self, i.e., the indirect effect to be significant.

Prior to running a formal test of mediation, we examined whether change in vividness was correlated with change in self-reported delinquency (for all participants) such that increases in vividness result in decreases in self-reported delinquency. This was the case [$r(84) = -.23$, $p < .05$]. To examine whether the change in vividness from T1 to T2 mediated the relation between condition and the change in delinquency from T1 to T2, we used a nonparametric bootstrapping procedure (Hayes, 2012; Preacher and Hayes, 2004). Because indirect effects are not normally distributed and the traditional approaches (e.g., Baron and Kenny, 1986; Sobel, 1982) suffer from several weaknesses, such as a higher probablity of Type I error rates, low power, and are problematic when used with small samples (e.g., MacKinnon et al., 2002; Shrout and Bolger, 2002), bootstrapping has become the preferred method for testing mediation. Rather than basing the inference about the indirect effect on the statistical significance of the single paths between the variables in the model, this method statistically tests the indirect effect itself, respecting the non-normality of the sampling distribution of the indirect effect (Hayes, 2012: 13).

We used the PROCESS macro for testing a simple mediation model (Hayes, 2012), which has a default of 1,000 bootstrap samples and yields 1,000 estimates of each path coefficient. These estimates were used to calculate estimates of the direct and indirect effect of our manipulation on the change in delinquency through a change in vividness of the future self. The mediation is significant at the .05 level if the bootstrapping confidence interval of the indirect effect does not include 0. In support of our hypothesis, a bias-corrected bootstrap 95 percent confidence interval (CI) showed that the direct effect of our manipulation on the change in delinquency was not significant, .06, 95 percent BCa CI: [–.0315–.1490], whereas the indirect effect of our manipulation on change in delinquency through change in vividness of the future self, which is the product of the two unstandardized path coefficients, was significant, –.36 x –.07, 95 percent BCa CI: [.0026–.0801] indicating that the change in vividness from T1 to T2 was a significant mediator of the relation between our manipulation and delinquency.[6]

6. The results for the 10-item scale were similar to the results obtained with the 9-item scale. For the 10-item $\text{delinquency}_{\text{week}}$ scale, the correlation with vividness was also significant ($p < .05$). The interaction between time and condition for the 10-item scale was slightly weaker [$F(1, 85) = 2.20$, $p = .14$]. Furthermore, analogous to the 9-item scale, after Box–Cox transformation, the residuals of the GLM for the 10-item scale were also normally distributed at T1 (Shapiro–Wilk test $p > .05$). They had a marginal skewness of .08 and a kurtosis of –.24 at T3. The p value of the interaction effect for $\text{delinquency}_{\text{week}}$ for the 10-item scale, with time as within-subjects factor and condition as between-subjects factor, showed a small increase compared with the 9-item scale, [$F(1, 85) = 2.06$, $p = .16$]. Finally, the mediation analyses with the 10-item delinquency scale yielded similar direct ($p = .20$) and indirect effects (95 percent BCa CI = .0010–.0731) as the 9-item scale.

DISCUSSION

There is certainly no dearth of empirical evidence that delinquents tend to live in the here-and-now and are inclined to disregard the longer term consequences of their actions. The failure to make informed trade-offs between the immediate and the delayed consequences of one's actions pervades the research literature on crime and delinquency and underlies a variety of established individual-level theoretical perspectives and constructs, such as self-control, impulsivity, and temporal discounting (e.g., De Vries and Van Gelder, 2013; Gottfredson and Hirschi, 1990; Loughran, Paternoster, and Weiss, 2012; Moffitt, 1993). However, the cognitive mechanisms underlying this failure have not yet been entirely identified, nor has the research literature provided clear answers to the question of how the ability of crime-prone individuals to consider the delayed consequences of their behavior can be increased. The current study was intended to provide a novel perspective on both issues.

We hypothesized that delinquent individuals have difficulty imagining themselves in the future. As a consequence, they fail to take the delayed consequences of their behavior into account and opt for immediate gratification by way of criminal behavior. In line with this reasoning, we furthermore hypothesized that instilling a greater sense of vividness of the future self would motivate individuals to act in more future-oriented ways and therefore to reduce their delinquent involvement. We tested both predictions in a field experiment using a social network website in which individuals, a sample of high-school adolescents, "befriended" a realistic version of their older, future self.

Both hypotheses were supported by the results. High-school youth with a more vivid image of their future self reported less engagement in delinquent and antisocial activities than individuals who had a less vivid image of themselves in the future. Furthermore, participants who had befriended their future self also reported less delinquent activity than participants in the control condition who had befriended their present avatar. Additionally, the effect of our manipulation on delinquency was mediated by changes in vividness of the future self, such that increases in vividness led to lower self-reported delinquency. In other words, delinquent activity seems to ebb and flow with changes in vividness of the future self. Finally, the high correlation between vividness scores over different measurements also hints at the stability of the vividness of the future self construct over time, instead of it being a fleeting momentary state.

Vividness of the Future Self and Related Perspectives

Having demonstrated an empirical relation between vividness of the future self and delinquency, it makes sense to discuss the novel paradigm in the context of related perspectives. Most prominently, the vividness of the future self construct shares its emphasis on the trade-off between costs and benefits that materialize at different points in time with various well-established constructs frequently encountered in the criminological literature, such as self-control, impulsivity, conscientiousness, and sensation seeking. Furthermore, several other constructs that have been associated with delinquency, such as time perspective (Zimbardo and Boyd, 1999, 2008), consideration of future consequences (Strathman et al., 1994), future orientation (Steinberg et al., 2008), and temporal discounting (Frederick, Loewenstein and O'Donoghue, 2003), have even more explicit temporal underpinnings.

The existence of a variety of different perspectives that all share a temporal orientation reveals several relevant issues. For one thing, it alludes to the fact that the mental representation of the time that lies ahead can exert a significant influence on our behavior in the present in one way or another and that the failure to give it due consideration can have harmful consequences to the self. Indeed, ample research has shown that the ability to consider the future is intimately related to a variety of negative behaviors, such as gambling, drug use, alcohol use and smoking, risky sexual behavior, and involvement in crime and delinquency. Conversely, research has also shown that paying attention to long-term consequences predicts a higher intent to save money for retirement and healthy behaviors (Bartels, Urminsky, and Frederick, 2014; Hershfield et al., 2011; Strathman et al., 1994). However, the diverging assumptions underlying these different perspectives and the fact that they often only intercorrelate modestly also indicates that the cognitive mechanisms underlying failures to "think ahead" might not have been entirely identified or that there are different pathways through which they operate on behavior, or both. Next, we tentatively discuss how the vividness of the future self perspective relates to other perspectives in criminology that link delinquency to temporal orientation. We focus principally on self-control given its prominence in criminological research. In the process, we identify interesting areas for future research.

Vividness of the Future Self and Developmental Changes

One way in which vividness differs from self-control is its development over time. According to Gottfredson and Hirschi (1990), self-control is stable over the life course, and after the first decade of life, between-individual levels of self-control are fixed. In contrast, similar to future orientation, i.e., the capacity and inclination to project events into the future (Steinberg, 2009), we expect that vividness of the future self increases with age; being weak during adolescence and developing considerably toward early adulthood. As Barbot and Hunter (2012: 22–3) remarked, adolescents' relatively limited life experience means that they perceive future time differently from adults in the sense that they are less able to perceive the proximity of the future and are consequently less inclined to heavily weigh future consequences. To an adolescent, short-term consequences are therefore likely to have far greater salience than consequences located several years away in the future, whereas long-term consequences of present-day decisions are likely to seem more immediate with increasing age (Barbot and Hunter, 2012; Steinberg, 2009).

Thus, besides individual differences in the extent to which people can imagine themselves in the future, the capacity to do so also develops with age. The development of this capacity might, to some extent, follow the developmental trajectory of the age–crime curve, according to which crime tends to peak during middle-to-late adolescence and subsequently declines in early adulthood (Farrington, 1986; Piquero, Farrington, and Blumstein, 2007). To explore this claim, future studies could examine the development of vividness over different phases of the life course, particularly the period between mid-adolescence to early adulthood. Additionally, research could compare life-course persisters with desisters in terms of their vividness of the future self, assuming that desisters will report higher levels of vividness compared with persisters.

On a related note, recent advances of research into the neurobiological development of the brain suggest that at least some of the constituent components of self-control are likely to develop more in accordance with the age–crime curve than others and

might therefore be conceptually closer to the vividness of the future self concept. Specifically, this research has shown that risk seeking and impulsivity, which are conflated in most existing measures of self-control (Burt, Sweeten, and Simons, 2014), develop along different maturational timetables (Barbot and Hunter, 2012; Casey, Jones, and Hare, 2008; Steinberg, 2008). As Steinberg et al. (2008: 39) remarked, researchers "interested in the course of 'future orientation' should bear in mind that different aspects of future orientation may follow different developmental trajectories and reach adult levels of maturity at different ages." These findings tie in nicely with the vividness concept as they imply that the ability of people to consider the future is likely to develop with age.

Another way in which vividness differs from self-control and the other temporal concepts mentioned previously, regards the implication of the self, i.e., individual identity, in the former. Not only is the period from adolescence to early adulthood important for learning to understand the consequences of one's actions, but also it is a crucial period in terms of the formation of individual identity and the self-concept (Erikson, 1968; Harter, 1990, 2003). Neurobiological and identity changes are among the most salient changes in adolescent development, and both neurobiological and identity perspectives provide insights from different angles to understand adolescent behavior, such as the propensity for risky behaviors, impulsivity, and emotional liability that emerge in adolescence. At the same time, the identity formation process provides further insights in that it guides the expression of these behaviors (e.g., breaking the law in the need for exploration or to integrate into a peer group), and such maladaptive behaviors can crystallize into a persistent delinquent identity (Barbot and Hunter, 2012). Therefore, extending this approach to the study of delinquency, by situating how neurobiological changes and identity formation processes result in delinquency, could shed new light on these phenomena. Indeed, the concept of (future) self can be used as a vehicle to integrate these existing approaches that attempt to explain delinquency (neurobiological, social network, social/societal structure, and self-control), which find their reflection in individuals' self-concepts (Oyserman and Markus, 1990). Although we have only scratched the surface in this article, we think that the integration between neurobiological changes and identity formation is a challenging and interesting avenue for future research to pursue, and could be of particular interest to life-course researchers.

We also think that in its link with identity and identity formation lies the potential of the vividness concept for prevention, treatment, and interventions involving offenders. Although we demonstrated that vividness is at least to some extent stable over time, and is not some momentary state, we also showed it is amenable to change. That is, we have shown that people can be made aware of their future self and that this increased awareness leads to a reduction in delinquent behavior. If an important element of offender therapy is to convince individuals to accept responsibility for their actions and see themselves and their behaviors more realistically (Topalli, Higgins, and Copes, 2014), then the vividness concept could prove to be useful for improving offender treatment programs.

Limitations and Suggestions for Future Research

Although we found vividness of the future self to be related to self-reported delinquency and showed that it is possible to manipulate it, various issues merit discussion. First, more research is needed to flesh out the exact mechanisms at stake. Even though

we propose that vividness of the future self could be the cognitive mechanism responsible for the failure to make informed cost–benefit trade-offs, this hypothesis remains to be directly tested. An alternative explanation for the found results could be that people who befriend or are confronted with their future self behave more ethically and less delinquently because they feel that their actions are being monitored or because the identification with their future self encourages them to act in more moral ways irrespective of the potential pains and gains of their actions. We think that these alternative explanations provide relevant input for the research agenda into this new paradigm. In a related vein, the fact that our results showed only partial mediation by vividness of the future self prompts the question of what other mechanisms may be at stake. Future studies should also address the temporal stability of the construct and use longer time intervals.

Second, in contrast to our expectations, we found a slight increase in delinquent behavior in the control condition from T1 to T3 while observing a decrease in vividness in this condition for the same period. We speculate that our manipulation for the control group, which had a strong focus on the present, could have been responsible for increasing the vividness of the present self at the expense of the future self. In other words, our control condition may have inadvertently triggered a "here-and-now" orientation that, as has been shown in extant research, is predictive of delinquent behavior. Future research could purposefully attempt to trigger such an orientation and examine whether this predicts delinquency.

Third, this study was conducted on a high-school sample. It remains to be seen whether the manipulations used are also effective on a sample of at-risk youth or juvenile delinquents. High preexisting levels of delinquency could represent a boundary condition for the effectiveness of future self manipulations. More work is needed, however, to determine whether such populations would be more affected by exposure to images of their future selves (given that they theoretically have more room to grow in this domain).

Fourth, our measure of delinquency during the prior week did not address more serious forms of delinquent behavior. Some of the items, such as doing something you regret, did not directly tap into delinquency. Because of the time frame of 7 days and the sample used, more severe forms of delinquency would have led to even lower prevalence rates, and therefore, we did not opt for using these.

Fifth, we recognize that the effect sizes were modest. Indeed, this was a field study, and many other factors could possibly affect delinquent behavior aside from our manipulation. In conjunction with the previous limitations, this point highlights the need for future research to replicate our findings. Nonetheless, the current research shows promise for implementation as, despite small effect sizes, showing adolescents images of their future selves is a relatively easy and inexpensive way of altering undesirable behavior. It is also worth noting in this context that our intervention lasted just 7 days and took less than 5 minutes of participants' time per day. The fact that this little intrusive and brief intervention was enough to influence real-world delinquent behavior boosts our confidence in the results and the promise of the paradigm for crime prevention and offender rehabilitation. Importantly, we think that a major strength of the paradigm is not only that it can shed light on some of the cognitive mechanisms underlying delinquency and the tendency to live in the here and now, but also that it offers relevant input for interventions aiming to reduce delinquent behavior or targeting at-risk youth.

Finally, we did not randomly allocate participants to the experimental and control conditions but instead assigned one of the participating schools to the experimental condition

and the other to the control condition. This strategy could potentially have influenced estimates of the effectiveness of our intervention. However, we think that given the nature of the manipulation, our approach is to be preferred over the random allocation of participants to the treatment conditions, which would have implied that participants from the same school would have been aware of the nature of the manipulation in both conditions. This could have contaminated the results. By assigning one school to the experimental condition and the other to the control condition, we were able to avoid spillage. Additionally, by selecting schools and cities that were highly similar in terms of background characteristics and targeting students in the same grade and education level, we have attempted to keep possible pretreatment differences to a minimum.

CONCLUSION

This study intended not only to introduce a novel theoretical perspective but also to provide a new method for increasing the ability of crime-prone individuals to consider the future consequences of their behavior. Social network websites such as Facebook form an integrated part of the daily life and routines of adolescents and young adults. Their use can therefore significantly add to the ecological validity of research designs. We think that precisely by virtue of this integration, effects of interventions using approaches such as the one used in the current study can carry over into the real world. Furthermore, we think that the possibility for interaction with research participants and the possibility for both written communication and visual stimuli that is offered make social media a powerful tool for criminological research in particular and social scientific research in general (see Van Gelder and Van Daele, 2014).

In closing, we note that the vividness of the future self paradigm can be usefully applied to other types of self-defeating behavior and self-control dilemmas such as smoking, gambling, alcohol abuse, and drug use, all of which are important correlates of delinquency (Hirschi, 2004). These behaviors are, analogous to delinquency, characterized by immediate benefits and long-term costs. The results of this study, although preliminary in nature, suggest that increasing the vividness of the distant self can help people step out of the here and now in an effort to live more for the future.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

- Faces Measure
- Self-Reported Delinquency in the Prior Year Measure
- Self-Reported Delinquency in the Past Week Measure