



## Vividness of the Future Self Predicts Delinquency

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Vividness of the Future Self Predicts Delinquency

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**Abstract**

The tendency to live in the here and now and the failure to think through the delayed consequences of behavior is one of the strongest individual-level correlates of delinquency. We tested the hypothesis that this results from a limited ability to imagine one's self in the future, which leads individuals to opt for immediate gratification. Strengthening the vividness of the future self should therefore reduce delinquent involvement. We tested and found support for this hypothesis in two studies. In Study 1, compared to those in a control condition, participants who wrote a letter to their future self were less inclined to make delinquent choices. In Study 2, participants who interacted with a realistic digital version of their future, aged-progressed, selves in a virtual environment were less likely to cheat on a subsequent task than controls.

*Keywords:* future self, delinquency, virtual reality, temporal discounting, self-defeating behavior

### Vividness of the Future Self Predicts Delinquency

A defining characteristic of delinquent acts is not their illegality per se, but the fact that they offer immediate rewards such as cash, sexual gratification, or excitement, while their costs are more remote (Hirschi, 2004). Unsurprisingly, one of the most established findings in crime research is that delinquents tend to focus on short-term gains while failing to adequately think through the longer-term consequences of their behavior (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000).

This individual disposition to live in the ‘here-and-now’ is a key ingredient of several established theories and explanations of crime (e.g. Gottfredson & Hirschi, 1990; Moffitt, 1993; Nagin & Pogarsky, 2003; Wilson & Herrnstein, 1985). Wilson and Herrnstein (1985), for example, note “the extent to which people take into account distant possibilities...will affect whether they choose crime or noncrime” (p. 44-45). In a similar vein, Gottfredson and Hirschi (1990) argue that people with a here-and-now orientation tend to respond to tangible stimuli in their environment and are unable to defer gratification, which leads them to engage in crime. Nagin and Pogarsky (2003) linked the tendency to live in the present to individuals’ discount rates; future-oriented individuals are more deterred by the delayed costs of their behaviour compared to their present-oriented counterparts who overly discount temporally remote consequences. Moffitt (1993) argued that impulsivity can lead to delinquency through its interference with the ability to think through the future consequences of one’s actions.

What these different perspectives have in common is that each of them argues that delinquent choices are the result of a limited ability to make informed tradeoffs between immediate benefits and long-term costs of behavior. Although research has consistently found the tendency to live in the here and now to be related to delinquent involvement, less is known about the cognitive mechanisms responsible for this association. In this paper, we examine the possibility that delinquent tendencies result in part from the way individuals

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2  
3 think of their future selves. More specifically, we hypothesize that delinquent behavior, and  
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5 the present-oriented mindset that often accompanies it, results from a limited ability to  
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7 imagine one's self in the future.  
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10 Recent research shows that people think about themselves in the future as if they are  
11  
12 different people (Pronin & Ross, 2006; Wakslak, Nussbaum, Liberman, & Trope, 2008). So-  
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14 called multiple-self models assume that instead of being unitary, individuals consist of a  
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16 succession of temporally distinct and overlapping selves (Bartels & Rips, 2010; Frederick,  
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18 2003; Hershfield, Cohen & Thompson, 2012; Parfit, 1986; Strotz, 1956). The connectedness  
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20 or overlap between selves naturally diminishes as a function of time, and hence people will  
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22 identify less with a very distant future self, e.g. one's 20-year older self, than a temporally  
23  
24 closer one, e.g. one's 3-months older self (Frederick, Loewenstein & O'Donoghue, 2002;  
25  
26 Hershfield, 2011). The psychological link between successive selves and decision making  
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28 can, for example, explain people's preferences for immediate, but smaller, rewards over  
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30 larger, but delayed ones (Bartels & Rips, 2010; Bartels & Urminsky, 2011; Ersner-  
31  
32 Hershfield, Garton, Ballard, Samanez-Larkin, & Knutson, 2009).  
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37 The vividness or concreteness of the image of the future self is likely to be a  
38  
39 determining variable in this context (Hershfield, 2011). Parfit (1986), for example, noted that  
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41 "when we imagine pains in the further future, we imagine them less vividly, or believe  
42  
43 confusedly that they will somehow be less real, or less painful" (p. 161). Similarly,  
44  
45 Loewenstein (1996) hypothesized that a more vivid mental impression of a future action or  
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47 self might intensify the emotions that are linked to thinking about that scenario. This  
48  
49 impression may then allow an individual to be better informed regarding the future  
50  
51 consequences of a decision made in the here and now. For example, a victim who is  
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53 portrayed in vivid terms is more likely to elicit a sense of connection and sympathy, and  
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55 subsequent charity than one who is not (Small & Loewenstein, 2003).  
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3 Because delinquency tends to be characterized by immediate benefits, which accrue to  
4 the present self, while its costs (e.g. having a criminal record, losing one's job, difficulties on  
5 the labor market, social exclusion) come at the expense of a more distant and harder to  
6 imagine future self, the temptation to perform this behavior can be hard to resist.  
7

8  
9 Analogously, if the future self is more vividly imagined – that is, if it is easier to picture in  
10 one's mind– costs will receive greater weight in decisions to commit a delinquent act or to  
11 abstain from crime. The degree to which an individual is able imagine himself in the future  
12 can therefore be expected to correlate with the degree to which he will engage in crime.  
13

14 Accordingly, we propose that people who possess a vivid, concrete representation of their  
15 future selves are more inclined to abstain from delinquency compared to those who lack this  
16 ability. Increasing the vividness of the future self should motivate individuals to act in a more  
17 future-oriented way and should therefore reduce delinquent involvement.  
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19  
20 We examined this hypothesis in two studies. In Study 1, we manipulated vividness by  
21 having participants write a letter to their future selves and subsequently presented them with a  
22 series of scenarios that allowed for making a delinquent choice. In Study 2, vividness of the  
23 future self was manipulated using immersive virtual reality technology. Specifically,  
24 participants were confronted either with a realistic version of their present or older self while  
25 looking into a virtual mirror (see Hershfield et al., 2011). We then measured actual rates of  
26 delinquent behavior using a quiz that gave participants an opportunity and incentive to cheat.  
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### Study 1

In this study, we examined whether vividness of the future self can be experimentally induced using a writing task. Previous research has shown that writing is an effective way to improve the psychological connectedness between multiple selves (Oyserman & Saltz, 1993; Pronin & Ross, 2006). Following the writing task, participants were presented with a series of scenarios to measure their tendency to make delinquent choices.

## Method

**Participants & procedure.** A total of 114 young adults<sup>1</sup> participated in exchange for \$.30. Participants were between the ages of 20 and 25 were recruited ( $M_{\text{age}} = 22.80$ ) from the Mechanical Turk subject pool. Three participants were excluded for failing to complete the letter-writing task.

### Materials.

**Letter to (future) self.** The manipulation consisted of a letter-writing task. As a cover story, participants read that the research was about how people see themselves in the future. In the distant-self condition, participants were asked to take 5 minutes to write a 200-300 word letter to their future self in 20 years' time. In the near-self condition, participants were asked to write a letter to themselves three months into the future. The instructions read: "Think about who you will be 20 years from now [three months from now], and write about the person you are now, which topics are important and dear to you, and how you see your life."

**Delinquent choice scenarios.** The letter-writing task was followed by a questionnaire containing five brief delinquent choice scenarios created for the purposes of this study. The scenarios were introduced as dilemmas. For example, "Imagine the following: You need a new computer but you are short on cash. A fellow student tells you about an acquaintance of his who sells laptops that 'fell off a truck'. The laptops meet your requirements and are very attractively priced. How likely is it that you would buy one of these potentially stolen laptops?" Answers were given on a 7-point Likert scale (*very unlikely-very likely*). The other topics regarded theft, insurance fraud, and illegal downloading. Participants' responses to the five dilemmas were averaged to form a delinquent choice scale ( $\alpha = .69$ ,  $M = 4.00$ ,  $SD = 1.36$ ). Higher scores on this scale reflect a tendency to make more delinquent choices.

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<sup>1</sup> Due to experimenter error, participants were not asked to report their gender. However, Burhmester, Kwang, and Gosling (2011) report that Mechanical Turk samples tend to be 55% female.

## Results & Discussion

On average, participants used a total of 151 words ( $SD = 73$ ). There was no difference between the experimental groups in the number of words used  $t(109) = 1.09, p = ns$ .

Consistent with our prediction, participants in the distant-self condition scored significantly lower on the delinquent choice scale ( $M = 3.71, SD = 1.45$ ), than did participants in the near-self condition ( $M = 4.23, SD = 1.24$ ),  $t(109) = 2.01, p = .05, d = .39$ . Furthermore, for each of the five individual scenarios, participants in the distant-self condition reported a lower likelihood to choose the delinquent option (see Table 1).

These results show having individuals contemplate their self in the future can influence delinquent decision-making. Note that the choice for a three-month period rules out the possibility that differences in the dependent variable between the near-self condition and distant-self condition are simply due to a differential consideration of the consequences of the choice behavior. During a three-month period, the more immediate consequences of a criminal choice, such as detection or arrest, should be able to materialize. It is therefore not so much thinking about the consequences of one's acts or contemplating the future in general that account for the results, as both the near-self and the distant-self groups were encouraged to 'think ahead' in this study. However, while supporting our predictions, this study relied on a self-report measure and lacks a behavioral indicator. In Study 2, we employ a behavioral measure and use a novel technique to induce vivid perceptions of the future self.

### Study 2

In this study we capitalize on a novel technology, immersive virtual reality (IVR). Instead of merely asking participants to imagine an older version of themselves, IVR creates an interaction between the present self and the future self, by having participants see a highly realistic age-progressed version of their future selves in a virtual mirror (Hershfield et al, 2011).



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3 IVR technology generates the experience of being ‘immersed’ in a computer-  
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5 generated environment, in which all real-world visual input is removed, creating the  
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7 impression that one has actually stepped inside the virtual world (Witmer & Singer, 1998).  
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10 We predict that participants who see the age-morphed version of their future selves will  
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12 engage in less delinquent behavior.  
13

#### 14 **Method**

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16 **Participants.** A total of 67 undergraduate students (47.8% women,  $M_{\text{age}} = 21.6$ , age  
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18 range: 18-26) participated. Participants received €7 in exchange for participation with the  
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20 possibility of earning an additional €7 by participating in a short quiz (see below).  
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23 Prospective participants, who were recruited in a university cafeteria, were told that the  
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25 research involved meeting their avatar in a virtual environment and that the goal of the study  
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27 was examining the relation between personality and the experience of virtual reality.  
28

#### 29 **Materials and procedure.**

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31 **Virtual reality.** We followed the procedure designed by Hershfield et al. (2011) to  
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33 create persuasive visual analogs of 40-year-old versions, i.e. avatars, of participants on the  
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35 basis of digital pictures of their face. Following the creation of a three-dimensional model of  
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37 their face, participants can enter an immersive virtual reality system. In this system, sensors  
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39 monitor the location of the participant in the virtual environment and feed it back to the  
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41 participant through a head-mounted display. The environment, which was created for the  
42  
43 purposes of this study, consisted of a basic room with a virtual mirror hanging in the middle  
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45 of one of its walls (see Figure 1). When participants approach the mirror, they see an age-  
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47 progressed version of themselves. In the control condition they see a normal, (i.e., non age-  
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49 progressed), version of themselves. The programming is such that the virtual mirror functions  
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51 identical to a regular mirror and moves in the physical world are mirrored by the virtual self-  
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53 image.  
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3       **Virtual reality experience.** To measure the impact and strength of the virtual  
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5 experience (i.e., to measure the extent to which the participant felt psychologically connected  
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7 to their avatar), participants were presented three items using 7-point Likert scales inquiring  
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9 about the virtual experience: 1) ‘To what extent did you find your avatar realistic?’ 2) ‘To  
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11 what extent did you recognize yourself in your avatar’ 3) ‘To what extent did you feel  
12  
13 connected to your avatar?’ (*not at all-very much*).

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16       **Quiz.** As a behavioral measure of delinquent behavior, we used a measure developed  
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18 by Nagin and Pogarsky (2003). This measure is a quiz containing eight multiple-choice trivia  
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20 questions, each with five possible answers, one of which is correct. Participants were told that  
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22 answering seven or eight questions correctly would entitle them to a €7 bonus over the €7  
23  
24 payment of the experiment. The trivia questions were intended to be so difficult that it would  
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26 be unlikely for participants to know even one correct answer, let alone seven or eight out of  
27  
28 eight, but also that it would be virtually impossible to have seven or eight answer right by  
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30 guessing. One question, for example, asked: “Which country borders Tanzania? (a) Ethiopia;  
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32 (b) Sudan; (c) Zambia; (d) Zimbabwe; (e) Angola.”

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36       At the end of the booklet, the correct answers were given on the reverse side of the  
37  
38 last page. Participants were instructed that once they had finished answering all the questions,  
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40 and not before, they could check what number of questions they had answered correctly. In  
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42 case they had seven or eight answers correct, they were allowed to take the envelope with the  
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44 €7 that was attached to the booklet with them. They were instructed that they could either  
45  
46 keep or throw away the booklet. Importantly, providing the answers afforded each subject an  
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48 opportunity to cheat. Indeed, the obscurity of the trivia questions and the infinitesimal  
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50 probability from guessing seven or eight answers correctly combine to form the premise of  
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52 the experiment: Participants claiming a trivia bonus are safely assumed to have cheated  
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56 (Nagin & Pogarsky, 2003).  
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3       **Experimental procedure.** Participants first read and signed a consent form, after  
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5 which a picture of their face was taken. Participants were told they would soon be brought  
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7 into a virtual environment in which they would meet their avatar. Before that could be done,  
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9 their avatar needed to be created on the basis of a picture of their face. Participants were  
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11 randomly assigned to either the experimental condition or the control condition. While the  
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13 experimenter created their avatar, participants completed the 200-item version of the revised  
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15 HEXACO Personality Inventory (Ashton & Lee, 2008) in a separate room, which was part of  
16  
17 the bogus story of the experiment: i.e., examining the relation between personality and virtual  
18  
19 reality experience. Following the completion of the personality questionnaire, a head-  
20  
21 mounted display was placed on the head of the participant and he/she was given instructions  
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23 to navigate the virtual environment. The instructions consisted of first crossing the virtual  
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25 room to get used to the virtual environment and subsequently approaching the mirror hanging  
26  
27 on one its walls. Participants were to carefully study their face in the mirror for about 30  
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29 seconds. They were then to step away from it twice (once to the left and once to the right) and  
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31 each time step back in front of it to take another good look at their face. After doing so they  
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33 were to walk towards the door in the virtual room.  
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38       After completing the assignment, the experimenter took the headgear off and  
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40 participants were escorted to a separate room and asked to fill out the survey containing the  
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42 questions about the virtual reality experience and the quiz. After having finished both,  
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44 participants went back to the experimenters' room and were paid for the experiment.  
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46 Debriefing occurred by email a week after participation to avoid the possibility of  
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48 participants giving away the goal of the experiment to fellow students.  
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## 52       **Results & Discussion**

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54       We first examined the scores on the virtual reality experience items of both conditions.  
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56 For none of the three items were there differences between the experimental and control  
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3 condition. Participants in the control condition found their avatar as realistic ( $M = 4.59$ ,  $SD =$   
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5  $1.58$ ) as participants in the experimental condition ( $M = 4.39$ ,  $SD = 1.66$ ),  $t(65) = .49$ ,  $p = ns$ .  
6  
7 Furthermore, participants in the control condition recognized themselves in their avatar ( $M =$   
8  
9  $5.44$ ,  $SD = 1.19$ ) as did participants in the experimental condition ( $M = 5.45$ ,  $SD = 1.54$ ),  
10  
11  $t(65) = -.04$ ,  $p = ns$ . Finally, there was no difference in the felt connectedness between the  
12  
13 participants and their avatar between the control condition ( $M = 4.21$ ,  $SD = 1.61$ ) and the  
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15 experimental condition ( $M = 4.03$ ,  $SD = 1.85$ ),  $t(65) = .42$ ,  $p = ns$ .

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18 As mentioned previously, the prospect of gaining extra money when answering seven or  
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20 eight items correctly provided participants with an incentive to cheat on the trivia quiz. We  
21  
22 expected participants in the experimental condition who had been confronted with their older  
23  
24 self to cheat less than participants in the control condition. In line with our prediction,  
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26 participants in the experimental condition were significantly less likely to cheat (6.1%) than  
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28 were participants in the control condition (23.5%) ( $\chi^2(1, N = 67) = 4.03$ ,  $p = .04$ ).  
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### 32 **General Discussion**

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34 In two studies we found support for the hypothesis that delinquency in part results  
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36 from a limited ability to imagine one's self in the future. In both studies we manipulated  
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38 vividness of the future self and found that when vividness of the future self is increased,  
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40 individuals are less inclined to engage in delinquent behaviour. In other words, the cognitive  
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42 mechanism underlying the tendency to live in the here and now leading to delinquent  
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44 behavior may reside in the vividness of the future self. The findings have an important  
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46 practical implication: increasing the vividness of the future self can reduce criminal  
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48 propensity.  
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52 It should be noted that the research examined relatively minor crimes. Nonetheless,  
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54 we assume the mechanism to be similar across populations. As Hirschi and Gottfredson  
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56 (2001) observe: “[C]riminal and deviant acts have something in common because  
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3 participation in any one of them predicts participation in all of the others... People who rob  
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5 and steal are more likely than people who do not rob and steal to smoke and drink, use illegal  
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7 drugs, break into houses, and cheat on tests” (p. 82). Furthermore, criminal careers generally  
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9 do not start with big heists, but with petty crime and rule-violating behavior that tend to  
10  
11 escalate in severity over time.  
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14 It could be argued that our approach resembles previous attempts to link present  
15  
16 behavior to future consequences. A classic example are ‘Scared-straight’ programs which  
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18 bring young offenders into adult prison facilities and brutally depict prison life under the  
19  
20 assumption that this negative prospect will deter them from further involvement in crime.  
21  
22 However, research shows that these programs have no effect at best and are  
23  
24 counterproductive at worst (Petrosino, Turpin-Petrosino, & Buehler, 2003). A central  
25  
26 difference with our approach is that in previous attempts the scenarios involving the future  
27  
28 self were hypothetical. Aging, however, is a physiological change that is inevitable. The  
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30 future self as it was operationalized in the present study is therefore not hypothetical, but real.  
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32 Furthermore, Scared-straight programs are designed to operate on an emotional level by  
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34 inducing fear, which is a fleeting psychological experience that is not stored in memory.  
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36 Hence their effects can be expected to be only temporary. The extent to which increasing the  
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38 vividness of the future self can produce long-term effects is an important question to be  
39  
40 addressed in future research. Additionally, future research could address the stability of  
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42 vividness of the future self and examine how it develops over the life course. For example,  
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44 crime tends to peak during late adolescence to show a consistent decline from early adulthood  
45  
46 onwards. It would be interesting to examine to what extent vividness of the future self shows  
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48 a parallel development and could account for age-related changes in delinquency.  
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54 It is possible that vividness of the future self could be linked to other concepts that  
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56 are related to delinquent behavior (such as self-control and present-bias). Yet, in previous  
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3 work, Bartels and Urminsky (2011) used narrative manipulations to boost participants' sense  
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5 of connectedness to their future selves and subsequently lower temporal discounting rates.  
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7 They found that a host of factors – such as present-bias, uncertainty about the future, or  
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9 different affective evaluations about the future – could not account for the link between  
10  
11 increased connectedness with the future self and temporal discounting. Along similar lines,  
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13 Hershfield et al. (2012) demonstrated that trait-level self-control could not explain the link  
14  
15 between overlap with one's future self and a lower tendency to engage in ethically  
16  
17 questionable behavior. As noted earlier, vividness, like similarity and connectedness, is an  
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19 important component of the way that people conceptualize their future selves (Hershfield,  
20  
21 2011). Nonetheless, the present studies do not examine connectedness or similarity with the  
22  
23 future self, but instead look solely at vividness. As such, future work should examine whether  
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25 manipulations that enhance vividness may also affect phenomena like present bias and self-  
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27 control more generally.  
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31  
32 Finally, it could be the case that thinking about the future in general, rather than  
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34 thinking about the future self *per se*, is what truly influences criminal decision-making.  
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36 Although we do not exclude this possibility, we do not consider it likely. Hershfield et al.  
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38 (2012), for example, found that people's ability to project their self into the future was  
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40 negatively related to their tendency to engage in unethical behavior, but that this was not the  
41  
42 case for participants who were asked to consider the future in more general terms.  
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45  
46 Crimes tend to severely affect their victims, the community in which they are  
47  
48 committed, and sometimes, even society at large. Furthermore, crime is costly. Significant  
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50 amounts of public resources are devoted to crime prevention and rehabilitation. Yet,  
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52 recidivism rates are high. Up to two-thirds of U.S. prisoners are, for example, re-arrested  
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54 within three years after their release from prison (Langan & Levin, 2002). One of the  
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56 strengths of this research is its applied potential as it has shown that increasing the vividness  
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3 of the future self may offer a way of reducing criminal propensity. It is relevant to remark in  
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5 this respect that deterrence, one of the pillars of our criminal justice systems, essentially  
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7 hinges on the ability of would-be offenders to imagine that the costs of their behavior accrue  
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9 to (a future version of) themselves. Moreover, because analogous problem behaviors such as  
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11 gambling, speeding, smoking and excessive drinking share with delinquency immediate  
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13 benefits and remote long-term costs (Loewenstein, 1996), interventions that focus on  
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15 increasing the vividness of the future self may also prove effective for countering these types  
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17 of self-defeating behaviors.  
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For Review Only

Table 1

*Means, standard deviations and probability levels on the delinquent choice scenarios*

Scenario	Control		Experimental		<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Restaurant	4.32	2.10	3.92	2.07	.32
Gym	4.72	1.83	3.92	2.18	.04
Camera	3.45	2.10	3.29	2.06	.70
Laptop	3.22	1.98	2.98	2.05	.54
Downloading	5.43	1.77	4.45	2.04	.01
Delinquent choice scale	4.23	1.24	3.71	1.45	.05

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## VIVIDNESS OF THE FUTURE SELF PREDICTS DELINQUENCY

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*Figure 1.* The computer screen on the left panel displays what is seen by the participant through the head-mounted display. The right panel shows the virtual room.

